From: Jerry Boles [chicojerry@yahoo.com]
Sent: 2/1/2021 11:52:21 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Re: Sites Reservoir

Hi Ali-

Wow. It has been awhile. I'm great, retired nearly 12 years ago (doesn't seem that long ago). Busier now than when I was working (home improvement stuff). Hope you're doing great. Still with CH2M Hill?

I would appreciate being added to the water quality group. When I was with the Red Bluff office of DWR before transferring to Sacramento to work on the Salton Sea project, they were working on Sites Reservoir as a potential State project, under the guidance of Gwen. I was asked to prepare a synopsis of potential water quality issues associated with the project, which I did (and they ignored). When the Sites Project Authority released their DEIR, I provided a rather detailed discussion of water quality issues as my comments on the DEIR. I still plan to be active in the discussion of water quality issues.

Nice hearing from you.

Jerry

On Monday, February 1, 2021, 6:35:20 AM PST, Alicia Forsythe <aforsythe@sitesproject.org> wrote:

Hi Jerry – How are you? Its been a while and I had a different last name at the time (Gasdick), but I worked with Gwen Bucholz at CH2M HILL with you on the Salton Sea EIR. I hope you are doing well!

I'd be happy to add you into the list for updates/information. Would you also like to be added to our water quality small group?

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Jerry Boles <chicojerry@yahoo.com>
Sent: Saturday, January 30, 2021 6:25 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Subject: Sites Reservoir

Hi Alicia-

Please add me to your list to receive updates/information on planning the Sites Reservoir project and EIR.

Thank you

Jerry Boles

Comments - Sites Reservoir Draft EIR/EIS

Jerry Boles <chicojerry@yahoo.com>

Thu 11/16/2017 10:33 AM

To:EIR-EIS-Comments <eir-eis-comments@sitesproject.org>;

1 attachment

Comments to EIREIS.docx;

I am providing to you my comments in response to the Draft Environmental Impact Report/Environmental Impact Statement for the Sites Reservoir Project, State Clearinghouse #2001112009. The comments are contained in the attached file.

The draft EIR/EIS fails to discuss the high concentrations of a number of metals in the source waters to the proposed project, and, even more important, does not discuss water quality in the proposed reservoir. Water quality in the proposed reservoir will mimic that of the source waters, and hence the reservoir will have concentrations of a large number of metals that exceed many water quality criteria and standards. The high concentrations of metals likely to occur in the proposed reservoir will impact most, if not all, beneficial uses of the proposed project, including agricultural water supply, wildlife and fisheries, and drinking water supplies for communities that divert water from the Sacramento River, making the project potentially infeasible.
The water quality section (Chapter 7) must be completely rewritten with an objective analysis of the data and potential adverse impacts to water quality both within the reservoir and to downstream resources in the Sacramento River. Subsequently, the aquatic biological resources (chapter 12), terrestrial biological resources (chapter 14), recreation resources (chapter 21), public health and environmental hazards (chapter 28), and cumulative impacts (chapter 35) sections of the draft EIR/EIS must reassess impacts from the adverse water quality expected from the proposed project. Following these re-analyses, re-circulation of the draft EIR/EIS is necessary with appropriate disclosure information about the potential impacts from metals to water quality and its effects on agricultural water supply, wildlife and fisheries, and drinking water supplies.

I am qualified to provide these comments since my background is in water quality, as former Chief of the Water Quality and Biology Section of the Northern District of DWR in Red Bluff.

If you have any questions, please contact me via email at chicojerry@yahoo.com.

Sincerely,

Jerry Boles

Comments on Draft EIR Sites Reservoir Project: Chapter 7 Surface Water Quality

An EIR is supposed to be a disclosure document that provides information on the benefits as well as potential impacts from a proposed project. Section 7 - Surface Water Quality does not disclose potential significant adverse issues which have serious ramifications for the viability of the proposed project, but rather ignores or misconstrues available data and reports to incorrectly conclude that there are no significant water quality impacts associated with the proposed project. The EIR claims to have evaluated post-project impacts to the Sacramento River, but there are no analyses provided that indicate that this was done. It is apparent that the preparers of the EIR failed to examine or simply ignored the available data that would show potential significant adverse impacts from the proposed project.

The analyses in Section 7 completely left out any evaluation or projection of water quality that may result in Sites Reservoir from diverting high winter flows from the Sacramento River. The EIR fails to point out that due to metals loads in the various source waters, water in the proposed reservoir may not be suitable for the beneficial uses stated for the proposed project, including enhanced water management flexibility, agricultural and urban water supply, water quality improvement, and ecosystem improvement for fish protection, habitat management, and other environmental needs.

A factual evaluation of the available data is presented below, which shows significant potential adverse impacts associated with the proposed project. Some comments on specific sections of Chapter 7 of the EIR are also presented.

<u>Available Data</u>

The EIR cites the DWR Water Data Library (WDL) online database as the source for water quality data used to determine impacts from the proposed project. However, very limited data from the WDL are available for evaluating water quality in source waters for the proposed project. The major source water for the proposed project is the Sacramento River, with potential diversion occurring at the Tehama-Colusa Canal, Glenn-Colusa Irrigation District Main Canal, and at Moulton Weir.

The Sacramento River below the Red Bluff Diversion Dam monitoring station of DWR provides information on the quality of water that would be diverted to the proposed project through the Tehama-Colusa Canal. Metals data are available in the WDL for the Sacramento River below the Red Bluff Diversion Dam beginning in February 2006 (Table 1). However, only 33 samples have been collected since 2006, and only nine of these were from the months in which higher flows most typically occur (December through March) and from which diversions to the proposed project would occur.

Cottonwood Creek contributes the most significant input to the Sacramento River during high runoff events. The Chico-Enterprise Record in an editorial published December 28, 2016 underscored the impact of tributaries on water quality in the Sacramento River. The newspaper stated that of the 100,000 cfs flowing in the river earlier in the month, only 5,000 cfs was coming from Keswick Dam below Shasta Dam – the rest of the 100,000 cfs (95,000 cfs) was coming from tributaries downstream from Keswick Dam, of which Cottonwood Creek provides the dominant flows.

Data from Cottonwood Creek near Cottonwood are even more sporadic than those for the Sacramento River. Data are available for this station in WDL beginning in October 2004, with only seven samples collected from the Cottonwood Creek monitoring station since 2006, and only four of which were collected during the months of expected higher flows of December through March (Table 2). Data available in the WDL show that only one sample was collected (March 2006) during the same period from both Cottonwood Creek and the Sacramento River below the Red Bluff Diversion Dam since 2006. This one sample shows that metal loads in the Sacramento River are similar to those found in Cottonwood Creek, showing that Cottonwood Creek significantly affects water quality in the Sacramento River. Water quality in Cottonwood Creek will have a significant impact on diversions to the proposed reservoir and water quality data from Cottonwood Creek can be used to approximate and supplement data from the Sacramento River, though the total number of samples from both sites combined are still exceptionally low for a project of this magnitude and potential for adverse effects.

The water quality monitoring station on the Sacramento River at Hamilton City is just downstream from the GCID Main Canal. Data from the WDL is somewhat more extensive at the Hamilton City monitoring site, with metals data available in the WDL beginning in late 2003 to early 2017, though still sporadic with only 78 samples collected in the span of a little more than 13 years (159 months), and only 23 of those collected sometime during the months of expected higher flows of December through March (Table 3). Samples were collected in each of these months only twice, with the rest of the samples during these months only collected in February months each year since 2008.

The WDL shows that metals data are available for the Sacramento River opposite Moulton Weir monitoring station from mid 2003 to early 2011, for a total of 80 samples, with 27 of those from the expected higher flow months (Table 4).

Water quality sampling during the expected months of higher flows of December through March did not target high flow periods (the periods during which diversions to the proposed project would occur) but were based on a rigid and fixed monthly or semi-monthly schedule. Monitoring did not provide any information on the variation in concentrations of metals over the runoff hydrograph. Even higher concentrations of metals would likely occur during the higher flow periods during these months, but were not targeted by the limited monitoring. The relatively low number of samples and lack of samples targeting critical flows (i.e., high runoff events) are nonetheless sufficient to indicate potential significant adverse water quality impacts with the proposed project. These data illustrate the need to collect additional data during appropriate time periods (i.e., during the high flow periods when diversions from the Sacramento River would be occurring) and re-evaluate the potential adverse water quality impacts from the proposed project.

Data Analyses

Some of the analytical results shown in the WDL for metals are reported as "dissolved" and other results as "total" (or total recoverable). "Total" concentrations, which include both dissolved and particulate forms of an analyte, are probably a better representation for the concentrations of metals that will affect water quality in the proposed reservoir. As well, the State Water Resources Control Board makes no distinction between dissolved or total recoverable concentrations when considering whether a criterion is exceeded (SWRCB 2011). The proposed reservoir will thermally stratify and will also be biologically productive due to nutrients brought in from source waters. This in-situ productivity, as well as organic material brought in with the source waters, will result in anoxic conditions (i.e., lack of oxygen) in the hypolimnion (i.e., bottom water layer). While dissolved forms of metals are generally the most bioavailable, the particulate fraction of total recoverable forms will undergo chemical transformation to dissolved forms under the anoxic conditions expected in the hypolimnion of the proposed reservoir. Transformed metals will be mixed throughout the reservoir water column during turnover events, or released downstream with anoxic water from the lower depths during the summer months.

Data from the WDL (Table 1) show that aluminum, arsenic, cadmium, chromium, iron, lead, manganese, and mercury in water samples from the Sacramento River below the Red Bluff Diversion Dam exceed various criteria and standards established to protect beneficial uses, including drinking water, public health, taste and odor for agriculture, and freshwater organisms, which includes fish. Maximum concentrations of some of these metals are many times higher than the corresponding criteria or standard. For example, aluminum, in addition to exceeding the SWRCB Basin Plan Primary Maximum Contaminant Level (MCL) for drinking water by one and half times, also exceeds the secondary drinking water standard in the Basin Plan by seven times and the US Environmental Protection Agency Secondary MCL by 30 times. Even the minimum concentration of arsenic reported in WDL exceeds by more than 10 times nearly all the criteria and standards for protection of human health. The least reported concentration of cadmium from river water samples exceed by five times the incremental cancer risk for drinking water. The least concentration of chromium reported in WDL exceeds the California Public Health Goal by 16 times and incremental cancer risk for drinking water by five times. The maximum concentration of iron that was reported in WDL exceeds the secondary drinking water maximum concentration level in the Basin Plan, as well as National Recommended Water Quality Criteria for taste and odor or welfare by nearly three times. The maximum concentration of lead that was reported exceeds the California Public Health Goal and California Proposition 65 maximum allowable dose level for reproductive toxicity by over four times. The maximum reported concentration of manganese exceeds the National Recommended Water Quality Criteria for taste and odor or welfare by one and a half times. The maximum concentration reported for mercury exceeds the National Recommended Water Quality Criteria for Freshwater Aquatic Life Continuous Concentration by nearly four times, and the Freshwater Aquatic Life Maximum Concentration by two times. An additional concern with these metals is that some metals are taken up by crops (such as arsenic by rice), making the crops potentially unsuitable for consumption. Plant uptake of metals in the water supply not only affect crops grown for human consumption, but also plants grown for support of wildlife, such as in refuges.

Similarly, data from the WDL for Cottonwood Creek near Cottonwood show that aluminum, arsenic, cadmium, iron, lead, manganese, and nickel exceed various criteria and standards established to protect beneficial uses (Table 2). Similar to the Sacramento River, maximum concentrations of some of these metals are many times higher than the corresponding criteria or standards. Aluminum concentrations exceed the Basin Plan drinking water primary standard MCL by 14 times, the secondary drinking water secondary standard MCL by 70 times, the California Public Health Goal by over 20 times, the National Academy of Sciences Health Advisory and Agriculture Water Quality Goals for taste and odor threshold by nearly three times, the National Recommended Water Quality Criteria for human health and welfare for water and fish consumption by nearly 30 times, and the National Recommended Water Quality Criteria for freshwater aquatic life maximum concentration by 20 times. As with the Sacramento River, even the minimum concentration of arsenic reported in WDL exceeds nearly all the criteria and standards for protection of human health by up to 167 times. The minimum concentration of cadmium reported exceeds the incremental cancer risk for drinking water by over three times, while the maximum concentration is over twice as high as the California Public Health Goal. As with the Sacramento River, the California Public Health Goal is exceeded by the least concentration of chromium reported by 16 times and the incremental cancer risk for drinking water by five times. Iron exceeds the Basin Plan drinking water standard secondary MCL by over five times, the Agricultural Water Quality Goals for taste and odor threshold by nearly five times, the National Recommended Water Quality Criteria for taste and odor or welfare by 78 times, and the National Recommended Water Quality Criteria for freshwater aquatic life maximum concentration by over 23 times. Reported lead concentrations are two and a half times higher than the California Public Health Goal, up to twice as high as the California Proposition 65 maximum allowable dose level for reproductive toxicity, and almost twice as high as the incremental cancer risk estimate for drinking water. Manganese concentrations reported from Cottonwood Creek exceed the Basin Plan Drinking Water Standards secondary MCL by a factor of 10, are nearly twice as high as the USEPA Health Advisory for drinking water, three times as high as the Agricultural Water Quality Goals for taste and odor threshold, and over 10 times higher than the National Recommended Water Quality Criteria for taste and odor or welfare. Reported maximum mercury concentrations exceed the National Recommended Water Quality Criteria for Freshwater Aquatic Life Continuous Concentration by nearly two times, while even the lowest reported concentration is nearly equal to the recommended criterion. Nickel exceeds the California Public Health Goal by nearly five times.

The GCID Main Canal intake is slightly upstream from the Sacramento River at Hamilton City water quality monitoring station. Therefore, water quality in the GCID Main Canal will be similar to that found at the Sacramento River at Hamilton City monitoring station. Metals data for this monitoring station can be found in the WDL from November 2003 to February 2017. Similar to the upstream monitoring station on the

Sacramento River below Red Bluff, the Sacramento River at Hamilton City water quality monitoring station has been identified to contain high levels of aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc (Table 3), which exceed a large number of criteria and standards similar to those upstream at the monitoring station below the Red Bluff Diversion Dam.

High levels of metals have also been identified at the water quality monitoring station opposite the Moulton Weir, including aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc (Table 4). As with the water quality monitoring station on the Sacramento River below the Red Bluff Diversion Dam, concentrations of metals from the Sacramento River monitoring station at the Moulton Weir exceed a large number of water quality criteria designed to protect beneficial uses.

As discussed earlier, Cottonwood Creek is the major source of water to the Sacramento River during higher flow periods, but other tributaries also contribute high levels of metals to the Sacramento River. In addition, local creeks directly tributary to the proposed reservoir, such as Funks Creek and Stone Corral Creek, also carry metals concentrations that will contribute to the metals loading. Leaching from soils beneath the reservoir will also contribute additional metals, as well as nutrients.

The Basin Plan lists other chemicals that adversely affect water quality in the Sacramento River, including chlorpyrifos and diazinon. The California State Water Resources Control Board lists a number of other "constituents of concern" in the study area, including chlordane, DDT, mercury, PCBs, and dieldrin. In addition, sewer outfalls from the cities of Redding and Red Bluff contribute other contaminants, such as pharmaceuticals, to the Sacramento River. No information is provided in the EIR about effects to the proposed project from these chemical contaminants.

<u>Discussion</u>

The data in the WDL for the Sacramento River and Cottonwood Creek demonstrate that high concentrations of metals can be expected during the high flow months of winter (December through March) when diversions would be occurring to the proposed Sites Reservoir. Higher concentrations of metals are likely during the higher flows that can occur during these months. Such higher flows were not targeted by the limited sampling effort presented in the WDL. The high concentrations of metals in the source water will adversely impact water quality in the proposed reservoir for most, if not all, the proposed beneficial uses of the stored water.

Some metals from both the Sacramento River and Cottonwood Creek, whose concentrations did not exceed criteria in the limited sampling effort, had concentrations that nearly exceed the criteria and standards. These and other metals whose concentrations did not exceed the criteria may have higher concentrations during the higher flow periods that the proposed project would be diverting. Again, these higher flow periods were not targeted during the limited sampling effort.

Even some of the minimum concentrations of metals found in the source waters exceed criteria and standards, which means that the source waters never meet these goals and standards – the criteria are always exceeded and the water is never suitable for the beneficial use or uses the criteria or standards were designed to protect. Water quality in the proposed reservoir for these parameters will exceed the criteria and standards all the time.

Since water quality in the proposed reservoir will reflect that of the source waters, the reservoir will have concentrations of numerous metals, including aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc, that exceed a number of criteria and standards developed to protect beneficial uses. In addition, other metals that may not exceed criteria and standards in the source waters may adversely affect reservoir water quality due to synergistic effects. The State Water Resources Control Board (SWRCB 2011) states that "when multiple constituents have been found together in groundwater or surface waters, their combined toxicity should be evaluated" and that "theoretical risks from chemicals found together in a water body shall be considered additive for all chemicals having similar toxicologic effects or having carcinogenic effects." Thus, the adverse effects from the metals delivered to the proposed reservoir from the source waters may have an even greater adverse impact and pose an unacceptable level of risk. Beneficial uses potentially impacted by metals in the proposed reservoir include agricultural water supply (direct toxicity or uptake by crops making the crops unsuitable for use), wildlife (such as fish-eating birds), fisheries, recreation (including sport fishing and water contact activities such as swimming), and drinking water supplies for communities that divert water from the Sacramento River.

Releases from the proposed reservoir would occur during the summer when metals concentrations in the Sacramento River are much lower due to the majority of flow being from Shasta Reservoir, with much better water quality, though still carrying a metals load. High metals concentrations in the proposed reservoir releases could adversely affect water quality in the Sacramento River during the summer months by increasing metals loads beyond acceptable limits and adversely impact beneficial uses.

Though high concentrations of metals that exceed water quality criteria exist in source waters to the proposed project, they cannot be regulated by governmental entities since they are natural occurrences. However, once contained artificially in a reservoir, they are subject to jurisdictional control by regulatory agencies. Any releases of water from the proposed reservoir will likely be subject to review by water quality regulatory agencies to ensure that such releases do not adversely affect downstream resources due to the heavy metals loads in the releases. The SWRCB has an antidegradation policy that prohibits discharges that would degrade water quality to a level below water quality objectives because no capacity would exist for degradation that will be caused by the next downstream or downgradient uses – the ability to beneficially use the water would have been impaired, even though water quality objectives would not yet have been exceeded (SWRCB 2011). The contribution of additional metal loads from releases from the proposed Sites Reservoir during the summer could cause concentrations of metals in the Sacramento River to exceed criteria and standards or at least be subject to the antidegradation policy due to an incremental increase in metals in the Sacramento River from the proposed project. Thus, the proposed project may face prohibition of releases if stored water does not meet water quality criteria or standards or if releases can cause criteria or standards to be exceeded by downstream inputs (i.e., antidegradation poicy).

During dry years, the adverse impacts associated with the project can be expected to be even greater. Flows in the Sacramento River from upstream reservoirs on the Sacramento River (i.e., Shasta Reservoir, Whiskeytown Reservoir) will be minimized during the winter months in an effort to restore water storage levels in those reservoirs. Likewise, during wet or even normal runoff years, releases from the upstream reservoirs during the winter will be curtailed during high runoff periods to prevent downstream flooding. In any of these scenarios, tributary influences, such as Cottonwood Creek, on water quality in the Sacramento River will be much greater. The proposed project would still attempt to capture as much runoff from the Sacramento River as possible, but the water diverted to the proposed project will have even greater concentrations of metals due to the majority of flow being from tributary streams (e.g., Cottonwood Creek) during dry and possibly even wet or normal runoff years.

Similarly, during the summer in dry years, releases from upstream reservoirs (i.e., Shasta Reservoir, Whiskeytown Reservoir) will be minimized. Releases to the Sacramento River from the proposed project will have a greater impact on water quality in the Sacramento River due to less dilution being available due to curtailed flows in the river from upstream reservoirs (i.e., Shasta and Whiskeytown reservoirs).

<u>Conclusion</u>

The proposed project is, at best, premature. Little or no data have been collected to determine the metals loads in the higher flows of the Sacramento River that would be diverted to the proposed reservoir. An extremely small amount of data have been collected during the months in which higher flows can be expected (December through March), but higher flows during these months were not targeted in the water quality sampling. None the less, the limited data presented in the WDL show high concentrations of a number of metals which exceed numerous water quality criteria and standards in the source waters for the proposed reservoir. Extremely high concentrations of metals are present in the small streams in the reservoir footprint, which occur due to the nature of the soils in the area of the proposed reservoir. Sites Reservoir would inundate these soils resulting in leaching of metals and further incremental loading of metals to the proposed reservoir. There is no discussion in the EIR about the potential impacts of metals leaching from the soils that would be inundated by the proposed reservoir. Prior to moving forward with the project, much additional data are needed during the high flow periods in which diversions would occur from the Sacramento River, metals loading from the smaller tributaries that flow directly into the proposed reservoir, and effects from leaching of metals from soils inundated by the proposed reservoir.

The limited data that are available are sufficient to show that water quality in the proposed reservoir will have concentrations of a large number of metals that exceed many water quality criteria and standards, including those established for the protection of agricultural water supply, wildlife and fisheries, and drinking water. Metals bioaccumulation in the reservoir food web could produce adverse impacts to fish-eating birds and other animals, as well as humans, and adversely affect any potential recreational benefit from the project. Releases from the proposed reservoir could adversely affect downstream resources, including agricultural water supply, wildlife and fisheries, and drinking water supplies for communities that divert water from the Sacramento River.

Also, the EIR does not discuss the physical conditions that can be expected to occur in the proposed reservoir. Like other nearby reservoirs, the proposed reservoir will thermally stratify during the summer months, with a warm upper water layer and a cooler lower water layer. The proposed reservoir will also be biologically productive due to nutrients brought in with source waters. The biological productivity will lead to anoxic conditions (i.e., lack of oxygen) in the hypolimnion (i.e., bottom water layer). Depending on the depth from which downstream releases are made from the proposed reservoir, water released will either be warm and unsupportive of cold water fisheries in the Sacramento River (i.e., migrating salmon) or cooler but devoid of oxygen. As releases from the reservoir progress during the summer, or in years in which the reservoir is not completely filled, the reservoir will be warm from surface to bottom as the cooler lower water strata is depleted from releases or wind mixing of the upper warm water layer. Under these conditions, only warm water would be available for release from the proposed reservoir, which would not be supportive of the cold water fishery in the Sacramento River.

An EIR is a disclosure document meant to disclose pertinent project information to planners, regulatory agencies, and other interested parties and the public. This EIR did not disclose the potential impacts from metals, other contaminants, nor the physical conditions likely to exist in the proposed reservoir. The little analyses presented in the EIR misconstrues, misinterprets, and ignores water quality data that amply demonstrate significant potential adverse impacts from the proposed project. The water quality section (Chapter 7) must be completely rewritten with an objective analysis of the data and potential adverse impacts to water quality both within the reservoir and to downstream resources in the Sacramento River. Subsequently, the aquatic biological resources (chapter 12), terrestrial biological resources (chapter 14), recreation resources (chapter 21), public health and environmental hazards (chapter 28), and cumulative impacts (chapter 35) sections of the EIR must reassess impacts from the adverse water quality expected from the proposed project. Whether any of the projected beneficial uses from the proposed project can be realized, and its feasibility to meet project objectives, purpose, and need, also needs to be reconsidered in light of the potential significant adverse water quality impacts from metals. Following these re-analyses, re-circulation of the EIR is necessary with appropriate disclosure information about the potential impacts from metals to water quality and its effects on agricultural water supply, wildlife and fisheries, and drinking water supplies for communities that divert water from the Sacramento River.

EIR Needs:

- Obtain additional metals data from source waters targeting high flows from which diversions would occur
- Provide information on the water quality impacts from other chemical contaminants that adversely affect water quality in the Sacramento River (including chlorpyrifos, diazinon, chlordane, DDT, mercury, PCBs, and dieldrin) and contaminants in sewer outfalls (such as pharmaceuticals) and other discharges (such as industrial discharges)
- Evaluate the contributions of metals from local tributaries (i.e., Funks Creek and Stone Corral Creek) to the proposed reservoir
- Provide information on the contribution from leaching of metals from the inundation area of the proposed reservoir
- Evaluate effects of metals to beneficial uses within the proposed reservoir
    - fisheries,
    - wildlife (including state and federal species listed as threatened or endangered),
    - recreation
- Evaluate effects of metals to beneficial uses due to releases from the reservoir
    - agricultural supply water,
    - effects of metals on crops including incorporation of metals by crops (e.g., arsenic uptake in rice),
    - effects of metals on plants grown for support of wildlife (such as in wildlife refuges),
    - drinking water supplies,
    - fisheries,
    - wildlife (including state and federal species listed as threatened or endangered),
- Evaluate combined toxicity of multiple metals
- Evaluate contributions of metals in reservoir releases related to the SWRCB antidegradation policy
- Evaluate impacts from mercury bioaccumulation in aquatic life (especially fish) in the proposed reservoir, and effects to wildlife that feed on fish from the reservoir and recreational opportunities (i.e., sport fishing)
- Evaluate physical conditions expected in the reservoir, including thermal stratification and hypolimnetic anoxia, and effects on reservoir and downstream aquatic resources
- Conduct re-analysis of impacts due to metals, other contaminants, and physical conditions in the proposed reservoir on:
    - water quality (chapter 7),
    - aquatic biological resources (chapter 12),
    - terrestrial biological resources (chapter 14),
    - recreation resources (chapter 21),

- public health and environmental hazards (chapter 28), and
- cumulative impacts (chapter 35).

Comments on Specific Sections of EIR

7.2.1.5 Other Heavy Metals

"In addition to mercury and selenium, other heavy metals, including cadmium, copper, and zinc, impair beneficial uses of water bodies. Cadmium, copper, and zinc enter the water bodies with the sediment from eroded soils and discharges from abandoned mines, and in stormwater runoff from municipal areas (SWRCB, 2011a). The primary source in the Central Valley appears to be tailing piles located at abandoned mine sites. Many of these mines are located upstream of reservoirs; therefore, the sediment that includes the heavy metal constituents is generally captured upstream of the dam. Heavy metals appear to cause health concerns in aquatic resources and in humans that consume the fish from these water bodies."

Abandoned mines, which contribute heavy metals to area streams, are also found downstream from Shasta and Keswick dams. In addition, natural erosion and soil leaching also contribute to metals loads found in area streams, such as Cottonwood Creek, which make up the bulk of the flow in the Sacramento River during high runoff events during which flows would be diverted to the proposed reservoir. It is not that "heavy metals appear to cause health concerns in aquatic resources and humans," it is well known that they do.

7.2.4 Primary Study Area
7.2.4.1 Overview and Methodology

"DWR began monthly sampling of streams in the Primary Study Area in 1997, including physical parameters, nutrients, minerals, and metals in the water column (DWR, 2012), as well as mercury analysis of sport fish tissues collected from nearby existing reservoirs, including East Park, Stony Gorge, and Black Butte (DWR, 2007a). Routine water quality monitoring by DWR was periodically suspended due to funding limitations during portions of 2008 and 2009, and ended following the January 2010 monitoring run. Sampling results were then compared to Central Valley Basin Plan water quality criteria (CVRWQCB, 2011) (Appendix 7A California State Water Resources Control Board Constituents of Concern of Water Bodies in the Study Area) and USEPA ambient water quality criteria to prevent nuisance algal growth in streams (USEPA, 2001b)."

DWR does not indicate any data for metals in its Water Data Library until 2006 for the Sacramento River below the Red Bluff Diversion Dam, and 2003 for the Sacramento River at Hamilton City and opposite the Moulton Weir, as well as Stone Corral Creek. Funding for water quality monitoring by DWR was curtailed shortly after the 1997 date indicated in the EIR, after the project manager in the Red Bluff office was informed of potential adverse impacts from metals by the then Chief of the Water Quality and Biology Section. If additional data are available, that data should be made available in the WDL so that reviewers of this EIR can verify claims about lack of water quality issues made in the EIR. However, the data that are in the WDL adequately demonstrate significant adverse water quality issues with the proposed project. Any additional data that has not been shared will just confirm these issues.

Appendix 7A - California State Water Resources Control Board Constituents of Concern of Water Bodies in the Study Area – lists a large number of parameters for which no information is contained in this EIR. For example, chlorpyrifos, diazinon, chlordane, DDT, mercury, PCBs, and dieldrin are constituents of concern from Keswick Dam to the Delta. The EIR should assess how these constituents will impact water quality in the proposed reservoir.

7.2.4.2 East Park and Stony Gorge Reservoirs

"East Park and Stony Gorge reservoirs were sampled during the summer of 2000 to evaluate the extent of mercury contamination in fish because these reservoirs are representative of conditions that could be expected in the proposed Sites Reservoir. DWR analyses of total recoverable mercury indicate that levels in samples collected near the bottom of the water column at Stony Gorge and Black Butte reservoirs, exceeded the California Toxics Rule for protection of human health.

Fish tissue samples were collected by DWR from East Park and Stony Gorge reservoirs during 2000 to 2001. Neither catfish nor bass composites collected from East Park Reservoir exceeded the OEHHA screening value or USEPA criterion, although mercury levels in the small-sized bass approached these values, and a very large channel catfish that was analyzed individually contained tissue mercury at over twice the level of the screening value and criterion limits. Mercury concentrations in tissues of channel catfish collected from Stony Gorge Reservoir contained levels less than the screening value and criterion (DWR, 2007a)."

Mercury sampling in fish from East Park and Stony Gorge reservoirs was conducted to contribute to the knowledge of mercury contamination in a number of northern California lakes and reservoirs, not simply because these reservoirs are representative of conditions that could be expected in the proposed Sites Reservoir, though they well might. As noted, the bass from East Park Reservoir that were used for the composite analysis were small in size (about one foot long), yet approached the screening value and criterion. Larger fish can be expected to exceed these values since mercury is accumulated and magnified in fish tissues. The large catfish which contained mercury at over twice the screening value and criterion is probably representative of mercury concentrations that can be found in this species.

The EIR fails to mention that mercury contamination exceeded the screening value and criterion in a relatively small largemouth bass collected from Stony Gorge Reservoir. Though the catfish analyzed from Stony Gorge Reservoir did not exceed the screening value and criterion, the cited report states that "larger channel catfish from Stony Gorge Reservoir, therefore, may be expected to contain mercury concentrations that exceed the screening value and criterion."

Since mercury contamination in excess of criteria occurs in lakes that the EIR states are representative of conditions that could be expected in the proposed Sites Reservoir, the EIR should discuss the probability of mercury contamination in the proposed reservoir and ramifications to recreational fishing and wildlife that would consume fish from the reservoir.

7.2.4.3 Salt Lake

"Saline water has been observed to seep from underground salt springs in the vicinity of the Salt Lake fault along the slopes above the valley and along the valley floor within the proposed inundation area of Sites Reservoir. These areas are generally located in the Funks Creek watershed. The water from the underground springs accumulates along the trough of the valley and forms Salt Lake (USGS, 1915). The size of Salt Lake and adjacent seasonal brackish wetlands varies with time. The wetted area appears to vary from 0 to 30 acres. The deeper water appears to be approximately 15 acres based on observations in 2017. The depth of the water has not been monitored.

Salt Lake was only sampled on a few occasions from 1997 to 1998. In August 1997, the Salt Lake was dry. In September 1997, the springs were bubbling and the EC was 194,100 micromhos per centimeter (µmhos/cm) as compared to 3,490 µmhos/cm for the nearby Stone Corral Creek. In January 1998, there was less than 1 cfs of flow from the springs, and the EC was 7,200 µmhos/cm as compared to 540 µmhos/cm for the nearby Stone Corral Creek. From these samples, it was found that waters from this location are extremely high in minerals. The EC value on one occasion reached 194,100 micromhos per centimeter. The TDS measurement at this time was 258,000 mg/L. EC, TDS, sodium, and boron exceeded all Central Valley Basin Plan criteria. A few metals also were noted at very high concentrations (aluminum, iron, and manganese) and exceeded all criteria, and a few others exceeded some criteria (arsenic, copper, lead, and nickel). Levels of ammonia and orthophosphate also were noted at high levels and exceeded criteria. Temperatures from this site were variable, and probably depend on seasonal conditions. Concentrations present in water from this site likely depend on the season and flow."

Though the EIR states that water quality data used in the analyses are available in the WDL, data for Salt Lake could not be found. However, the EIR states that several metals (aluminum, iron, and manganese) were found in concentrations that exceed all Basin Plan criteria, while others (arsenic, copper, lead, and nickel) exceed some criteria. These metals from the springs feeding Salt Lake will add to the metals load in the proposed reservoir.

7.2.4.4 Funks Creek

"Funks Creek originates at approximately 850 feet elevation in the foothills west of Antelope Valley. The banks of this intermittent stream are heavily eroded and the gravel bed is highly disturbed and compacted by cattle. Along the north end of Antelope Valley, Funks Creek receives underground drainage from Salt Lake. Funks Creek widens as it cuts through Logan Ridge and enters the western side of the Sacramento Valley, although flows are still intermittent. Approximately 1 mile downstream of Logan Ridge, Funks Creek is impounded by Funks Reservoir. This reservoir is fed mainly from waters of the Tehama-Colusa Canal. Downstream of the reservoir, Funks Creek is bordered by agricultural lands, and much of this reach is channelized before emptying into Stone Corral Creek. This portion of Funks Creek likely has some flow year round, due to leakage from the dam at Funks Reservoir.

DWR observed aluminum, arsenic, copper, iron, manganese, mercury, nickel, and phosphorus in Funks Creek at the Glenn-Colusa Irrigation District (GCID) Main Canal station during intermittent water quality sampling. The concentrations appeared to be higher during and immediately following storm events."

As with Salt Lake, data for Funks Creek could not be found in the WDL. The data used in the analyses in the EIR must be made available for review. It is likely that the reported metals exceed various criteria, as with Salt Lake, and thus add to the metals load in the proposed reservoir.

7.2.4.5 Stone Corral Creek

"Stone Corral Creek originates at approximately 700 feet elevation in the foothills west of Antelope Valley. As the intermittent stream flows into the grasslands of Antelope Valley, the channel is narrow and the banks eroded. The much larger Antelope Creek flows into Stone Corral Creek from the south near the town of Sites. Stone Corral Creek flows through the gap in the foothills and into the western Sacramento Valley.

DWR observed aluminum, arsenic, copper, iron, manganese, nickel, and phosphorus during intermittent sampling in Stone Corral Creek near Sites station during intermittent water quality sampling. The concentrations appeared to be higher during and immediately following storm events."

Data for Stone Corral Creek are available in the WDL. These data show that not only are high concentrations of aluminum, arsenic, copper, iron, manganese, and nickel present, as reported in the EIR, but also cadmium, chromium, lead, mercury, selenium, silver, and zinc, as well as boron (Table 5). The EIR does not disclose the fact that, not only are the concentrations higher during and immediately following storm events, the resulting metals concentration in Stone Corral Creek exceed a large number of criteria and standards including those to protect drinking water, public health, freshwater aquatic life, and agricultural uses. These metals will also contribute to the metals load in the proposed reservoir.

The metals concentrations found in Stone Corral Creek, Salt Lake, and Funks Creek are a result of leaching from the soils through which these water bodies flow. Inundation of these soils by the proposed reservoir will result in an additional metals load to the reservoir.

7.2.4.6 *Tehama-Colusa Canal*

"The intake for the Tehama-Colusa Canal occurs at the southeast end of the City of Red Bluff at River Mile (RM) 243. The intake occurs downstream of the mouth of Red Bank Creek. The Tehama-Colusa Canal is approximately 111 miles long and extends from Red Bluff in Tehama County to downstream of Dunnigan in Yolo County. Funks Reservoir is approximately 66 canal miles downstream of the intake at the Sacramento River.

DWR observed aluminum, arsenic, cadmium, and iron during intermittent sampling in the Tehama-Colusa Canal downstream of the siphon under Stony Creek during intermittent water quality sampling."

The intake for the Tehama-Colusa Canal is at the Sacramento River below Red Bluff Diversion Dam water quality monitoring station. Therefore, water quality in the Tehama-Colusa Canal will be exactly that found at the Sacramento River below Red Bluff Diversion Dam monitoring station. Data for this monitoring station can be found in the WDL.

This is another example where the EIR is less than forthcoming. Not only are aluminum, arsenic, cadmium, and iron present in water diverted from the river into the canal, but, as discussed earlier, so are chromium, copper, lead, manganese, mercury, nickel, selenium, and zinc (Table 1). The highest concentrations were found during the higher flow months (December through March). As discussed earlier, many of these metals exceed a large number of criteria and standards, including those developed to protect drinking water, public health, freshwater aquatic life, and agricultural uses. Water quality in the proposed reservoir will reflect that in the Sacramento River below the Red Bluff Diversion Dam and other source waters, and exceed many of the criteria developed to protect beneficial uses of the water.

7.2.4.7 Glenn-Colusa Irrigation District Main Canal

"The intake for the GCID Main Canal is on a side channel off the Sacramento River at RM 205.5, north of the town of Hamilton City. GCID's Hamilton City pump station, located at the intake, diverts water into the GCID Main Canal from the Sacramento River for distribution within the GCID service area. The canal is an unlined earthen channel that stretches approximately 65 miles from the system diversion point near Hamilton City to its downstream southern terminus at the CBD near Williams, in Colusa County.

DWR observed aluminum, arsenic, cadmium, copper, iron, mercury, manganese, and phosphorus during intermittent sampling in the GCID Main Canal intake during intermittent water quality sampling."

The intake for the GCID Main Canal is slightly upstream from the Sacramento River at Hamilton City water quality monitoring station. Therefore, water quality in the GCID Main Canal will be similar to that found at the Sacramento River at Hamilton City monitoring station. Data for this monitoring station can be found in the WDL.

Not only are aluminum, arsenic, cadmium, copper, iron, manganese, and mercury present in the Sacramento River in the vicinity of the diversion into the GCID Main Canal, but so are chromium, lead, nickel, selenium, silver, and zinc (Table 3). Aluminum, arsenic, cadmium, iron, lead, manganese, mercury, and nickel are present in concentrations that exceed various criteria and standards. The highest concentrations are generally found during the higher flow months of December through March, when the proposed project may be diverting water from this area of the Sacramento River.

7.2.4.9 Sacramento River Opposite Moulton Weir

"DWR monitored water quality at the Sacramento River along the western bank opposite Moulton Weir station from 2000 to 2010. The water quality samples included aluminum, arsenic, copper, iron, mercury, manganese, lead, and phosphorus. Total aluminum levels in the Sacramento River at this location frequently exceeded aquatic life criteria during associated high flow conditions in the river, but rarely exceeded drinking water criteria and the agricultural goal. Arsenic levels exceeded human toxicity thresholds in all samples collected, and the criterion for protection of aquatic life for cadmium was occasionally exceeded. Copper levels frequently exceeded hardness-dependent aquatic life protection criteria during high flow conditions in the river, and iron levels frequently exceeded drinking water and aquatic life protection criteria, as well as the agricultural goal during the same river conditions. Dissolved iron levels exceeded the Central Valley Basin Plan level occasionally. Mercury levels approached, but did not exceed, the CTR criterion during the highest flows in the river. Manganese levels

occasionally exceeded drinking water standards and the agricultural goal, and lead levels rarely exceeded drinking water criteria. All samples contained total phosphorus at levels at or above the recommended criteria range to prevent nuisance algal growth in streams."

Monitored metals also included cadmium, chromium, nickel, selenium, silver, and zinc (Table 4). Contrary to the statement in the EIR, aluminum concentrations frequently exceed drinking water criteria and on several occasions the agricultural goal during the high flow months of December through March. With reported concentrations up to 38 ug/L, mercury not only approached but greatly exceeded the California Toxics Rule (CTR) criterion (0.05 ug/L) for sources of drinking water as well as the National Recommended Water Quality for freshwater aquatic life continuous concentration (0.77 ug/L) and maximum concentration (1.8 ug/L). Reported lead concentrations frequently exceed the California Public Health Goal of 0.02 ug/L, and had a median value of 0.058 ug/L. Reported nickel concentrations also exceed the California Public Health Goal.

Environmental Impacts/Environmental Consequences

7.3.1 Section 303 Evaluation Criteria and Significance Thresholds

"Significance criteria represent the thresholds that were used to identify whether an impact would be potentially significant. Appendix G of the CEQA Guidelines suggests the following evaluation criteria for water quality:

Would the Project:

- *Violate any water quality standards or waste discharge requirements?*
- *Create or contribute runoff water that would exceed the capacity of existing or planned stormwater*

  drainage systems or provide substantial additional sources of polluted runoff?

- *Otherwise substantially degrade water quality?*

  The evaluation criteria used for this impact analysis represent a combination of the Appendix G criteria and professional judgment that considers current regulations, standards, and/or consultation with agencies, knowledge of the area, and the context and intensity of the environmental effects, as required pursuant to NEPA. For the purposes of this analysis, an alternative would result in a potentially significant impact if it would cause the following:

** A violation of any water quality standard or waste discharge requirement, or otherwise substantially degrade water quality*

If a water quality constituent declines under the action alternatives as compared to the Existing Conditions/No Project/No Action Condition, the changes are not considered to be adverse.

Qualitative Analysis of Constituents

The qualitative analysis of changes in other constituents (e.g., mercury, selenium, nutrients) was based upon an analysis of potential changes in loadings from sources of the constituent and related changes in flows that would occur from implementation of the Project as compared to the Existing Conditions/ No Project/No Action Condition. For example, the qualitative analysis of changes in mercury is based upon changes in flow patterns from the major sources of mercury in the Sacramento River watershed (e.g., tributaries to the Sacramento River)."

What the heck does this last paragraph mean? It makes absolutely no sense. The analysis of potential impacts should be based on an assessment of the expected water quality in the proposed reservoir, whether that water quality exceeds any criteria or standards, and the adverse effects that would occur if criteria or standards are exceeded, both within the reservoir and in downstream areas subject to releases from the reservoir.

7.3.4 Section 303 Impacts Associated with Alternative A

Shasta Lake and Sacramento River from Shasta Lake and Keswick Reservoir to Freeport

Impact SW Qual-1: A Violation of Any Water Quality Standard or Waste Discharge Requirement, or Otherwise Substantially Degrade Surface Water Quality

Mercury and Other Heavy Metals

"As described in Section 7.2, the sources of mercury and other heavy metals in Shasta Lake are located upstream of the lake and accumulate within Shasta Lake. Mercury in the Sacramento River downstream of Keswick Reservoir is generated along the tributaries to the Sacramento River. The generation rate and the accumulation rates of mercury and other heavy metals in Shasta Lake or along the Sacramento River would not be affected by implementation of Alternative A because there would be no new facilities constructed upstream of Shasta Lake or along the tributaries. Operations of Shasta Lake under Alternative A, as reflected by end-of-month Shasta Lake storage, would be similar to conditions under the Existing Conditions/No Project/No Action Condition, as described in Chapter 6 Surface Water Resources."

Accumulation of mercury would indeed be affected by Alternative A (and all the other alternatives) since water from the Sacramento River, containing mercury concentrations in excess of various criteria, would be diverted into the proposed reservoir. Releases from the reservoir could adversely affect downstream resources and beneficial uses due to the mercury contained in the reservoir. In addition, fisheries, wildlife, and recreation that utilize the reservoir could be adversely affected from mercury accumulation in the reservoir food web.

Summary

"Concentrations of mercury, other heavy metals, and salinity would be similar in the Sacramento River under Alternative A as compared to the Existing Conditions/No Project/No Action Condition; therefore, there would be **no impact** related to these constituents."

Again, there are potential very significant adverse impacts associated with diverting water from the Sacramento River during higher flow periods to the proposed reservoir. The Sacramento River contains concentrations of a large number of metals, including aluminum, arsenic, cadmium, chromium, iron, lead, manganese, and mercury, that significantly exceed various criteria and standards designed to protect beneficial uses. Water in the reservoir will reflect that of the water diverted from the Sacramento River, and will also exceed a number of criteria developed to protect beneficial uses. The metals may adversely affect aquatic resources in the reservoir and terrestrial resources that may utilize the reservoir (such as fish-eating birds), as well as reservoir recreation.

The metals in releases from the reservoir may adversely affect downstream resources, including drinking water supply, agricultural supply, wildlife, and fisheries, and may violate the SWRCB antidegradation policy. These are definite "impacts related to these constituents," contrary to what is stated above in this EIR. All the alternatives suffer from the exact same significant adverse impacts due to metals in the source waters.

7.4 Mitigation Measures

"Because no potentially significant direct water quality impacts were identified, no mitigation is required or recommended."

The EIR failed to identify any impacts, though significant potential adverse impacts are painfully obvious. The EIR completely ignores any assessment of the proposed project – Sites Reservoir, as well as any assessment of the adverse impacts the reservoir may pose to beneficial uses within the reservoir (i.e., fisheries, wildlife, recreation) and those adverse impacts attributable to releases from the reservoir (i.e., drinking water supply, agricultural water supply, fisheries, wildlife, recreation). As shown throughout this discussion, a number of metals significantly exceed water quality criteria and standards in the water sources to the proposed reservoir. The EIR completely ignores potential chemical contaminants (such as chlorpyrifos, diazinon, chlordane, DDT, mercury, PCBs, and dieldrin). Water quality in the reservoir will reflect that of the source waters. Therefore, the reservoir will contain a number of metals, including aluminum, arsenic, cadmium, chromium, iron, lead, manganese, and mercury, and possibly other chemical contaminants that exceed a number of water quality criteria designed to protect beneficial uses. Both water resources within the reservoir and downstream resources that receive reservoir releases may be adversely affected by the metals and chemical contaminants. The EIR also fails to address the physical properties that will exist in the reservoir (such as thermal stratification and hypolimnetic anoxia), and how they will affect both reservoir and downstream resources. The EIR needs to address how these significant adverse impacts are going to be mitigated.

References

SWRCB 2011. State Water Resources Control Board. A Compilation of Water Quality Goals, 16th Edition. April 2011.

Table 1. Sacramento River below Red Bluff Diversion Dam, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
SACRAMENTO R BL RED BLUFF DIV DM	2/21/06 10:45	131	154	0.702	0.789	0.013	0.016	0.97	0.98	1.08	1.21	76	162
SACRAMENTO R BL RED BLUFF DIV DM	3/1/06 11:00	1459	2240	0.857	1.06	0.017	0.055	2.75	6.1	2.59	6.09	878	2854
SACRAMENTO R BL RED BLUFF DIV DM	4/18/06 9:25	462	729	0.874	0.951	<0.1	<0.1	0.95	1.57	2.36	3.42	277	677
SACRAMENTO R BL RED BLUFF DIV DM	5/16/06 6:45	131	206	0.915	0.959	<0.1	<0.1	0.55	0.58	1.45	1.84	86.8	181
SACRAMENTO R BL RED BLUFF DIV DM	6/26/06 10:05	220	399	1.04	1.09	<0.1	<0.1	0.67	0.98	1.12	1.6	66.2	233
SACRAMENTO R BL RED BLUFF DIV DM	7/25/06 8:20	318	794	1.03	1.1	<0.1	<0.1	1	1.31	1.31	2.18	82	323
SACRAMENTO R BL RED BLUFF DIV DM	8/21/06 13:30	194	278	0.884	0.993	<0.1	<0.1	1.1	1.37	1.07	1.55	132	259
SACRAMENTO R BL RED BLUFF DIV DM	9/21/06 7:15	320	730	0.9	0.933	<0.1	<0.1	0.65	1.01	1.03	1.67	85.3	300
SACRAMENTO R BL RED BLUFF DIV DM	10/25/06 12:30	84.1	214	0.917	0.964	<0.1	<0.1	0.61	0.89	1.28	1.6	51	218
SACRAMENTO R BL RED BLUFF DIV DM	12/13/06 9:20	1238	2010	0.977	1.22	<0.1	<0.1	0.61	1.56	2.3	3.91	235	621
SACRAMENTO R BL RED BLUFF DIV DM	1/10/07 12:25	41.7	91.4	1.42	1.5	<0.1	<0.1	0.55	0.59	0.92	1.01	34.9	54.3
SACRAMENTO R BL RED BLUFF DIV DM	2/26/07 10:45	212	322	0.929	0.987	<0.1	<0.1	1.2	1.61	2.55	2.8	293	376
SACRAMENTO R BL RED BLUFF DIV DM	3/21/07 10:30	9.58	51	1.41	1.46	<0.1	<0.1	0.44	0.59	1.47	1.74	21.5	85.5
SACRAMENTO R BL RED BLUFF DIV DM	4/17/07 10:30	12.3	41	1.53	1.62	<0.1	<0.1	0.45	0.58	1.71	1.93	13.4	51.1
SACRAMENTO R BL RED BLUFF DIV DM	5/29/07 9:45	5.52	15.9	1.68	1.87	<0.1	<0.1	0.53	0.59	1.27	1.53	4.2	32.2
SACRAMENTO R BL RED BLUFF DIV DM	6/26/07 9:45	5.47	56.6	1.59	1.72	<0.1	<0.1	0.55	0.74	1.1	1.41	12.3	75.5
SACRAMENTO R BL RED BLUFF DIV DM	7/18/07 10:10	6.45	50.2	1.63	1.73	<0.1	<0.1	0.5	0.62	0.88	1.25	4.5	73.4
SACRAMENTO R BL RED BLUFF DIV DM	8/27/07 12:10	14.2	26.6	1.55	1.75	<0.1	<0.1	0.47	0.6	0.75	0.97	8.8	33.8
SACRAMENTO R BL RED BLUFF DIV DM	9/12/07 10:40	2.04	24	1.4	1.59	<0.1	<0.1	0.42	0.55	0.67	0.82	3.8	24.6
SACRAMENTO R BL RED BLUFF DIV DM	10/30/07 10:40	5.66	34.5	1.5	1.64	<0.1	<0.1	0.42	0.46	0.99	1.14	12	73
SACRAMENTO R BL RED BLUFF DIV DM	11/26/07 13:40	1.11	18	1.96	2.01	<0.1	<0.1	0.5	0.52	0.66	0.92	5.5	51.2
SACRAMENTO R BL RED BLUFF DIV DM	1/22/08 8:40	6.82	284	1.5	1.71	<0.1	<0.1	0.53	1.15	1.45	2.04	9.5	259
SACRAMENTO R BL RED BLUFF DIV DM	2/26/08 10:40	14.2	846	0.799	0.932	<0.1	<0.1	0.33	2.49	1.97	3.88	24.6	790
SACRAMENTO R BL RED BLUFF DIV DM	3/25/08 7:25	2.25	35	1.31	1.37	<0.1	<0.1	0.42	0.55	1.7	2.09	7.8	62
SACRAMENTO R BL RED BLUFF DIV DM	4/22/08 13:55	4.86	89.3	1.58	1.63	<0.1	<0.1	0.43	0.51	1.63	1.84	9.1	94.6
SACRAMENTO R BL RED BLUFF DIV DM	7/23/08 13:50	2.29	84.5	1.5	1.55	<0.1	<0.1	0.44	0.56	0.9	1.14	7.1	72.4
SACRAMENTO R BL RED BLUFF DIV DM	4/21/09 13:20	6.61	107	1.73	2.06	<0.1	<0.1	0.39	0.65	2.53	2.72	21.6	144
SACRAMENTO R BL RED BLUFF DIV DM	5/27/09 14:30	5.07	89.8	1.27	1.32	<0.1	<0.1	0.39	0.54	1.82	1.95	7.4	87.8
SACRAMENTO R BL RED BLUFF DIV DM	6/24/09 14:00	12.5	66.4	1.26	1.28	<0.1	<0.1	0.39	0.5	1.68	1.72	8.9	72.1
SACRAMENTO R BL RED BLUFF DIV DM	7/27/09 14:07	9.61	168	1.49	1.56	<0.1	<0.1	0.49	0.79	1.11	1.51	11.2	130
SACRAMENTO R BL RED BLUFF DIV DM	8/25/09 9:55	2.86	80.4	1.18	1.25	<0.1	<0.1	0.39	0.54	0.91	1.08	5.8	71.9
SACRAMENTO R BL RED BLUFF DIV DM	9/23/09 8:50	4.04	72.6	1.27	1.33	<0.1	<0.1	0.38	0.48	1.04	1.09	9.6	79.8
SACRAMENTO R BL RED BLUFF DIV DM	10/26/09 13:15	7.2	87.1	1.44	1.52	<0.1	<0.1	0.44	0.6	1.26	1.49	16.1	84.8
	Maximum	1459	2240	1.96	2.06	0.017	0.055	2.75	6.1	2.59	6.09	878	2854
	Median	9.61	89.8	1.31	1.37	0.015	0.0355	0.5	0.6	1.27	1.6	13.4	87.8
	Minimum	1.11	15.9	0.702	0.789	0.013	0.016	0.33	0.46	0.66	0.82	3.8	24.6
SWRCB Basin Plan - Drinking Water Standards -Primary MCL		1000		10									
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL		200										300	
Cal EPA/OEHHA - California Public Health Goal				0.004				0.02					
USEPA Secondary MCL		50											
Cal EPA - One in a million incremental cancer risk estimate for drinking water				0.023		0.0023		0.07					
USEPA Health Advisory for drinking water				0.02									
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity				0.05									
Agriculture Water Quality Goals - Taste and odor threshold													
National Recommended WQ Criteria - Taste and Odor or Welfare												300	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption				0.018									
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous		87										1000	
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum		750											

Table 1. Sacramento River below Red Bluff Diversion Dam, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
SACRAMENTO R BL RED BLUFF DIV DM	2/21/06 10:45	<0.045	0.049	2.37	5.71	N/A	1.53	1.62	<0.149	0.15	1.45	1.89
SACRAMENTO R BL RED BLUFF DIV DM	3/1/06 11:00	0.274	1.1	13.5	78.9	N/A	2.84	8.57	<0.149	0.16	4.49	13.2
SACRAMENTO R BL RED BLUFF DIV DM	4/18/06 9:25	0.086	0.271	6.94	19.6	N/A	1.69	2.84	0.24	0.31	2.95	5.81
SACRAMENTO R BL RED BLUFF DIV DM	5/16/06 6:45	<0.04	0.075	1.64	7.63	N/A	1.14	1.34	<0.2	<0.2	0.49	1.78
SACRAMENTO R BL RED BLUFF DIV DM	6/26/06 10:05	<0.04	0.092	1.1	7.92	N/A	1.6	2.1	<0.2	<0.2	0.72	2.31
SACRAMENTO R BL RED BLUFF DIV DM	7/25/06 8:20	<0.04	0.15	1.49	11.7	1.7	1.8	3.01	<0.2	0.26	1.02	4.39
SACRAMENTO R BL RED BLUFF DIV DM	8/21/06 13:30	<0.04	0.102	1.65	5.98	0.89	1.84	2.55	<0.2	<0.2	1.51	3.22
SACRAMENTO R BL RED BLUFF DIV DM	9/21/06 7:15	<0.04	0.102	1.88	12.8	1.4	1.88	2.85	<0.2	0.24	1.18	5.92
SACRAMENTO R BL RED BLUFF DIV DM	10/25/06 12:30	<0.04	0.1	0.91	6.93	0.58	1.78	2.19	<0.2	0.26	0.69	4.16
SACRAMENTO R BL RED BLUFF DIV DM	12/13/06 9:20	0.103	0.546	3.08	38.6	0.84	1.3	2.32	<0.2	0.24	2.07	9.17
SACRAMENTO R BL RED BLUFF DIV DM	1/10/07 12:25	<0.04	<0.04	1.37	3.13	0.59	0.97	1.02	<0.2	<0.2	0.71	2.82
SACRAMENTO R BL RED BLUFF DIV DM	2/26/07 10:45	0.149	0.234	6.41	10.2	2.6	1.14	1.49	0.2	0.28	3.09	5.68
SACRAMENTO R BL RED BLUFF DIV DM	3/21/07 10:30	<0.04	0.04	1.27	4.8	0.9	0.84	0.97	<0.2	0.2	0.38	3.58
SACRAMENTO R BL RED BLUFF DIV DM	4/17/07 10:30	<0.04	<0.04	1.71	5.08	1.2	0.57	0.72	<0.2	<0.2	0.48	3.46
SACRAMENTO R BL RED BLUFF DIV DM	5/29/07 9:45	<0.04	<0.04	0.39	2.95	N/A	0.65	0.76	<0.2	0.23	0.31	3.01
SACRAMENTO R BL RED BLUFF DIV DM	6/26/07 9:45	<0.04	0.058	3.41	7.57	0.74	0.97	1.22	<0.2	0.25	1.19	4.35
SACRAMENTO R BL RED BLUFF DIV DM	7/18/07 10:10	<0.04	<0.04	0.2	4.47	0.98	0.76	1.08	<0.2	<0.2	0.31	3.37
SACRAMENTO R BL RED BLUFF DIV DM	8/27/07 12:10	<0.04	<0.04	0.33	3.8	N/A	1.25	1.4	<0.2	0.23	2	2.22
SACRAMENTO R BL RED BLUFF DIV DM	9/12/07 10:40	<0.04	0.058	0.18	3	0.58	0.89	1	<0.2	<0.2	0.5	2.34
SACRAMENTO R BL RED BLUFF DIV DM	10/30/07 10:40	<0.04	0.052	0.19	4.66	0.48	0.92	1.2	<0.2	<0.2	0.71	3.12
SACRAMENTO R BL RED BLUFF DIV DM	11/26/07 13:40	<0.04	0.078	0.32	4.71	1.2	0.63	0.93	<0.2	<0.2	0.34	2.59
SACRAMENTO R BL RED BLUFF DIV DM	1/22/08 8:40	<0.04	0.13	0.73	12.9	N/A	0.91	1.08	<0.2	<0.2	1.33	4.99
SACRAMENTO R BL RED BLUFF DIV DM	2/26/08 10:40	<0.04	0.388	0.68	23.4	N/A	1.58	3	<0.2	0.21	0.97	6.85
SACRAMENTO R BL RED BLUFF DIV DM	3/25/08 7:25	<0.04	<0.04	0.36	6.12	N/A	0.71	0.95	<0.2	0.25	0.44	3.11
SACRAMENTO R BL RED BLUFF DIV DM	4/22/08 13:55	<0.04	0.051	1.48	5.43	N/A	0.72	0.88	0.25	0.26	1.11	3.47
SACRAMENTO R BL RED BLUFF DIV DM	7/23/08 13:50	<0.04	<0.04	0.26	4.64	0.65	1.2	1.24	<0.2	<0.2	0.51	2.87
SACRAMENTO R BL RED BLUFF DIV DM	4/21/09 13:20	<0.04	0.073	0.57	5.35	N/A	0.8	0.88	<0.2	<0.2	1.07	4.06
SACRAMENTO R BL RED BLUFF DIV DM	5/27/09 14:30	<0.04	<0.04	0.43	2.32	N/A	0.82	0.96	<0.2	<0.2	0.48	2.28
SACRAMENTO R BL RED BLUFF DIV DM	6/24/09 14:00	<0.04	<0.04	0.3	3.26	N/A	0.91	1.05	0.23	0.27	1.25	3.27
SACRAMENTO R BL RED BLUFF DIV DM	7/27/09 14:07	<0.04	0.063	1.86	6.71	N/A	1.17	1.24	<0.2	<0.2	1.32	4.09
SACRAMENTO R BL RED BLUFF DIV DM	8/25/09 9:55	<0.04	<0.04	0.35	4.54	N/A	1.13	1.21	<0.2	<0.2	0.81	2.67
SACRAMENTO R BL RED BLUFF DIV DM	9/23/09 8:50	<0.04	<0.04	0.32	4.77	N/A	1.01	1.16	<0.2	<0.2	0.63	2.79
SACRAMENTO R BL RED BLUFF DIV DM	10/26/09 13:15	<0.04	0.076	2.55	7.5	N/A	0.97	1.03	<0.2	<0.2	0.94	3.12
	Maximum	0.274	1.1	13.5	78.9	2.6	2.84	8.57	0.25	0.31	4.49	13.2
	Median	0.126	0.085	1.1	5.71	0.89	1.01	1.21	0.235	0.245	0.94	3.27
	Minimum	0.086	0.04	0.18	2.32	0.48	0.57	0.72	0.2	0.15	0.31	1.78
SWRCB Basin Plan - Drinking Water Standards -Primary MCL												
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL				50								
Cal EPA/OEHHA - California Public Health Goal		0.2										
USEPA Secondary MCL												
Cal EPA - One in a million incremental cancer risk estimate for drinking water												
USEPA Health Advisory for drinking water												
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for		0.25										
Agriculture Water Quality Goals - Taste and odor threshold												
National Recommended WQ Criteria - Taste and Odor or Welfare				50								
National Recommended WQ Criteria - Human Health and Welfare protection -												
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous						0.77						
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum						1.4						

Table 2. Cottonwood Creek near Cottonwood, Part 1 of 2													
Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
COTTONWOOD C NR COTTONWOOD	10/5/04 11:30	5.21	10.5	0.662	0.668	<0.011	<0.008	0.65	0.68	0.47	0.58	10.2	39
COTTONWOOD C NR COTTONWOOD	11/8/04 11:20	3.98	6.42	0.684	0.723	<0.008	<0.007	1.51	1.75	0.48	0.72	3.6	26
COTTONWOOD C NR COTTONWOOD	12/7/04 10:40	7.02	31.3	0.524	0.612	<0.012	0.081	2.04	2.33	0.66	0.7	<4.5	42
COTTONWOOD C NR COTTONWOOD	1/10/05 7:35	208	448	0.517	0.549	<0.011	<0.007	1.73	1.9	1.29	1.67	137	522
COTTONWOOD C NR COTTONWOOD	2/2/05 13:00	87.1	157	0.396	0.417	<0.011	<0.066	1.05	1.14	0.63	0.85	57.1	218
COTTONWOOD C NR COTTONWOOD	3/10/05 13:50	34.7	95.6	0.46	0.468	<0.033	<0.011	1.6	1.63	0.5	0.67	13.7	128
COTTONWOOD C NR COTTONWOOD	4/19/05 8:10	40.2	88	0.413	0.484	<0.022	<0.009	1.02	1.52	0.42	0.59	29.3	114
COTTONWOOD C NR COTTONWOOD	5/18/05 11:20	1358	14345	0.863	3.04	<0.058	0.085	2.94	36.5	4.43	39.2	963	23594
COTTONWOOD C NR COTTONWOOD	6/28/05 7:30	63.9	86.1	0.455	0.465	<0.009	<0.012	1.7	1.14	0.42	0.46	23.8	62.6
COTTONWOOD C NR COTTONWOOD	7/26/05 6:45	1.55	7.51	0.682	0.72	<0.011	<0.004	0.47	0.78	0.48	0.52	<1.51	8.6
COTTONWOOD C NR COTTONWOOD	8/22/05 11:45	2.65	32.9	0.657	0.691	<0.009	<0.009	1.7	1.98	0.5	0.54	<4.16	72.4
COTTONWOOD C NR COTTONWOOD	9/26/05 11:20	10.2	152	0.779	0.795	0.003	0.016	1.03	1.1	1.03	1.28	20.2	294
COTTONWOOD C NR COTTONWOOD	10/24/05 8:30	12.9	47.2	0.705	0.708	<0.009	<0.009	0.9	0.99	0.57	0.69	17.8	83.7
COTTONWOOD C NR COTTONWOOD	11/14/05 9:00	5.42	11.9	0.537	0.579	<0.009	<0.009	0.9	0.91	0.6	0.62	9	26.2
COTTONWOOD C NR COTTONWOOD	12/15/05 9:15	4.38	10.2	0.343	0.434	<0.005	0.007	1.04	1.24	0.41	0.41	<1.51	17.2
COTTONWOOD C NR COTTONWOOD	1/24/06 9:10	202	380	0.42	0.46	0.009	0.015	1.71	2.26	0.75	1.22	123	512
COTTONWOOD C NR COTTONWOOD	3/1/06 9:15	2533	3739	0.889	1.16	0.009	0.023	8.2	15.7	3.22	7.63	1760	5793
COTTONWOOD C NR COTTONWOOD	4/24/06 10:03	151	1225	0.394	0.569	<0.1	<0.1	1.11	4.58	0.6	2.63	122	1174
COTTONWOOD C NR COTTONWOOD	8/16/06 11:00	1.91	20.8	0.703	0.806	<0.1	<0.1	0.33	0.35	0.73	0.84	7.2	29.5
COTTONWOOD C NR COTTONWOOD	11/14/06 9:05	24.8	75.7	0.467	0.594	<0.1	<0.1	0.54	0.68	0.51	0.61	37.4	96.2
COTTONWOOD C NR COTTONWOOD	12/6/06 13:20	4.8	6.62	0.438	0.539	<0.1	<0.1	0.45	1.14	0.5	0.54	6.1	11.7
COTTONWOOD C NR COTTONWOOD	2/20/07 8:45	47.5	52.3	0.3	0.344	<0.1	<0.1	1.38	1.91	0.57	0.62	35.2	50.4
	Maximum	2533	14345	0.889	3.04	0.009	0.085	8.2	36.5	4.43	39.2	1760	23594
	Mean	18.85	64	0.5205	0.5865	0.009	0.0195	1.08	1.38	0.57	0.68	26.55	78.05
	Minimum	1.55	6.42	0.3	0.344	0.003	0.007	0.33	0.35	0.41	0.41	3.6	8.6
SWRCB Basin Plan - Drinking Water Standards -Primary MCL		1000											
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL		200										300	
Cal EPA/OEHHA - California Public Health Goal		600				0.04		0.02					
USEPA Secondary MCL													
Cal EPA - One in a million incremental cancer risk estimate for drinking water				0.023		0.0023		0.07					
USEPA Health Advisory for drinking water				0.02									
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity				0.05									
National Academy of Sciences Health Advisory		5000											
Agriculture Water Quality Goals - Taste and odor threshold		5000										5000	
National Recommended WQ Criteria - Taste and Odor or Welfare												300	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption		87		0.018									
National Recommended WQ Criteria - Freshwater Aquatic Life		750										1000	
National Recommended WQ Criteria - Freshwater Aquatic Life													

Table 2. Cottonwood Creek near Cottonwood, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
COTTONWOOD C NR COTTONWOOD	10/5/04 11:30	0.008	<0.017	2.58	11.3	N/A	1.34	1.34	0.18	<0.204	<0.077	<0.054	0.19	0.42
COTTONWOOD C NR COTTONWOOD	11/8/04 11:20	<0.001	0.008	3.06	4.36	N/A	0.86	1.53	0.33	0.35	<0.006	<0.063	0.05	0.09
COTTONWOOD C NR COTTONWOOD	12/7/04 10:40	0.012	0.028	0.46	4.09	N/A	1.07	1.2	<0.163	0.28	<0.011	<0.04	0.31	0.65
COTTONWOOD C NR COTTONWOOD	1/10/05 7:35	0.048	0.166	1.79	12.6	N/A	1.59	2.61	0.74	0.81	<0.003	0.006	0.55	1.58
COTTONWOOD C NR COTTONWOOD	2/2/05 13:00	0.017	0.063	2.87	7.91	N/A	1.41	1.93	<0.222	0.18	<0.001	<0.002	0.22	0.73
COTTONWOOD C NR COTTONWOOD	3/10/05 13:50	0.008	0.044	0.79	4.71	N/A	1.28	1.64	<0.245	0.32	<0.001	<0.036	0.16	0.44
COTTONWOOD C NR COTTONWOOD	4/19/05 8:10	0.015	0.034	1.51	5.07	N/A	0.98	1.47	0.31	0.44	<0.003	<0.005	0.2	0.53
COTTONWOOD C NR COTTONWOOD	5/18/05 11:20	0.475	7.26	8.76	563	N/A	3.38	57.9	<0.399	0.39	0.039	0.101	3.31	72
COTTONWOOD C NR COTTONWOOD	6/28/05 7:30	<0.009	<0.027	3.47	3.93	N/A	0.66	1.16	<0.14	<0.354	<0.002	<0.027	0.14	0.36
COTTONWOOD C NR COTTONWOOD	7/26/05 6:45	<0.019	<0.063	0.32	2.51	N/A	0.43	0.82	<0.145	<0.176	<0.002	<0.04	<0.083	0.15
COTTONWOOD C NR COTTONWOOD	8/22/05 11:45	<0.004	0.024	1.05	13.7	N/A	0.79	1.07	<0.227	<0.227	<0.001	<0.001	0.18	0.56
COTTONWOOD C NR COTTONWOOD	9/26/05 11:20	0.006	0.111	0.76	24.9	N/A	1.31	2.36	0.17	0.19	<0.003	<0.003	0.88	1.97
COTTONWOOD C NR COTTONWOOD	10/24/05 8:30	0.008	0.028	1.93	15.4	N/A	1.18	1.45	0.11	0.19	<0.002	<0.002	0.31	0.48
COTTONWOOD C NR COTTONWOOD	11/14/05 9:00	0.01	0.017	1.78	5.95	N/A	1.37	1.38	<0.186	<0.186	<0.009	<0.009	0.39	0.71
COTTONWOOD C NR COTTONWOOD	12/15/05 9:15	0.006	0.008	0.79	2.59	N/A	1.41	1.48	0.16	0.29	<0.001	<0.001	<0.177	<0.177
COTTONWOOD C NR COTTONWOOD	1/24/06 9:10	0.033	0.146	6.19	16.7	N/A	1.95	3.38	0.23	0.28	<0.005	<0.005	0.43	1.44
COTTONWOOD C NR COTTONWOOD	3/1/06 9:15	0.491	1.53	30.8	138	N/A	7.35	20.9	<0.149	0.15	<0.009	<0.009	3.64	13.6
COTTONWOOD C NR COTTONWOOD	4/24/06 10:03	0.04	0.444	2.06	40.8	N/A	1.51	6.9	0.21	0.32	<0.03	<0.03	0.47	4.32
COTTONWOOD C NR COTTONWOOD	8/16/06 11:00	<0.04	<0.04	1.13	5.41	0.72	1.14	1.32	0.42	0.6	<0.03	<0.03	0.14	0.73
COTTONWOOD C NR COTTONWOOD	11/14/06 9:05	<0.04	<0.04	4.82	10.7	N/A	1.56	1.77	0.56	0.63	<0.03	<0.03	<0.1	1.07
COTTONWOOD C NR COTTONWOOD	12/6/06 13:20	<0.04	<0.04	2.55	4.44	N/A	0.87	1.24	0.33	0.59	<0.03	<0.03	0.79	2.02
COTTONWOOD C NR COTTONWOOD	2/20/07 8:45	<0.04	<0.04	5	5.57	1.2	0.16	1.66	0.35	0.51	<0.03	<0.03	0.18	1.65
	Maximum	0.491	7.26	30.8	563	1.2	7.35	57.9	0.74	0.81	0.039	0.101	3.64	72
	Mean	0.0135	0.044	1.995	6.93	0.96	1.295	1.505	0.31	0.32	0.039	0.0535	0.31	0.73
	Minimum	0.006	0.008	0.32	2.51	0.72	0.16	0.82	0.11	0.15	0.039	0.006	0.05	0.09
SWRCB Basin Plan - Drinking Water Standards -Primary MCL														
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL				50										
Cal EPA/OEHHA - California Public Health Goal		0.2					12							
USEPA Secondary MCL														
Cal EPA - One in a million incremental cancer risk estimate for drinking w		4.1												
USEPA Health Advisory for drinking water				300										
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity		0.25												
National Academy of Sciences Health Advisory														
Agriculture Water Quality Goals - Taste and odor threshold				200										
National Recommended WQ Criteria - Taste and Odor or Welfare				50										
National Recommended WQ Criteria - Human Health and Welfare														
National Recommended WQ Criteria - Freshwater Aquatic Life						0.77								
National Recommended WQ Criteria - Freshwater Aquatic Life						1.4								

Table 3. Sacramento River at Hamilton City, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
SACRAMENTO R A HAMILTON CITY	11/25/03 9:10	N/A	12.8	N/A	1.93	N/A	<0.005	N/A	0.61	N/A	1.28	N/A	15.3
SACRAMENTO R A HAMILTON CITY	3/8/04 13:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SACRAMENTO R A HAMILTON CITY	5/20/04 15:00	N/A	110	N/A	1.81	N/A	0.011	N/A	0.84	N/A	1.87	N/A	122
SACRAMENTO R A HAMILTON CITY	8/12/04 10:20	N/A	189	N/A	1.36	N/A	0.016	N/A	0.76	N/A	1.65	N/A	223
SACRAMENTO R A HAMILTON CITY	10/5/04 10:05	14.5	113	1.3	1.32	<0.011	<0.008	0.9	0.98	0.72	1.43	9.6	134
SACRAMENTO R A HAMILTON CITY	11/9/04 11:40	23.6	36.1	2.49	2.52	<0.008	<0.007	1	1	0.85	1.77	15.5	87.4
SACRAMENTO R A HAMILTON CITY	12/7/04 10:40	2.54	12.5	2.38	2.54	<0.012	0.034	0.54	0.84	0.56	0.73	<4.5	7.8
SACRAMENTO R A HAMILTON CITY	1/10/05 12:15	352	413	1.48	1.55	<0.011	<0.007	1.06	1.44	1.98	2.45	225	443
SACRAMENTO R A HAMILTON CITY	2/2/05 7:35	77.5	163	1.42	1.51	<0.011	<0.066	1.67	1.88	1.53	1.73	71.5	223
SACRAMENTO R A HAMILTON CITY	3/10/05 7:30	11	75.7	2.03	2.08	<0.033	<0.011	1.29	1.39	1.09	1.37	<3.34	118
SACRAMENTO R A HAMILTON CITY	4/20/05 12:00	15.9	39.3	1.99	2.09	<0.022	<0.009	1.02	1.02	1.13	1.25	14.1	55.8
SACRAMENTO R A HAMILTON CITY	5/19/05 9:30	1075	6686	1.66	3.17	<0.058	0.076	2.69	18.9	3.11	18.7	726	10052
SACRAMENTO R A HAMILTON CITY	6/28/05 7:15	106	121	1.37	1.58	<0.009	<0.012	0.52	1.1	1.15	1.2	116	142
SACRAMENTO R A HAMILTON CITY	7/26/05 12:45	1.65	31.4	1.31	1.34	<0.011	0.007	0.63	0.69	0.73	0.81	<1.51	37.8
SACRAMENTO R A HAMILTON CITY	8/23/05 11:20	14.1	44.8	1.39	1.47	<0.009	0.016	0.46	0.68	0.86	1.13	<4.16	66.9
SACRAMENTO R A HAMILTON CITY	9/27/05 10:00	27.7	98.8	1.41	1.43	0.007	0.011	0.54	0.64	0.85	1.14	16.3	114
SACRAMENTO R A HAMILTON CITY	10/25/05 12:40	30.9	61.6	1.54	1.56	<0.009	<0.009	0.63	0.72	1	1.1	17.2	65.4
SACRAMENTO R A HAMILTON CITY	11/15/05 11:00	30.8	67.6	1.84	1.92	<0.009	0.014	0.79	0.82	1.07	1.22	26	102
SACRAMENTO R A HAMILTON CITY	12/14/05 11:45	6.67	36.7	1.94	2.1	<0.005	0.008	0.79	0.89	0.81	0.84	2.6	58.1
SACRAMENTO R A HAMILTON CITY	1/4/06 7:30	866	3462	1.61	2.35	0.014	0.092	2.61	9.74	2.47	11.2	569	4787
SACRAMENTO R A HAMILTON CITY	1/24/06 7:30	359	709	1.41	1.49	0.011	0.042	1.51	2.4	1.62	2.92	214	923
SACRAMENTO R A HAMILTON CITY	2/21/06 12:45	222	733	1.3	1.47	0.014	0.029	1.18	2.34	1.12	2.55	139	913
SACRAMENTO R A HAMILTON CITY	3/1/06 7:30	2887	4955	1.36	1.85	0.021	0.087	4.99	11.2	4.26	11.5	1773	6116
SACRAMENTO R A HAMILTON CITY	4/17/06 6:00	914	2219	1.06	1.47	<0.1	<0.1	1.69	5.11	2.51	6.68	556	2397
SACRAMENTO R A HAMILTON CITY	5/17/06 6:40	163	285	1.42	1.57	<0.1	<0.1	0.59	0.74	1.25	1.71	114	258
SACRAMENTO R A HAMILTON CITY	6/27/06 6:30	200	398	1.27	1.4	<0.1	<0.1	0.74	1.26	1.09	1.49	38.8	236
SACRAMENTO R A HAMILTON CITY	7/25/06 5:40	255	570	1.24	1.32	<0.1	<0.1	0.92	1.01	1.14	1.66	65.1	218
SACRAMENTO R A HAMILTON CITY	8/22/06 6:40	195	298	1.12	1.15	<0.1	<0.1	0.67	0.84	1.09	1.41	130	276
SACRAMENTO R A HAMILTON CITY	9/20/06 6:30	591	882	1.12	1.23	<0.1	<0.1	0.61	1.35	1.07	1.84	81.4	374
SACRAMENTO R A HAMILTON CITY	10/24/06 7:00	36.8	201	0.859	1.37	<0.1	<0.1	0.56	0.83	0.75	1.47	57.3	217
SACRAMENTO R A HAMILTON CITY	12/12/06 6:40	181	905	1.98	2.33	<0.1	<0.1	0.52	1.31	1.18	1.89	34.5	292
SACRAMENTO R A HAMILTON CITY	1/9/07 7:15	61.6	138	2.08	2.23	<0.1	<0.1	0.66	0.69	0.9	1.04	46.3	79.1
SACRAMENTO R A HAMILTON CITY	2/26/07 14:00	478	657	1.31	1.42	<0.1	<0.1	1.81	1.91	2.99	3.9	591	916
SACRAMENTO R A HAMILTON CITY	3/20/07 6:50	16.1	91.6	2.17	2.36	<0.1	<0.1	0.41	0.71	1.22	1.55	26.6	154
SACRAMENTO R A HAMILTON CITY	4/17/07 7:30	12.8	52	1.93	1.94	<0.1	<0.1	0.43	0.58	1.54	1.84	13.4	65.8
SACRAMENTO R A HAMILTON CITY	5/29/07 12:15	3.21	37.2	1.9	2.11	<0.1	<0.1	0.52	0.72	1.26	1.65	4.6	73.9
SACRAMENTO R A HAMILTON CITY	6/26/07 12:30	6.11	50.1	1.6	1.67	<0.1	<0.1	0.52	0.75	1.07	1.39	11.4	77.2
SACRAMENTO R A HAMILTON CITY	7/18/07 7:00	10.8	114	1.62	1.69	<0.1	<0.1	0.47	0.84	1.15	1.53	6.2	135
SACRAMENTO R A HAMILTON CITY	8/28/07 7:05	18.4	49.2	1.37	1.58	<0.1	<0.1	0.45	0.6	0.92	1.12	6.2	65.2
SACRAMENTO R A HAMILTON CITY	9/13/07 7:55	2.26	37.9	1.47	1.55	<0.1	<0.1	0.45	0.59	0.63	0.83	5.7	46.6
SACRAMENTO R A HAMILTON CITY	11/7/07 10:30	0.83	10.5	1.96	2.06	<0.1	<0.1	0.4	0.41	0.64	0.75	<0.1	24.7
SACRAMENTO R A HAMILTON CITY	2/20/08 12:15	5.62	85.8	2.04	2.27	<0.1	<0.1	0.49	0.78	1.09	1.26	7.4	105
SACRAMENTO R A HAMILTON CITY	5/6/08 13:05	2.94	85.3	2.14	2.16	<0.1	<0.1	0.35	0.67	1.43	1.87	10.4	117
SACRAMENTO R A HAMILTON CITY	8/6/08 9:40	2.82	70	1.6	1.68	<0.1	<0.1	0.42	0.54	0.96	1.11	10.2	84
SACRAMENTO R A HAMILTON CITY	11/5/08 7:20	10.2	95.6	2.06	2.17	<0.1	<0.1	0.31	0.51	1.49	1.95	16.4	140
SACRAMENTO R A HAMILTON CITY	2/24/09 10:40	51.1	3110	1.62	4.07	<0.1	<0.1	0.47	7.07	2.03	8.21	68.6	3210
SACRAMENTO R A HAMILTON CITY	5/5/09 8:50	14.7	439	1.83	2.05	<0.1	<0.1	0.35	1.15	1.74	3.09	27.5	428
SACRAMENTO R A HAMILTON CITY	8/11/09 8:40	2.75	35.1	1.31	1.35	<0.1	<0.1	0.36	0.46	0.88	1.05	2.3	36.3
SACRAMENTO R A HAMILTON CITY	11/3/09 7:50	2.94	47	1.87	1.94	<0.1	<0.1	0.38	0.49	1.13	1.35	10.6	66.8
SACRAMENTO R A HAMILTON CITY	2/2/10 8:45	12	340	1.37	1.43	<0.1	<0.1	0.36	1.05	1.76	3.65	17.1	383
SACRAMENTO R A HAMILTON CITY	5/4/10 7:45	10.2	160	1.31	1.85	<0.1	<0.1	0.47	0.96	1.56	2.3	12.1	236
SACRAMENTO R A HAMILTON CITY	8/3/10 11:00	7.55	24	1.4	1.42	<0.1	<0.1	0.47	0.58	1.29	1.35	10.4	51.3
SACRAMENTO R A HAMILTON CITY	11/2/10 8:30	4.63	67.4	1.97	2.06	<0.1	<0.1	0.66	1.27	1.35	1.58	15.3	130
SACRAMENTO R A HAMILTON CITY	2/1/11 9:30	5.73	53.6	1.9	1.96	<0.1	<0.1	0.43	0.55	1.29	1.41	12	59.6
SACRAMENTO R A HAMILTON CITY	5/3/11 8:55	3	24.6	1.6	1.73	<0.1	<0.1	0.45	0.52	1.4	1.59	6	32.9
SACRAMENTO R A HAMILTON CITY	8/2/11 8:10	116	159	1.41	1.45	<0.1	<0.1	0.65	0.76	1.11	1.36	87.6	176
SACRAMENTO R A HAMILTON CITY	11/1/11 8:45	56	91.5	1.21	1.58	<0.1	<0.1	0.64	0.76	0.95	1.11	43	108
SACRAMENTO R A HAMILTON CITY	1/31/12 8:25	178	276	2.04	2.2	<0.1	<0.1	0.52	0.6	1	1.33	94.1	162
SACRAMENTO R A HAMILTON CITY	5/8/12 8:30	88.3	125	2.11	2.64	<0.1	<0.1	0.3	0.45	1.6	1.62	74.9	126
SACRAMENTO R A HAMILTON CITY	8/7/12 8:00	10	28.6	1.25	1.28	<0.1	<0.1	0.39	0.5	0.67	0.95	11	45.5
SACRAMENTO R A HAMILTON CITY	11/6/12 9:35	11.6	12.5	2.09	2.17	<0.1	<0.1	0.48	0.82	0.65	0.81	34.4	41
SACRAMENTO R A HAMILTON CITY	2/6/13 9:15	3.6	127	1.98	2	<0.1	<0.1	0.32	0.75	1.1	1.32	8.2	124
SACRAMENTO R A HAMILTON CITY	5/7/13 8:05	19.2	29.5	1.74	1.77	<0.1	<0.1	0.53	0.53	1.07	1.55	32.6	66.6
SACRAMENTO R A HAMILTON CITY	8/6/13 7:30	1.05	20	1.18	1.48	<0.1	<0.1	0.45	0.66	0.53	0.86	4.3	30.1
SACRAMENTO R A HAMILTON CITY	11/5/13 9:10	1.69	24.4	2.06	2.17	<0.1	<0.1	0.39	0.46	0.5	0.82	10.6	55.2
SACRAMENTO R A HAMILTON CITY	2/4/14 9:05	0.19	6.03	2.7	2.88	<0.1	<0.1	0.52	1.31	0.72	0.85	6.2	26.2
SACRAMENTO R A HAMILTON CITY	5/6/14 8:30	4.3	37.2	2.36	2.5	<0.1	<0.1	0.37	0.46	1.48	2.03	10.6	74.5
SACRAMENTO R A HAMILTON CITY	8/12/14 9:50	1.91	18.7	1.93	2.12	<0.1	<0.1	0.44	0.52	0.72	0.87	13	38.1
SACRAMENTO R A HAMILTON CITY	11/5/14 8:50	2.57	62.4	2.05	2.12	<0.1	<0.1	0.48	11.7	0.8	4.03	13.1	264
SACRAMENTO R A HAMILTON CITY	2/10/15 9:30	21.2	1960	1	2.14	<0.1	<0.1	0.33	5.3	1.96	8	63.2	2100
SACRAMENTO R A HAMILTON CITY	5/11/15 10:00	21.9	42.4	1.76	1.81	<0.1	<0.1	0.5	0.68	1.7	2.24	25.3	53.3
SACRAMENTO R A HAMILTON CITY	8/11/15 10:20	13.4	32.2	1.65	1.72	<0.1	<0.1	0.33	0.42	0.98	1.18	17.3	40.6
SACRAMENTO R A HAMILTON CITY	11/4/15 11:27	12.6	18.9	2.43	2.61	<0.1	<0.1	0.43	0.58	0.77	0.94	23.6	36.9
SACRAMENTO R A HAMILTON CITY	2/3/16 12:10	39.7	352	1.26	1.49	<0.1	<0.1	0.44	1.73	1.15	2.14	42.8	349
SACRAMENTO R A HAMILTON CITY	5/9/16 12:15	42.5	183	2.05	2.38	<0.1	<0.1	0.41	1.12	1.75	3	45.2	188
SACRAMENTO R A HAMILTON CITY	8/8/16 8:15	45	100	1.32	1.42	<0.1	<0.1	0.43	0.55	1.26	1.58	48.9	116
SACRAMENTO R A HAMILTON CITY	11/7/16 11:00	35.3	78	1.97	2.1	<0.1	<0.1	0.41	0.5	1.06	1.29	29.3	78.3
SACRAMENTO R A HAMILTON CITY	2/6/17 13:00	136	1020	1.16	1.67	<0.1	<0.1	0.52	3.85	1.79	5.78	138	1100
	Maximum	2887	6686	2.7	4.07	0.021	0.092	4.99	18.9	4.26	18.7	1773	10052
	Mediam	16	91.5	1.615	1.81	0.014	0.016	0.51	0.76	1.115	1.49	25.3	117
	Minimum	0.19	6.03	0.859	1.15	0.007	0.007	0.3	0.41	0.5	0.73	2.3	7.8
SWRCB Basin Plan - Drinking Water Standards -Primary MCL		1000											
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL		200										300	
Cal EPA/OEHHA - California Public Health Goal		600		0.004				0.02					
USEPA Secondary MCL		50											
Cal EPA - One in a million incremental cancer risk estimate for drinking water				0.023		0.0023		0.07					
USEPA Health Advisory for drinking water				0.02									
USEPA IRIS Reference Dose Drinking Water Health Advisories				2.1									
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity				0.05									
Agriculture Water Quality Goals - Taste and odor threshold		5000										5000	
Calfiornia Toxics Rule Sources of Drinking Water													
National Academy of Sciences Drinking Water Health Advisories		5000											
National Recommended WQ Criteria - Taste and Odor or Welfare												300	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption				0.018									
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration		87										1000	
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration		750											

Table 3. Sacramento River at Hamilton City, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
SACRAMENTO R A HAMILTON CITY	11/25/03 9:10	N/A	0.118	N/A	1.61	N/A	N/A	1.26	N/A	<0.061	N/A	<0.012	N/A	1.25
SACRAMENTO R A HAMILTON CITY	3/8/04 13:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SACRAMENTO R A HAMILTON CITY	5/20/04 15:00	N/A	0.027	N/A	6.14	N/A	N/A	1.31	N/A	0.12	N/A	<0.034	N/A	1.53
SACRAMENTO R A HAMILTON CITY	8/12/04 10:20	N/A	0.08	N/A	6.88	N/A	N/A	1.84	N/A	0.28	N/A	<0.145	N/A	2.07
SACRAMENTO R A HAMILTON CITY	10/5/04 10:05	0.018	0.067	1.13	6.34	N/A	1.25	1.62	<0.144	<0.204	<0.077	<0.054	0.48	1.56
SACRAMENTO R A HAMILTON CITY	11/9/04 11:40	0.004	0.024	1.55	5.42	N/A	1.11	1.33	<0.149	0.25	<0.006	<0.063	0.52	0.88
SACRAMENTO R A HAMILTON CITY	12/7/04 10:40	<0.01	0.011	0.2	1.8	N/A	0.57	0.59	<0.163	0.28	<0.011	<0.04	0.35	0.44
SACRAMENTO R A HAMILTON CITY	1/10/05 12:15	0.064	0.168	2.22	12.4	N/A	1.39	1.98	0.3	0.34	<0.003	<0.002	1.54	3.1
SACRAMENTO R A HAMILTON CITY	2/2/05 7:35	0.029	0.084	2.54	10.6	N/A	1.02	1.53	<0.222	0.27	0.002	0.003	0.95	1.96
SACRAMENTO R A HAMILTON CITY	3/10/05 7:30	0.008	0.049	0.98	6.37	N/A	0.87	1.24	<0.245	<0.19	<0.001	<0.036	0.36	1.06
SACRAMENTO R A HAMILTON CITY	4/20/05 12:00	0.01	0.023	3.12	6.03	N/A	0.76	0.94	0.14	0.35	<0.003	<0.005	0.41	0.75
SACRAMENTO R A HAMILTON CITY	5/19/05 9:30	0.202	3.24	7.33	272	N/A	2.75	30.7	<0.399	<0.317	0.018	0.041	2.46	35
SACRAMENTO R A HAMILTON CITY	6/28/05 7:15	<0.009	<0.027	4.71	5.17	N/A	0.95	1.41	<0.14	<0.354	<0.002	<0.027	0.8	1.65
SACRAMENTO R A HAMILTON CITY	7/26/05 12:45	<0.019	<0.063	0.16	2.07	N/A	0.85	0.95	<0.145	<0.176	<0.002	<0.04	0.36	0.85
SACRAMENTO R A HAMILTON CITY	8/23/05 11:20	<0.004	0.048	0.58	3.38	N/A	0.81	1.16	<0.227	0.29	<0.001	<0.001	0.27	1.09
SACRAMENTO R A HAMILTON CITY	9/27/05 10:00	<0.004	0.047	0.51	4.61	N/A	0.99	1.35	0.23	0.23	<0.003	<0.003	0.38	1.56
SACRAMENTO R A HAMILTON CITY	10/25/05 12:40	0.011	0.028	0.69	2.88	N/A	1.13	1.22	0.11	0.23	<0.002	<0.002	0.52	1.03
SACRAMENTO R A HAMILTON CITY	11/15/05 11:00	0.04	0.047	0.98	4.81	N/A	1.02	1.24	<0.186	<0.186	<0.009	<0.009	0.56	1.25
SACRAMENTO R A HAMILTON CITY	12/14/05 11:45	0.003	0.023	0.53	4.17	N/A	0.9	1.09	<0.149	0.15	<0.001	<0.001	0.5	0.93
SACRAMENTO R A HAMILTON CITY	1/4/06 7:30	0.191	1.89	9.75	134	N/A	2.67	15.4	<0.149	0.22	<0.001	0.021	2.24	20.8
SACRAMENTO R A HAMILTON CITY	1/24/06 7:30	0.062	0.306	9.24	32.4	N/A	1.68	3.32	<0.186	0.19	<0.005	<0.005	1.55	4.71
SACRAMENTO R A HAMILTON CITY	2/21/06 12:45	0.046	0.299	5.83	27.5	N/A	1.53	3.32	<0.149	0.3	<0.009	<0.009	1	3.94
SACRAMENTO R A HAMILTON CITY	3/1/06 7:30	0.648	2.04	23.2	146	N/A	4.69	15.7	<0.149	0.29	<0.009	<0.009	5.79	21.7
SACRAMENTO R A HAMILTON CITY	4/17/06 6:00	0.188	1.01	9.56	70.9	N/A	2.31	8.02	0.23	0.27	<0.03	<0.03	2.57	12.5
SACRAMENTO R A HAMILTON CITY	5/17/06 6:40	<0.04	0.1	2.1	10.1	N/A	1.12	1.46	<0.2	<0.2	<0.03	<0.03	0.67	1.78
SACRAMENTO R A HAMILTON CITY	6/27/06 6:30	<0.04	0.079	0.69	8.87	N/A	1.29	1.87	<0.2	<0.2	<0.03	0.063	0.41	1.71
SACRAMENTO R A HAMILTON CITY	7/25/06 5:40	<0.04	0.094	1.01	9.35	1.8	1.7	2.5	<0.2	<0.2	<0.03	<0.03	0.77	2.04
SACRAMENTO R A HAMILTON CITY	8/22/06 6:40	<0.04	0.077	1.6	7.18	0.89	1.7	2.33	0.25	0.26	<0.03	<0.03	1.02	1.94
SACRAMENTO R A HAMILTON CITY	9/20/06 6:30	<0.04	0.111	2.01	14.2	1.5	1.67	2.76	0.23	0.26	<0.03	<0.03	0.65	4.79
SACRAMENTO R A HAMILTON CITY	10/24/06 7:00	<0.04	0.078	0.87	9.44	0.28	1.01	2.02	0.25	0.28	<0.03	<0.03	0.16	3.3
SACRAMENTO R A HAMILTON CITY	12/12/06 6:40	<0.04	0.186	1.04	16.9	0.72	0.96	1.75	0.25	0.29	<0.03	<0.03	0.55	4.77
SACRAMENTO R A HAMILTON CITY	1/9/07 7:15	<0.04	<0.04	2.22	5.24	0.68	1.01	1.08	<0.2	<0.2	<0.03	<0.03	0.64	2.57
SACRAMENTO R A HAMILTON CITY	2/26/07 14:00	0.262	0.581	10.3	28.8	2.8	2.22	2.99	<0.2	0.23	<0.03	<0.03	3.68	8.39
SACRAMENTO R A HAMILTON CITY	3/20/07 6:50	<0.04	0.056	2.01	8.22	1.6	0.85	1.22	<0.2	<0.2	<0.03	<0.03	0.31	2.82
SACRAMENTO R A HAMILTON CITY	4/17/07 7:30	<0.04	<0.04	3.44	8.78	1	0.8	0.9	0.24	0.33	<0.03	<0.03	0.4	2.84
SACRAMENTO R A HAMILTON CITY	5/29/07 12:15	<0.04	0.044	0.36	5.99	N/A	0.8	1.04	<0.2	0.22	<0.03	<0.03	0.55	2.86
SACRAMENTO R A HAMILTON CITY	6/26/07 12:30	<0.04	0.066	2.52	7.29	0.59	0.9	1.12	<0.2	0.21	<0.03	<0.03	0.73	3.38
SACRAMENTO R A HAMILTON CITY	7/18/07 7:00	<0.04	0.07	0.21	7.42	1.3	0.88	1.27	<0.2	<0.2	<0.03	<0.03	0.3	3.87
SACRAMENTO R A HAMILTON CITY	8/28/07 7:05	<0.04	<0.04	0.46	5.33	N/A	1.07	1.22	<0.2	<0.2	<0.03	<0.03	2	2.29
SACRAMENTO R A HAMILTON CITY	9/13/07 7:55	<0.04	0.055	0.33	4.66	1.7	0.89	1.02	<0.2	<0.2	<0.03	2.11	0.36	<0.1
SACRAMENTO R A HAMILTON CITY	11/7/07 10:30	<0.04	<0.04	0.08	3.01	0.32	0.58	0.82	<0.2	<0.2	<0.03	<0.03	0.17	2.09
SACRAMENTO R A HAMILTON CITY	2/20/08 12:15	<0.04	0.041	0.7	8.15	N/A	0.88	0.95	<0.2	0.22	<0.03	<0.03	0.71	3.31
SACRAMENTO R A HAMILTON CITY	5/6/08 13:05	<0.04	0.061	0.27	8.38	N/A	1	1.12	<0.2	<0.2	<0.03	<0.03	0.22	3.21
SACRAMENTO R A HAMILTON CITY	8/6/08 9:40	<0.04	0.044	0.39	4.98	N/A	1.04	1.2	<0.2	<0.2	<0.03	<0.03	0.45	2.43
SACRAMENTO R A HAMILTON CITY	11/5/08 7:20	<0.04	0.09	0.35	10.4	N/A	1.22	1.6	<0.2	<0.2	<0.03	<0.03	0.93	3.51
SACRAMENTO R A HAMILTON CITY	2/24/09 10:40	<0.04	1.47	1.28	101	N/A	2.59	11	0.2	0.25	<0.03	<0.03	0.52	14.3
SACRAMENTO R A HAMILTON CITY	5/5/09 8:50	<0.04	0.289	0.53	17.7	N/A	0.85	1.76	<0.2	<0.2	<0.03	<0.03	1.07	6.22
SACRAMENTO R A HAMILTON CITY	8/11/09 8:40	<0.04	<0.04	0.22	2.36	N/A	0.74	0.84	<0.2	<0.2	<0.03	<0.03	0.45	2.26
SACRAMENTO R A HAMILTON CITY	11/3/09 7:50	<0.04	0.071	0.38	7.29	N/A	0.74	0.93	<0.2	<0.2	<0.03	<0.03	0.65	3.08
SACRAMENTO R A HAMILTON CITY	2/2/10 8:45	<0.04	0.188	1.01	17.1	N/A	1.78	2.08	<0.2	<0.2	<0.03	<0.03	1.39	5.43
SACRAMENTO R A HAMILTON CITY	5/4/10 7:45	<0.04	0.11	0.52	14	N/A	0.79	1.32	<0.2	<0.2	<0.03	<0.03	0.62	2.91
SACRAMENTO R A HAMILTON CITY	8/3/10 11:00	<0.04	<0.04	0.62	4.15	N/A	0.85	1.11	<0.2	<0.2	<0.03	<0.03	0.62	2.51
SACRAMENTO R A HAMILTON CITY	11/2/10 8:30	<0.04	0.09	0.73	12.5	N/A	1.34	1.82	<0.2	0.228	<0.03	<0.03	2.32	3.33
SACRAMENTO R A HAMILTON CITY	2/1/11 9:30	<0.04	<0.04	0.67	6.4	N/A	0.71	0.9	<0.2	<0.2	<0.03	<0.03	0.76	2.68
SACRAMENTO R A HAMILTON CITY	5/3/11 8:55	<0.04	<0.04	0.49	5.05	N/A	0.6	0.65	<0.2	<0.2	<0.03	<0.03	0.28	0.51
SACRAMENTO R A HAMILTON CITY	8/2/11 8:10	<0.04	0.061	1.47	6.38	N/A	1.1	1.37	<0.2	<0.2	<0.03	<0.03	0.77	1.63
SACRAMENTO R A HAMILTON CITY	11/1/11 8:45	<0.04	<0.04	1.44	4.4	N/A	1.37	1.68	<0.2	<0.2	<0.03	<0.03	0.59	2.11
SACRAMENTO R A HAMILTON CITY	1/31/12 8:25	<0.04	<0.04	1.87	9.58	N/A	0.68	1.11	<0.2	<0.2	<0.03	<0.03	1.17	2.32
SACRAMENTO R A HAMILTON CITY	5/8/12 8:30	<0.04	<0.04	5.73	7.97	N/A	0.68	0.79	<0.2	<0.2	<0.03	<0.03	0.48	1.79
SACRAMENTO R A HAMILTON CITY	8/7/12 8:00	<0.04	<0.04	0.41	2.81	0.8	0.79	1.36	<0.2	<0.2	<0.03	<0.03	0.41	1.83
SACRAMENTO R A HAMILTON CITY	11/6/12 9:35	<0.04	<0.04	2.19	3.12	3.4	0.96	1.08	<0.2	<0.2	<0.03	<0.03	0.67	1.34
SACRAMENTO R A HAMILTON CITY	2/6/13 9:15	<0.04	<0.04	0.35	5.45	1.3	0.44	0.65	<0.2	<0.2	<0.03	<0.03	0.93	1.45
SACRAMENTO R A HAMILTON CITY	5/7/13 8:05	<0.04	<0.04	1.2	3.14	0.9	0.85	1.03	<0.2	<0.2	<0.03	<0.03	0.52	1.11
SACRAMENTO R A HAMILTON CITY	8/6/13 7:30	<0.04	<0.04	0.12	2.4	0.6	1.27	1.63	<0.2	<0.2	<0.03	<0.03	<0.1	1.09
SACRAMENTO R A HAMILTON CITY	11/5/13 9:10	<0.04	<0.04	0.58	3.53	<0.5	0.6	0.89	<0.2	<0.2	<0.03	<0.03	0.45	1.16
SACRAMENTO R A HAMILTON CITY	2/4/14 9:05	<0.04	<0.04	0.35	2.17	0.8	0.54	0.69	<0.2	0.21	<0.03	<0.03	0.21	0.97
SACRAMENTO R A HAMILTON CITY	5/6/14 8:30	<0.04	<0.04	0.74	6.62	2.5	0.47	0.7	<0.2	<0.2	<0.03	<0.03	0.38	1.24
SACRAMENTO R A HAMILTON CITY	8/12/14 9:50	<0.04	<0.04	0.99	2.82	N/A	0.76	0.84	<0.2	<0.2	<0.03	<0.03	0.37	0.74
SACRAMENTO R A HAMILTON CITY	11/5/14 8:50	<0.04	0.173	0.79	9.25	N/A	1.58	7.22	<0.2	<0.2	<0.03	<0.03	0.37	34
SACRAMENTO R A HAMILTON CITY	2/10/15 9:30	<0.04	1.52	0.96	59.6	29.1	1.36	6.88	0.26	0.31	<0.03	0.037	0.38	13.9
SACRAMENTO R A HAMILTON CITY	5/11/15 10:00	<0.04	0.048	1.15	6.15	1.1	0.92	1.27	<0.2	<0.2	<0.03	<0.03	0.62	1.37
SACRAMENTO R A HAMILTON CITY	8/11/15 10:20	<0.04	<0.04	0.91	3.21	4.4	0.88	1.36	0.34	0.35	<0.03	<0.03	<0.1	0.4
SACRAMENTO R A HAMILTON CITY	11/4/15 11:27	<0.04	<0.04	1.16	2.67	<0.5	0.66	0.92	<0.2	<0.2	<0.03	<0.03	0.5	1.06
SACRAMENTO R A HAMILTON CITY	2/3/16 12:10	<0.04	0.204	0.62	17.7	3.5	1.26	2.47	0.21	0.28	<0.03	<0.03	0.75	2.98
SACRAMENTO R A HAMILTON CITY	5/9/16 12:15	<0.04	0.194	2.28	16.8	N/A	1.05	1.78	<0.2	<0.2	<0.03	<0.03	0.49	3.45
SACRAMENTO R A HAMILTON CITY	8/8/16 8:15	<0.04	0.046	0.74	4.35	N/A	1.29	1.63	<0.2	0.21	<0.03	<0.03	0.84	1.48
SACRAMENTO R A HAMILTON CITY	11/7/16 11:00	<0.04	<0.04	0.41	2.91	N/A	1.12	1.46	<0.2	<0.2	<0.03	<0.03	0.75	1.36
SACRAMENTO R A HAMILTON CITY	2/6/17 13:00	<0.04	0.945	3.35	43	N/A	1.08	5.36	0.36	0.37	<0.03	<0.03	0.86	9.16
	Maximum	0.648	3.24	23.2	272	29.1	4.69	30.7	0.36	0.37	0.018	2.11	5.79	35
	Mediam	0.043	0.0795	0.97	6.4	1.2	0.995	1.32	0.24	0.26	0.01	0.039	0.575	2.1
	Minimum	0.003	0.011	0.08	1.61	0.28	0.44	0.59	0.11	0.12	0.002	0.003	0.16	0.4
SWRCB Basin Plan - Drinking Water Standards -Primary MCL														
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL				50										
Cal EPA/OEHHA - California Public Health Goal		0.2					12							
USEPA Secondary MCL														
Cal EPA - One in a million incremental cancer risk estimate for drinking water		0.2												
USEPA Health Advisory for drinking water														
USEPA IRIS Reference Dose Drinking Water Health Advisories														
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity		0.25												
Agriculture Water Quality Goals - Taste and odor threshold				200										
California Toxics Rule Sources of Drinking Water						0.05								
National Academy of Sciences Drinking Water Health Advisories														
National Recommended WQ Criteria - Taste and Odor or Welfare				50										
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption														
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration						0.77								
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration						1.4								

Table 4. Sacramento River op Moulton Weir, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
SACRAMENTO R OPP MOULTON WR	5/14/03 14:15	22.6	584	1.46	1.67	0.01	0.078	1.34	2.25	0.93	3.17	4.1	813
SACRAMENTO R OPP MOULTON WR	6/10/03 9:00	15.8	180	1.83	1.88	<0.031	<0.031	0.84	0.91	0.71	1.52	<2.08	214
SACRAMENTO R OPP MOULTON WR	7/10/03 10:40	36.4	116	1.58	1.69	<0.031	<0.009	0.65	0.83	1.29	1.3	17.1	137
SACRAMENTO R OPP MOULTON WR	8/13/03 11:45	4.42	215	1.45	1.5	<0.004	<0.049	0.77	0.95	0.79	1.45	<2.45	317
SACRAMENTO R OPP MOULTON WR	9/3/03 12:30	5.91	304	1.43	1.51	<0.01	<0.01	0.73	1.02	1.23	2.24	<3.1	449
SACRAMENTO R OPP MOULTON WR	10/8/03 12:40	33.5	117	0.879	1.3	<0.011	0.009	0.17	0.78	0.97	1.32	25.1	172
SACRAMENTO R OPP MOULTON WR	11/5/03 11:00	64	131	1.47	1.63	<0.02	<0.004	<0.209	1.9	1.06	1.59	61.6	151
SACRAMENTO R OPP MOULTON WR	12/8/03 10:45	1193	3448	1.63	2.84	0.019	0.175	2.23	9.25	4.25	16.4	852	5689
SACRAMENTO R OPP MOULTON WR	1/6/04 9:30	262	1248	1.73	2.13	<0.008	0.045	1.04	4.56	2.21	7.17	193	2131
SACRAMENTO R OPP MOULTON WR	2/4/04 12:20	1614	1950	1.04	1.44	<0.011	0.037	2.17	5.11	3.82	8.17	1062	2748
SACRAMENTO R OPP MOULTON WR	2/17/04 12:00	2521	8733	1.59	2.8	<0.015	0.232	9.17	24.8	7.64	27.7	2035	13032
SACRAMENTO R OPP MOULTON WR	3/8/04 11:40	184	1478	1.44	1.83	0.011	0.053	0.8	4.63	1.93	6.89	135	2133
SACRAMENTO R OPP MOULTON WR	4/7/04 9:45	26.9	160	1.61	1.74	0.009	0.013	0.54	1.16	1.46	1.99	16.6	238
SACRAMENTO R OPP MOULTON WR	5/5/04 11:00	6.14	289	1.77	1.83	0.004	0.027	0.74	1.8	0.78	2.83	<3.73	396
SACRAMENTO R OPP MOULTON WR	6/9/04 10:00	185	302	1.75	1.84	0.011	0.013	0.6	1.53	1.65	2.43	123	349
SACRAMENTO R OPP MOULTON WR	7/29/04 10:40	100	155	1.4	1.43	0.005	0.011	0.63	0.91	1.06	1.74	52.7	162
SACRAMENTO R OPP MOULTON WR	10/5/04 11:00	14.3	89	1.22	1.34	<0.011	<0.008	0.8	0.94	0.73	1.28	9.8	116
SACRAMENTO R OPP MOULTON WR	11/9/04 13:00	20	76.2	2.34	2.4	<0.008	<0.007	0.9	0.93	0.89	1.38	14.5	99.5
SACRAMENTO R OPP MOULTON WR	12/7/04 10:20	3.4	82.6	2.25	2.27	<0.012	<0.034	1.86	1.93	0.89	1.07	<4.5	114
SACRAMENTO R OPP MOULTON WR	1/10/05 11:00	459	1259	1.36	1.6	<0.011	<0.007	1.81	3.91	2.41	4.96	304	1706
SACRAMENTO R OPP MOULTON WR	2/2/05 12:25	170	582	1.51	1.58	<0.011	<0.066	2.02	2.55	1.7	3.21	143	886
SACRAMENTO R OPP MOULTON WR	3/10/05 14:45	10.2	133	1.91	1.97	<0.033	<0.011	1.52	1.74	1.17	1.62	13	222
SACRAMENTO R OPP MOULTON WR	4/20/05 10:50	20.7	130	1.97	2.07	<0.022	<0.009	1.08	1.32	1.16	1.48	13.4	182
SACRAMENTO R OPP MOULTON WR	5/19/05 11:15	314	5936	1.34	3.07	<0.058	0.138	1.37	18	1.81	20.9	196	9164
SACRAMENTO R OPP MOULTON WR	6/28/05 15:05	103	126	1.42	1.65	<0.009	<0.012	0.62	1.1	1.32	1.34	96.3	148
SACRAMENTO R OPP MOULTON WR	7/26/05 11:00	7.14	197	1.45	1.46	0.007	0.014	0.48	0.98	0.93	1.42	<3.27	270
SACRAMENTO R OPP MOULTON WR	8/23/05 9:30	8.08	84.1	1.52	1.57	<0.009	<0.009	0.5	0.59	0.89	1.08	<4.16	130
SACRAMENTO R OPP MOULTON WR	9/28/05 8:30	17.3	82.5	1.41	1.46	0.007	0.017	1	1.31	0.88	1.16	10.6	125
SACRAMENTO R OPP MOULTON WR	10/25/05 10:30	21.8	190	1.5	1.52	0.013	0.019	0.57	1.08	1.06	1.59	13.8	258
SACRAMENTO R OPP MOULTON WR	11/14/05 12:00	18.3	297	1.93	2.16	0.012	0.033	0.79	1.35	1.22	2.24	15.8	453
SACRAMENTO R OPP MOULTON WR	12/14/05 11:40	9.4	71.4	1.84	2.04	0.01	0.017	0.77	1.03	0.92	1.24	5.2	114
SACRAMENTO R OPP MOULTON WR	1/4/06 10:40	2779	4845	1.84	2.53	0.024	0.096	6.91	14.1	5.21	14.3	1670	6695
SACRAMENTO R OPP MOULTON WR	1/24/06 13:10	413	1419	1.45	1.85	0.013	0.062	1.53	4.53	1.77	5.63	283	2016
SACRAMENTO R OPP MOULTON WR	2/22/06 11:40	263	848	1.37	1.68	0.018	0.05	1.76	2.94	1.15	3.79	176	1189
SACRAMENTO R OPP MOULTON WR	3/1/06 12:10	4357	6132	1.58	1.99	0.029	0.105	6.51	13.4	5.76	14.6	2579	7827
SACRAMENTO R OPP MOULTON WR	4/17/06 11:10	1232	2222	1.06	1.56	<0.1	<0.1	2.25	5.68	2.73	7.09	782	2269
SACRAMENTO R OPP MOULTON WR	5/17/06 11:35	129	511	1.48	1.64	<0.1	<0.1	0.81	1.24	1.18	2.32	98.3	446
SACRAMENTO R OPP MOULTON WR	6/27/06 10:25	47.7	677	1.37	1.67	<0.1	<0.1	1.22	2.05	1.04	1.78	9.9	392
SACRAMENTO R OPP MOULTON WR	7/26/06 8:20	228	793	1.28	1.38	<0.1	<0.1	0.5	1.39	1.22	2.1	60.9	436
SACRAMENTO R OPP MOULTON WR	8/22/06 10:50	157	272	1.1	1.16	<0.1	<0.1	0.61	0.93	1.11	1.44	111	271
SACRAMENTO R OPP MOULTON WR	9/20/06 11:35	351	633	1.06	1.15	<0.1	<0.1	0.55	1.23	1.07	1.6	56.5	286
SACRAMENTO R OPP MOULTON WR	10/24/06 12:15	31.7	226	1.23	1.44	<0.1	<0.1	0.66	1.09	1.29	1.55	58.7	208
SACRAMENTO R OPP MOULTON WR	12/12/06 12:35	103	1584	2.6	2.74	<0.1	<0.1	0.49	3.25	1.44	2.86	133	593
SACRAMENTO R OPP MOULTON WR	1/9/07 13:00	81.8	284	1.93	2.11	<0.1	<0.1	1.66	1.74	1.02	1.4	55.9	287
SACRAMENTO R OPP MOULTON WR	2/27/07 10:00	457	524	1.27	1.38	<0.1	<0.1	1.91	2.02	2.93	3.62	464	829
SACRAMENTO R OPP MOULTON WR	3/20/07 11:15	17.6	96.9	2.13	2.36	<0.1	<0.1	0.49	0.72	1.18	1.59	26.2	166
SACRAMENTO R OPP MOULTON WR	4/18/07 10:15	16.6	105	1.9	1.98	<0.1	<0.1	0.45	0.76	1.53	2.13	15.1	139
SACRAMENTO R OPP MOULTON WR	5/30/07 9:00	3.42	99.8	2.07	2.22	<0.1	<0.1	0.5	0.94	1.28	2.09	4.7	179
SACRAMENTO R OPP MOULTON WR	6/27/07 8:00	5.35	110	1.66	1.75	<0.1	<0.1	0.5	0.95	1.09	1.68	15.4	136
SACRAMENTO R OPP MOULTON WR	7/19/07 10:05	6.46	107	1.77	1.81	<0.1	<0.1	0.47	0.86	1.02	1.49	4.4	159
SACRAMENTO R OPP MOULTON WR	8/28/07 10:40	1.04	34.3	1.69	1.72	<0.1	<0.1	0.42	0.59	0.86	1.01	2.7	51.4
SACRAMENTO R OPP MOULTON WR	9/13/07 11:40	2.77	33.8	1.44	1.61	<0.1	<0.1	0.46	0.57	0.81	0.88	5.4	46.1
SACRAMENTO R OPP MOULTON WR	10/31/07 10:55	2.04	41.1	2.18	2.23	<0.1	<0.1	0.4	0.59	0.81	1.13	9.1	112
SACRAMENTO R OPP MOULTON WR	11/27/07 11:50	0.87	27.8	2.27	2.44	<0.1	<0.1	0.48	0.54	0.78	0.9	7.3	65.7
SACRAMENTO R OPP MOULTON WR	1/23/08 12:40	3.9	218	2.63	2.75	<0.1	<0.1	0.54	1.47	1.12	1.89	5.2	273
SACRAMENTO R OPP MOULTON WR	2/27/08 10:50	10.4	1710	1.06	1.73	<0.1	<0.1	0.41	6.45	2.06	6.7	20.4	1852
SACRAMENTO R OPP MOULTON WR	3/26/08 10:10	2	56.4	2.27	2.36	<0.1	<0.1	0.42	0.73	1.26	1.61	4.9	121
SACRAMENTO R OPP MOULTON WR	4/23/08 10:30	4.59	121	2.14	2.2	<0.1	<0.1	0.43	0.88	1.35	1.95	5	188
SACRAMENTO R OPP MOULTON WR	7/24/08 11:15	2.02	62.8	1.65	1.78	<0.1	<0.1	0.41	0.6	1.07	1.25	5.1	92.9
SACRAMENTO R OPP MOULTON WR	4/22/09 11:10	3.89	66.2	2.14	2.29	<0.1	<0.1	0.38	0.58	1.67	2.11	10.1	98.6
SACRAMENTO R OPP MOULTON WR	5/28/09 12:15	2.79	86.6	1.89	1.97	<0.1	<0.1	0.35	0.57	1.81	1.96	8.6	95.8
SACRAMENTO R OPP MOULTON WR	6/25/09 9:25	3.27	101	1.43	1.52	<0.1	<0.1	0.36	0.61	1.37	1.7	6.3	126
SACRAMENTO R OPP MOULTON WR	7/28/09 10:30	7.77	142	1.39	1.53	<0.1	<0.1	0.45	0.69	1.07	1.5	11.8	126
SACRAMENTO R OPP MOULTON WR	8/27/09 9:30	1.66	30.7	1.19	1.24	<0.1	<0.1	0.35	0.46	0.88	1.06	3	38.2
SACRAMENTO R OPP MOULTON WR	9/24/09 9:50	2.09	35.9	1.34	1.36	<0.1	<0.1	0.34	0.45	0.96	1.05	4.3	40.2
SACRAMENTO R OPP MOULTON WR	10/27/09 11:40	5.31	98.5	1.76	1.85	<0.1	<0.1	0.39	0.64	1.04	1.5	17.1	123
SACRAMENTO R OPP MOULTON WR	11/18/09 11:30	2.56	60	1.94	2.14	<0.1	<0.1	0.4	0.7	0.98	1.45	8	113
SACRAMENTO R OPP MOULTON WR	12/9/09 8:15	1.73	25.8	2.53	2.64	<0.1	<0.1	0.45	0.53	0.92	1.02	3.1	51.7
SACRAMENTO R OPP MOULTON WR	1/26/10 8:45	87.7	3953	1.3	2.43	<0.1	0.144	0.59	14.7	3.45	20.2	114	4700
SACRAMENTO R OPP MOULTON WR	3/2/10 13:15	13.9	793	1.15	1.51	<0.1	<0.1	0.39	3.19	1.56	4.3	29.5	947
SACRAMENTO R OPP MOULTON WR	3/24/10 7:10	1.83	54.6	1.72	1.76	<0.1	<0.1	0.53	0.65	0.95	1.29	5.6	94.2
SACRAMENTO R OPP MOULTON WR	4/21/10 7:00	3.67	780	1.45	1.69	<0.1	<0.1	0.46	3.47	1.43	3.93	8.3	1018
SACRAMENTO R OPP MOULTON WR	5/26/10 7:00	3.46	49.6	1.2	1.26	<0.1	<0.1	0.4	0.54	1.61	1.75	1.4	69.7
SACRAMENTO R OPP MOULTON WR	6/30/10 7:00	6.01	52.4	1.28	1.46	<0.1	<0.1	0.35	0.51	1.17	1.46	5.5	71.9
SACRAMENTO R OPP MOULTON WR	7/28/10 8:40	3.8	29	1.4	1.45	<0.1	<0.1	0.44	0.56	1.33	1.45	3.8	68.8
SACRAMENTO R OPP MOULTON WR	8/31/10 10:10	6.25	34.7	1.22	1.24	<0.1	<0.1	0.27	0.6	1.19	1.26	3.5	76.2
SACRAMENTO R OPP MOULTON WR	10/26/10 8:00	12.9	682	1.55	3.49	<0.1	<0.1	0.42	3.07	1.79	3.95	25.6	830
SACRAMENTO R OPP MOULTON WR	11/30/10 8:50	4.11	48.3	1.67	1.89	<0.1	<0.1	0.58	0.73	1.19	1.29	6.9	75.1
SACRAMENTO R OPP MOULTON WR	12/13/10 11:20	2.71	93.3	1.46	1.52	<0.1	<0.1	0.44	0.91	1.21	1.66	9.1	154
SACRAMENTO R OPP MOULTON WR	1/18/11 10:45	6.13	500	1.48	1.6	<0.1	<0.1	0.47	2.8	1.45	2.77	16.3	547
	Maximum	4357	8733	2.63	3.49	0.029	0.232	9.17	24.8	7.64	27.7	2579	13032
	Mediam	14.1	148.5	1.505	1.735	0.011	0.041	0.55	1.055	1.185	1.67	15.4	198
	Minimum	0.87	25.8	0.879	1.15	0.004	0.009	0.17	0.45	0.71	0.88	1.4	38.2
SWRCB Basin Plan - Drinking Water Standards -Primary MCL		1000											
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL		200										300	
Cal EPA/OEHHA - California Public Health Goal		600		0.004		0.04							
USEPA Secondary MCL		50											
Cal EPA - One in a million incremental cancer risk estimate for drinking water				0.023		0.0023							
USEPA Health Advisory for drinking water				0.02									
USEPA IRIS Reference Dose Drinking Water Health Advisories				2.1									
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity				0.05									
Agriculture Water Quality Goals - Taste and odor threshold		5000										5000	
Calfiornia Toxics Rule Sources of Drinking Water													
National Academy of Sciences Drinking Water Health Advisories		5000											
National Recommended WQ Criteria - Taste and Odor or Welfare												300	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption				0.018									
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration		87										1000	
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration		750											

Table 4. Sacramento River op Moulton Weir, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury ng/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
SACRAMENTO R OPP MOULTON WR	5/14/03 14:15	<0.025	0.299	0.17	20.7	N/A	0.65	3.17	0.11	0.2	<0.025	<0.273	0.4	4.5
SACRAMENTO R OPP MOULTON WR	6/10/03 9:00	<0.017	0.068	0.14	7.15	N/A	0.52	1.38	0.18	<0.296	<0.001	<0.251	0.3	1.5
SACRAMENTO R OPP MOULTON WR	7/10/03 10:40	0.012	0.055	2.05	5.66	N/A	0.92	1.26	<0.129	0.17	<0.011	<0.123	0.35	1.6
SACRAMENTO R OPP MOULTON WR	8/13/03 11:45	<0.003	0.124	0.48	9.98	N/A	0.95	1.8	<0.163	0.21	<0.015	<0.122	0.46	2.24
SACRAMENTO R OPP MOULTON WR	9/3/03 12:30	<0.007	0.183	0.1	18.6	N/A	1.1	2.29	<0.21	0.26	<0.144	<0.144	0.41	3.16
SACRAMENTO R OPP MOULTON WR	10/8/03 12:40	0.028	0.085	4.96	9.5	N/A	1.16	1.64	<0.327	<0.162	<0.01	<0.131	0.62	1.47
SACRAMENTO R OPP MOULTON WR	11/5/03 11:00	0.029	0.057	6.6	8.03	N/A	1.33	1.61	0.17	0.22	<0.02	<0.04	0.9	1.3
SACRAMENTO R OPP MOULTON WR	12/8/03 10:45	0.385	2.93	9.6	218	N/A	3.19	15.7	0.12	0.28	0.037	0.049	10.4	31.6
SACRAMENTO R OPP MOULTON WR	1/6/04 9:30	0.085	0.877	4.62	52.9	N/A	1.53	7.62	0.1	<0.248	<0.007	<0.014	0.9	10.9
SACRAMENTO R OPP MOULTON WR	2/4/04 12:20	0.306	1.2	11.3	83.1	N/A	3.16	8.72	0.11	<0.282	<0.015	0.088	4.09	14.4
SACRAMENTO R OPP MOULTON WR	2/17/04 12:00	0.677	4.8	31.2	381	N/A	6.92	44.5	<0.121	0.26	<0.016	0.06	7.53	56.8
SACRAMENTO R OPP MOULTON WR	3/8/04 11:40	0.054	0.541	3.02	59.7	N/A	1.28	7.41	0.2	0.31	0.04	<0.065	1.04	10.6
SACRAMENTO R OPP MOULTON WR	4/7/04 9:45	<0.022	0.09	2.06	10	N/A	1.14	1.76	<0.112	0.53	0.02	<0.031	0.5	1.54
SACRAMENTO R OPP MOULTON WR	5/5/04 11:00	<0.007	0.13	1.58	12.3	N/A	0.87	2.16	<0.166	0.23	<0.001	<0.044	0.19	2.57
SACRAMENTO R OPP MOULTON WR	6/9/04 10:00	0.082	0.112	4.82	10.2	N/A	1.3	1.99	<0.121	<0.226	<0.014	<0.081	1.22	2.38
SACRAMENTO R OPP MOULTON WR	7/29/04 10:40	0.017	0.059	1.81	4.98	N/A	1.02	1.46	0.15	0.27	<0.008	<0.067	0.47	1.31
SACRAMENTO R OPP MOULTON WR	10/5/04 11:00	0.011	0.049	2.04	7.22	N/A	1.16	1.44	<0.144	<0.204	<0.077	<0.054	0.45	1.09
SACRAMENTO R OPP MOULTON WR	11/9/04 13:00	0.008	0.04	1.69	8.14	N/A	1.09	1.24	<0.149	0.19	<0.006	<0.063	0.46	0.89
SACRAMENTO R OPP MOULTON WR	12/7/04 10:20	<0.01	0.054	0.68	7.19	N/A	0.61	0.84	<0.163	0.37	<0.011	<0.04	0.2	0.88
SACRAMENTO R OPP MOULTON WR	1/10/05 11:00	0.091	0.609	2.64	43.2	N/A	1.79	6.19	0.31	0.46	0.005	0.01	1.11	7.93
SACRAMENTO R OPP MOULTON WR	2/2/05 12:25	0.058	0.404	2.79	23.2	N/A	1.45	4.05	<0.222	0.36	0.002	0.007	0.77	4.12
SACRAMENTO R OPP MOULTON WR	3/10/05 14:45	0.011	0.094	0.78	7.17	N/A	0.83	1.6	<0.245	0.29	<0.001	<0.036	0.24	1.26
SACRAMENTO R OPP MOULTON WR	4/20/05 10:50	0.021	0.079	2.74	10.8	N/A	0.8	1.42	0.25	0.28	<0.003	<0.005	0.56	1.37
SACRAMENTO R OPP MOULTON WR	5/19/05 11:15	0.04	3.35	2.73	268	N/A	1.38	31.5	<0.399	<0.317	<0.009	0.045	1.14	39.4
SACRAMENTO R OPP MOULTON WR	6/28/05 15:05	<0.009	0.041	4.35	4.85	N/A	0.72	1.18	0.31	0.38	<0.002	<0.027	1	1.28
SACRAMENTO R OPP MOULTON WR	7/26/05 11:00	<0.018	0.039	0.63	7.35	N/A	0.69	1.55	<0.222	<0.222	<0.013	<0.013	0.55	1.86
SACRAMENTO R OPP MOULTON WR	8/23/05 9:30	<0.004	0.045	0.66	5.73	N/A	0.69	1.11	<0.227	<0.227	<0.001	<0.001	0.14	0.88
SACRAMENTO R OPP MOULTON WR	9/28/05 8:30	<0.004	0.048	0.45	4.75	N/A	0.88	1.25	0.18	0.22	<0.003	<0.003	0.23	1.13
SACRAMENTO R OPP MOULTON WR	10/25/05 10:30	0.021	0.114	1.28	10.6	N/A	1.04	1.77	<0.063	0.18	<0.002	<0.002	0.53	1.81
SACRAMENTO R OPP MOULTON WR	11/14/05 12:00	0.013	0.212	1.27	26.9	N/A	1.04	2.36	<0.186	<0.186	<0.009	<0.009	0.73	3.62
SACRAMENTO R OPP MOULTON WR	12/14/05 11:40	0.008	0.079	0.68	6.17	N/A	1.05	1.33	<0.149	0.19	<0.001	<0.001	0.66	1.78
SACRAMENTO R OPP MOULTON WR	1/4/06 10:40	0.626	2.64	24.9	164	N/A	5.91	22.2	<0.149	0.15	0.011	0.028	4.66	22.9
SACRAMENTO R OPP MOULTON WR	1/24/06 13:10	0.105	0.749	13.6	60.3	N/A	1.78	6.85	0.23	0.28	<0.005	<0.005	1.54	9.49
SACRAMENTO R OPP MOULTON WR	2/22/06 11:40	0.058	0.538	6.68	40.1	N/A	1.44	4.63	0.16	0.23	<0.009	<0.009	0.83	5.22
SACRAMENTO R OPP MOULTON WR	3/1/06 12:10	0.852	2.81	35.8	207	N/A	6.24	19.6	<0.149	0.2	<0.009	<0.009	7.67	27.9
SACRAMENTO R OPP MOULTON WR	4/17/06 11:10	0.271	1.27	13.8	83.2	N/A	2.88	9.26	<0.2	0.22	<0.03	<0.03	2.99	12.8
SACRAMENTO R OPP MOULTON WR	5/17/06 11:35	<0.04	0.183	2.83	19.1	N/A	1.08	2.15	0.22	0.26	<0.03	<0.03	0.39	2.53
SACRAMENTO R OPP MOULTON WR	6/27/06 10:25	<0.04	0.133	0.32	13.6	N/A	1	2.08	<0.2	<0.2	<0.03	0.066	0.19	2.06
SACRAMENTO R OPP MOULTON WR	7/26/06 8:20	<0.04	0.149	1.11	14	1.6	1.26	2.6	<0.2	<0.2	<0.03	<0.03	0.69	2.39
SACRAMENTO R OPP MOULTON WR	8/22/06 10:50	<0.04	0.081	1.89	8.01	0.67	1.38	2.05	0.21	0.26	<0.03	<0.03	0.55	1.5
SACRAMENTO R OPP MOULTON WR	9/20/06 11:35	<0.04	0.096	2.46	11.8	1.5	1.42	2.26	<0.2	<0.2	<0.03	<0.03	0.54	8.42
SACRAMENTO R OPP MOULTON WR	10/24/06 12:15	<0.04	0.105	2.1	12.3	0.39	1.45	2.03	<0.2	0.21	<0.03	<0.03	0.16	3.21
SACRAMENTO R OPP MOULTON WR	12/12/06 12:35	<0.04	0.264	3.24	22	1.8	2.21	2.82	<0.2	<0.2	<0.03	<0.03	1.65	6.62
SACRAMENTO R OPP MOULTON WR	1/9/07 13:00	<0.04	0.067	2.75	11	1.5	1.08	1.61	<0.2	<0.2	<0.03	<0.03	0.52	3.05
SACRAMENTO R OPP MOULTON WR	2/27/07 10:00	0.254	0.501	10.7	24.6	0.95	2.31	2.83	<0.2	<0.2	<0.03	<0.03	3.33	7.25
SACRAMENTO R OPP MOULTON WR	3/20/07 11:15	<0.04	0.071	2.35	9.98	1.7	0.85	1.21	<0.2	0.31	<0.03	<0.03	0.36	2.78
SACRAMENTO R OPP MOULTON WR	4/18/07 10:15	<0.04	0.078	3.59	11.1	1.3	0.79	1.17	<0.2	<0.2	<0.03	<0.03	0.46	3.33
SACRAMENTO R OPP MOULTON WR	5/30/07 9:00	<0.04	0.147	0.45	12.5	N/A	0.73	1.32	<0.2	<0.2	<0.03	<0.03	0.2	3.66
SACRAMENTO R OPP MOULTON WR	6/27/07 8:00	<0.04	0.092	5.8	12.7	1.1	0.79	1.19	<0.2	<0.2	<0.03	<0.03	0.49	3.4
SACRAMENTO R OPP MOULTON WR	7/19/07 10:05	<0.04	0.066	0.22	8.58	0.98	0.56	1.2	<0.2	<0.2	<0.03	<0.03	0.28	3.2
SACRAMENTO R OPP MOULTON WR	8/28/07 10:40	<0.04	<0.04	0.21	4.92	N/A	0.89	1.02	<0.2	<0.2	<0.03	<0.03	0.46	1.99
SACRAMENTO R OPP MOULTON WR	9/13/07 11:40	<0.04	0.051	0.22	4.64	0.9	0.91	0.95	<0.2	<0.2	<0.03	<0.03	0.46	2.04
SACRAMENTO R OPP MOULTON WR	10/31/07 10:55	<0.04	0.054	0.23	8.41	0.77	1.09	1.2	<0.2	<0.2	<0.03	<0.03	0.31	2.42
SACRAMENTO R OPP MOULTON WR	11/27/07 11:50	<0.04	0.082	0.31	5.67	0.75	0.89	0.92	<0.2	<0.2	<0.03	<0.03	0.29	2.33
SACRAMENTO R OPP MOULTON WR	1/23/08 12:40	<0.04	0.134	1.7	16.3	N/A	1.17	1.49	<0.2	<0.2	<0.03	<0.03	0.77	3.76
SACRAMENTO R OPP MOULTON WR	2/27/08 10:50	<0.04	0.979	0.79	61.7	N/A	1.98	8.93	0.32	0.45	<0.03	<0.03	0.46	11
SACRAMENTO R OPP MOULTON WR	3/26/08 10:10	<0.04	0.061	0.55	11.3	N/A	1	1.13	0.28	0.29	<0.03	<0.03	0.2	2.39
SACRAMENTO R OPP MOULTON WR	4/23/08 10:30	<0.04	0.095	4.21	14.4	N/A	0.92	1.36	<0.2	0.25	<0.03	<0.03	0.66	3.67
SACRAMENTO R OPP MOULTON WR	7/24/08 11:15	<0.04	0.048	0.28	5.01	38	0.65	0.85	0.24	0.28	<0.03	<0.03	0.3	2.53
SACRAMENTO R OPP MOULTON WR	4/22/09 11:10	<0.04	0.057	0.53	9.11	N/A	0.82	0.92	<0.2	0.23	<0.03	<0.03	0.28	2.66
SACRAMENTO R OPP MOULTON WR	5/28/09 12:15	<0.04	0.062	0.41	7.18	N/A	0.78	0.89	<0.2	<0.2	<0.03	<0.03	0.53	2.72
SACRAMENTO R OPP MOULTON WR	6/25/09 9:25	<0.04	0.094	0.33	6.95	N/A	0.93	1.06	0.23	0.26	<0.03	<0.03	0.94	4.54
SACRAMENTO R OPP MOULTON WR	7/28/09 10:30	<0.04	0.062	1.39	7.1	N/A	1.02	1.06	<0.2	<0.2	<0.03	<0.03	0.47	2.72
SACRAMENTO R OPP MOULTON WR	8/27/09 9:30	<0.04	<0.04	0.36	2.63	N/A	0.78	0.86	<0.2	<0.2	<0.03	<0.03	0.33	1.79
SACRAMENTO R OPP MOULTON WR	9/24/09 9:50	<0.04	<0.04	0.33	4.98	N/A	0.84	0.96	<0.2	<0.2	<0.03	<0.03	0.33	1.99
SACRAMENTO R OPP MOULTON WR	10/27/09 11:40	<0.04	0.117	4.35	12.7	N/A	0.94	1.13	<0.2	<0.2	<0.03	<0.03	0.57	2.83
SACRAMENTO R OPP MOULTON WR	11/18/09 11:30	<0.04	0.07	0.44	7.87	N/A	0.89	0.99	<0.2	<0.2	<0.03	<0.03	0.32	2.59
SACRAMENTO R OPP MOULTON WR	12/9/09 8:15	<0.04	<0.04	0.32	7.77	N/A	0.57	0.71	<0.2	<0.2	<0.03	<0.03	0.5	2.41
SACRAMENTO R OPP MOULTON WR	1/26/10 8:45	0.077	4.39	1.92	204	N/A	3.62	25.6	0.23	0.26	<0.03	0.071	0.59	35.9
SACRAMENTO R OPP MOULTON WR	3/2/10 13:15	<0.04	0.604	0.96	45.5	N/A	2.53	4.77	0.24	0.27	<0.03	<0.03	0.84	7.53
SACRAMENTO R OPP MOULTON WR	3/24/10 7:10	<0.04	0.05	0.58	7.08	N/A	0.71	0.8	<0.2	<0.2	<0.03	<0.03	0.23	2.29
SACRAMENTO R OPP MOULTON WR	4/21/10 7:00	0.313	0.56	0.44	37.7	N/A	0.72	4.76	<0.2	0.21	<0.03	<0.03	0.24	7.17
SACRAMENTO R OPP MOULTON WR	5/26/10 7:00	0.048	0.05	0.32	4.64	N/A	0.6	0.73	<0.2	<0.2	<0.03	<0.03	0.42	2.29
SACRAMENTO R OPP MOULTON WR	6/30/10 7:00	<0.04	<0.04	0.28	5.87	N/A	0.73	0.87	<0.2	<0.2	<0.03	<0.03	0.56	2.17
SACRAMENTO R OPP MOULTON WR	7/28/10 8:40	<0.04	0.066	0.33	5.81	N/A	0.86	1.01	<0.2	<0.2	<0.03	<0.03	0.73	2.23
SACRAMENTO R OPP MOULTON WR	8/31/10 10:10	<0.04	0.043	0.5	6.58	N/A	0.8	1.04	<0.2	<0.2	<0.03	<0.03	0.51	1.99
SACRAMENTO R OPP MOULTON WR	10/26/10 8:00	<0.04	0.556	2.25	34	N/A	1.45	3.88	<0.2	0.27	<0.03	<0.03	1.3	6.87
SACRAMENTO R OPP MOULTON WR	11/30/10 8:50	<0.04	0.046	0.58	6.62	N/A	1.33	1.37	<0.2	<0.2	<0.03	<0.03	1.15	2.82
SACRAMENTO R OPP MOULTON WR	12/13/10 11:20	<0.04	0.149	0.6	11.3	N/A	0.62	1.12	<0.2	<0.2	<0.03	<0.03	0.13	2.89
SACRAMENTO R OPP MOULTON WR	1/18/11 10:45	<0.04	0.399	0.83	24.2	N/A	0.88	2.81	<0.2	0.22	<0.03	0.042	1.03	4.83
	Maximum	0.852	4.8	35.8	381	38	6.92	44.5	0.32	0.53	0.04	0.088	10.4	56.8
	Median	0.058	0.095	1.335	10.7	1.1	1.01	1.52	0.215	0.26	0.0155	0.047	0.515	2.69
	Minimum	0.008	0.039	0.1	2.63	0.39	0.52	0.71	0.1	0.15	0.002	0.007	0.13	0.88
SWRCB Basin Plan - Drinking Water Standards -Primary MCL														
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL				50										
Cal EPA/OEHHA - California Public Health Goal		0.02					12							
USEPA Secondary MCL														
Cal EPA - One in a million incremental cancer risk estimate for drinking water		4.1												
USEPA Health Advisory for drinking water				300										
USEPA IRIS Reference Dose Drinking Water Health Advisories														
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity		0.025												
Agriculture Water Quality Goals - Taste and odor threshold				200										
Calfiornia Toxics Rule Sources of Drinking Water						0.05								
National Academy of Sciences Drinking Water Health Advisories														
National Recommended WQ Criteria - Taste and Odor or Welfare				50										
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption														
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration						0.77								
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration						1.4								

Table 5. Stone Corral C nr SI, Part 1 of 2

Station Name	Sample Date	Dissolved Aluminum µg/L	Total Aluminum µg/L	Dissolved Arsenic µg/L	Total Arsenic µg/L	Dissolved Boron mg/L	Dissolved Cadmium µg/L	Total Cadmium µg/L	Dissolved Chromium µg/L	Total Chromium µg/L	Dissolved Copper µg/L	Total Copper µg/L	Dissolved Iron µg/L	Total Iron µg/L
STONE CORRAL C NR SI	5/27/98 10:20	N/A	N/A	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/5/01 15:45	N/A	N/A	N/A	N/A	<0.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/9/01 9:00	N/A	N/A	N/A	N/A	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/20/02 11:30	N/A	N/A	N/A	N/A	0.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/7/02 9:30	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/18/02 11:20	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/10/02 16:45	N/A	N/A	N/A	N/A	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/13/02 8:45	N/A	N/A	N/A	N/A	0.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/18/02 15:15	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/9/03 12:15	N/A	N/A	N/A	N/A	0.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/03 10:50	N/A	N/A	N/A	N/A	0.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/6/03 10:00	N/A	N/A	N/A	N/A	0.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/11/03 14:25	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/17/03 11:45	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/8/03 13:10	N/A	N/A	N/A	N/A	0.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/28/03 11:00	N/A	N/A	N/A	N/A	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/14/03 12:40	3.68	51.9	1.94	2.34	0.6	0.079	0.03	8.1	6.51	4.46	4.69	<3.31	59.5
STONE CORRAL C NR SI	1/6/04 11:30	143	559	1.4	1.45	0.2	<0.008	<0.016	3.4	3.64	2.25	3.28	92.3	691
STONE CORRAL C NR SI	2/4/04 13:00	1399	2065	1.34	1.46	0.2	<0.011	0.016	2.76	3.06	4.71	4.75	1289	1600
STONE CORRAL C NR SI	2/17/04 13:30	1280	6149	1.26	1.91	<0.1	<0.015	0.025	5.74	11	5.45	14.9	966	7420
STONE CORRAL C NR SI	3/8/04 12:45	42.5	55.5	0.719	0.97	0.3	0.006	0.013	1.62	1.86	1.56	1.95	15.5	59
STONE CORRAL C NR SI	4/7/04 10:15	4.17	49.5	1.01	1.27	0.4	<0.005	<0.006	3.6	3.62	2.36	3.01	<2.76	67.1
STONE CORRAL C NR SI	5/5/04 11:50	1.75	3.71	2.21	2.25	0.6	0.011	0.021	6.03	6.49	3.18	3.24	<3.73	10.5
STONE CORRAL C NR SI	10/5/04 14:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/8/04 9:50	5.18	19.8	8.84	9.86	1	0.187	0.195	7	7.37	3	7.65	23.4	67.3
STONE CORRAL C NR SI	12/7/04 12:45	21.9	134	5.05	5.2	0.6	0.176	0.36	5.97	8.43	3.75	4.04	11.8	175
STONE CORRAL C NR SI	1/10/05 13:30	458	1369	1.06	1.23	0.2	0.035	0.037	2.74	3.67	2.72	3.74	331	1285
STONE CORRAL C NR SI	2/2/05 10:45	121	182	1.19	1.19	0.3	0.104	0.524	2.72	2.87	1.84	2.03	73.8	178
STONE CORRAL C NR SI	3/10/05 13:00	4.5	23.6	1.19	1.26	<0.1	0.082	0.13	3.28	3.72	1.86	2.21	<3.34	32.1
STONE CORRAL C NR SI	4/19/05 7:20	4.24	4.98	1.25	1.36	0.5	0.028	0.031	4.9	4.92	1.79	2.56	<5.67	<3.58
STONE CORRAL C NR SI	5/19/05 9:50	2.52	6.37	1.65	1.8	0.4	<0.058	<0.015	3.47	4.86	1.93	2.69	<4.53	11.1
STONE CORRAL C NR SI	6/28/05 13:30	4	4.44	2.01	2.57	0.7	0.036	0.04	0.93	4.4	2.21	3.3	10.5	12.2
STONE CORRAL C NR SI	7/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/22/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/26/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/14/05 9:35	2.27	2.66	8.32	8.66	0.8	<0.009	<0.009	3.78	3.87	4	4.13	28	36.2
STONE CORRAL C NR SI	12/14/05 10:15	2.94	3.44	6.79	7.14	0.7	0.011	0.014	5.18	8.08	1.88	4.38	33.1	41
STONE CORRAL C NR SI	1/24/06 11:45	23.1	28.1	1.76	1.81	0.4	<0.002	<0.002	5.42	5.65	1.65	2.96	14.3	40
STONE CORRAL C NR SI	2/22/06 9:45	7.08	9.09	1.79	1.84	0.5	<0.009	<0.009	7.91	8.93	2.49	2.75	7.9	20.6
STONE CORRAL C NR SI	3/1/06 10:25	1991	2268	1.41	1.49	0.2	0.011	0.051	4.32	4.57	5	5.77	1370	2282
STONE CORRAL C NR SI	4/17/06 8:30	206	265	0.77	0.774	0.2	<0.1	<0.1	1.27	1.42	1.38	1.48	181	236
STONE CORRAL C NR SI	5/17/06 10:00	2.37	4.04	1.75	1.81	0.4	<0.1	<0.1	4.03	4.28	1.78	1.98	0.7	4.3
STONE CORRAL C NR SI	6/27/06 9:00	1.39	34	3.08	3.53	0.6	<0.1	<0.1	1.05	1.48	1.26	1.99	22.9	70.5
STONE CORRAL C NR SI	7/26/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/12/06 10:30	135	598	6.74	9.96	0.8	<0.1	<0.1	5.1	9.05	4.32	6.1	53.2	222
STONE CORRAL C NR SI	1/9/07 11:30	11.1	74.1	5.49	5.7	0.7	<0.1	<0.1	4	4.83	1.82	1.94	42.7	117
STONE CORRAL C NR SI	2/27/07 8:30	34.6	36.9	3.41	3.86	0.6	<0.1	<0.1	0.98	1.69	3.9	3.96	57.9	81.1
STONE CORRAL C NR SI	3/20/07 9:50	5.74	64.1	3.26	3.49	0.7	<0.1	<0.1	0.66	1.03	1.1	1.35	61.1	215
STONE CORRAL C NR SI	4/18/07 8:00	4.48	16.4	4.19	4.38	0.7	<0.1	<0.1	0.91	0.97	0.69	0.83	47.3	89.4
STONE CORRAL C NR SI	5/30/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/28/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/13/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/31/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/08 11:30	9.77	3188	1.41	2.23	0.1	<0.1	<0.1	0.41	8.39	5.11	10.8	42.3	3247
STONE CORRAL C NR SI	2/27/08 10:05	1.94	770	1.12	1.4	0.2	<0.1	<0.1	0.21	1.87	2.49	3.5	4.1	634
STONE CORRAL C NR SI	3/26/08 9:10	0.94	33.5	1.57	2.15	0.4	<0.1	<0.1	0.36	0.49	2.97	3.01	2.7	62.7
STONE CORRAL C NR SI	4/23/08 9:50	1.73	50.6	2.63	2.97	0.6	<0.1	<0.1	0.53	0.55	3.82	3.86	7.9	78.4
STONE CORRAL C NR SI	7/23/08 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/22/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	6/25/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	7/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/27/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/24/09 9:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/21/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/18/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/9/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/26/10 10:45	27.1	3100	0.682	1.42	0.1	<0.1	<0.1	0.26	7.11	3.01	9.95	54.8	33.5
STONE CORRAL C NR SI	3/2/10 12:20	3.34	960	1.16	1.45	0.2	<0.1	<0.1	0.27	2.29	2.85	4.4	11.5	854
STONE CORRAL C NR SI	3/24/10 9:05	0.66	8.66	1.85	1.87	0.5	<0.1	<0.1	0.43	0.47	2.34	2.41	3	19.2
STONE CORRAL C NR SI	4/21/10 9:00	3.61	175	0.961	1.12	0.4	<0.1	<0.1	0.48	0.73	2.21	2.86	3.8	225
STONE CORRAL C NR SI	5/26/10 8:50	1.45	1.46	4.07	4.12	0.6	<0.1	<0.1	0.62	0.68	2.28	2.39	1.4	5.1
STONE CORRAL C NR SI	6/29/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/31/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/26/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/30/10 10:30	2.35	6.7	6.04	6.24	0.8	<0.1	<0.1	2.2	2.44	2.79	3.04	9.9	48.4
STONE CORRAL C NR SI	12/13/10 10:10	1.23	2.25	6	6.22	0.7	<0.1	<0.1	3.55	3.73	4.11	4.22	5.2	19.6
STONE CORRAL C NR SI	1/18/11 12:25	3.06	105	2.07	2.14	0.4	<0.1	<0.1	0.74	0.91	2.82	2.99	9.2	131
	Maximum	1991	6149	8.84	9.96	1	0.187	0.524	8.1	11	5.45	14.9	1370	7420
	Median	4.36	50.05	1.775	2.025	0.5	0.0355	0.034	2.75	3.695	2.49	3.14	23.15	70.5
	Minimum	0.66	1.46	0.682	0.774	0.1	0.006	0.013	0.21	0.47	0.69	0.83	0.7	4.3
SWRCB Basin Plan - Drinking Water Standards -Primary MCL		1000												
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL		200											300	
Cal EPA/OEHHA - California Public Health Goal		600		0.004			0.04							
USEPA Secondary MCL														
Cal EPA - One in a million incremental cancer risk estimate for drinking water				0.023			0.0023							
USEPA Health Advisory for drinking water		50		0.02										
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive toxicity				0.05										
California Toxics Rule Sources of Drinking Water														
California Toxics Rule Freshwater Aquatic Life Protection Continuous Concentration														
California Toxics Rule Freshwater Aquatic Life Protection Maximum Concentration														
Agriculture Water Quality Goals - Taste and odor threshold				100		0.7							5000	
California Notification Level - Drinking Water						1								
National Academy of Sciences Health Advisory for Drinking Water		5000												
USEPA IRIS Reference Dose Drinking Water Health Advisory				2.1										
National Recommended WQ Criteria - Taste and Odor or Welfare													300	
National Recommended WQ Criteria - Human Health and Welfare protection - water and fish consumption														
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration		87											1000	
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration		750												

Table 5. Stone Corral C nr SI, Part 2 of 2

Station Name	Sample Date	Dissolved Lead µg/L	Total Lead µg/L	Dissolved Manganese µg/L	Total Manganese µg/L	Total Mercury µg/L	Dissolved Nickel µg/L	Total Nickel µg/L	Dissolved Selenium µg/L	Total Selenium µg/L	Dissolved Silver µg/L	Total Silver µg/L	Dissolved Zinc µg/L	Total Zinc µg/L
STONE CORRAL C NR SI	5/27/98 10:20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/5/01 15:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/9/01 9:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/20/02 11:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/7/02 9:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/18/02 11:20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/10/02 16:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/13/02 8:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/18/02 15:15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/9/03 12:15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/03 10:50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	2/6/03 10:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/11/03 14:25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	3/17/03 11:45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/8/03 13:10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/28/03 11:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/14/03 12:40	0.058	0.042	0.17	9.03	N/A	2.57	3.14	7.33	7.37	0.131	<0.197	0.86	1.25
STONE CORRAL C NR SI	1/6/04 11:30	0.036	0.256	9.48	42.9	N/A	2.32	3.56	3.02	3.07	<0.007	<0.014	0.46	2.74
STONE CORRAL C NR SI	2/4/04 13:00	0.266	0.507	13.1	32.3	N/A	3.27	3.79	0.66	1.25	<0.015	0.207	4.24	5.21
STONE CORRAL C NR SI	2/17/04 13:30	0.782	2.91	36.1	203	N/A	3.58	15.8	0.26	0.38	<0.016	0.056	4.53	24.9
STONE CORRAL C NR SI	3/8/04 12:45	0.009	0.094	1.66	3.57	N/A	2.11	2.32	1.34	2.38	0.054	0.09	0.82	1.05
STONE CORRAL C NR SI	4/7/04 10:15	0.05	0.065	1.15	4.6	N/A	2.4	2.58	4.26	4.48	0.03	<0.031	1.3	1.65
STONE CORRAL C NR SI	5/5/04 11:50	0.035	0.038	0.85	2.41	N/A	2.82	2.85	8.2	8.22	0.09	<0.044	1.38	1.4
STONE CORRAL C NR SI	10/5/04 14:30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/8/04 9:50	0.059	0.142	27.2	43.1	N/A	4.98	9.72	30	30.4	0.082	0.107	1.78	1.81
STONE CORRAL C NR SI	12/7/04 12:45	0.244	0.293	1.07	30.6	N/A	3.29	3.49	10.5	10.6	0.05	0.086	0.99	1.44
STONE CORRAL C NR SI	1/10/05 13:30	0.111	0.428	2.61	32.1	N/A	2.24	3.48	1.69	1.84	0.009	0.015	1.46	4.64
STONE CORRAL C NR SI	2/2/05 10:45	0.095	0.117	7.35	19.8	N/A	2.15	2.63	2.32	2.87	0.004	0.007	0.99	1.45
STONE CORRAL C NR SI	3/10/05 13:00	0.05	0.057	1.17	6.21	N/A	1.53	2.29	3	3	<0.001	<0.036	0.73	3.86
STONE CORRAL C NR SI	4/19/05 7:20	0.054	0.147	2.44	3.02	N/A	2.12	2.15	4.22	5.06	<0.003	<0.005	0.81	0.88
STONE CORRAL C NR SI	5/19/05 9:50	0.006	0.038	0.73	2.12	N/A	1.43	2.09	4.07	4.46	<0.009	0.021	0.7	0.74
STONE CORRAL C NR SI	6/28/05 13:30	0.094	0.099	2.4	6.88	N/A	1.96	2.45	5.68	5.9	0.05	0.173	0.91	1.72
STONE CORRAL C NR SI	7/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/22/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/26/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/05 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/14/05 9:35	0.007	0.008	20.3	21.2	N/A	7.73	8.27	20.6	20.7	<0.009	<0.009	1.55	1.57
STONE CORRAL C NR SI	12/14/05 10:15	0.008	0.014	17.1	19	N/A	8	8.64	21.4	22.6	<0.001	0.041	1.04	1.36
STONE CORRAL C NR SI	1/24/06 11:45	0.013	0.021	29.4	32.6	N/A	3.34	3.9	5.53	5.63	<0.005	0.011	0.84	0.87
STONE CORRAL C NR SI	2/22/06 9:45	<0.045	0.009	8.96	13.9	N/A	3.57	3.39	6.31	7.05	<0.009	<0.009	0.91	1.03
STONE CORRAL C NR SI	3/1/06 10:25	0.536	1.38	29.8	46.9	N/A	4.79	5.55	0.8	1.06	<0.009	<0.009	6.47	7.11
STONE CORRAL C NR SI	4/17/06 8:30	0.054	0.089	9.99	14.1	N/A	2.65	3.23	1.75	1.99	<0.03	<0.03	1.27	1.61
STONE CORRAL C NR SI	5/17/06 10:00	<0.04	<0.04	1.65	1.73	N/A	1.59	1.98	5.38	5.93	<0.03	<0.03	0.9	0.93
STONE CORRAL C NR SI	6/27/06 9:00	<0.04	<0.04	8.27	39.4	N/A	2.15	3.46	3.58	3.97	0.087	0.165	0.6	0.64
STONE CORRAL C NR SI	7/26/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/24/06 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/12/06 10:30	<0.04	0.122	18.5	71.3	N/A	4.37	6.92	15.6	21.8	<0.03	<0.03	0.79	3.78
STONE CORRAL C NR SI	1/9/07 11:30	0.2	0.215	32.8	80.2	0.29	3.07	3.23	19.6	20.6	<0.03	<0.03	1.04	2.53
STONE CORRAL C NR SI	2/27/07 8:30	0.05	0.121	28	29.3	N/A	2.59	3.79	9.75	13.7	<0.03	<0.03	1.32	3.01
STONE CORRAL C NR SI	3/20/07 9:50	<0.04	0.062	35.3	89.4	0.92	1.2	1.44	6.1	7.26	<0.03	<0.03	0.97	2.79
STONE CORRAL C NR SI	4/18/07 8:00	0.06	0.068	25.6	41.4	2.3	1.3	1.38	5.73	5.93	<0.03	<0.03	1.03	2.42
STONE CORRAL C NR SI	5/30/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/28/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/13/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/31/07 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/23/08 11:30	0.06	2.04	2.41	92.6	N/A	3.43	9.39	0.65	0.9	<0.03	0.033	0.5	16.3
STONE CORRAL C NR SI	2/27/08 10:05	<0.04	0.272	0.54	30.8	N/A	1.66	2.46	2.2	2.5	<0.03	<0.03	0.64	4.66
STONE CORRAL C NR SI	3/26/08 9:10	<0.04	0.064	1.63	27.9	N/A	2.13	3.1	3.53	4.02	<0.03	<0.03	0.8	2.42
STONE CORRAL C NR SI	4/23/08 9:50	0.046	0.059	8.33	19.1	N/A	3.77	3.86	9.54	9.75	<0.03	<0.03	1.28	2.94
STONE CORRAL C NR SI	7/23/08 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	4/22/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	5/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	6/25/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	7/28/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/27/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	9/24/09 9:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/21/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/18/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	12/9/09 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	1/26/10 10:45	<0.04	1.91	1.52	106	N/A	4.36	8.87	0.59	0.63	<0.03	<0.03	0.86	16.1
STONE CORRAL C NR SI	3/2/10 12:20	<0.04	0.438	0.69	46.6	N/A	2.29	2.98	2.02	2.54	<0.03	<0.03	1.08	5.48
STONE CORRAL C NR SI	3/24/10 9:05	<0.04	<0.04	2.65	14.4	N/A	1.57	2.33	4.97	5.56	<0.03	<0.03	1.04	2.44
STONE CORRAL C NR SI	4/21/10 9:00	<0.04	0.087	1.64	12.6	N/A	1.51	1.98	2.93	3	<0.03	<0.03	1.06	2.7
STONE CORRAL C NR SI	5/26/10 8:50	<0.04	<0.04	0.14	1.34	N/A	2	2.06	4.31	4.4	<0.03	<0.03	1.85	2.52
STONE CORRAL C NR SI	6/29/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	8/31/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	10/26/10 0:00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
STONE CORRAL C NR SI	11/30/10 10:30	<0.04	<0.04	63.4	75.9	N/A	2.04	2.1	1.36	1.42	<0.03	<0.03	2.7	3.76
STONE CORRAL C NR SI	12/13/10 10:10	<0.04	<0.04	0.29	16	N/A	1.93	2.61	1.74	1.88	0.089	0.12	2.17	2.5
STONE CORRAL C NR SI	1/18/11 12:25	<0.04	0.057	38.2	78.8	N/A	1.25	1.72	3.43	3.5	0.064	0.347	1.42	1.79
	Maximum	0.782	2.91	63.4	203	2.3	8	15.8	30	30.4	0.131	0.347	6.47	24.9
	Median	0.054	0.0965	5	28.6	0.92	2.305	3.12	4.145	4.43	0.059	0.086	1.035	2.43
	Minimum	0.006	0.008	0.14	1.34	0.29	1.2	1.38	0.26	0.38	0.004	0.007	0.46	0.64
SWRCB Basin Plan - Drinking Water Standards -Primary MCL														
SWRCB Basin Plan - Drinking Water Standards -Secondary MCL				50										
Cal EPA/OEHHA - California Public Health Goal		0.2					12		30					
USEPA Secondary MCL														
Cal EPA - One in a million incremental cancer risk estimate for drinking water														
USEPA Health Advisory for drinking water														
California Proposition 65 Safe Harbor Level - Max. Allowable dose level for reproductive tox		0.25												
California Toxics Rule Sources of Drinking Water						0.05								
California Toxics Rule Freshwater Aquatic Life Protection Continuous Concentration									5					
California Toxics Rule Freshwater Aquatic Life Protection Maximum Concentration									20					
Agriculture Water Quality Goals - Taste and odor threshold									20					
California Notification Level - Drinking Water														
National Academy of Sciences Health Advisory for Drinking Water														
USEPA IRIS Reference Dose Drinking Water Health Advisory														
National Recommended WQ Criteria - Taste and Odor or Welfare				50										
National Recommended WQ Criteria - Human Health and Welfare protection - water and														
National Recommended WQ Criteria - Freshwater Aquatic Life Continuous Concentration														
National Recommended WQ Criteria - Freshwater Aquatic Life Maximum Concentration														

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/1/2021 4:23:50 PM
To: Wang,Chuching [cwang@mwdh2o.com]
CC: Neudeck,Randall D [rneudeck@mwdh2o.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Sites Modeling Request

Hi Chuching,

Thank you for your patience as it took me a little longer than expected to circle back with you on this topic. After talking with CH and reviewing their scope, here's where we are with respect to the "Minimum Modeling Set" slide you sent over:

- One note: the baseline included in the Sites EIR/EIS is the 2020 Benchmark Baseline, which has both ROC on LTO and the SWP ITP. It was developed by Reclamation in collaboration with DWR and CDFW.
- The Authority currently does not have scope with CH or firm plans to provide modeling with Delta Conveyance. We originally hoped we could include Delta Conveyance in the cumulative analysis for the EIR/EIS. But, right now no operating/modeling criteria have been released for the Delta Conveyance Project and we need to advance the analysis to meet our schedule, so it won't be included in the Draft EIR/EIS. Depending on timing and CH's workload, it is possible a Sites + Delta Conveyance run could be completed once operating/modeling criteria have been released for the Delta Conveyance Project.
- Additional future regulations: we have done some high-level analysis on possible regulations. For example, CH evaluated an unimpaired flow requirement to see how it might impact the project. The answer is that it depends how it is implemented (e.g. system-wide or by tributary). I think that may be the case for many proposed future regulations. Do you have something specific in mind with this item?
- The Storage Policy states that the Authority will maximize diversions whenever possible. However, it is possible for an individual participant to opt-out (or, more likely, lease their space) should they so choose. Does this get at your concern with this item? Does the policy as it stands now work for Met or would you propose something different? We are in the midst of updates to the Storage Policy, so any feedback is appreciated.

You also sent me an email last week about the modeling results. We will discuss the results in this month's workgroup meeting – I sent out a Doodle poll to the primary participants but will be sure to include you when the invite goes out.

Please let me know if you have any questions or would like to set up a call to discuss and of this.

Best,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Wang,Chuching <cwang@mwdh2o.com>
Sent: Thursday, December 17, 2020 5:37 PM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Cc: Neudeck,Randall D <rneudeck@mwdh2o.com>
Subject: FW: Sites Modeling Request

Hi, Erin,

I apologize for the delay of sharing the attached file.
I have add watermark “DRAFT, for discussion purpose” to the slides.

Should you have any further question on it, please contact me.

Best regards,
Chuching

Chuching Wang, Ph.D., P.E.
Senior Engineer
Bay Delta Initiatives
Office of The General Manager
Metropolitan Water District of Southern California
(213)217-6188, (310)500-8658 cell

From: Wang,Chuching
Sent: Friday, December 11, 2020 3:41 PM
To: 'Heydinger, Erin' <Erin.Heydinger@hdrinc.com>
Cc: Neudeck,Randall D <rneudeck@mwdh2o.com>
Subject: RE: Sites Modeling Request

Hi, Erin,

For your information, I have emailed the slides to my manager for review. I will follow it up for response. Hopefully, I will get it to you on Monday.

Have a nice weekend.

Chuching

Chuching Wang, Ph.D., P.E.
Senior Engineer
Bay Delta Initiatives
Office of The General Manager
Metropolitan Water District of Southern California
(213)217-6188, (310)500-8658 cell

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, December 11, 2020 3:37 PM
To: Wang,Chuching <cwang@mwdh2o.com>
Subject: RE: Sites Modeling Request

Hi Chuching,

Following up on the email below. Sorry to do so on a Friday afternoon! No rush on this, just wanted to ping you as a reminder.

Have a great weekend,
Erin

Erin Heydinger PE, PMP

D 916.679.8863 M 651.307.9758

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From: Heydinger, Erin
Sent: Monday, December 7, 2020 4:26 PM
To: Wang,Chuching <cwang@mwdh2o.com>
Cc: Randall Neudeck (rneudeck@mwdh2o.com) <rneudeck@mwdh2o.com>
Subject: Sites Modeling Request

Hi Chuching,

At the last ad hoc Workgroup meeting, you showed a slide that included Sites modeling needs. Would you be willing to share that with me? I'm working on putting together a brief description that identifies which of those items are already scoped to perform and which are not.

Also, you included an item that said Operation Policy – Optimize Reservoir Yield vs. Individual Operation. Could you expand on that a bit? I don't think we discussed it specifically and I can read that a couple of different ways.

Thanks,
Erin

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/2/2021 8:08:11 AM
To: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: Sending CalSim Model to Agencies

Yes, Ali sent out an email. I am thinking CH will have it done today. They let me know it was done yesterday and they're doing QC and starting on the DSM2/HEC 5Q.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>
Sent: Tuesday, February 2, 2021 6:39 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Cc: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Subject: RE: Sending CalSim Model to Agencies

Hi Ali,

We didn't get a chance to discuss the Alt 3 modeling re-do during our EIR/EIS call. Has ICF been notified or should I reach out to Nicole and Monique?

Thanks,

Laurie

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <john.spranza@hdrinc.com>; Heydinger, Erin <erin.heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
~~~~~~

Good [afternoon],

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:
~~~~~~

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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From: Marcia Kivett [MKivett@sitesproject.org]
Sent: 2/2/2021 8:25:22 AM
To: Bruce Houdesheldt [bhoudesheldt@roseville.ca.us]
Subject: Sites Reservoir Project Meeting Request

Good Morning,

Do you have a few minutes this week to talk with Jerry about water quality concerns raised at last week's town hall meeting?

Jerry's available:

Today: any time at/after 3:00
Wednesday, Feb 3 – 8:00
Thursday, Feb 4 – 8:00, 10:00, any time at/after 3:00

Thanks Bruce!

Marcia Kivett
Sites Project Admin
Phone: 561.843.9740
Email: mkivett@sitesproject.org
Web: www.SitesProject.org
P.O. Box 517
122 Old Hwy 99W
Maxwell, CA 95955

From: Herrin, Jeff [jeff.herrin@aecom.com]
Sent: 2/2/2021 12:29:47 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]
CC: Heydinger, Erin [erin.heydinger@hdrinc.com]
Subject: RE: Sites - Recreation Benefits
Attachments: AppendixE_Recreation (1).pdf

Ali,

We did not include any minimum water surface elevation for recreational benefits. The design includes two access ramps for boats (one on the east and one on the west) that will likely go all the way to dead pool. In the descriptions of the recreation areas, we focused on camping, hiking, and other land-based activities. We did not envision it as a great place for swimming. Other than fishing or boating, we downplay water based recreation. Not to say that more couldn't be done, but we didn't envision features to maximize it.

The attached file shows all recreation areas evaluated in the Federal Feasibility Report. The Authority is proposing Stone Corral and Peninsula Hills (the County has relocated this area slightly to the north with boat access to the south) only. Even with the changes, you can see the types of activities proposed.

Jeff

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 02, 2021 11:46 AM
To: Herrin, Jeff <jeff.herrin@aecom.com>
Cc: Heydinger, Erin <erin.heydinger@hdrinc.com>
Subject: [EXTERNAL] Sites - Recreation Benefits

Hi Jeff – We are working on a re-draft of the Storage Policy. We added the new section below, which identifies that recreation is incidental to the water supply benefits. One of the members asked if this would conflict with or compromise our ability to get the recreation WSIP funds.

I reviewed the recreation WSIP materials that I have (but I don't have the actual application), and they all seemed to be clear that the reservoir water surface elevation may fluctuate. None of the materials that I saw seemed to say that recreation had a certain priority or that we needed to hold the reservoir at some elevation for recreation.

With your tremendous history and knowledge of the WSIP process, do you think having recreation incidental to the water benefits would be an issue? Any materials that I should review / double check on this?

PRIORITY OF OPERATION

(11) Sites Reservoir will provide water supply and water supply related environmental benefits (including water quality benefits) along with flood control, recreation, and power generation benefits. Sites Reservoir will be operated for water supply and water supply related environmental benefits that accrue to the Storage Partners. Flood control benefits are inherent and will accrue regardless of the other benefits. Recreation and power generation benefits are incidental to the operations of Sites Reservoir for water supply and water supply related environmental benefits.

Any thoughts you have are much appreciated!

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 |
aforsythe@sitesproject.org | www.SitesProject.org

From: Hartman, Jelena@Waterboards [Jelena.Hartman@waterboards.ca.gov]
Sent: 2/3/2021 8:48:57 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Montgomery, Amanda@Waterboards [Amanda.Montgomery@waterboards.ca.gov]; Heydinger, Erin [erin.heydinger@hdrinc.com]
Subject: RE: Staff contact for climate change consideration relevant to water availability

Good morning-

Thank you for the introductions, Amanda and Alicia. The plan sounds good.
Looking forward to hearing more about your efforts.

Best,

Jelena

Jelena Hartman, Senior Scientist
Division of Water Rights
State Water Resources Control Board
(916) 327-8621

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Wednesday, February 3, 2021 8:43 AM
To: Montgomery, Amanda@Waterboards <Amanda.Montgomery@waterboards.ca.gov>; Heydinger, Erin <erin.heydinger@hdrinc.com>; Hartman, Jelena@Waterboards <Jelena.Hartman@waterboards.ca.gov>
Subject: RE: Staff contact for climate change consideration relevant to water availability

EXTERNAL:

Wonderful. Thanks Amanda!

Jelena, Erin Heydinger (included on this email) would be our contact from the Sites Project. She will be in touch shortly to set up some time to discuss the climate change efforts we have planned for the EIR analysis and the California Water Commission Feasibility Report.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 |
aforsythe@sitesproject.org | www.SitesProject.org

From: Montgomery, Amanda@Waterboards <Amanda.Montgomery@waterboards.ca.gov>
Sent: Tuesday, February 2, 2021 10:33 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>
Cc: Hartman, Jelena@Waterboards <Jelena.Hartman@waterboards.ca.gov>
Subject: Staff contact for climate change consideration relevant to water availability

Hi Alicia,

I have on my follow up list from yesterdays discussion to inquire with you about how to connect the appropriate member of your team with our division permitting climate change lead (Jelena Hartman) so they can begin to coordinate on that issue area. I remain the overall contact within water rights permitting (until I hire a designated staff person as mentioned yesterday).

Amanda Montgomery
Environmental Program Manager
Permitting Section
Division of Water Rights
State Water Resources Control Board
Amanda.montgomery@waterboards.ca.gov

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 2/3/2021 10:42:04 AM
To: Heydinger, Erin [erin.heydinger@hdrinc.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Rob Leaf [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]
Subject: RE: Sending CalSim Model to Agencies

All of the agencies have asked for at least 2 weeks to review the results and models. If we get it out this week, that starts the clock and puts the initial meeting last week of February/first week of March.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Wednesday, February 3, 2021 9:07 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good I will pull together the items for the attachments. John – what timeline should I provide, assuming I get this out by early next week? I will also send the link separately to MBK.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
~~~~~~

Good [afternoon],
~~~~~~

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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From: Jerry Brown [jbrown@sitesproject.org]
Sent: 2/4/2021 8:13:13 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Heydinger, Erin [erin.heydinger@hdrinc.com]
Subject: FW: SCV Water

Can whomever of the two of you is the appropriate person get back to Dirk on his question about availability of the Sites Ops model. I think we provided something similar to MWD didn't we?

From: Dirk Marks <dmarks@scvwa.org>
Date: Thursday, February 4, 2021 at 7:59 AM
To: Jerry Brown <jbrown@sitesproject.org>
Cc: Steve Cole <scole@scvwa.org>
Subject: RE: SCV Water

Hi Jerry,
Thanks for checking in. The consultant's comments you referred to at last week's public work shop on our pending Water Shortage Contingency Plan don't indicate SCV Water changing its direction related to Sites Reservoir or for that matter other projects we are considering to supplement our water portfolio with. In our UWMP we intend to discuss Sites as an investment in reliability that could provide us with dry-year supplies that complement the existing portfolio. That portfolio is view as being sufficient to meet current normal year demands but additional investment is required for meeting dry-year demands as well as considering resiliency of supplies as we face climate change and increasing stringent regulatory constraints.

Part of our Urban Planning effort is to update our Reliability Report that is based on a model that uses CASIM II output to operate our various programs. It would be very helpful to have the new CASIM data from the most recent Sites modeling so we could complete our modeling effort in the upcoming weeks. Should I contact Ali or Erin directly?

Appreciate all of your teams efforts to advance this project. I remain very impressed by your many accomplishments,
Dirk

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Wednesday, February 3, 2021 4:56 PM
To: Dirk Marks <dmarks@scvwa.org>
Subject: SCV Water

CAUTION - EXTERNAL SENDER

Hi Dirk – I hope you are well. I was able to attend SCV Water's UWMP Update public meeting last week. I was really impressed with the professionalism of the staff and the presentations were great. I didn't see a lot of public engagement during the session but I applaud the agency for making the effort. I didn't get to stay for the entire presentation but this quote in the news article is why I'm reaching out to you to see if anything is changing at the agency as it relates to involvement in Sites. I take it from this statement that SCV Water is looking at Sites as a supply to support new development and not for improving reliability for existing customers. Is this correct?

Jerry

The proposed strategy is to first augment supply, utilizing groundwater through water banking and transfers from other water agencies, to reduce customer hardships, while then balancing customer incentives, such as rebates for water-saving measures, with prohibitions and penalties for water waste, Erbeznik said.

This plan would then become part of a water shortage ordinance, which following approval by the SCV Water board of directors, provides the agency legal authorities to implement and enforce its shortage response actions.

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/4/2021 9:09:19 AM
To: Dirk Marks [dmarks@scvwa.org]
CC: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: RE: SCV Water

Good morning Dirk,

Jerry forwarded your email to me. We do have updated CalSim results and the operations team is working on pulling together participant-specific results. We intend to go over these at the ad hoc workgroup meeting on Monday, February 15th and will send out the presentation following the meeting if you aren't able to attend. Will this work for your timeline with the UWMP or do you need something sooner?

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Dirk Marks <dmarks@scvwa.org>
Date: Thursday, February 4, 2021 at 7:59 AM
To: Jerry Brown <jbrown@sitesproject.org>
Cc: Steve Cole <scole@scvwa.org>
Subject: RE: SCV Water

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Part of our Urban Planning effort is to update our Reliability Report that is based on a model that uses CASIM II output to operate our various programs. It would be very helpful to have the new CASIM data from the most recent Sites modeling so we could complete our modeling effort in the upcoming weeks. Should I contact Ali or Erin directly?

Appreciate all of your teams efforts to advance this project. I remain very impressed by your many accomplishments,
Dirk

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Wednesday, February 3, 2021 4:56 PM
To: Dirk Marks <dmarks@scvwa.org>
Subject: SCV Water

CAUTION - EXTERNAL SENDER

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Jerry

The proposed strategy is to first augment supply, utilizing groundwater through water banking and transfers from other water agencies, to reduce customer hardships, while then balancing customer incentives, such as rebates for water-saving measures, with prohibitions and penalties for water waste, Erbeznik said.

This plan would then become part of a water shortage ordinance, which following approval by the SCV Water board of directors, provides the agency legal authorities to implement and enforce its shortage response actions.

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/4/2021 9:24:24 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: Dead Pool Confirmation

Ali,

See below. This is related to storage-based participation. I think today we also mention that we are refining our dead pool assumptions. I think if we are overestimating the dead pool (which it looks like we may be given Jeff's response below), this could also be a source of water for future investors.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Herrin, Jeff <jeff.herrin@aecom.com>
Sent: Wednesday, February 3, 2021 9:27 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Cc: Luu, Henry <Henry.Luu@hdrinc.com>
Subject: RE: Dead Pool Confirmation

The low-level drawdown is set at an elevation of 300 ft MSL. If you look at the reservoir elevation-storage curve (see snapshot below) you can see that at El. 300 ft there is 17.7 TAF storage. I don't know what the basis for 60 TAF is, but we could draw down below that elevation – I think we would need to for an emergency drawdown event. The design for the specific tower portal gates is approximate at this time. As we get more information on operations, we can better define the size and elevations for the gates.

Elevation Versus Storage Data

Reservoir Elevation (ft)	Storage (Acre-Feet)
280.0	0
290.0	11,029
300.0	17,647
310.0	29,412
320.0	50,078
330.0	80,882
340.0	112,359
350.0	151,470
360.0	200,601
370.0	257,353
380.0	320,833
390.0	385,294
400.0	462,053
410.0	541,177
420.0	631,450
430.0	723,529
440.0	824,033
450.0	932,353
460.0	1,040,446
470.0	1,154,412
480.0	1,276,899
490.0	1,394,117
500.0	1,533,618
510.0	1,669,117
520.0	1,807,485
531.0	1,980,000
540.0	2,096,884

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Wednesday, February 03, 2021 8:21 AM
To: Herrin, Jeff <jeff.herrin@aecom.com>
Cc: Luu, Henry <Henry.Luu@hdrinc.com>
Subject: [EXTERNAL] Dead Pool Confirmation

Hi Jeff,

I wanted to confirm with you on the elevation/storage of the dead pool. The modeling right now assumes we generally preserve dead pool of 120 TAF for water quality considerations. However, dead pool could be drawn down to 60 TAF for TCCA or GCID in critically dry years for ag use only. Can you confirm that it is physically possible to access water down to 60 TAF? Not sure what the elevation is on that. Rob said he ran this by you in the past but wanted to make sure this assumption is still okay given the latest engineering.

Thanks!
Erin

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR

2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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Ad Hoc Operations and Engineering Workgroup Agenda

Sites
Affordable Water, Sustainably Managed

Our Core Values – Safety, Trust and Integrity, Respect for Local Communities, Environmental Stewardship, Shared Responsibility and Shared Benefits, Accountability and Transparency, Proactive Innovation, Diversity and Inclusivity
Our Commitment – To live up to these values in everything we do

Meeting Information:

Date:	February 15, 2021	**Location:**	Click here to join the meeting **Or call in (audio only)** (833) 255-2803,,325971704#
Start Time:	10:00 a.m.	**Finish Time:**	12:00 p.m.
Purpose:	Review and provide input on Sites project operations and engineering.		

Meeting Participants:

Mike Azevedo, Colusa County
Thad Bettner, GCID
Robert Cheng, CVWD
Amparo Flores, Zone 7
Felix Hernandez (A), American Canyon
Katrina Jessop (A), Valley Water
Robert Kunde, WRMWSD
Eric Leitterman (A), Valley Water
Dirk Marks, SCVWA
Randall Neudeck, MWD
Dan Ruiz, WWD
Jeff Sutton (A), TCCA
Bob Tincher, SBVMWD
Bill Vanderwaal, RD 108
Petya Vasileva, CVWD
Chuching Wang, MWD
Lillian Xie, Zone 7
Jerry Brown, Sites Authority
Ali Forsythe, Sites Authority
Mike Forrest, AECOM
Jeff Herrin, AECOM
Erin Heydinger, Sites Integration
Rob Leaf, Jacobs
Henry Luu, Sites Integration
Steve Micko, Jacobs
Pete Rude, Jacobs
Reed Thayer, Jacobs

Agenda:

Discussion Topic	Topic Leader	Time Allotted
1. Roll Call	Heydinger	5 min
2. Opening Remarks	Kunde/Azevedo	5 min
3. Review of Modeling Results for EIR/EIS Objective: receive feedback and provide input on final modeling results. Discuss implication for overall project operations.	Heydinger/Leaf/Micko	50 min
4. Updated Cost Estimate Objective: review cost estimate and provide input on possible changes	Luu/Forrest/Rude	50 min
5. Recap Action Items	Heydinger	5 min

From: Arsenijevic, Jelica [Jelica.Arsenijevic@hdrinc.com]
Sent: 2/4/2021 10:24:19 AM
To: SPKRegulatoryMailbox [SPKRegulatoryMailbox@usace.army.mil]
CC: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Spranza, John [john.spranza@hdrinc.com]; Dekar, Melissa D [mdekar@usbr.gov]; Davis, Ryan A [rdavis@usbr.gov]; Risse, Danielle [Danielle.Risse@hdrinc.com]; Jerry Brown [jbrown@sitesproject.org]; Smith, Kristin [Kristin.Smith@hdrinc.com]; Briard, Monique [Monique.Briard@icf.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Vondergeest, Michael [Michael.Vondergeest@icf.com]
Subject: RE: UPDATE Project Information -- Inter-Agency Pre-application for February 2021
Attachments: Sites_USACE_PreAp_Mtg_FINAL-2-2-2021.pdf

Good morning
Thank you for the opportunity to give you an overview and update on the Sites Project. Attached is a PDF of today's presentation. As mentioned, do not hesitate to reach out to us if you have any questions or concerns. We look forward to having continued discussions with all of you.

Kind Regards

Jelica Arsenijevic
Environmental Project Manager

Due to COVID-19, I will be working from home. Please contact me via cell # listed below. Be safe out there!

HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916-679-8854
M 209-329-6897

Jelica.Arsenijevic@hdrinc.com

hdrinc.com/follow-us

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, February 4, 2021 9:02 AM
To: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>; 'Alicia Forsythe' <aforsythe@sitesproject.org>; Jerry Brown <jbrown@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Risse, Danielle <Danielle.Risse@hdrinc.com>; Smith, Kristin <Kristin.Smith@hdrinc.com>; Davis, Ryan A <rdavis@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Briard, Monique <Monique.Briard@icf.com>
Subject: RE: UPDATE Project Information -- Inter-Agency Pre-application for February 2021

Here is the unblocked link. Please copy and paste it into your browser.

microsoft.com/l/meetup-join/19%3ameeting_ODA2OWFmMzgtNTVlYS00OGU0LWI0OTctN2I5NzVjMjZmOWI0%40thread.v2/0?context=%7b%22Tid%22%3a%2221acfbb3-32be-4715-9025-1e2f015cbbe9%22%2c%22Oid%22%3a%2226ffc99f-e2d2-43ab-b038-742ac7684a41%22%7d

John Spranza

D 916.679.8858 M 818.640.2487

-----Original Appointment-----
From: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>
Sent: Monday, January 25, 2021 10:52 AM
To: SPKRegulatoryMailbox; 'Alicia Forsythe'; Jerry Brown; Spranza, John; Laurie Warner Herson; Risse, Danielle; Smith, Kristin; Davis, Ryan A; Dekar, Melissa D; Arsenijevic, Jelica; Briard, Monique
Subject: UPDATE Project Information -- Inter-Agency Pre-application for February 2021
When: Thursday, February 4, 2021 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

-----Original Appointment-----
From: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>
Sent: Friday, January 22, 2021 12:37 PM
To: SPKRegulatoryMailbox; Arsenijevic, Jelica; Briard, Monique
Subject: FW: UPDATE Project Information -- Inter-Agency Pre-application for February 2021
When: Thursday, February 4, 2021 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

-----Original Appointment-----
From: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>
Sent: Thursday, January 21, 2021 12:16 PM
To: SPKRegulatoryMailbox; Roberts, Matthew J CIV USARMY CESPK (USA); California Department of Fish and Wildlife - Bay Delta Region [Blinn] (Brenda.Blinn@wildlife.ca.gov); California Dept of Fish and Wildlife [Connolly] (linda.connolly@wildlife.ca.gov); California Waterboard [Tadlock] (Stephanie.Tadlock@waterboards.ca.gov); Central Valley Regional Water Quality Control Board, Sacramento Office [Lee] (emlee@waterboards.ca.gov); DLL-CESPK-408; DLL-CESPK-RD-1325J; Fresno CVRWQCB [Scroggins] (mscroggins@waterboards.ca.gov); Kim Squires (Kim_Squires@fws.gov); Leana Rosetti (Rosetti.Leana@epa.gov); NMFS [McBride] (ellen.mcbride@noaa.gov); NMFS [Mill] (tancy.mill@noaa.gov); State Water Resources Control Board [Payne] (Elizabeth.Payne@waterboards.ca.gov); U.S. Environmental Protection (EPA) [Goldmann] (Goldmann.Elizabeth@epamail.epa.gov); U.S. EPA [Leidy] (Leidy.Robert@epamail.epa.gov); U.S. EPA Region 9 [Kwok] (Kwok.Rose@epamail.epa.gov); Leeman, Thomas; U.S. Fish and Wildlife Service [Sloan] (justin_sloan@fws.gov); US EPA [Scianni] (Scianni.Melissa@epamail.epa.gov); US EPA Region 9 (Morgan.Joseph@epa.gov); US FISH AND WILDLIFE SERVICE [Berry] (Kellie Berry (kellie_berry@fws.gov); USFWS [Cole] (patricia_cole@fws.gov); USFWS [Hanni] (Jason_Hanni@fws.gov); Jentsch, Stephanie; USFWS [Montgomery] (Rocky_Montgomery@fws.gov); USFWS [Olah] (Ryan_Olah@fws.gov); USFWS [Turner] (Kim Turner (Kim_S_Turner@fws.gov)); Vondergeest, Michael
Subject: UPDATE Project Information -- Inter-Agency Pre-application for February 2021
When: Thursday, February 4, 2021 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams

UPDATE – Project Information provided below.

The February 2021 Regulatory Division Inter-Agency Pre-Application meeting will be held virtually, due to COVID-19, on Thursday, February 4, 2021, from 9:00 AM to 10:00 AM via Microsoft Teams.

The project scheduled for this Pre-Application meeting is listed below.

Please see http://www.spk.usace.army.mil/Missions/Regulatory/Permitting/Standard-Permits/ for recommendations for a successful Pre-Application meeting. You must submit your project package to the project manager and agencies at least 10 days before your scheduled meeting or the meeting could be cancelled.

Link to virtual meeting:

If you have difficulties opening the link, you may try copying the meeting link into another browser and delete the word "blocked" at beginning of link. Then use either the open with "Desktop app", if you have Teams software installed on your computer, otherwise select "Continue on browser" option.

Microsoft Teams meeting

Join on your computer or mobile app

Click here to join the meeting

Or call in (audio only)

+1 571-388-3904,,941997900# United States, Arlington

Phone Conference ID: 941 997 900#

Find a local number | Reset PIN

Learn More | Meeting options

TIME **PROJECT**

9:00-10:00 Sites Reservoir Project, Colusa, Glenn, Tehama and Yolo Counties, POC: Michael Vondergeest, ICF, Michael.Vondergeest@icf.com, PM: Matthew Roberts

Pre-Application Meeting

February 4, 2021

Sites

Agenda

- Sites Overview / Update
- Activities to Date
- Existing Project Site Conditions
- Preliminary Impacts
- Approach to Agency Authorizations
- General Discussion/Q&A

Project History and Current Status

Sites

Original Proposed Project and 2017 Draft EIR/EIS Comments

- Original Project
  - 1.8 million acre-foot reservoir
  - 3 intakes (about 6,000 cfs diversion capacity in total)
  - New Delevan Pipeline and intake
  - Pump/generation facility
- 2017 Draft EIR/EIS – August 2017
- 137 comment letters received, 11 from conservation organizations

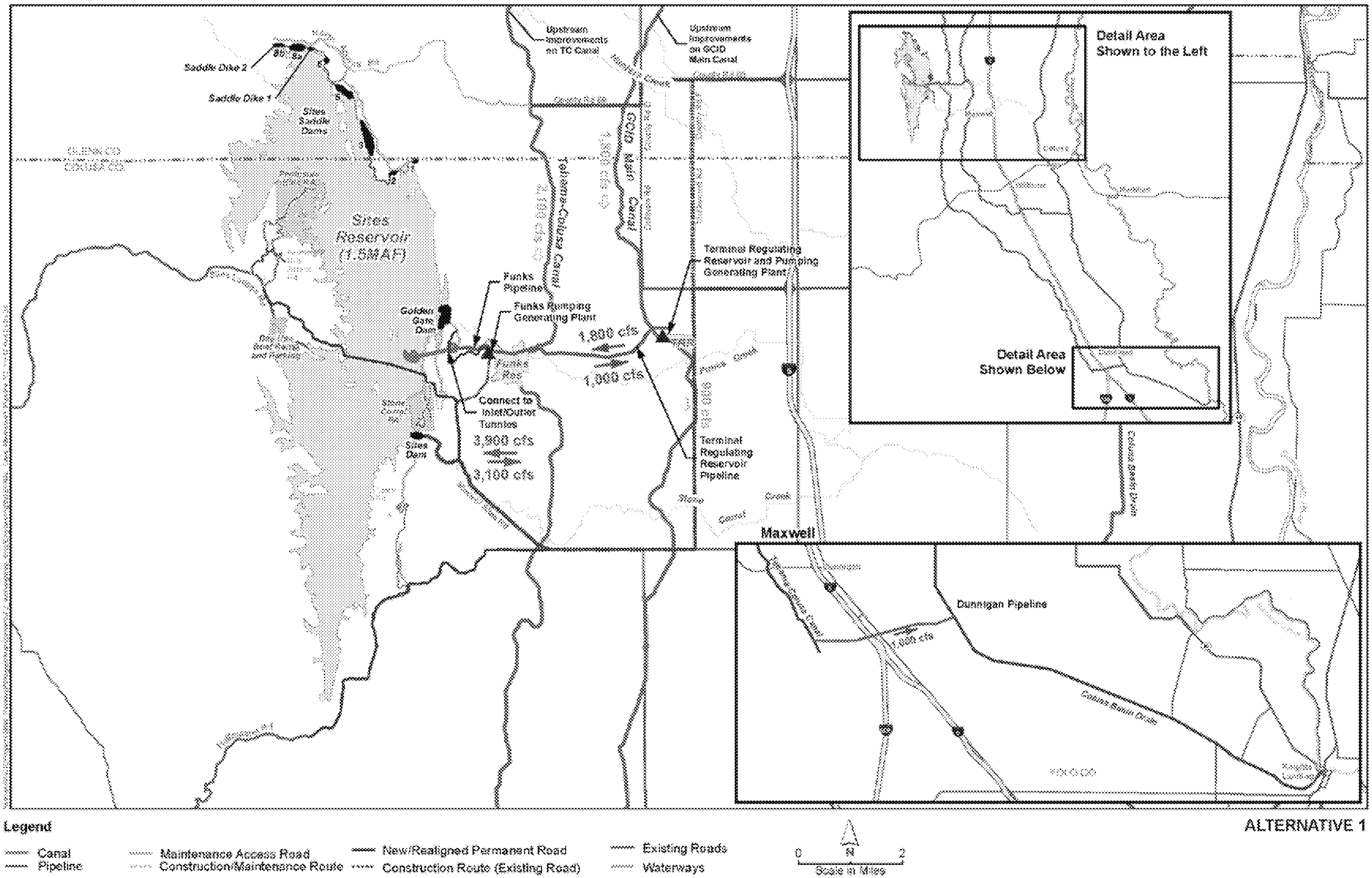
Value Planning Report

- October 2019 – Began Value Planning Efforts
  - 16 new / modified alternatives considered
- April 2020 – Board adopted Value Planning Report and recommendations

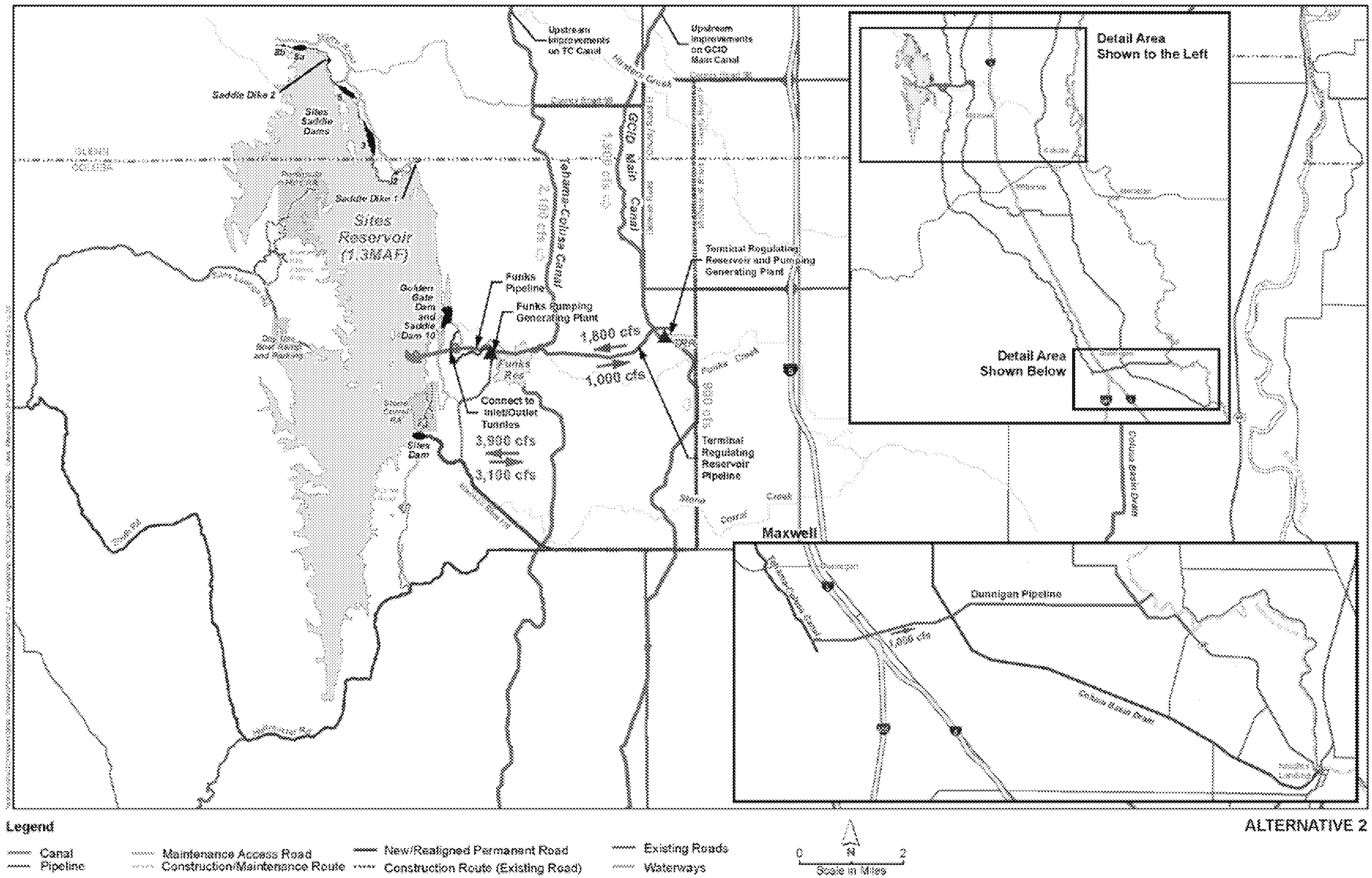
Major Facilities	VP5	VP6	VP7 Recommended
Reservoir Size	1.3 MAF	1.3 MAF	1.5 MAF
Bridge Size (avoids future traffic interruption)	1.5 MAF	1.5 MAF	1.5 MAF
South Road to Local Residents	Included	Included	Included
Misc. Local and Project Roads	Included	Included	Included
Diversion Locations	Red Bluff & Hamilton City	Red Bluff & Hamilton City	Red Bluff & Hamilton City
Dunnigan Release	1,000 cfs to CBD	1,000 cfs to River	1,000 cfs to CBD

CBD = Colusa Basin Drain
MAF = Million Acre-feet
TRR = Terminal Regulating Reservoir

Alternative 1 – Authority Preferred Project



Alternative 2



Schedule and Activities to Date

Activities to Date

- Project Description Development (Construction and Operations)
- Agency Coordination /Public Outreach
- Draft Recirculated EIR/Supplemental EIS
- Initial Impact Analysis and GIS work
- Operations Analysis
- Biological Assessment and ITP Development
- Geotechnical Investigations to support feasibility reports
- Permit Application Preparation (on-going)

2021/2022 Milestones (subject to change)

- NEPA/CEQA
  - Draft Recirculated EIR/Supplemental EIS: Summer 2021
  - Final REIR/SEIS: Summer 2022
- USFWS/NMFS ESA Section 7
  - Submit Draft BA to Reclamation: Fall 2021
  - Submit Final BA to Reclamation: Winter 2021
- CWA 404/401
  - Delineation Work: Report in Progress
  - Submit 404 Application: Fall 2021
  - Submit CWA 401 Certification App: Fall 2021
- NHPA Section 106
  - Initiate Consultation and prepare a Final PA for signature: Fall 2021
- CDFW ITP
  - Submit Construction and Operations ITP – Winter 2021

Existing Conditions and Preliminary Impacts

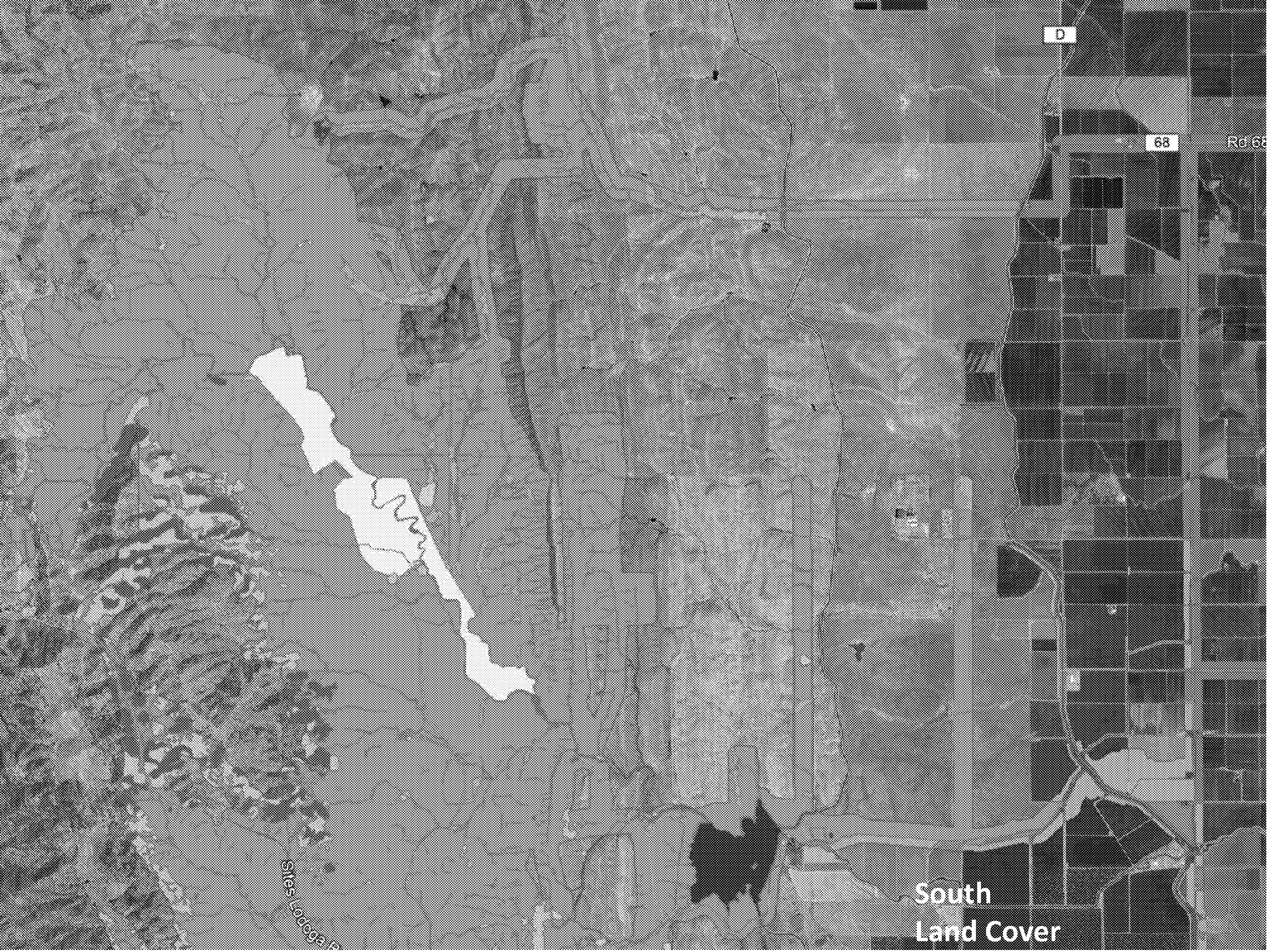
Sites

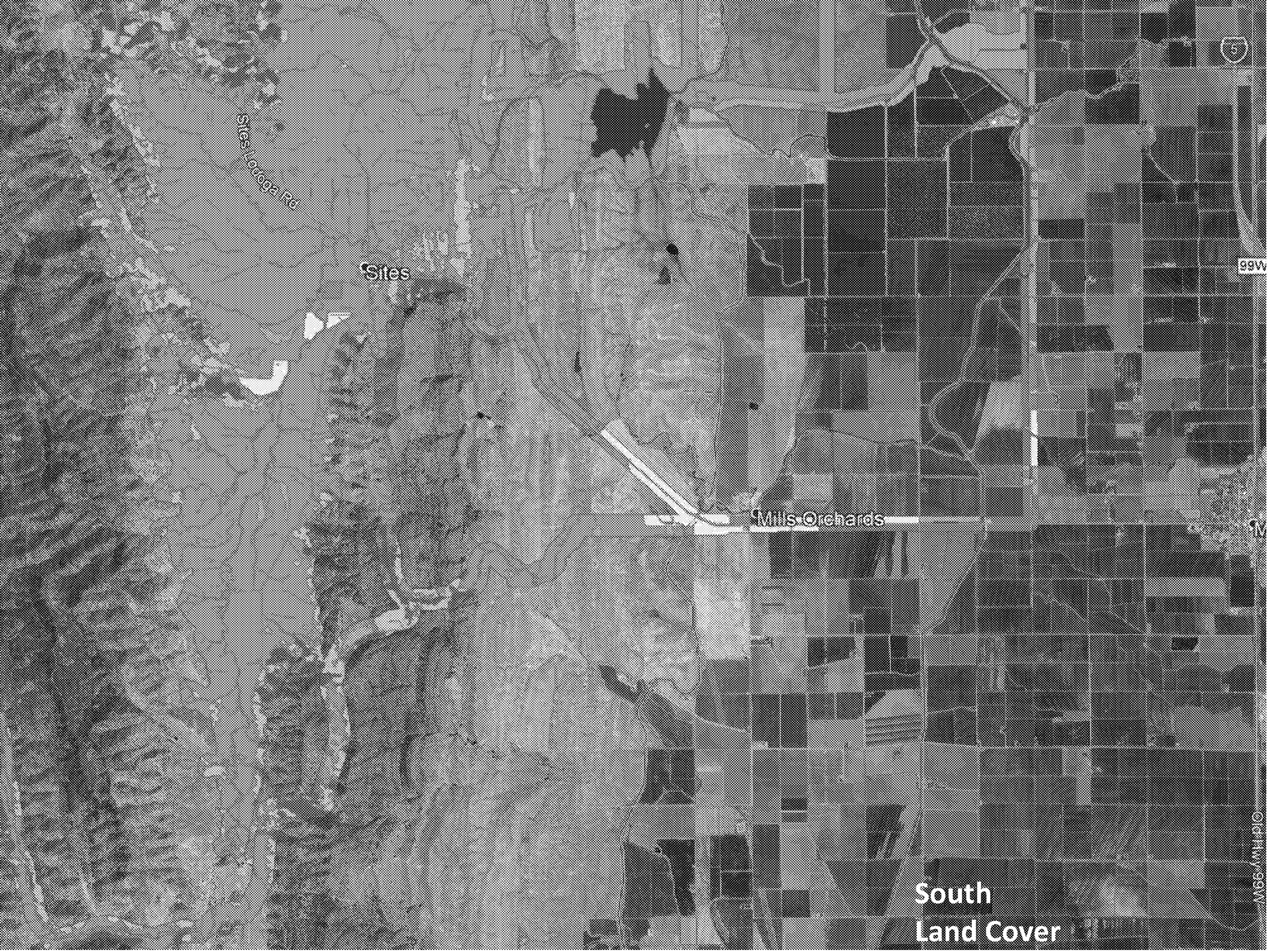
Aquatic Resources and Acreages

Non-Wetlands	Canal	124 acres
	Ephemeral Stream	2 acres
	Intermittent Stream	219 acres
	Pond	67 acres
	Reservoir	224 acres
Wetlands	Freshwater Marsh	113 acres
	Managed Wetlands	30 acres
	Rice	1,393 acres
	Season Wetland/Vernal Pool/Alkali Wetlands	134 acres
Riparian	Riverine	15 acres
	Valley Foothill Riparian	53 acres


D
68
North
Aquatic Resources


Mills Orchards
South
Aquatic Resources


D
68
Rd 68
Sites Lodoga R
South
Land Cover


Sites Lodoga Rd
Sites
Mills Orchards
99W
5
Old Hwy 99W
South
Land Cover

Federal and State Listed (T/E) Wildlife Resources

Species	Listing Status
Yellow-billed cuckoo	FT
Golden eagle Bald eagle	State and Federally fully protected species
Swainson's hawk	ST
Tricolored blackbird	ST
White-tailed kite	State fully protected species
Bank swallow	ST
Giant garter snake	FT
California red-legged frog	FT
Conservancy fairy shrimp	FE
Vernal pool fairy shrimp	FT
Vernal pool tadpole shrimp	FE

Other Biological Resources

- Plants:
  - palmate-bracted bird's-beak (Federally Endangered)
  - Keck's checkerbloom (Federally Endangered)
- Fish:
  - Chinook Salmon (Federally Threatened)
  - Steelhead (Federally Threatened)
  - Green Sturgeon (Federally Threatened)
  - Delta Smelt (Federally Threatened)
  - Longfin Smelt (State Threatened)
  - Essential Fish Habitat

Cultural Resources

Archaeology

- Early Native American resource collection and processing
- Early Native American habitation
- Early Native American ceremonial sites
- Early Native American multi-use sites
- Post-contact architectural ruins, refuse deposits, or dumps
- Post-contact sub-surface infrastructure or transportation
- Post-contact sub-surface agricultural features
- Post-contact sub-surface water conveyance features
- Post-contact Native American archaeological resources

Built

- Community buildings
- Residences, farmsteads
- Agricultural processing structures (silos, mills)
- Levees, dams, berms, ditches, and other water control/conveyance structures
- Railroad features (track alignments, bridges)
- Transportation features (roads, bridges)
- Electrical infrastructure (transmission lines, substations)
- Cemeteries

Preliminary Impacts

Direct Permanent and Temporary

- Fill related to material for dams and other project facilities
- Inundation by Flooding
- Borrow Excavation
- Dewatering
- Access and Staging
- Indirect Effects from Construction and Operation
- Hydromodification

Preliminary Impacts – Aquatic Resources

- CWA 404/401
  - Non-wetlands
  - Wetlands
  - Riparian
- Federal Project Levee
  - Colusa Basin Drainage Canal East Levee
  - Sacramento River Levee at outfall (Alternative 2)

Approach to Agency Authorizations

- Encourage Agency Participation and Collaboration
- Frequent Coordination and Document Checkpoints
- Focused workshops with agencies to discuss approach options to mirror phased construction approach
  - Separate permits for construction vs. operation?
  - Separate permits for reservoir vs. conveyance facilities?

Approach to Agency Authorizations – Mitigation Brainstorming

- Maximizing Ecological Benefits

- Restoration Project Opportunities
  - River Partners
  - Voluntary Agreements

- Onsite/ Offsite Compensatory Mitigation
  - Land Acquisition and Restoration
  - Land Acquisition and Protection of Existing Habitat (Conservation Easements)
  - Restoration/Enhancement of Protected Lands
  - Approved Mitigation and Conservation Bank Credits

Alternatives Information CWA 404(b)(1) and Supplemental EIS

SWRCB and USACE Agreement Required for

- Alternatives screened in the Draft REIR/SEIS to determine the Preferred Alternative:
  - Offsite Alternatives
  - No Project
  - 1.5 MAF
  - 1.3 MAF
- Alternatives to fill screened separately to determine the LEDPA
  - Dam alternatives
  - Road alignments
  - Pipeline alignments

General Discussion, Q&A, Next Steps

Thank You

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 2/4/2021 5:00:51 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: Re: UPDATE Project Information -- Inter-Agency Pre-application for February 2021

Has our board members seen this kind of presentation before? Some of this could be good for them to be aware of before the EIR comes out.

Lets discuss at our 1v1 tomorrow.

From: "Arsenijevic, Jelica" <Jelica.Arsenijevic@hdrinc.com>
Date: Thursday, February 4, 2021 at 10:24 AM
To: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>
Cc: Laurie Warner Herson <laurie.warner.herson@phenixenv.com>, "Spranza, John" <john.spranza@hdrinc.com>, "Dekar, Melissa D" <mdekar@usbr.gov>, "Davis, Ryan A" <rdavis@usbr.gov>, "Risse, Danielle" <Danielle.Risse@hdrinc.com>, Jerry Brown <jbrown@sitesproject.org>, "Smith, Kristin" <Kristin.Smith@hdrinc.com>, "Briard, Monique" <Monique.Briard@icf.com>, Alicia Forsythe <aforsythe@sitesproject.org>, "Vondergeest, Michael" <Michael.Vondergeest@icf.com>
Subject: RE: UPDATE Project Information -- Inter-Agency Pre-application for February 2021

Good morning
Thank you for the opportunity to give you an overview and update on the Sites Project. Attached is a PDF of today's presentation. As mentioned, do not hesitate to reach out to us if you have any questions or concerns. We look forward to having continued discussions with all of you.

Kind Regards

Jelica Arsenijevic
Environmental Project Manager

Due to COVID-19, I will be working from home. Please contact me via cell # listed below. Be safe out there!

HDR
2379 Gateway Oaks Drive, Suite 200
Sacramento, CA 95833
D 916-679-8854
M 209-329-6897

Jelica.Arsenijevic@hdrinc.com

hdrinc.com/follow-us

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Thursday, February 4, 2021 9:02 AM
To: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>; 'Alicia Forsythe' <aforsythe@sitesproject.org>; Jerry Brown <jbrown@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Risse, Danielle <Danielle.Risse@hdrinc.com>; Smith, Kristin <Kristin.Smith@hdrinc.com>; Davis, Ryan A <rdavis@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Arsenijevic, Jelica <Jelica.Arsenijevic@hdrinc.com>; Briard, Monique <Monique.Briard@icf.com>
Subject: RE: UPDATE Project Information -- Inter-Agency Pre-application for February 2021

Here is the unblocked link. Please copy and paste it into your browser.

microsoft.com/l/meetup-join/19%3ameeting_ODA2OWFmMzgtNTVlYS00OGU0LWI0OTctN2I5NzVjMjZmOWI0%40thread.v2/0?context=%7b%22Tid%22%3a%2221acfbb3-32be-4715-9025-1e2f015cbbe9%22%2c%22Oid%22%3a%2226ffc99f-e2d2-43ab-b038-742ac7684a41%22%7d

John Spranza

D 916.679.8858 M 818.640.2487

-----Original Appointment-----
From: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>
Sent: Monday, January 25, 2021 10:52 AM
To: SPKRegulatoryMailbox; 'Alicia Forsythe'; Jerry Brown; Spranza, John; Laurie Warner Herson; Risse, Danielle; Smith, Kristin; Davis, Ryan A; Dekar, Melissa D; Arsenijevic, Jelica; Briard, Monique
Subject: UPDATE Project Information -- Inter-Agency Pre-application for February 2021
When: Thursday, February 4, 2021 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams

-----Original Appointment-----
From: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>
Sent: Friday, January 22, 2021 12:37 PM
To: SPKRegulatoryMailbox; Arsenijevic, Jelica; Briard, Monique
Subject: FW: UPDATE Project Information -- Inter-Agency Pre-application for February 2021
When: Thursday, February 4, 2021 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

-----Original Appointment-----
From: SPKRegulatoryMailbox <SPKRegulatoryMailbox@usace.army.mil>
Sent: Thursday, January 21, 2021 12:16 PM
To: SPKRegulatoryMailbox; Roberts, Matthew J CIV USARMY CESPK (USA); California Department of Fish and Wildlife - Bay Delta Region [Blinn] (Brenda.Blinn@wildlife.ca.gov); California Dept of Fish and Wildlife [Connolly] (linda.connolly@wildlife.ca.gov); California Waterboard [Tadlock] (Stephanie.Tadlock@waterboards.ca.gov); Central Valley Regional Water Quality Control Board, Sacramento Office [Lee] (emlee@waterboards.ca.gov); DLL-CESPK-408; DLL-CESPK-RD-1325J; Fresno CVRWQCB [Scroggins] (mscroggins@waterboards.ca.gov); Kim Squires (Kim_Squires@fws.gov); Leana Rosetti (Rosetti.Leana@epa.gov); NMFS [McBride] (ellen.mcbride@noaa.gov); NMFS [Mill] (tancy.mill@noaa.gov); State Water Resources Control Board [Payne] (Elizabeth.Payne@waterboards.ca.gov); U.S. Environmental Protection (EPA) [Goldmann] (Goldmann.Elizabeth@epamail.epa.gov); U.S. EPA [Leidy] (Leidy.Robert@epamail.epa.gov); U.S. EPA Region 9 [Kwok] (Kwok.Rose@epamail.epa.gov); Leeman, Thomas; U.S. Fish and Wildlife Service [Sloan] (justin_sloan@fws.gov); US EPA [Scianni] (Scianni.Melissa@epamail.epa.gov); US EPA Region 9 (Morgan.Joseph@epa.gov); US FISH AND WILDLIFE SERVICE [Berry] (Kellie Berry (kellie_berry@fws.gov); USFWS [Cole]

(patricia_cole@fws.gov); USFWS [Hanni] (Jason_Hanni@fws.gov); Jentsch, Stephanie; USFWS [Montgomery] (Rocky_Montgomery@fws.gov); USFWS [Olah] (Ryan_Olah@fws.gov); USFWS [Turner] (Kim Turner (Kim_S_Turner@fws.gov)); Vondergeest, Michael
Subject: UPDATE Project Information -- Inter-Agency Pre-application for February 2021
When: Thursday, February 4, 2021 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams

UPDATE – Project Information provided below.

The February 2021 Regulatory Division Inter-Agency Pre-Application meeting will be held virtually, due to COVID-19, on Thursday, February 4, 2021, from 9:00 AM to 10:00 AM via Microsoft Teams.

The project scheduled for this Pre-Application meeting is listed below.

Please see http://www.spk.usace.army.mil/Missions/Regulatory/Permitting/Standard-Permits/ for recommendations for a successful Pre-Application meeting. You must submit your project package to the project manager and agencies at least 10 days before your scheduled meeting or the meeting could be cancelled.

Link to virtual meeting:

If you have difficulties opening the link, you may try copying the meeting link into another browser and delete the word "blocked" at beginning of link. Then use either the open with "Desktop app", if you have Teams software installed on your computer, otherwise select "Continue on browser" option.

Microsoft Teams meeting

Join on your computer or mobile app
Click here to join the meeting
Or call in (audio only)
+1 571-388-3904,,941997900# United States, Arlington
Phone Conference ID: 941 997 900#
Find a local number | Reset PIN
Learn More | Meeting options

TIME **PROJECT**

9:00-10:00 Sites Reservoir Project, Colusa, Glenn, Tehama and Yolo Counties, POC: Michael Vondergeest, ICF, Michael.Vondergeest@icf.com, PM: Matthew Roberts

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/5/2021 9:34:51 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Spranza, John [john.spranza@hdrinc.com]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Rob Leaf [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]; Lecky, Jim [Jim.Lecky@icf.com]; Hendrick, Mike [mike.hendrick@icf.com]
Subject: RE: Sending CalSim Model to Agencies
Attachments: SitesRDEIRSDEIS-ModelingCriteriaDRAFT-20210205.xlsx

Hi all,

Please take a look at the attached spreadsheet and let me know what changes you have. Do we want something related to Reclamation spring pulse flows? We also have a more detailed description of NDOI from another document that I cut down. Let me know if you think we need more.

Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

Ali – this really focuses on modeling criteria and doesn't exactly get at what you were looking for on actual operations. I think we can use it as a starting point, though.

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 9:10 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:55 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer,

Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good. I also think we should include a summary table of the Alternatives. What about the diversion criteria? We could include those as attachments.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:47 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!

~~~~~~

Good [afternoon],

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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~~~~~~

File Provided Natively

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/5/2021 9:38:41 AM
To: Marcia Kivett [MKivett@sitesproject.org]
Subject: RE: Red Bluff and Ham City Power Demand

Sounds good. Our meeting with Rob is at noon. I took a look but don't have any changes now unless Jerry wants me to cut down some of the initial project description language.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Friday, February 5, 2021 9:37 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Subject: RE: Red Bluff and Ham City Power Demand

Jerry said that you may have changes after your meeting with Rob Leaf. I am standing by for you or Jerry to let me know when to send out the documents to the team.

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, February 4, 2021 4:56 PM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: FW: Red Bluff and Ham City Power Demand

Can you create a cut/paste from the "design basis TM" linked below of the following items from this report:
Section 1.1 Project description
Section 2.7 Electrical Supply – Design Criteria
Section 3.7 Electrical Supply - Facilities

This is to be a backgrounder we give to Reclamation tomorrow with the agenda for the Monday power meeting. The agenda is ready to go. Please provide draft for Erin to review before we send to Reclamation tomorrow afternoon.

Thanks

From: "Luu, Henry" <Henry.Luu@hdrinc.com>
Date: Thursday, February 4, 2021 at 3:32 PM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: RE: Red Bluff and Ham City Power Demand

Jerry,

I've inquired Pete…will let you know when he responds. The package we sent to PG&E is within the attached email.

Additional references:

- Design basis TM @ https://sitesreservoirproject.sharepoint.com/:b:/r/Engineering%26Geotechnical/WSIP%20Feasibility/Technical%20Memorandums/Final/HC_Conveyance/HC%20Feasibility%20Study%20Report%209Nov2020.pdf?csf=1&web=1&e=QJLZgx
- Hydroelectric Energy Recovery Valuation TM @ https://sitesreservoirproject.sharepoint.com/:b:/r/Engineering%26Geotechnical/WSIP%20Feasibility/Technical%20Memorandums/Final/HC_Conveyance/HydroEnergyRecovery_TM-Final.pdf?csf=1&web=1&e=pqEkzV

Henry H. Luu, PE
D 916.679.8857 M 916.754.7566

hdrinc.com/follow-us

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, February 4, 2021 2:58 PM
To: Luu, Henry <Henry.Luu@hdrinc.com>
Subject: Red Bluff and Ham City Power Demand

Would be good to get these numbers in terms of kilowatt hours per ac ft if possible.

From: Lecky, Jim [Jim.Lecky@icf.com]
Sent: 2/5/2021 5:05:28 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Hendrick, Mike [Mike.Hendrick@icf.com]; Heydinger, Erin [erin.heydinger@hdrinc.com]; Spranza, John [john.spranza@hdrinc.com]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]
CC: Briard, Monique [Monique.Briard@icf.com]
Subject: RE: Sending CalSim Model to Agencies
Attachments: TCCA_GCID screen performance from Kapla .docx; Sites Authority - Intake Fish Screen Operations (003).pdf

Erin, just following up on Ali e-mail. Attached are two figures re screen performance form the report James Kapla prepared for CH2M. I am also attaching the report in case you don't have it. There are tables of the flow – diversion relationship in the report that are illustrative as well.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Friday, February 5, 2021 2:38 PM
To: Hendrick, Mike <Mike.Hendrick@icf.com>; Heydinger, Erin <erin.heydinger@hdrinc.com>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin for putting this together. I am good with Mike's comments below and have no additional comments. Minor editorial in Fremont Weir Notch – change "Versus no actional alternative . . ." to "Versus no action alternative . . ."

I am good with sending this out.

I do think we should eventually get a table and/or graphic together to show the screen functions at both fish screens. If we have these graphics, then lets copy them into a different sheet in the excel file. I think that people don't realized (as I didn't for a long time), that we simply cant take a lot of water at lower flows due to the screen function. I just feel like this will help our story and help people understand that this isn't a massive gulp of 3,900 cfs in all situations – this is a shaving off of flows. And scaled diversions aren't needed as the screen function does this for us.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <john.spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, February 5, 2021 9:35 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick, Mike <Mike.Hendrick@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please take a look at the attached spreadsheet and let me know what changes you have. Do we want something related to Reclamation spring pulse flows? We also have a more detailed description of NDOI from another document that I cut down. Let me know if you think we need more.

Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

Ali – this really focuses on modeling criteria and doesn't exactly get at what you were looking for on actual operations. I think we can use it as a starting point, though.

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 9:10 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:55 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good. I also think we should include a summary table of the Alternatives. What about the diversion criteria? We could include those as attachments.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:47 AM

To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
~~~~~~

Good [afternoon],

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
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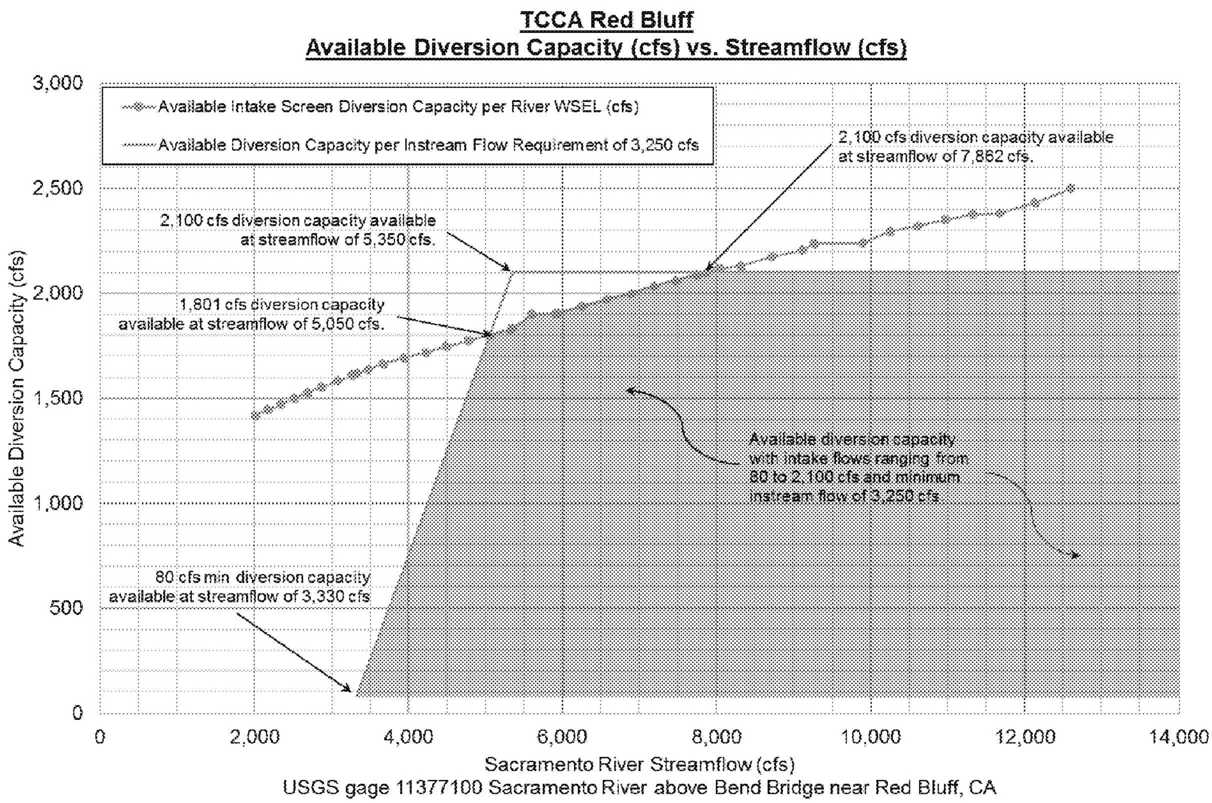

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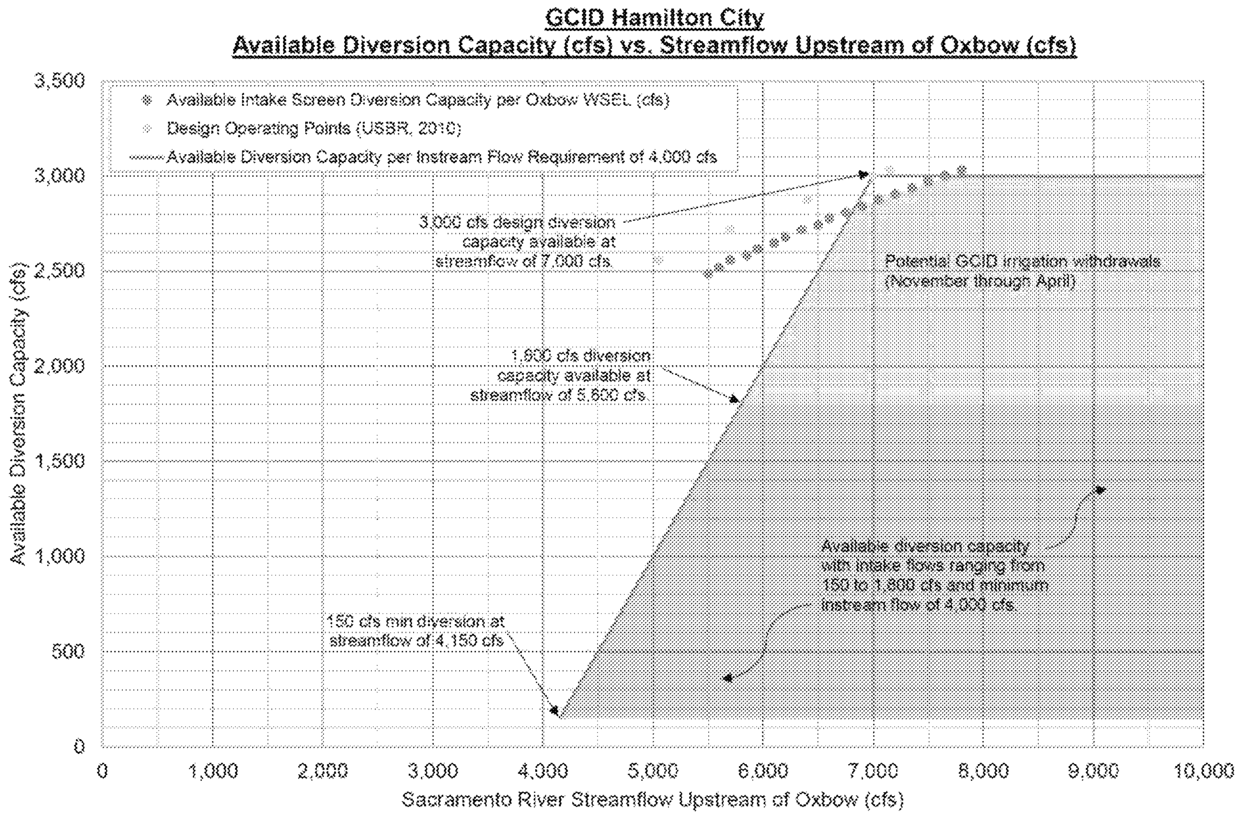

GCID Hamilton City
Available Diversion Capacity (cfs) vs. Streamflow Upstream of Oxbow (cfs)
Available Intake Screen Diversion Capacity per Oxbow WSEL (cfs)
Design Operating Points (USBR, 2010)
Available Diversion Capacity per Instream Flow Requirement of 4,000 cfs
3,000 cfs design diversion capacity available at streamflow of 7,000 cfs.
Potential GCID irrigation withdrawals (November through April)
1,800 cfs diversion capacity available at streamflow of 5,800 cfs.
Available diversion capacity with intake flows ranging from 150 to 1,800 cfs and minimum instream flow of 4,000 cfs.
150 cfs min diversion at streamflow of 4,150 cfs
Available Diversion Capacity (cfs)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Sacramento River Streamflow Upstream of Oxbow (cfs)

TECHNICAL MEMORANDUM

Sites Project Authority – Sacramento River Intake Fish Screen Operations

PREPARED FOR:	Rob Tull/SAC
PREPARED BY:	James Kapla/SEA Aaron George/SEA
DATE:	25 March 2020
PROJECT NUMBER:	D3205400.A.CS.OE.D1.D1-03-03

Introduction and Purpose

The Sites Reservoir Project is a proposed 1.8 million acre-foot off-stream reservoir intended to divert and store excess Sacramento River streamflows, providing approximately 500,000 acre-feet per year of additional water supply on average. The Project would provide multiple beneficial uses including a reliable water supply for cities and agriculture; dedicated water for fisheries and environmental purposes; increased habitat for migratory birds; and improved flexibility and drought resiliency for the Central Valley Project and the State Water Project.

The purpose of this technical memorandum (TM) is to summarize key operational parameters of three Sacramento River intakes intended to supply water to the proposed Project. This includes estimates of available diversion capacity at various streamflows, given instream flow requirements and pumping capability. The intake facilities under consideration include the following:

1. Tehama-Colusa Canal Authority (TCCA) Red Bluff
2. Glenn-Colusa Irrigation District (GCID) Hamilton City
3. Delevan (Proposed)

The location of each facility is shown in Figure 1. This TM includes the following sections:

- Introduction and Purpose
- Intake Facilities Overview
- Methodology, Assumptions and Limitations
- Red Bluff Facility Operations
- Hamilton City Facility Operations
- Delevan Facility Operations
- References
- Attachments

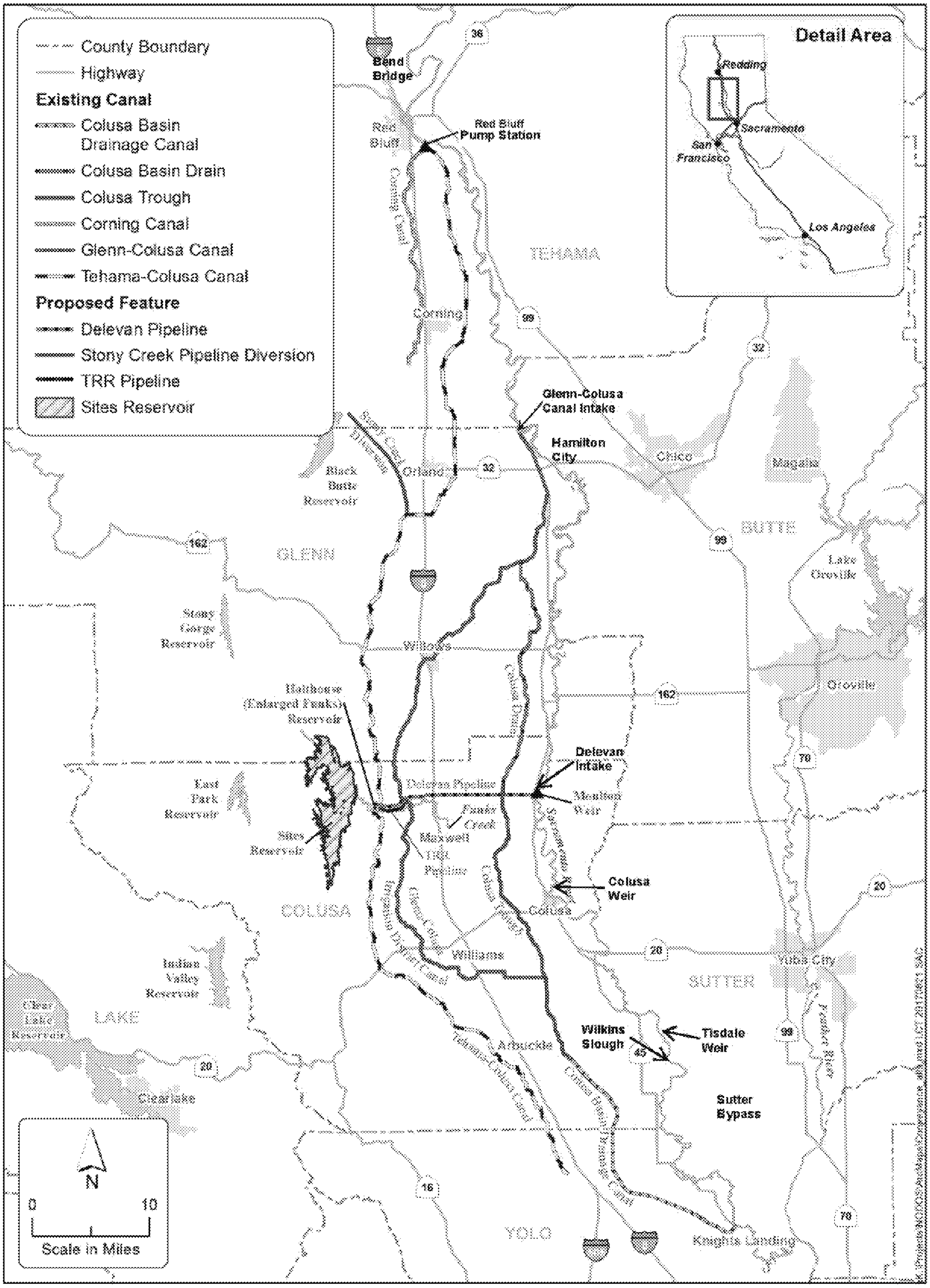


Figure 1. Sites Reservoir Project Facilities
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Intake Facilities Overview

Table 1. Intake Facilities Overview
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Intake Facility	Location	Screen Configuration	Fish Protection Screen Criteria	Screen Cleaning	Provisions for Fish Protection and Monitoring	Pumping Capability	Diversion Capacity	Operations
TCCA Red Bluff	River mile 244 near Red Bluff, CA.	• Flat plate screens in vertical configuration. • 60 screen bays with a total structure length of approximately 1,118 feet. • Effective screen height of 9.8 feet, from EL 235.83 to EL 245.67 (NAVD88).	• 1.75 mm slot size. • 0.33 fps approach velocity. • Sweeping velocity minimum 2x approach velocity.	• Four mechanical brush cleaners. • Sediment jetting system with one duty and one standby pump: 100 Hp rated at 3,500 gpm.	• Seven fish refuge bays, of which three are located at blowout panel openings. • Refuge bays include ¾-inch round bars with 1-inch clear openings. • Anchorages for fyke net frames located downstream of screen panels.	• Installed capacity of 2,000 cfs. – Pump Nos. 1 and 11: 300 Hp rated at 125 cfs. – Pump Nos. 3 through 9: 600 Hp rated at 250 cfs. • Future capacity of 2,500 cfs. – Future Pump Nos. 2 and 10: 600 Hp rated at 250 cfs. • All pumps are controllable with VFDs.	• Minimum is 80 cfs with all screen bays except 59 and 60 blocked off with solid panels, and maximum VFD turn-down on Pump Nos. 1 or 11. • Sites Reservoir maximum requirement is 2,100 cfs. • Maximum capacity of 2,500 cfs.	• Streamflows per USGS Gage 11377100 Sacramento River above Bend Bridge near Red Bluff, CA. • Existing minimum instream flow requirement of 3,250 cfs below intake for summer operations. • Red Bluff Diversion Dam located immediately downstream is operated with gates out.
GCID Hamilton City	River mile 206 near Hamilton City, CA.	• Flat plate screens in vertical configuration with 5 degree batter. • 87 screen bays with a total structure length of approximately 1,090 feet. • Original structure effective screen height of 11.5 feet, from EL 127.52 to EL 138.99 (NAVD88). • Extended structure effective screen height of 11.5 feet, from EL 126.72 to EL 138.19 (NAVD88).	• 1.75 mm slot size. • 0.33 fps approach velocity. • Sweeping velocity minimum 2x approach velocity.	• Eight mechanical brush cleaners.	• Three bypass bays with internal fish return system (not currently operated).	• Existing capacity of 3,000 cfs. - Pump Nos. 1 and 2: 206 Hp rated at 150 cfs and 10.3 feet TDH. - Pump Nos. 3 through 8: 550 Hp rated at 400 cfs and 10.3 feet TDH. - Pump No. 9: 270 Hp rated at 200 cfs and 10.3 feet TDH. - Pump No. 10: 135 Hp rated at 100 cfs and 10.3 feet TDH. • Diversion by gravity is available starting at an approximate intake afterbay WSEL of 136.0. Maximum gravity diversion rate is approximately 1,000 cfs with an intake afterbay WSEL > 145.0. • Deck at EL 154.8 is overtopped at streamflows greater than approximately 100,000 cfs.	• Minimum is 150 cfs. • Sites Reservoir maximum requirement is 1,800 cfs. • Maximum capacity is 3,000 cfs.	• Streamflows per USGS Gage 11383800 Sacramento River near Hamilton City, CA. • Existing minimum instream flow requirement of 4,000 cfs below intake for summer operations. • Average daily irrigation withdrawals from November 2012 through April 2018 were approximately 293 cfs. Monthly averages for this period were as follows: • November - 671 cfs • December - 336 cfs • January - 90 cfs • February - 51 cfs • March - 103 cfs • April - 513 cfs • Operated with Water Control Structure weir blocks removed.

Intake Facility	Location	Screen Configuration	Fish Protection Screen Criteria	Screen Cleaning	Provisions for Fish Protection and Monitoring	Pumping Capability	Diversion Capacity	Operations
Delevan (Proposed)	River mile 158.5 near Maxwell, CA.	• Flat plate screens in vertical configuration. • 32 screen bays with a total structure length of approximately 560 feet. • Effective screen height of 12.3 feet, from EL 38.33 to EL 50.67 (NGVD29).	• 1.75 mm slot size. • 0.33 fps approach velocity • Sweeping velocity minimum 2x approach velocity.	• Two mechanical brush cleaners. • Sediment jetting system.	• To be determined (TBD)	• Design capacity of 2,000 cfs. - Pump Nos. 1 through 4: rated at 500 cfs. - No VFDs are currently considered.	• Sites Reservoir maximum requirement is 2,000 cfs. • Minimum is 200 cfs (per AECOM). • Adjacent Maxwell ID intake and PS is 200 cfs.	• Streamflows per CA DWR Station BTC, Sacramento River at Butte City, CA. • Proposed minimum instream flow requirement of 5,000 cfs. • Proposed return flow requirement of 1,500 cfs; separate or combined facility TBD.

Methodology, Assumptions and Limitations

The following provides an overview of the methodology, assumptions and limitations associated with the estimates of available diversion capacity. Some information is common to all three intakes while other information is specific to TCCA Red Bluff, GCID Hamilton City or Delevan.

Common Attributes

Methodology

The analysis utilized the following general methodology at each intake facility location:

1. Identify appropriate Sacramento River streamflow data set, typically a U.S. Geological Survey (USGS) or California Department of Water Resources (CA DWR) stream gage.
2. Develop rating curve for correlating streamflow with water surface elevations (River stage) at the intake location.
3. Evaluate facility configuration and geometry to compare effective screen area with River stage.
4. Consider instream flow requirements, pump capability and other constraints.
5. Develop estimates of available diversion capacity versus streamflow, while maintaining approach velocities in accordance with fisheries design criteria (NMFS, 2018).

Assumptions

- Where river stage water surface elevation information is available at both the upstream and downstream ends of the intake facility, the water surface profile is averaged linearly across the face of the screeens.
- The intake screens are in a clean condition without significant accumulation of sediment and/or debris.
- Porosity controls provide balanced and uniform approach velocities through the intake screens.

Limitations

This memorandum provides high-level estimates of water availability at Project facilities and is intended to support water supply and operations modeling efforts. The estimates are based on recent historical streamflows, rating curves and pumping data. Actual withdrawal rates may be affected by a variety of factors including the following:

- Changing River morphology
- Ground subsidence
- Sediment and debris accumulation
- Non-uniform approach velocities
- Future winter irrigation demands
- Other proposed diversions not quantified herein
- Differing instream flow requirements
- Modifications to existing fisheries design guidelines and criteria

TCCA Red Bluff

Methodology

Historical streamflows for TCCA Red Bluff were obtained from USGS Gage 11377100 Sacramento River above Bend Bridge near Red Bluff, CA. The gage is located approximately 17 miles upstream of the site.

A composite rating curve was developed using data from the November 2009 Design Development Report (CH2M, 2009), including Appendix A, Table A-1 for the low end of rating curve (streamflow 0 cfs to 24,999 cfs), and Table A-2 for the high end of rating curve (streamflow 25,000 cfs and greater). This curve was used for the purposes of generating stage-frequency data based on the USGS data set.

Existing estimates of diversion capacity are available in the table "Project Diversion as a Function of River Stage" located in the conformed construction drawings (CH2M, 2009a), as well as another table (Table 2) located in the Design Development Report. The values in the drawing set utilized a slightly lower, more conservative diversion capacity for a given streamflow and were therefore used for the purposes of evaluating diversion capacity.

River stage values interior to the existing rating curve were interpolated at 0.1-foot WSEL intervals, and extended at the upstream and downstream work points as necessary. Diversion rates for the additional data points were then calculated assuming an approach velocity equal to the average approach velocity from existing data. This results in approach velocities that are approximately 3 percent lower than the criteria velocity of 0.33 fps. This was deemed reasonable and appropriately conservative for this type of analysis.

Assumptions

- Instream flow requirement of 3,250 cfs.
- The Red Bluff Diversion Dam located immediately downstream of the Intake is operated with the gates removed.
- The additional water demand associated with the sediment jetting system is intermittent and has negligible impact.
- The minimum diversion of 80 cfs occurs with all screen bays except 59 and 60 blocked off with solid panels, and maximum VFD turn-down on Pump Nos. 1 or 11.
- Future Pump Nos. 2 and 10 are installed.

Limitations

- Additional pumping capacity is required to meet Project objectives (future Pump Nos. 2 and 10).
- Several tributaries including Red Bank Creek and Elder Creek are located between the Bend Bridge gage and the Red Bluff Intake. The tributaries are understood to have substantial streamflows in winter, but such flows were not quantified as part of this analysis. This is assumed to conservatively under-estimate diversion capacity at the intake location.

GCID Hamilton City

Methodology

Historical streamflows for GCID Hamilton City were obtained from USGS Gage 11383800 Sacramento River near Hamilton City, CA. The gage is located approximately 5 miles downstream of the site. The streamflows were adjusted to a location just upstream of the oxbow by adding historical pumping rates from the GCID Main Pump Station. Daily shift records of pump discharge (typically three shifts per day) were averaged to develop average daily pump discharge rates. This information was then correlated and added to the average daily streamflow data.

Water surface elevations were obtained from historical data collected by GCID from 2011 through 2018 at the upstream end of the intake structure, "Screen 85;" the downstream end of the screen structure, "Bypass Channel;" and the intake structure afterbay/pump station forebay, "Forebay." The water surface profile at the face of the screens was linearly averaged between "Screen 85" and "Bypass Channel." Where data was missing, the average differential was assumed in order to facilitate calculation of the profile.

A large data gap in water surface elevation data exists between April 2015 and December 2017. The average differential was 0.63 feet before that time, and 1.01 feet after that time. The cause of the change is unknown, but could potentially be attributed to re-calibration of instruments, an increase in the headwater at the Gradient Structure, removal of a hydraulic constriction downstream, and/or some other contributing event. The removal of the weir blocks in the Water Control Structure were ruled out as a cause since this occurred circa 2006. The most recent average water differential value of 1.01 feet was assumed to be representative of current operations and was therefore utilized where necessary for the purposes of this diversion capacity analysis.

Operation of the GCID Main Pump Station impacts the water surface elevations (WSELs) at the screens, and the water surface profile along the screens for a given streamflow in the Sacramento River can vary with pump discharge. A higher pumped flowrate will result in a lower water surface profile through the oxbow as compared to the profile for a lower pumped flowrate – for the same streamflow. Therefore, a series of rating curves were developed for a range of pump station discharges and streamflows to account for the impact of drawdown on the water surface profile in the oxbow.

Table 2. GCID Hamilton City Rating Curves
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Streamflow Above Oxbow (cfs)	Rating Curve Utilized
< 20,000	Low flow curve developed from data where Main Pump Station discharge is >2,500 cfs
20,000 to 30,000	Linear transition assumed between low and high flow curves (0.25 feet per 1,000 cfs)
> 30,000	High flow curve developed from data where Main Pump Station discharge is zero

The curves are based on empirical data and are intended to conservatively estimate water surface elevations in the oxbow over the range of operational conditions, particularly for low streamflows.

The rating curve was tabulated at 0.1-foot intervals (using the average WSEL at the screens) and estimates of available screen area were calculated. Separate calculations were made for the original intake screen structure and the fish screen extension (circa 2001), since the structures are not identical and have different geometry.

Existing estimates of diversion capacity are available in Table 1 of the Designer's Operating Criteria (USBR, 2010) and this information is plotted on the diversion capacity figure for reference. Diversion rates utilizing the developed rating curves were then calculated for both portions of the intake structure assuming an approach velocity of 0.33 fps.

Assumptions

- No other significant diversions or inflows are assumed to occur between the intake facility and the gage location. Therefore, the summation of the Main Pump Station discharge and gage streamflow is assumed to be representative of the Sacramento River streamflow immediately upstream of the oxbow.
- Instream flow requirement of 4,000 cfs.
- Minimum diversion of 150 cfs in accordance with pump capability.
- The bypass bays and internal fish return system are not operated.
- The Water Control Structure weir blocks were removed circa 2006 and are no longer utilized.
- November through April irrigation withdrawals are typically less than approximately 1,200 cfs.

Limitations

- A significant change in average water surface differential across the screens is evident in data before and after the April 2015 to December 2017 time period. This discontinuity is unexplained and associated impacts to diversion capacity are currently unknown.

- It is understood that gravity flow is possible starting at an afterbay WSEL of approximately 136.0 (streamflow of approximately 5,500 cfs). A review of the available data set indicates that there may be periods when gravity flow is possible (and probable), but the pumped flow is reported as zero. These periods typically occur at streamflows greater than approximately 20,000 cfs. Therefore, the rating curve for streamflows above approximately 20,000 cfs may slightly under-estimate available diversion capacity for certain conditions.

Delevan

Methodology

Historical streamflows were obtained from CA DWR Station BTC, Sacramento River at Butte City, CA. The gage is approximately 10 miles upstream of the site.

The rating curve (Figure 6) from the North of Delta Offstream Storage (NODOS) Sacramento River Fish Screen Facility Feasibility Study (CH2M, 2008) was utilized to inform this analysis. This curve was developed via analysis of existing ratings at the Butte City gage and USGS gage 11389500 Sacramento River at Colusa. The curve includes a River stage of 52.0 feet (NGVD29) at a streamflow of 6,000 cfs. A supporting field measurement of 53.5 feet at 6,212 cfs suggests that the actual stage may be even higher. However, a subsequent analysis by the California Department of Water Resources (CA DWR) recommended that a conservative value of 51.0 feet be used at 6,000 cfs for the purposes of the Feasibility Study.

For the diversion capacity analysis, the curve was adjusted in accordance with the 51.0-foot constraint, and linear interpolation was used to complete interior portions of the curve. River stage values for diversion capacities ranging from 0 cfs to 2,000 cfs were interpolated at 1-foot WSEL intervals.

Assumptions

- Streamflows were not adjusted to account for reach gains or losses (likely negligible) between the gage and intake facility.
- Instream flow requirement of 5,000 cfs.
- Minimum diversion of 200 cfs in accordance with proposed pump capability.

Limitations

- The design low WSEL for the fish screens of 51.0 feet at 6,000 cfs streamflow identified by CA DWR varies from the Figure 6 rating curve (AECOM, 2018 and CH2M, 2008) and measurements taken in the field. It appears that this elevation is conservatively low, and could be refined (raised) during future design. This may result in a slightly shorter intake structure with a reduced footprint.
- Additional water surface elevation measurements were identified in as a potential method to be taken to develop a more detailed rating curve for final design (CH2M, 2008).
- The proposed intake facility may also be required to operate as a flow release / discharge structure under certain scenarios. This analysis does not include consideration of specific fisheries criteria (i.e., exclusion barrier criteria) that would be required to accommodate this mode of operation.

TCCA Red Bluff Facility Operations

Table 3. TCCA Red Bluff Available Diversion Capacity by Streamflow
Sites Project Authority – Sacramento River Intake Fish Screen Operations

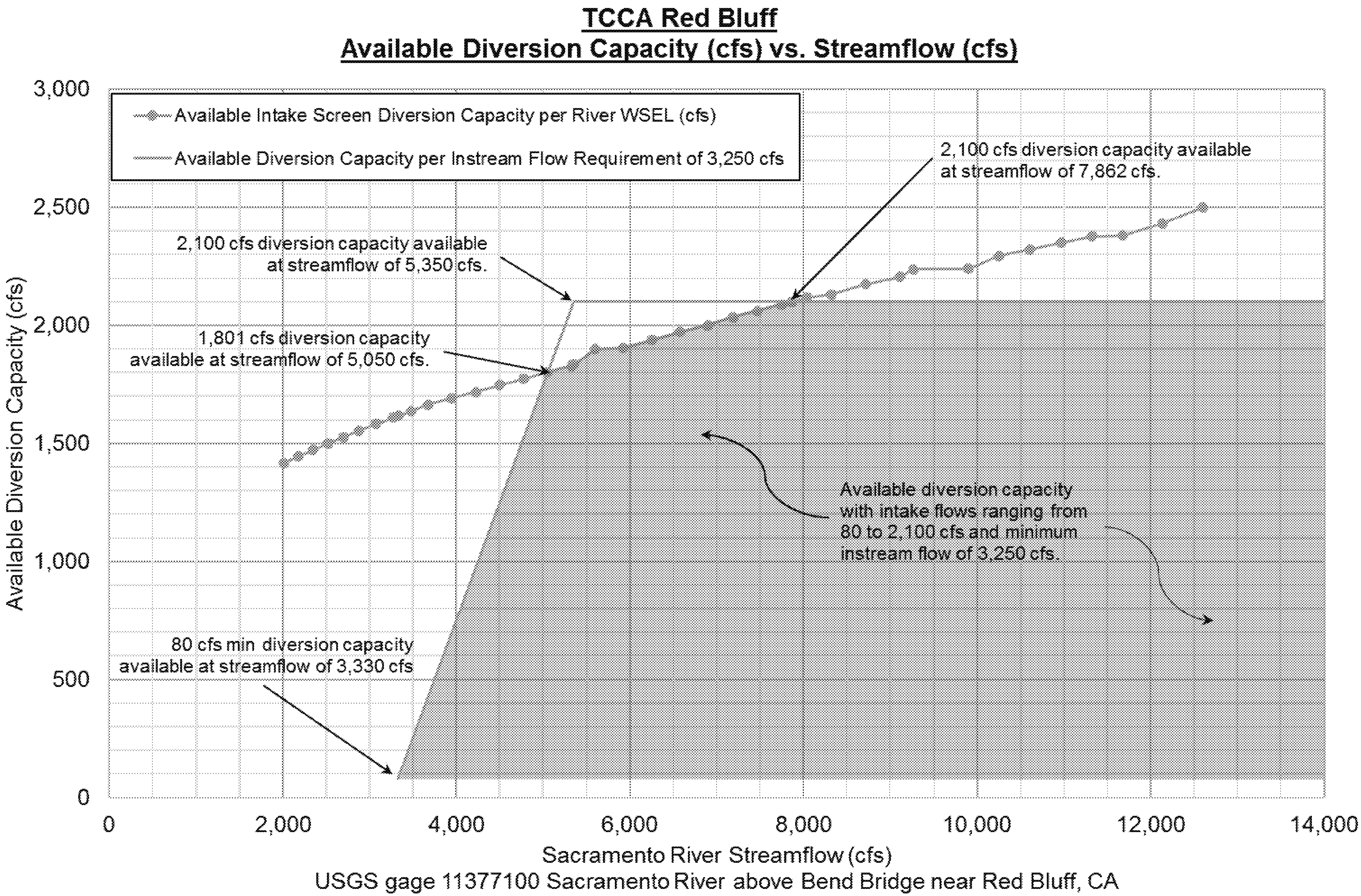
Streamflow at Gage (cfs)	River WSEL at U/S Work Point (feet, NAVD88)	Available Facility Diversion Capacity (cfs)
2,010	241.2	1,417
2,175	241.3	1,445
2,350	241.4	1,472
2,525	241.5	1,500
2,700	241.6	1,527
2,875	241.7	1,554
3,075	241.8	1,582
3,275	241.9	1,609
3,330	241.9	1,617
3,475	242.0	1,637
3,675	242.1	1,664
3,950	242.2	1,692
4,225	242.3	1,719
4,500	242.4	1,746
4,775	242.5	1,774
5,050	242.6	1,801
5,325	242.7	1,829
5,350	242.7	1,835
5,600	242.9	1,900
5,925	243.1	1,904
6,250	243.2	1,938
6,575	243.4	1,973
6,900	243.5	2,000
7,184	243.6	2,034
7,468	243.7	2,062
7,751	243.8	2,089
7,862	243.8	2,100
8,035	243.9	2,117
8,319	244.0	2,130

8,714	244.1	2,175
9,109	244.3	2,206
9,266	244.4	2,237
9,898	244.5	2,240
10,254	244.6	2,295
10,610	244.7	2,322
10,965	244.8	2,350
11,321	244.9	2,377
11,677	245.0	2,380
12,139	245.1	2,432
12,600	245.2	2,500

Diversions limited by instream flow requirement of 3,250 cfs

Diversions limited by River WSEL and submerged screen area

No restrictions (assumes use of future Pump Nos. 2 and 10)


TCCA Red Bluff
Available Diversion Capacity (cfs) vs. Streamflow (cfs)
Available Intake Screen Diversion Capacity per River WSEL (cfs)
Available Diversion Capacity per Instream Flow Requirement of 3,250 cfs
2,100 cfs diversion capacity available at streamflow of 7,862 cfs.
2,100 cfs diversion capacity available at streamflow of 5,350 cfs.
1,801 cfs diversion capacity available at streamflow of 5,050 cfs.
Available diversion capacity with intake flows ranging from 80 to 2,100 cfs and minimum instream flow of 3,250 cfs.
80 cfs min diversion capacity available at streamflow of 3,330 cfs
Available Diversion Capacity (cfs)
3,000
2,500
2,000
1,500
1,000
500
0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
Sacramento River Streamflow (cfs)
USGS gage 11377100 Sacramento River above Bend Bridge near Red Bluff, CA

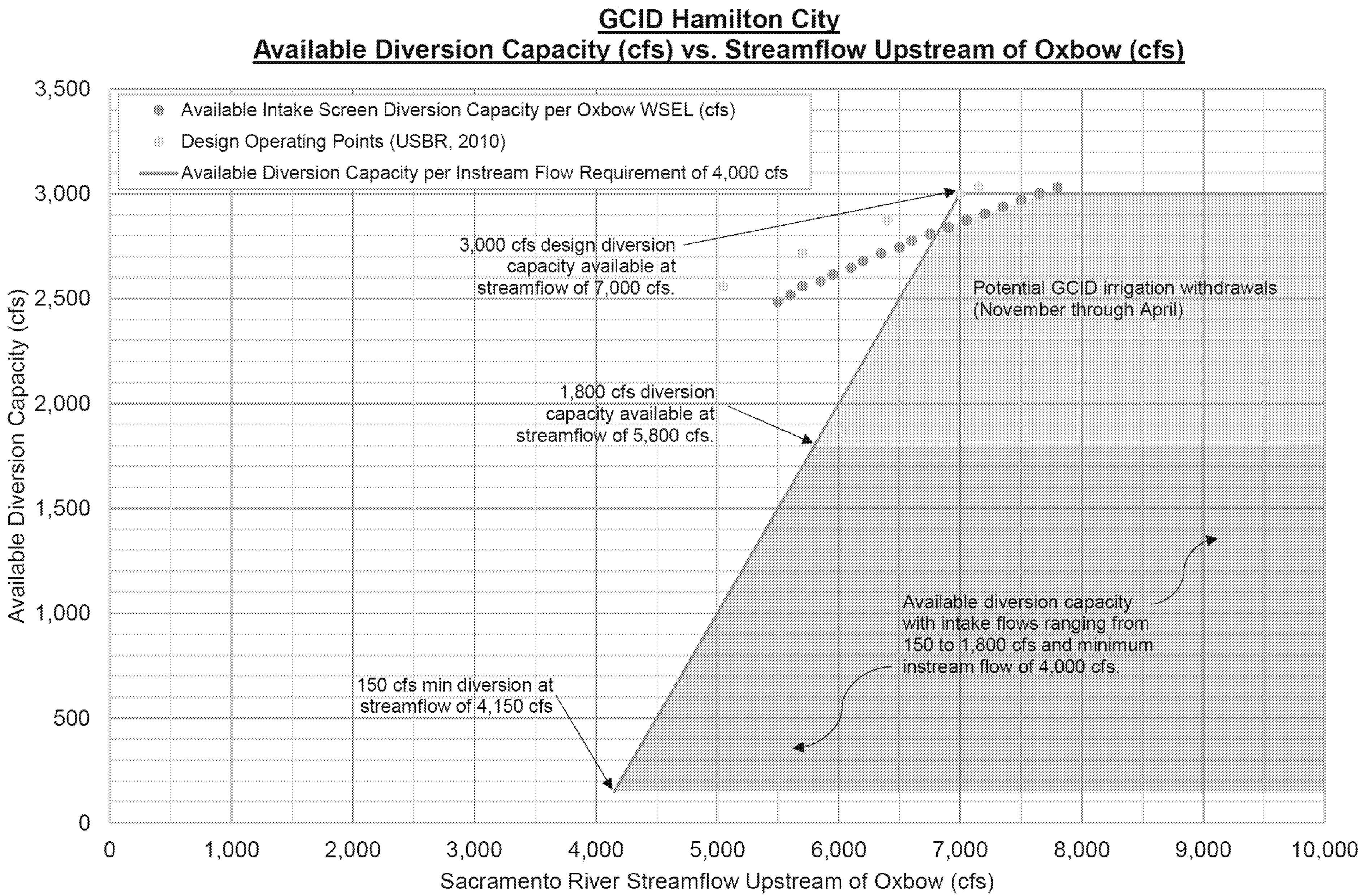
GCID Hamilton City Facility Operations

Table 4. GCID Hamilton City Available Diversion Capacity by Streamflow
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Streamflow Upstream of Oxbow (cfs)	River WSEL at U/S Oxbow (feet, NGVD29)	Available Facility Diversion Capacity (cfs)
900	132.5	1,744
938	132.6	1,777
977	132.7	1,809
1,018	132.8	1,841
1,061	132.9	1,873
1,105	133.0	1,906
1,151	133.1	1,938
1,200	133.2	1,970
1,250	133.3	2,002
2,690	133.4	2,035
2,765	133.5	2,067
2,842	133.6	2,099
2,921	133.7	2,131
3,002	133.8	2,164
3,086	133.9	2,196
3,172	134.0	2,228
3,260	134.1	2,260
3,351	134.2	2,292
3,445	134.3	2,325
3,541	134.4	2,357
3,639	134.5	2,389
3,741	134.6	2,421
3,845	134.7	2,454
3,952	134.8	2,486
4,062	134.9	2,518
4,176	135.0	2,559
4,292	135.1	2,583
4,412	135.2	2,615
4,534	135.3	2,647
4,661	135.4	2,679

4,791	135.5	2,717
4,924	135.6	2,744
5,061	135.7	2,776
5,203	135.8	2,808
5,348	135.9	2,841
5,497	136.0 (begin possible gravity diversion)	2,874
5,650	136.1	2,905
5,807	136.2	2,937
5,969	136.3	2,969
6,135	136.4	3,002
6,306	136.5	3,031

(light shading)	Diversions limited by instream flow requirement of 4,000 cfs
(dark shading)	No restrictions, assuming GCID irrigation withdrawals are less than approximately 1,000 cfs



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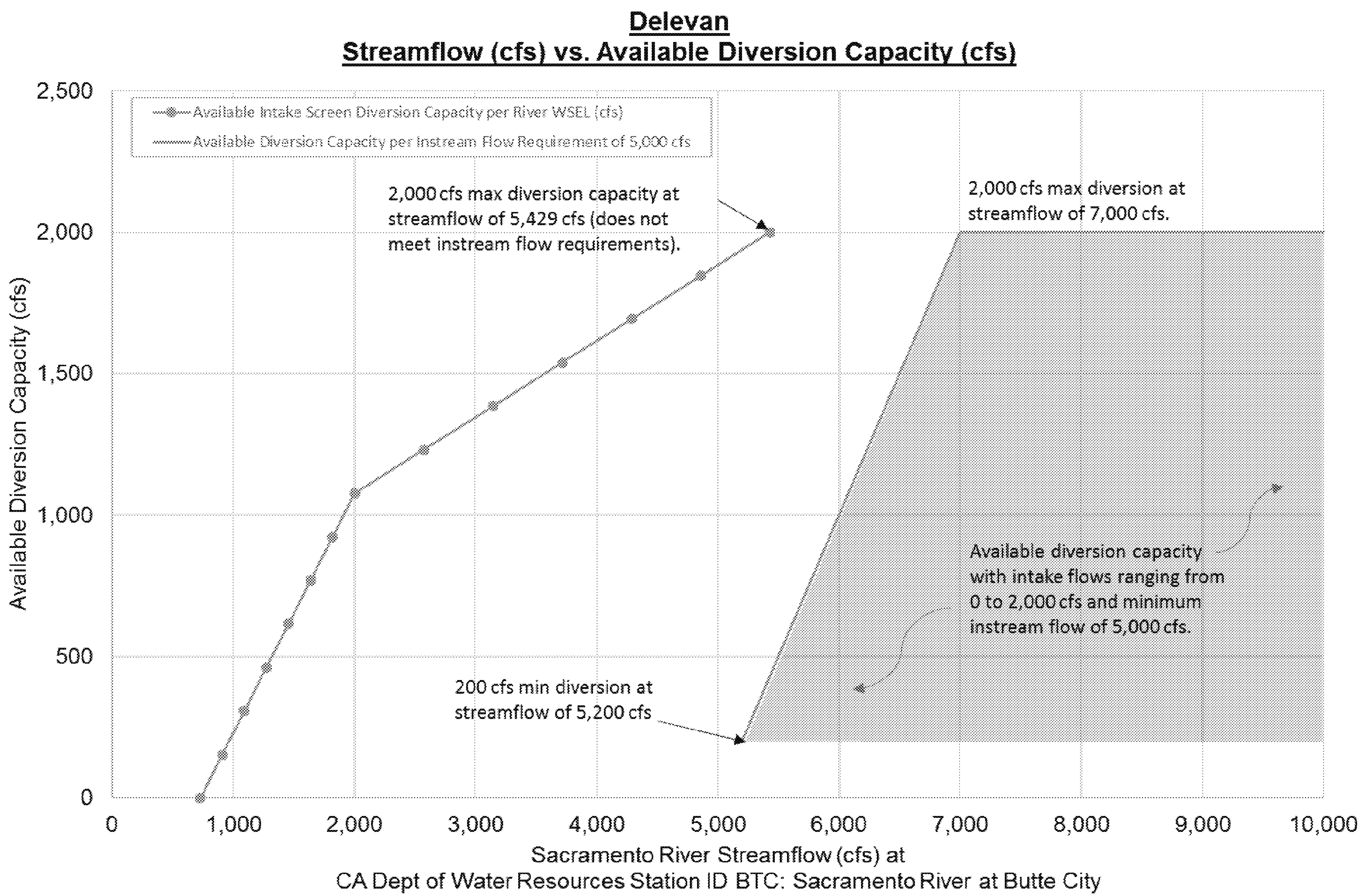
Delevan Facility Operations

Table 5. Delevan Available Diversion Capacity by Streamflow
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Streamflow at Gage (cfs)	River WSEL at Fish Screens (feet, NGVD29)	Available Facility Diversion Capacity (cfs)
727	38.0	0
909	39.0	154
1,091	40.0	308
1,273	41.0	462
1,455	42.0	615
1,636	43.0	769
1,818	44.0	923
2,000	45.0	1,077
2,571	46.0	1,231
3,143	47.0	1,385
3,714	48.0	1,538
4,286	49.0	1,692
4,857	50.0	1,846
5,429	51.0	2,000


Delevan
Streamflow (cfs) vs. Available Diversion Capacity (cfs)
Available Intake Screen Diversion Capacity per River WSEL (cfs)
Available Diversion Capacity per Instream Flow Requirement of 5,000 cfs
2,000 cfs max diversion capacity at streamflow of 5,429 cfs (does not meet instream flow requirements).
2,000 cfs max diversion at streamflow of 7,000 cfs.
Available diversion capacity with intake flows ranging from 0 to 2,000 cfs and minimum instream flow of 5,000 cfs.
200 cfs min diversion at streamflow of 5,200 cfs
Available Diversion Capacity (cfs)
2,500
2,000
1,500
1,000
500
0
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Sacramento River Streamflow (cfs) at
CA Dept of Water Resources Station ID BTC: Sacramento River at Butte City

References

Table 6. References.
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Intake Site	Document Number	Document Title	Description and Use
Common to All Three Intakes	1	CH2M. 2017. *Sites Reservoir Project Preliminary Operations Plan Under a Range of Hydrologic Conditions.* August.	Project operations.
	2	NMFS. 2018. National Oceanic and Atmospheric Administration (NOAA) Fisheries *West Coast Region Anadromous Salmonid Passage Design Guidelines, Peer Review Draft*. 16 August.	Fisheries design guidelines and criteria.
	3	URS Group, Inc. 2018. *North-of-the-Delta Offstream Storage Investigation Final Feasibility Study.* Prepared for the U.S. Bureau of Reclamation (USBR), Mid-Pacific Region. 18 October.	Project configuration and operations.
	4	USBR. 2009. Water Resources Technical Publication. *Guidelines for Performing Hydraulic Field Evaluations at Fish Screening Facilities.* Denver, Colorado. April.	Fish screen hydraulics.
Red Bluff	5	USGS Gage 11377100 Sacramento River above Bend Bridge near Red Bluff, CA.	Streamflow data. https://waterdata.usgs.gov/nwis/uv?site_no=11377100

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Red Bluff	6	CH2M. 2009. *Design Development Report, Fish Passage Improvement Project at the Red Bluff Diversion Dam.* Prepared for the Tehama-Colusa Canal Authority and the USBR. November.	Rating Curve: • Appendix A, Table A-1 used to generate low end of rating curve, up to 24,999 cfs • Appendix A, Table A-2 used to generate high end of rating curve, 25,000 cfs and greater Diversion Capacity: • Table 2 provides design capacity at low River streamflow/stage conditions to maintain the maximum 0.33 fps approach velocity; however, this information was not used for purposes of this analysis. Capacity values from a similar table on the construction drawings were used instead since they were deemed to be more conservative (see below).
	7	CH2M. 2009a. *Conformed Construction Drawings for the Red Bluff Pumping Plant and Fish Screen.* Four volumes. Prepared for the Tehama-Colusa Canal Authority and the USBR. 29 October.	Diversion Capacity: • Volume 1, Drawing 602-D-4308, Table "Project Diversion as a Function of River Stage." Provides design capacity at low River streamflow/stage conditions to maintain the maximum 0.33 fps approach velocity (used for this analysis). • Volume 2, various drawings including Drawing 602-D-4390, "Typical Bay Section." Section of fish screen used to confirm design capacity for diversion at various water levels.
	8	USBR. 2018. *Tehama-Colusa Canal Authority Red Bluff Pumping Plant Post-Construction Fish Screen Hydraulic Evaluation.* March.	Post-construction hydraulic monitoring and evaluation.

GCID Hamilton City	9	Ayres Associates. 1995. *Riverbed Gradient Restoration Structures for the Sacramento River at the Glenn-Colusa Irrigation District Intake, California.* Prepared for the U.S. Army Corps of Engineers (USACE) Sacramento District. 10 July.	Hydraulic analysis of riverbed gradient structure alternatives.
	10	Ayres Associates. 1999. *Gradient Facility Project Report.* Prepared for USACE Sacramento District. June.	Design development of riverbed gradient structure.
	11	Ayres Associates. 2002. *Sacramento River Gradient Facility Post-Construction Evaluation Draft Report.* Prepared for USACE Sacramento District. July	Post construction monitoring and evaluation of riverbed gradient structure.
	12	CA DWR Station ID: HMC, Sacramento River at Hamilton City, CA	Streamflow data. http://cdec.water.ca.gov/dynamicapp/staMeta?station_id=hmc
	13	CH2M. 1985. *Plans for the Construction of Main Pump Station.* Prepared for Glenn-Colusa Irrigation District (GCID).	Record drawings of GCID Main Pump Station.
	14	CH2M. 1993. *Modifications to the CDF&G Fish Screens at the GCID Diversion.* Prepared for GCID. February.	Drawings for installation of screen cleaners and fish bypass. Used in conjunction with original drawings (USBR, 2007) to confirm design capacity for diversion at various water levels while maintaining maximum approach velocity of 0.33 fps.
	15	CH2M. 2008. *Glenn-Colusa Irrigation District Fish Protection Evaluation and Monitoring Program.* Prepared for GCID. January.	Hydraulic monitoring and evaluation.
	16	GCID operational flows and WSEL data.	Historical operations data collected by GCID from January 2011 through December 2018. Provided in numerous Excel files, compiled and processed by Jacobs for this evaluation. Includes Main Pump Station discharge and WSELs for the River, Oxbow (Screen 85), Bypass and Afterbay.
	17	GCID Main Pump Station Data	Pump specifications and pump curves.

GCID Hamilton City	18	McMillen, LLC. 2013. *Glenn-Colusa Irrigation District Gradient Facility, Sacramento River, CA, Water Data Collection Technical Memorandum.* Prepared for USACE Sacramento District. 21 June.	Water surface elevation data.
	19	USBR. 2010. *Designer's Operating Criteria for Hamilton City Pumping Plant Fish Screen Structure and Downstream Channel Structures.* Prepared for GGCID, California. Technical Service Center, Denver, Colorado. 26 January.	Diversion Capacity: • Table 1 summarizes design capacity for diversion at low river flow conditions to maintain maximum 0.33 fps approach velocity. Note that this table does not contain associated stage information, which was based on the low flow rating curve. • Provides minimum WSEL for full pumped flow of 3,000 cfs (El. 136.5 upstream of the weir)
	20	USBR. 1997. *Drawings for Specification No. 20-C0476.* Fish Screen Structure Extension, Fish Screen Structure Improvement Project, Glenn-Colusa Irrigation District, Central Valley Project Improvement Act. 21 October.	Volume III, various drawings including Drawing 602-D-4095 "Fish Screen Structure Sections." Sections used to confirm design capacity for diversion at various water levels while maintaining maximum approach velocity of 0.33 fps.
Delevan	21	AECOM. Delevan Intake Pumping-Generating Plant and Fish Screen Structure, Site Plan, Authority Project Alternative - D. Prepared for Sites Project Authority. 2018.	Intake and fish screen general arrangement drawing.
	22	CA DWR Station ID: BTC, Sacramento River at Butte City, CA	Streamflow data. http://cdec.water.ca.gov/dynamicapp/staMeta?station_id=btc
	23	CH2M. 2008. *North-of-Delta Offstream Storage – Sacramento River Fish Screen Facility Feasibility Study.* Prepared for California Department of Water Resources. June.	Rating Curve: • Figure 6 rating curve used to generate stage data at the intake based on streamflow. Diversion Capacity: • Fish screen drawings used to confirm design capacity for diversion at various water levels while maintaining maximum approach velocity of 0.33 fps.

Attachments

1 – TCCA Red Bluff

- November through April flow-duration curve
- Monthly flow-duration curves
- Annual stage-frequency curve
- November through April stage-frequency curve
- Monthly stage-frequency curves

2 – GCID Hamilton City

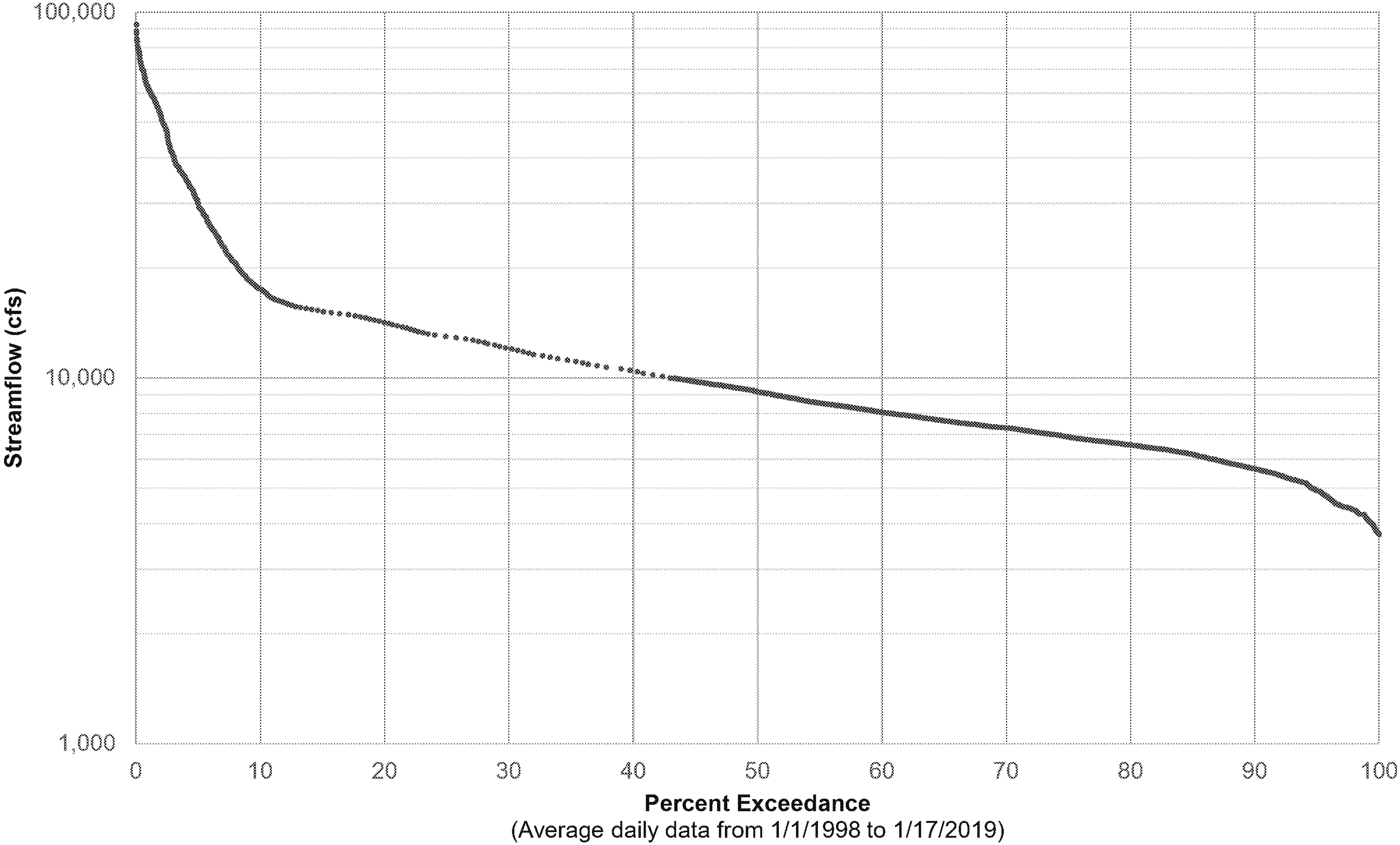
- Annual flow-duration curve
- November through April flow-duration curve
- Monthly flow-duration curves
- Annual stage-frequency curve
- November through April stage-frequency curve
- Monthly stage-frequency curves

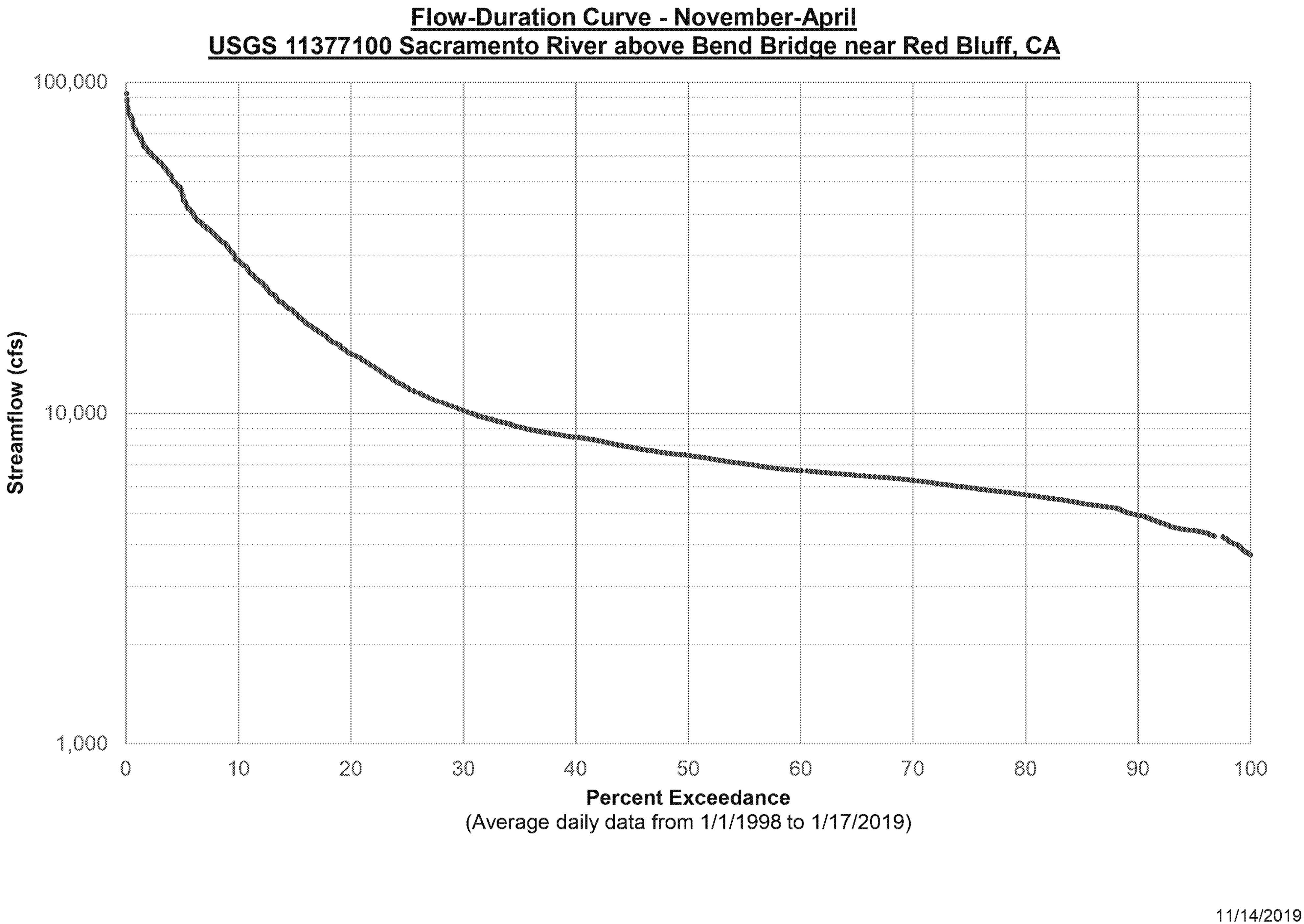
3 – Delevan

- Annual flow-duration curve
- November through April flow-duration curve
- Monthly flow-duration curves
- Annual stage-frequency curve
- November through April stage-frequency curve
- Monthly stage-frequency curves

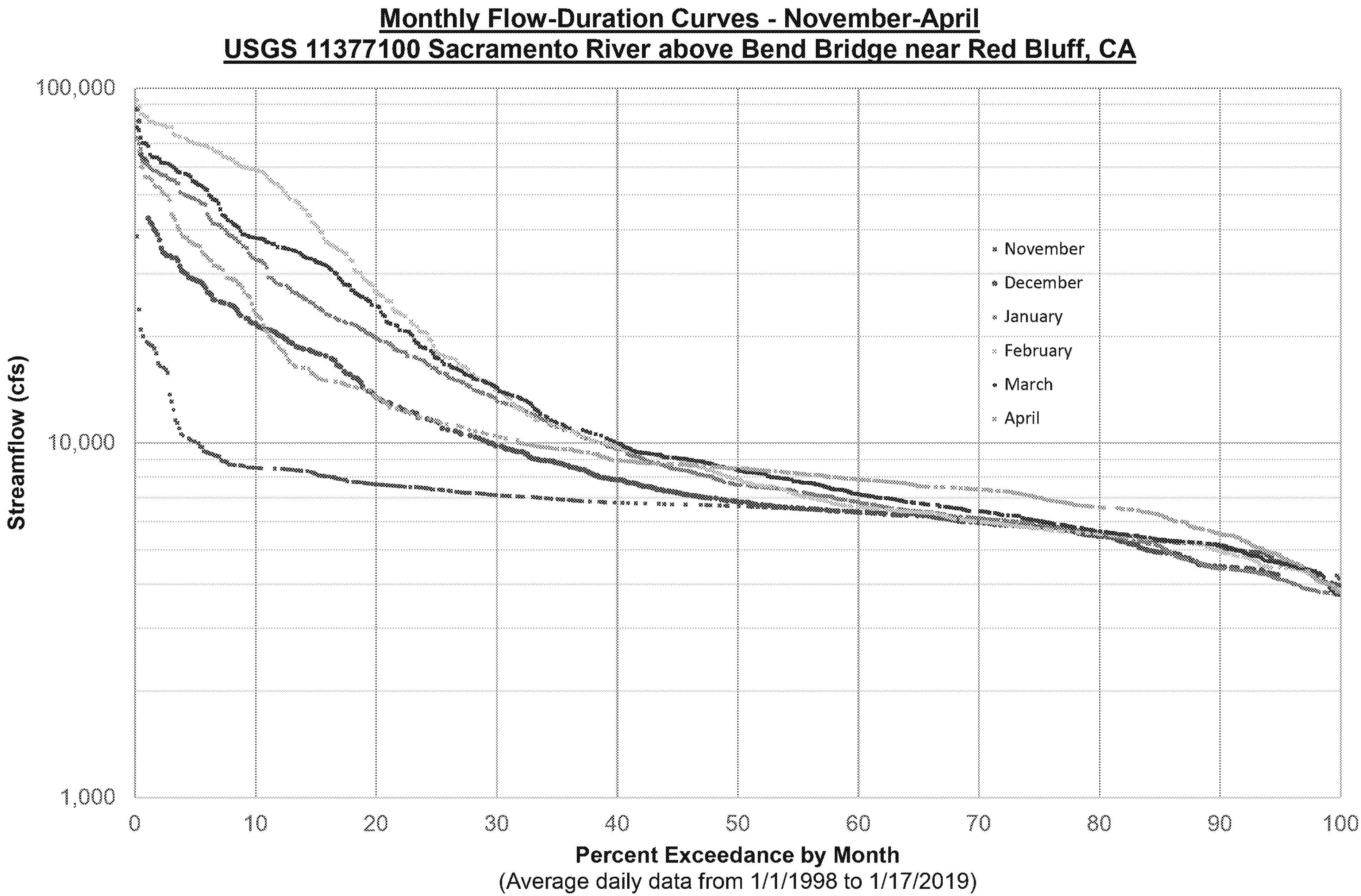
Attachment 1 – TCCA Red Bluff

Flow-Duration Curve - Annual
USGS 11377100 Sacramento River above Bend Bridge near Red Bluff, CA

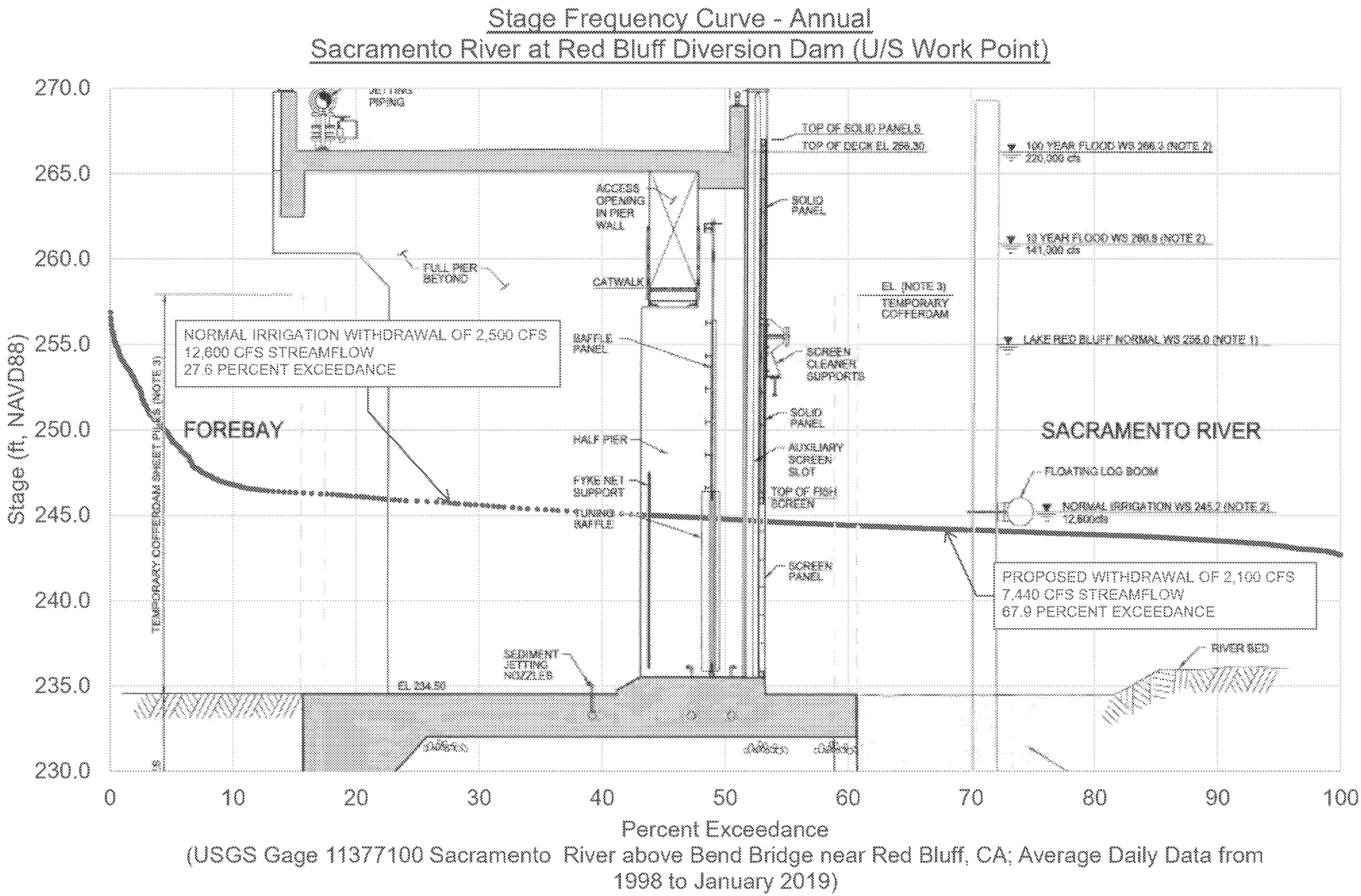




Flow-Duration Curve - November-April
USGS 11377100 Sacramento River above Bend Bridge near Red Bluff, CA
100,000
10,000
1,000
Streamflow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedance
(Average daily data from 1/1/1998 to 1/17/2019)
11/14/2019


Monthly Flow-Duration Curves - November-April
USGS 11377100 Sacramento River above Bend Bridge near Red Bluff, CA
100,000
10,000
1,000
Streamflow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedance by Month
(Average daily data from 1/1/1998 to 1/17/2019)
November
December
January
February
March
April

11/14/2019



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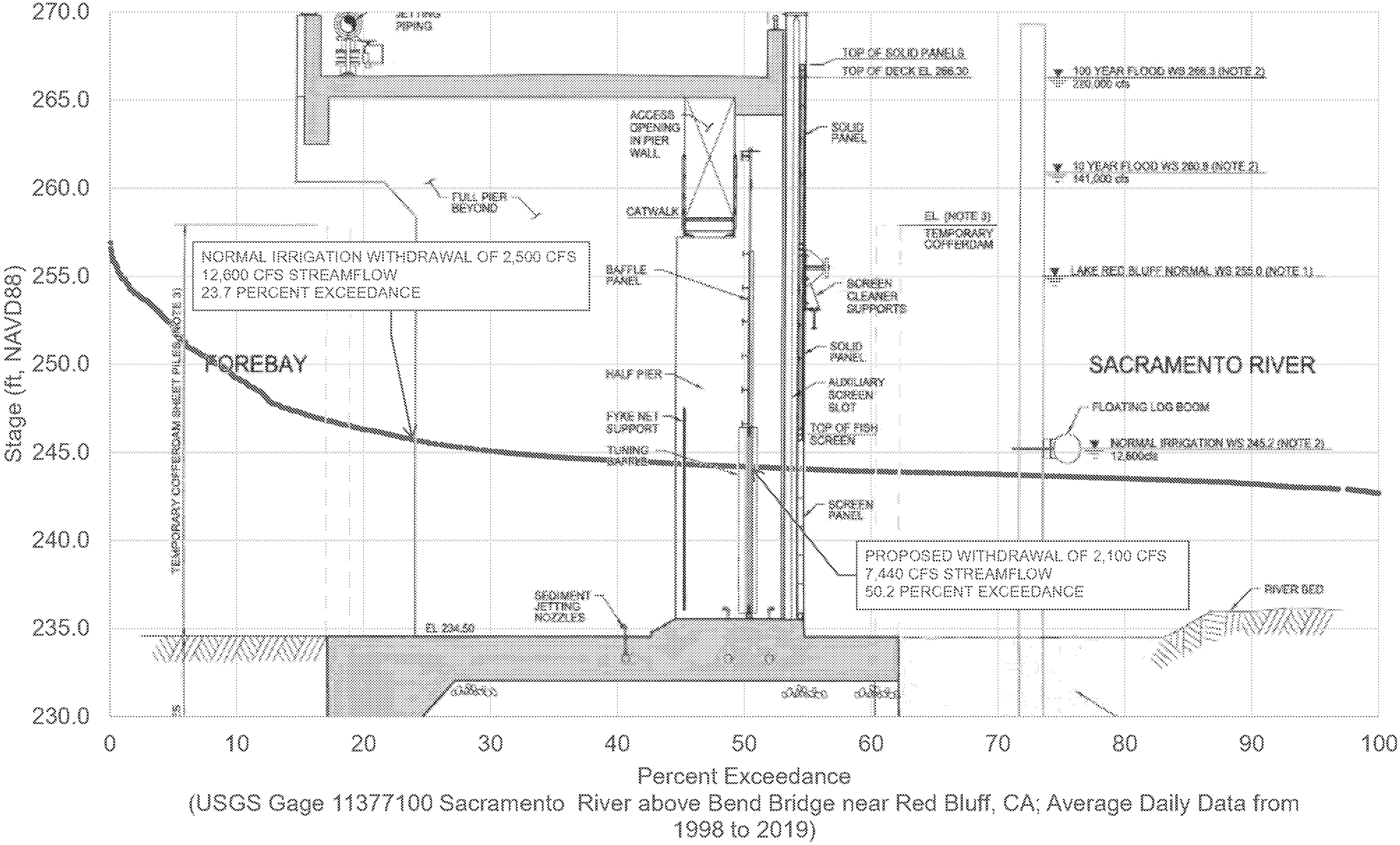
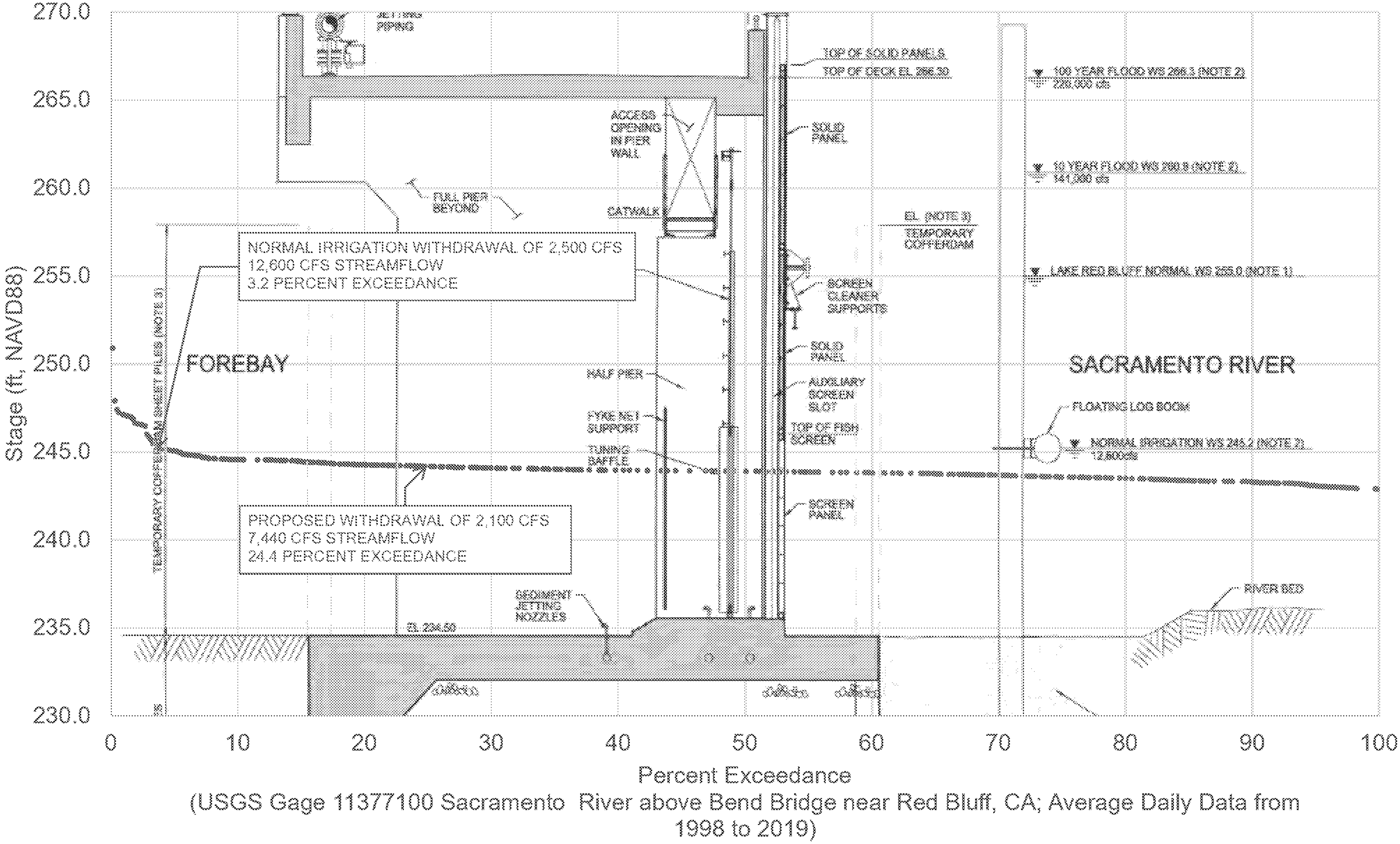
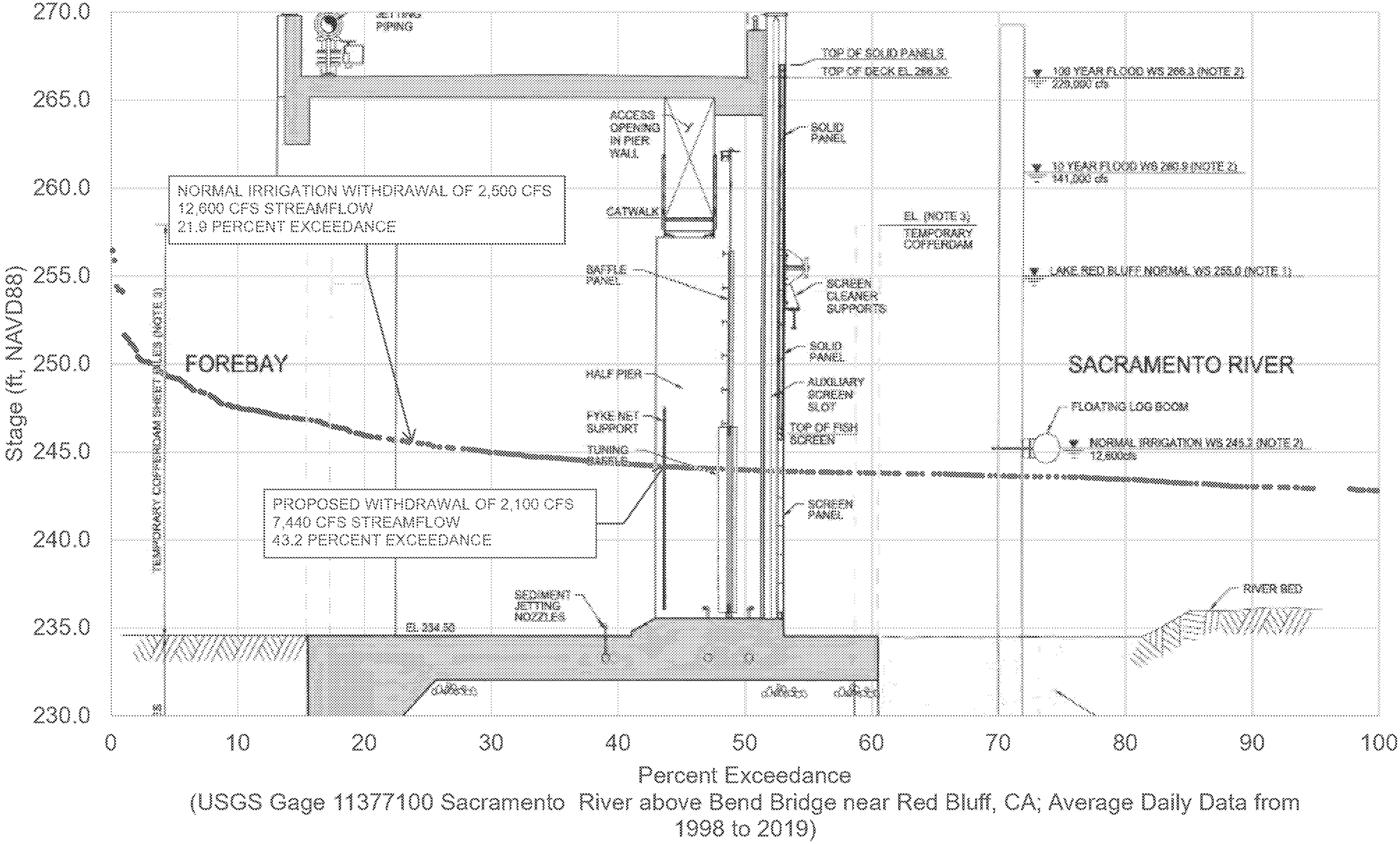
Stage Frequency Curve - November-April
Sacramento River at Red Bluff Diversion Dam (U/S Work Point)



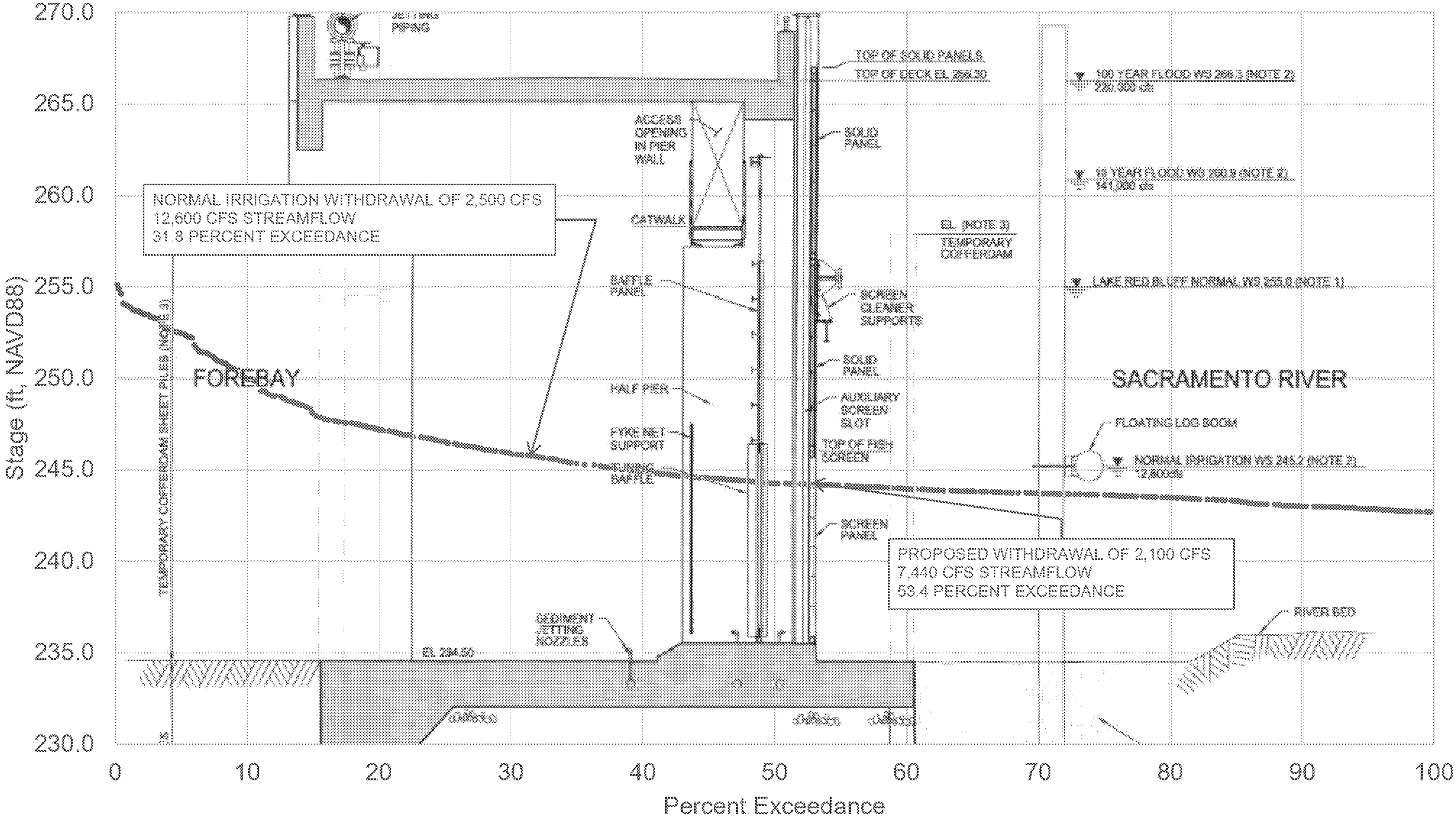
Stage Frequency Curve - November
Sacramento River at Red Bluff Diversion Dam (U/S Work Point)



Stage Frequency Curve - December
Sacramento River at Red Bluff Diversion Dam (U/S Work Point)

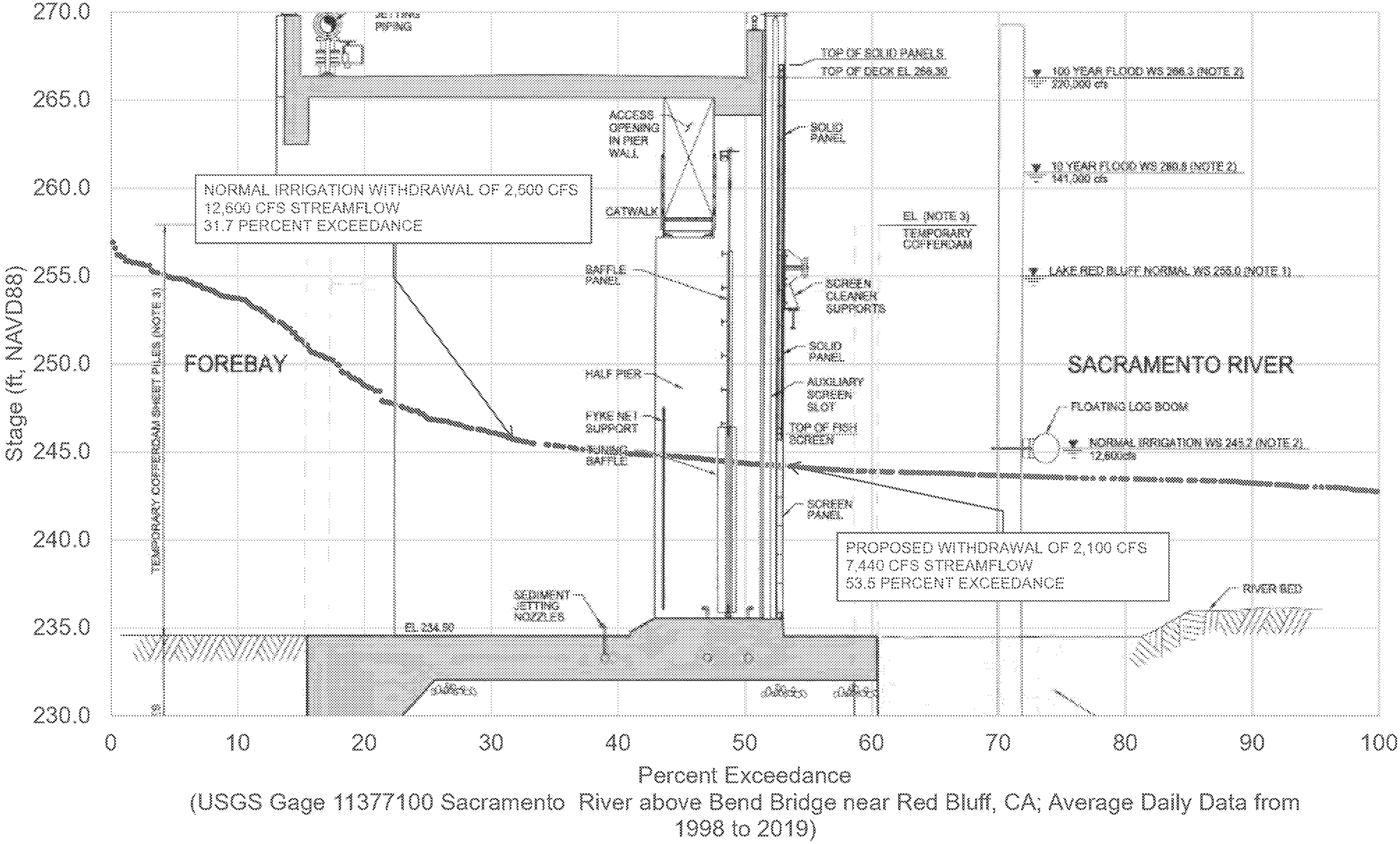


Stage Frequency Curve - January
Sacramento River at Red Bluff Diversion Dam (U/S Work Point)

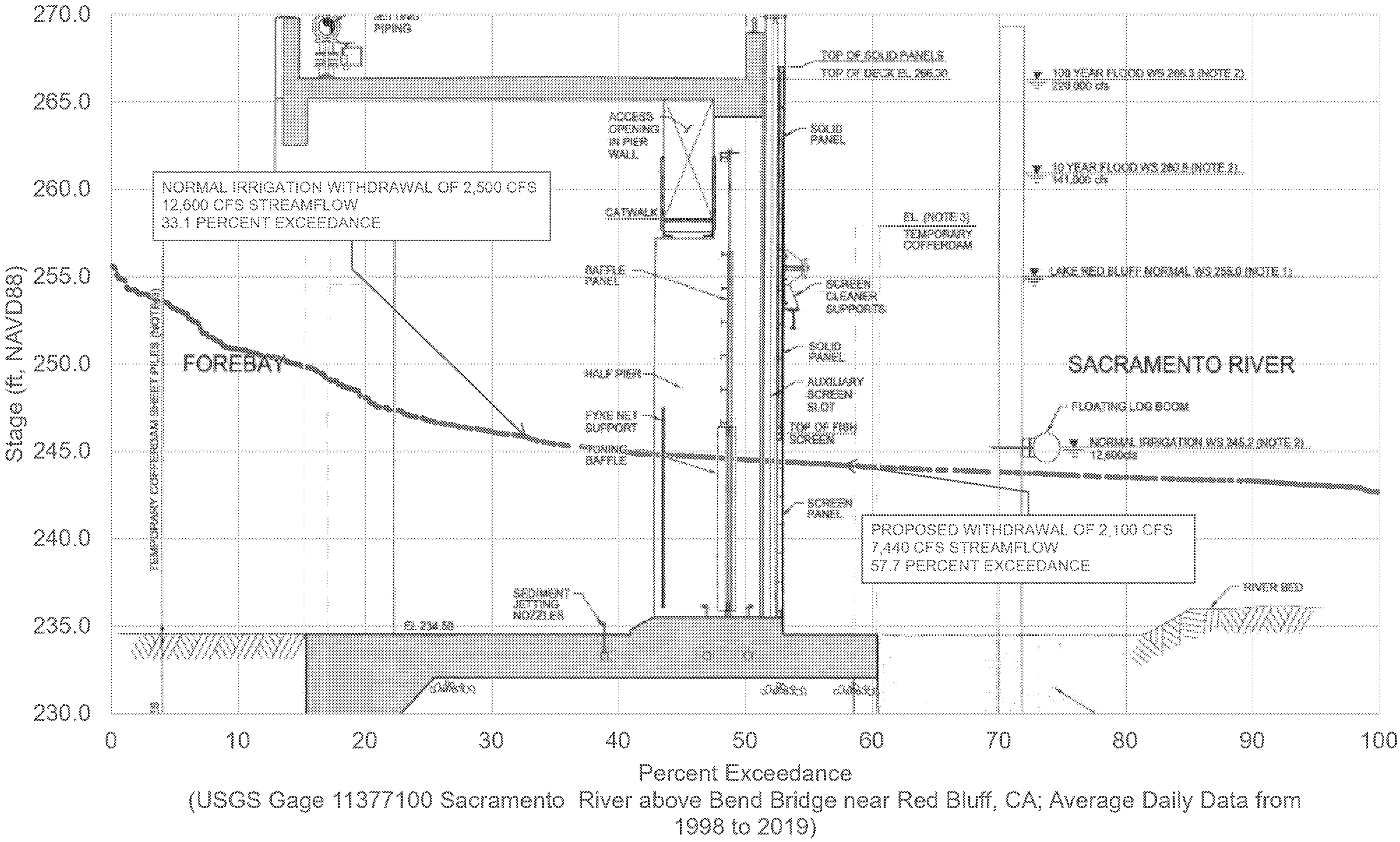


(USGS Gage 11377100 Sacramento River above Bend Bridge near Red Bluff, CA; Average Daily Data from 1998 to 2019)

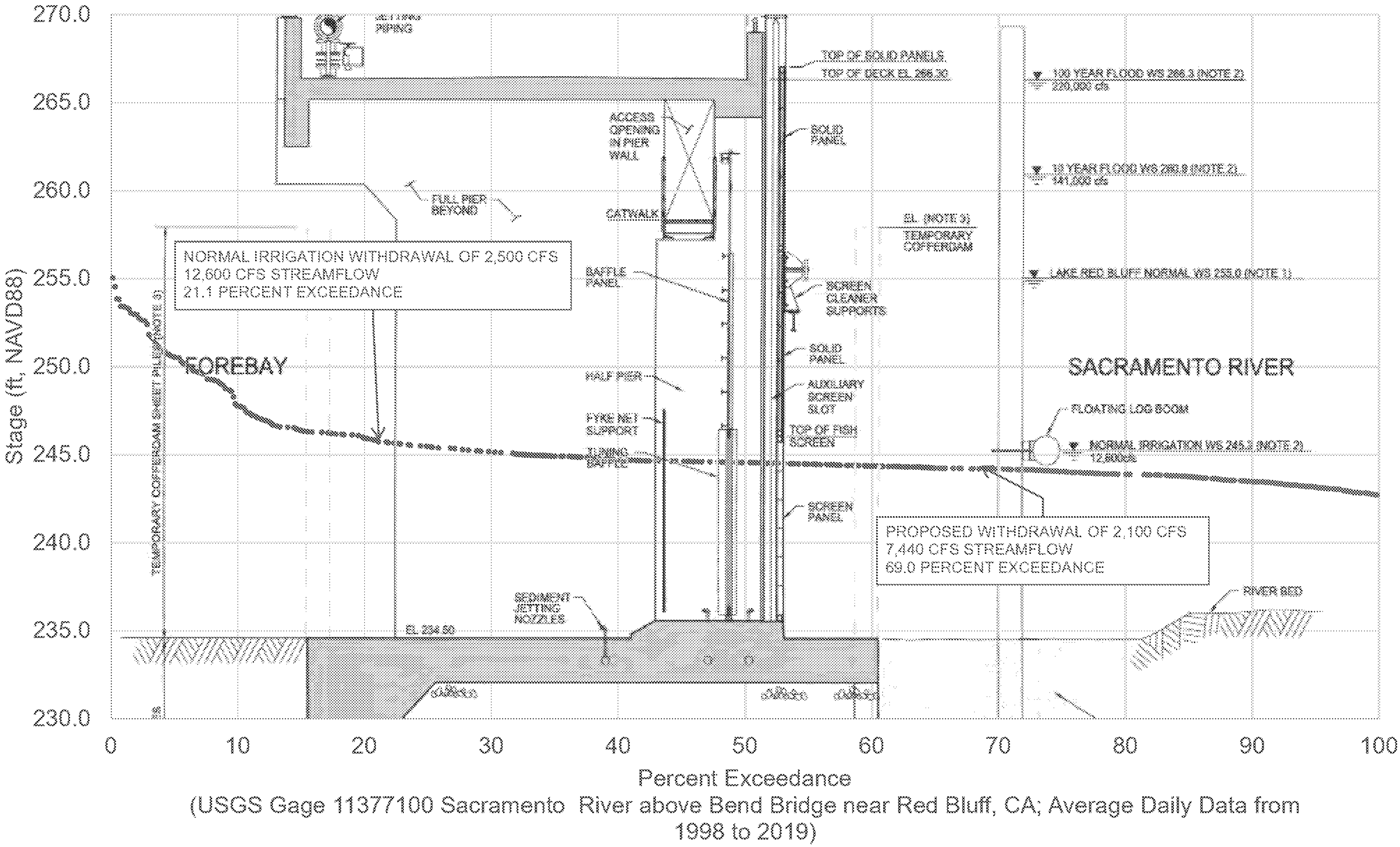
Stage Frequency Curve - February
Sacramento River at Red Bluff Diversion Dam (U/S Work Point)



Stage Frequency Curve - March
Sacramento River at Red Bluff Diversion Dam (U/S Work Point)

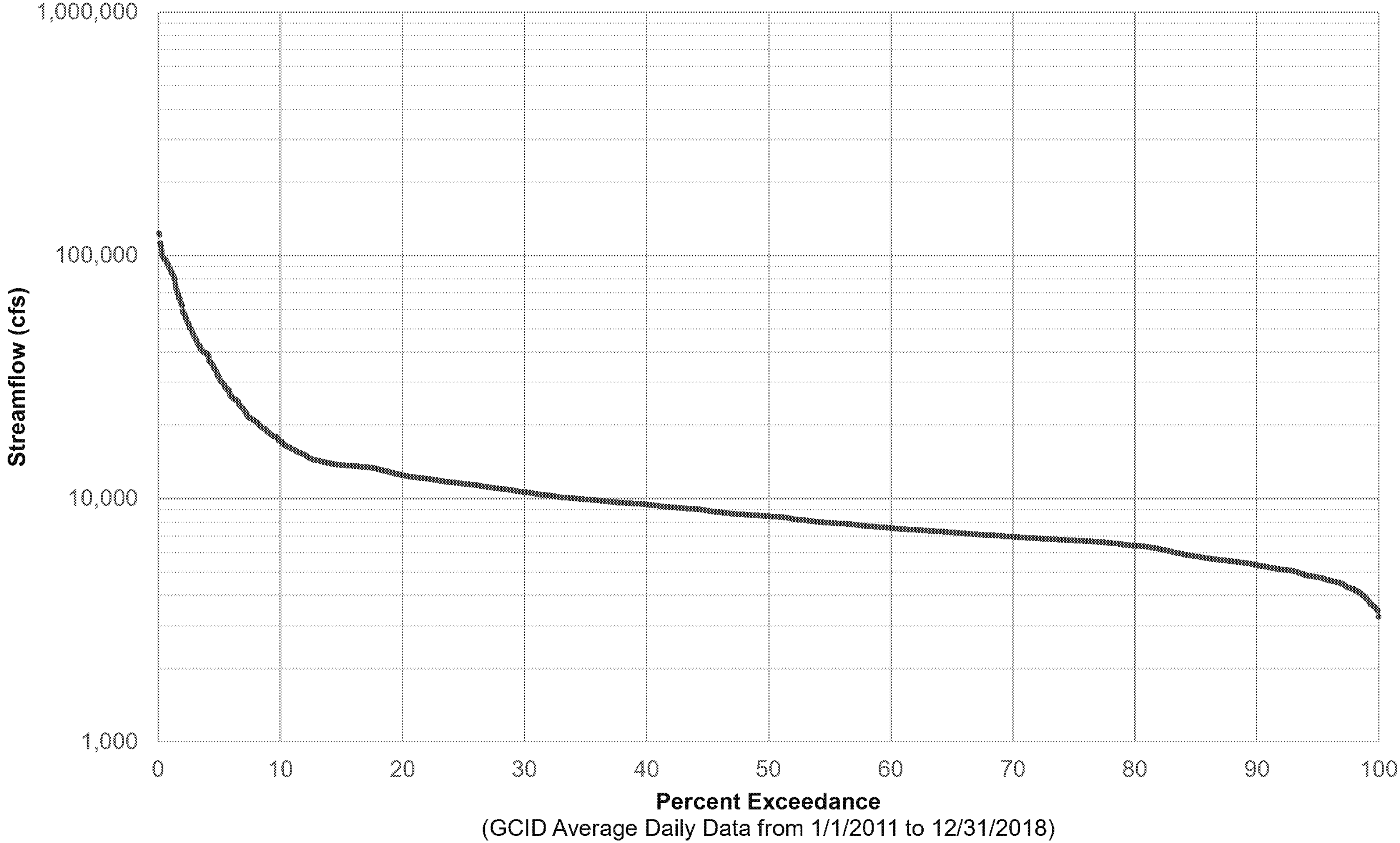


Stage Frequency Curve - April
Sacramento River at Red Bluff Diversion Dam (U/S Work Point)

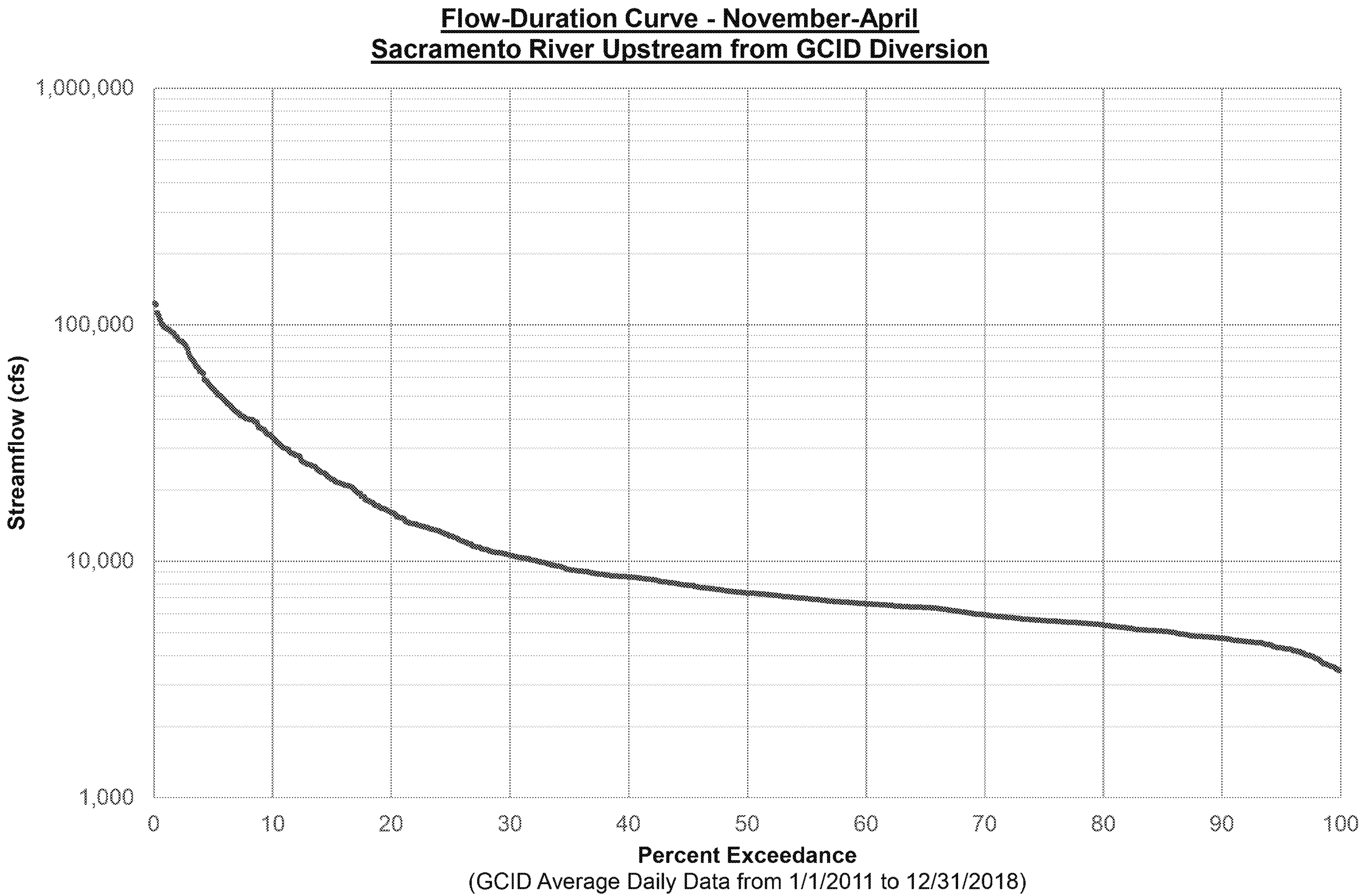


Attachment 2 – GCID Hamilton City

Flow-Duration Curve - Annual
Sacramento River Upstream from Oxbow



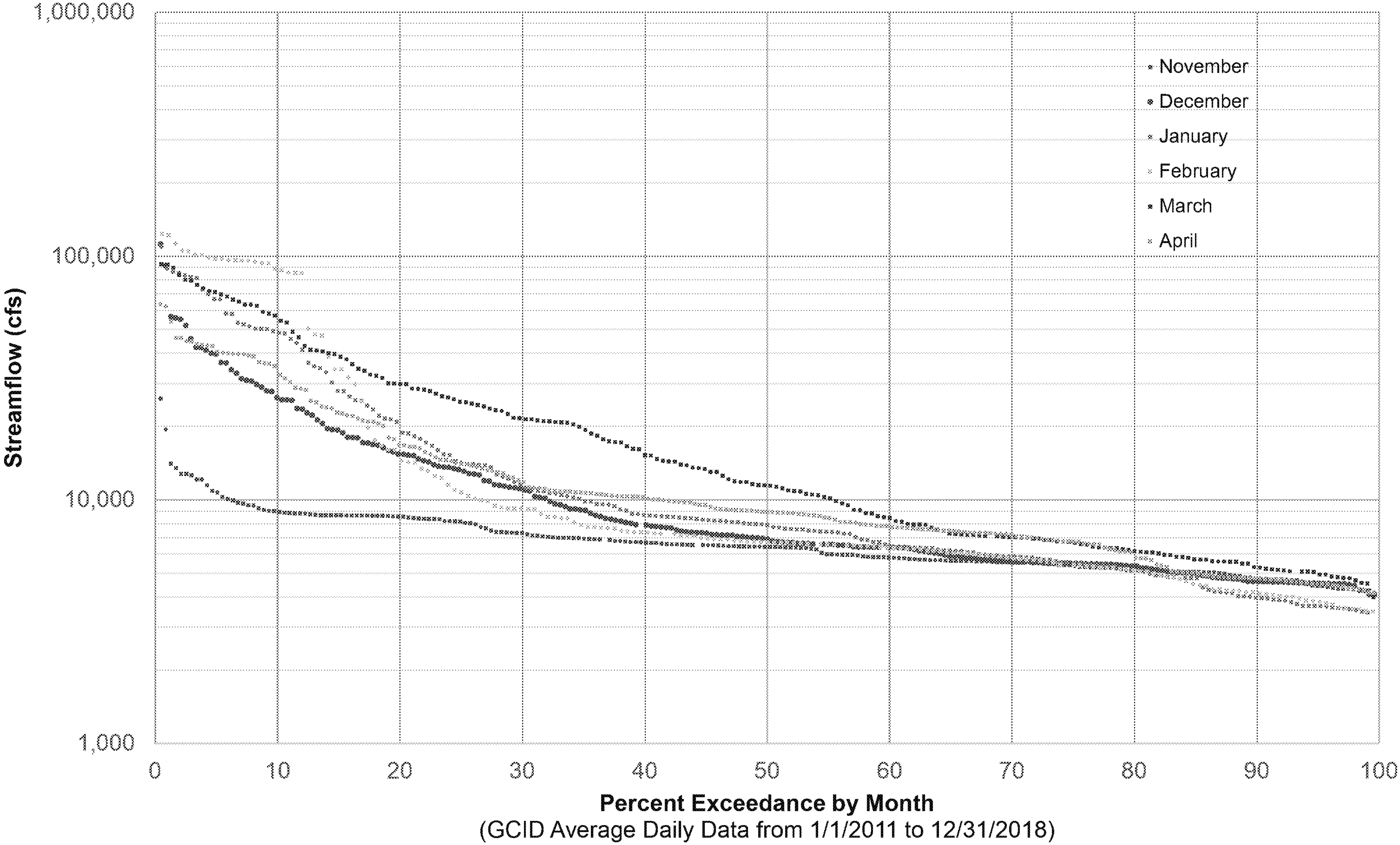
8/2/2019



Flow-Duration Curve - November-April
Sacramento River Upstream from GCID Diversion
1,000,000
100,000
10,000
1,000
Streamflow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedance
(GCID Average Daily Data from 1/1/2011 to 12/31/2018)

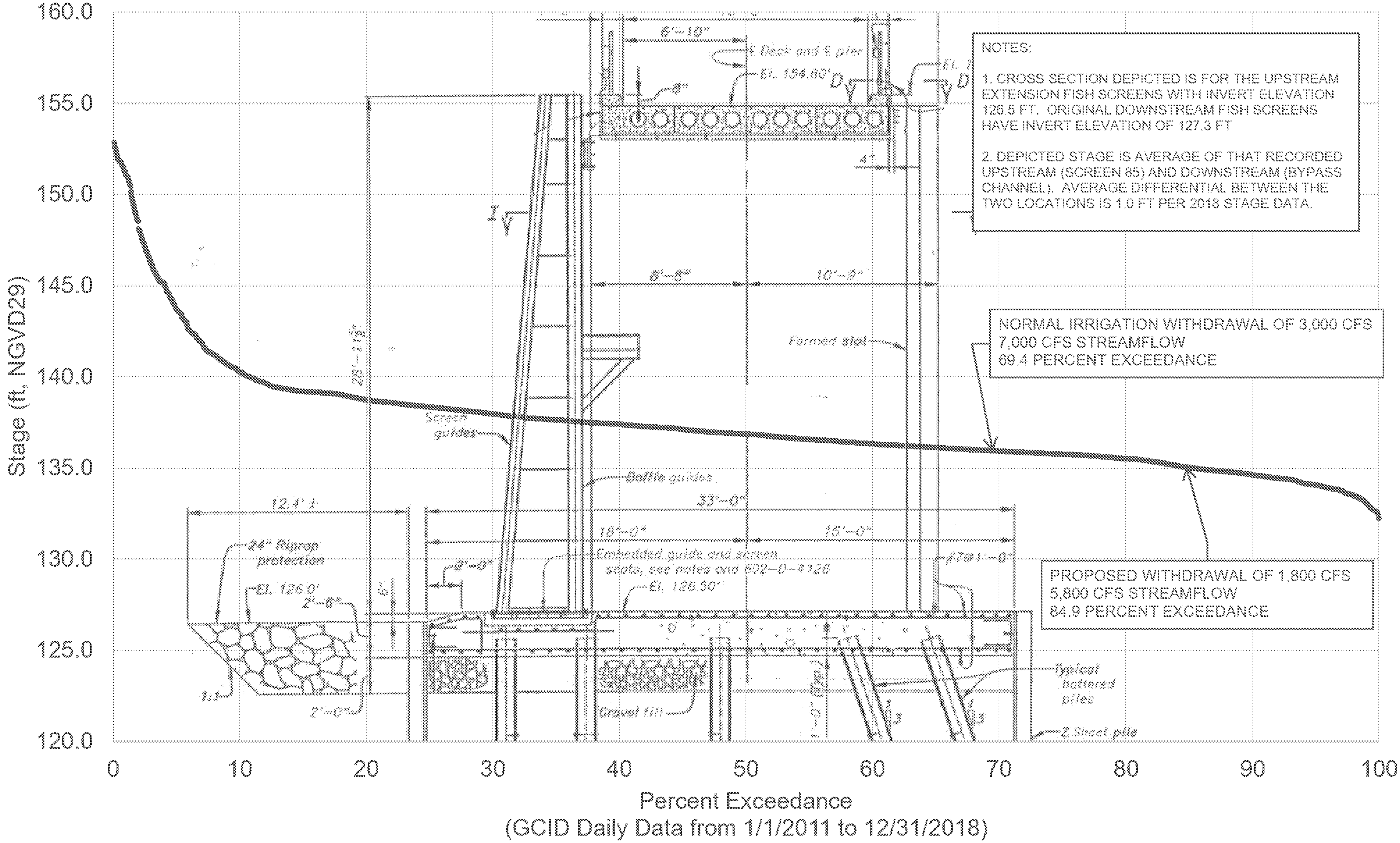
11/14/2019

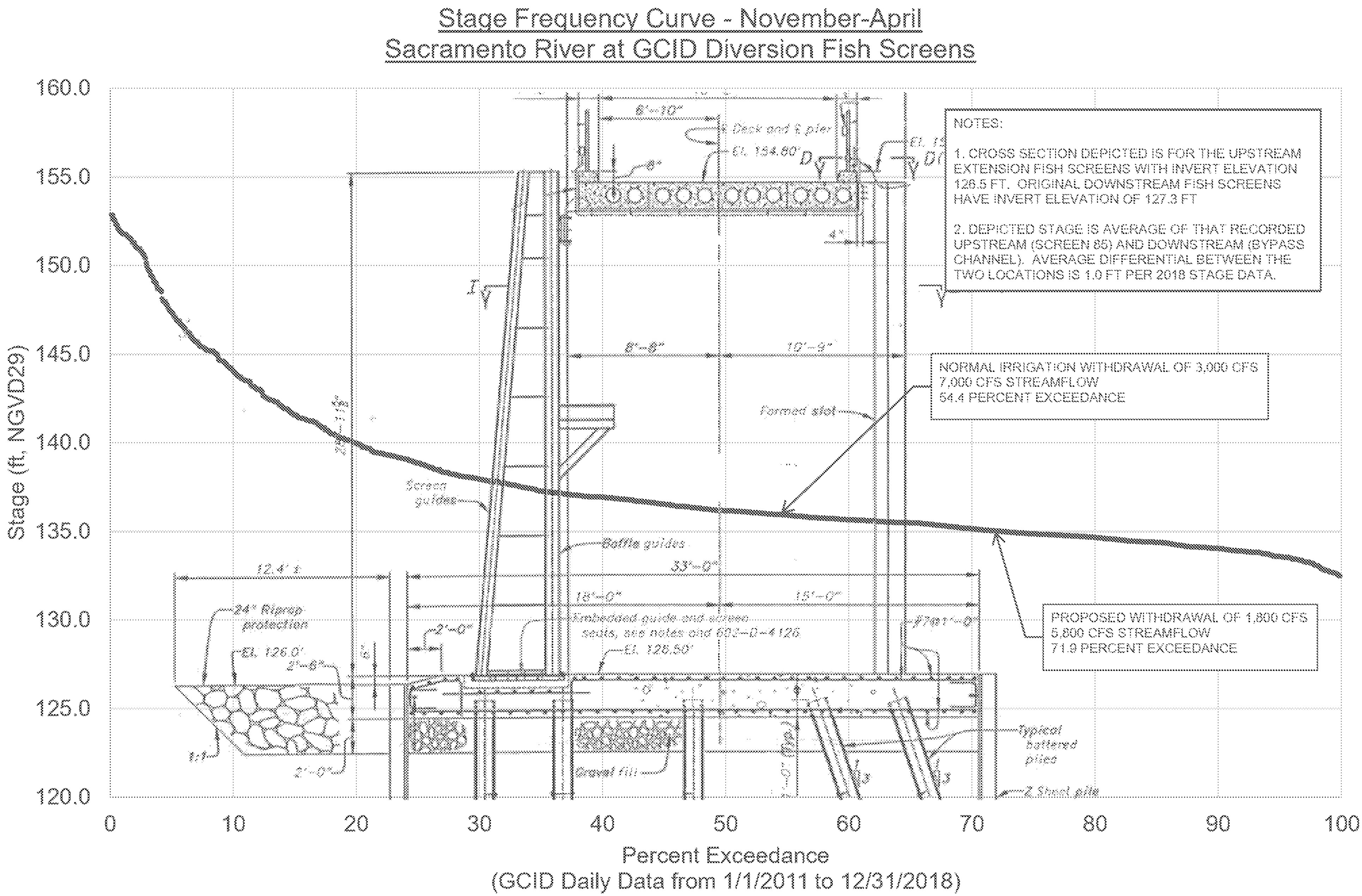
Monthly Flow-Duration Curves - November-April
Sacramento River Upstream from GCID Diversion



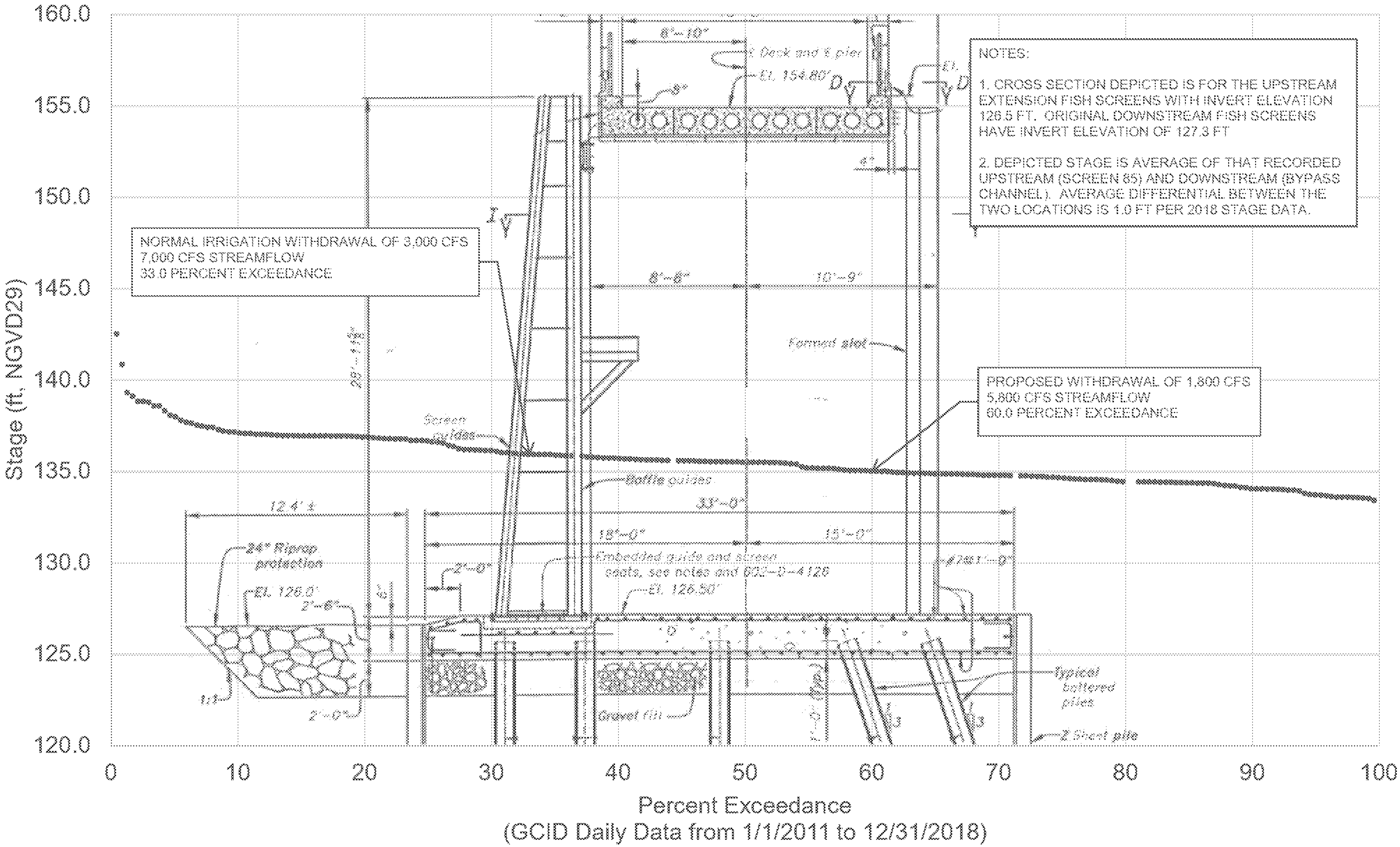
11/14/2019

Stage Frequency Curve - Annual
Sacramento River at GCID Diversion Fish Screens

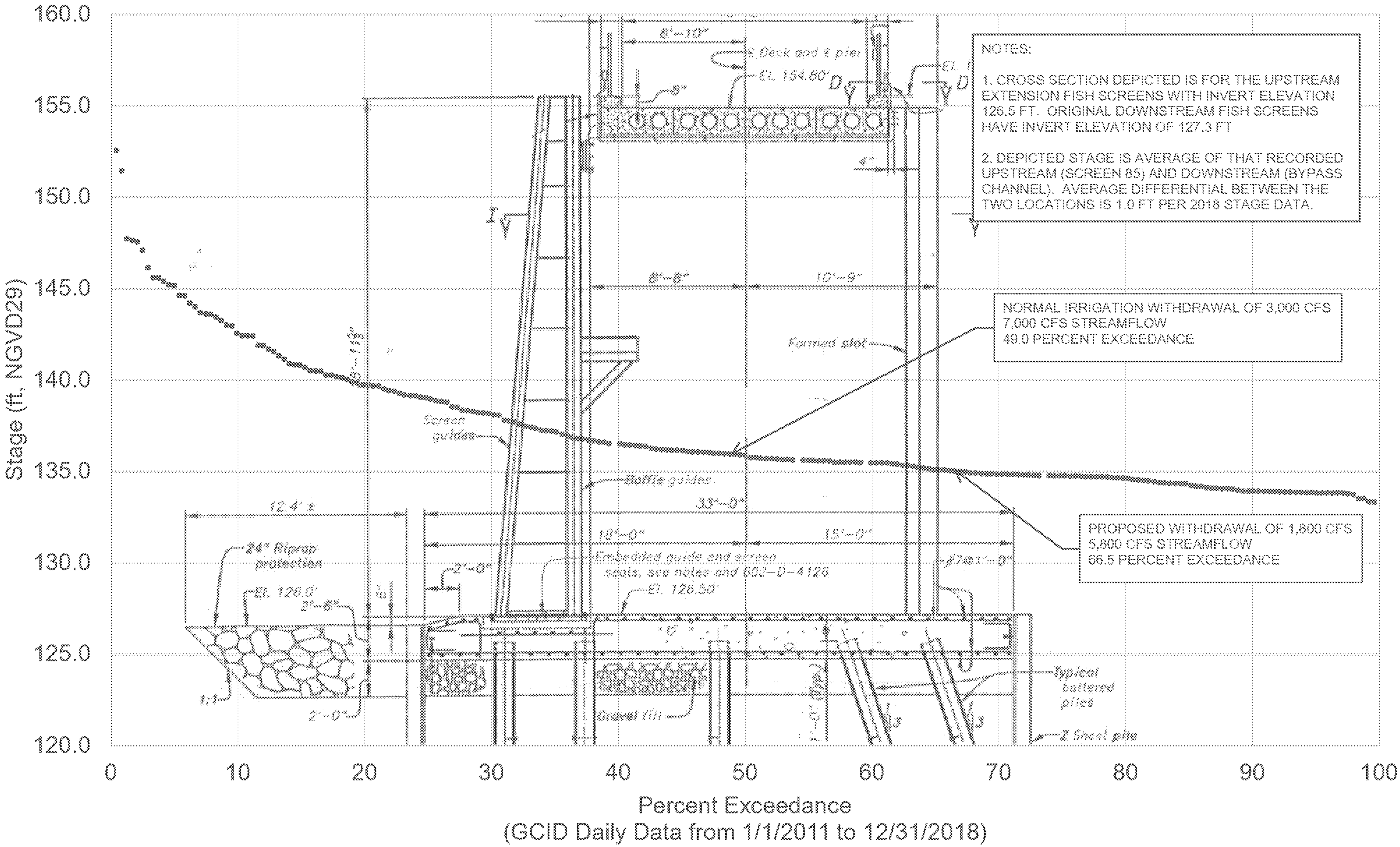



Stage Frequency Curve - November-April
Sacramento River at GCID Diversion Fish Screens
Stage (ft, NGVD29)
Percent Exceedance
(GCID Daily Data from 1/1/2011 to 12/31/2018)
NOTES:
1. CROSS SECTION DEPICTED IS FOR THE UPSTREAM EXTENSION FISH SCREENS WITH INVERT ELEVATION 126.5 FT. ORIGINAL DOWNSTREAM FISH SCREENS HAVE INVERT ELEVATION OF 127.3 FT
2. DEPICTED STAGE IS AVERAGE OF THAT RECORDED UPSTREAM (SCREEN 85) AND DOWNSTREAM (BYPASS CHANNEL). AVERAGE DIFFERENTIAL BETWEEN THE TWO LOCATIONS IS 1.0 FT PER 2018 STAGE DATA.
NORMAL IRRIGATION WITHDRAWAL OF 3,000 CFS
7,000 CFS STREAMFLOW
54.4 PERCENT EXCEEDANCE
PROPOSED WITHDRAWAL OF 1,800 CFS
5,800 CFS STREAMFLOW
71.9 PERCENT EXCEEDANCE

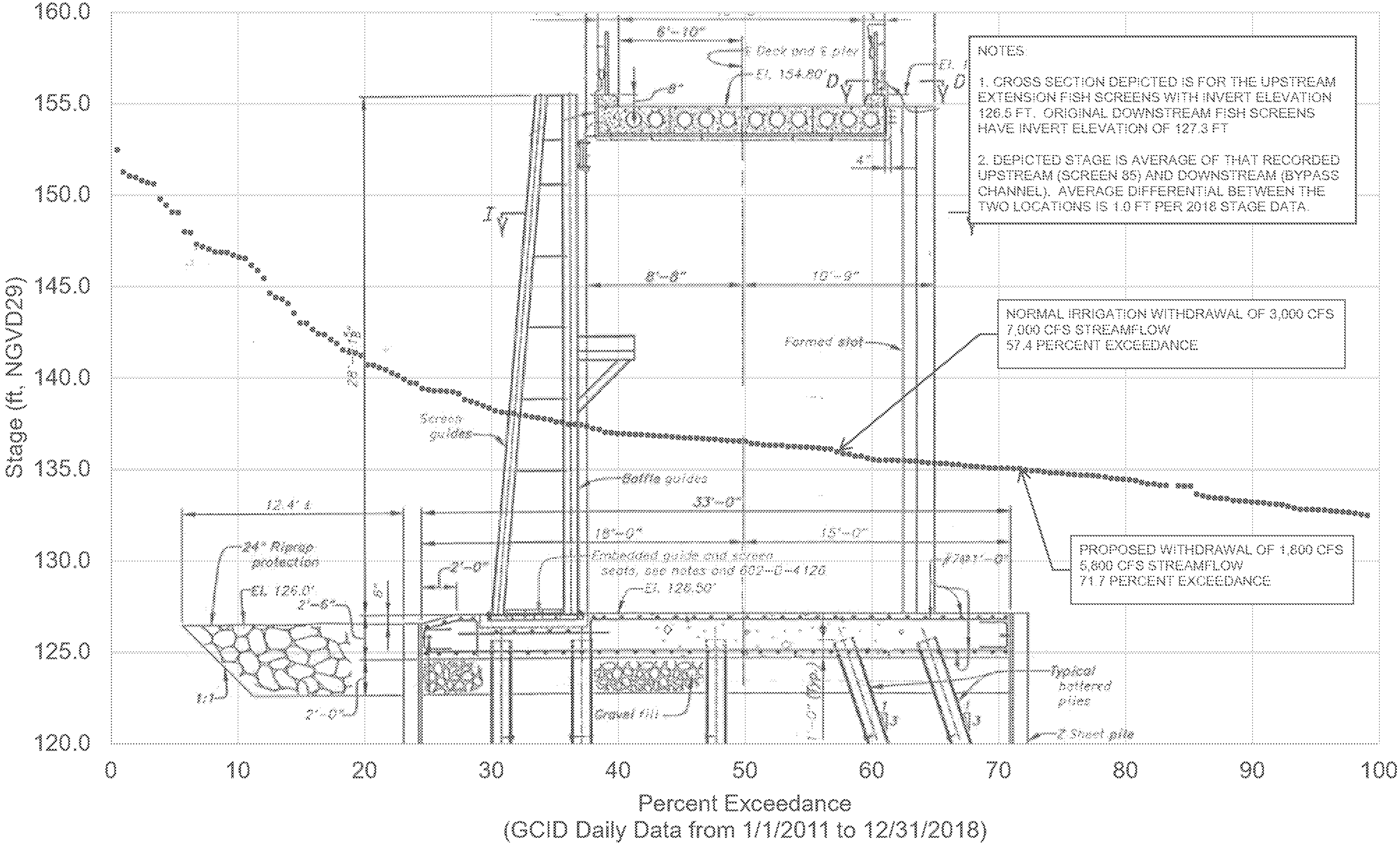
Stage Frequency Curve - November
Sacramento River at GCID Diversion Fish Screens



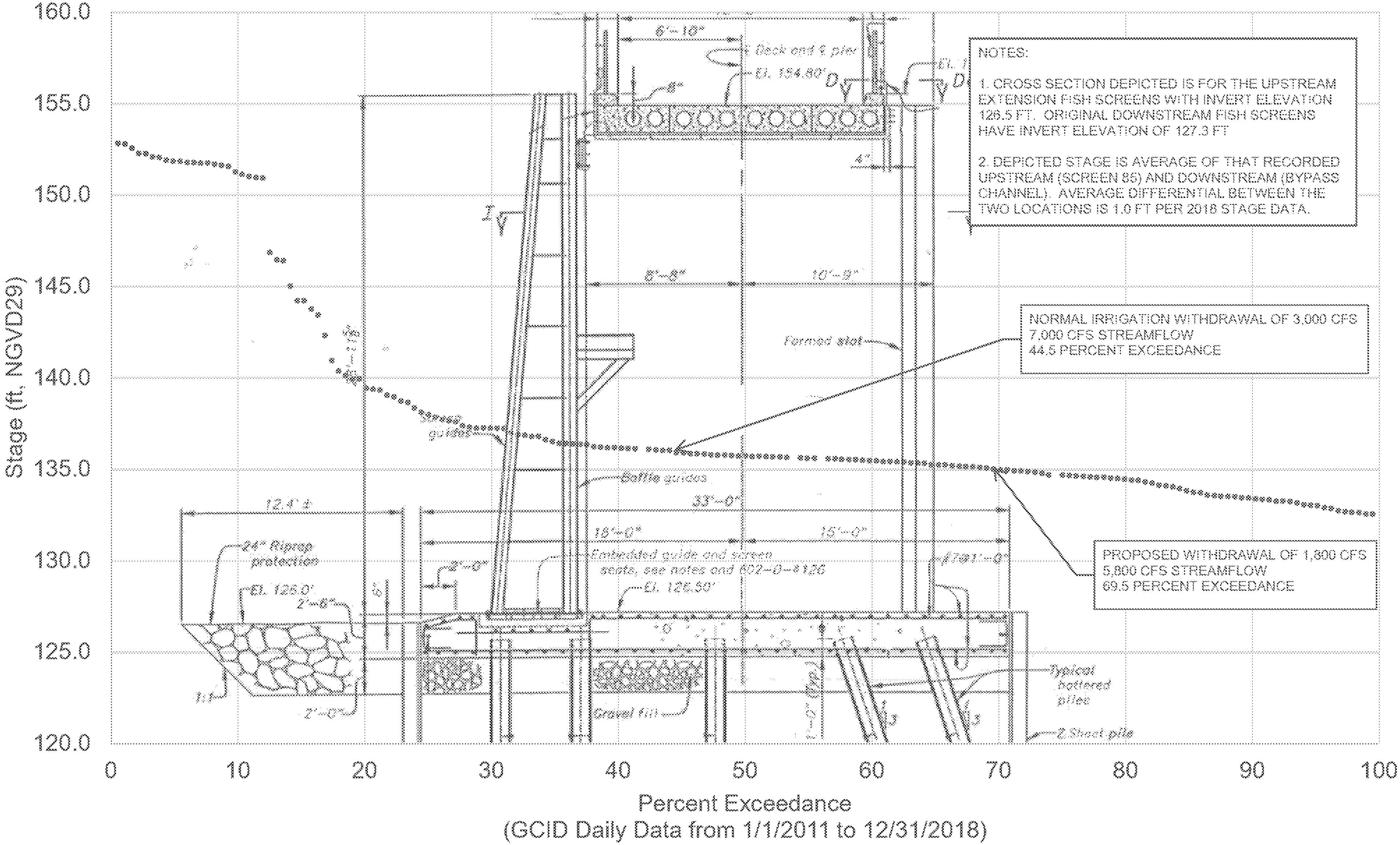
Stage Frequency Curve - December
Sacramento River at GCID Diversion Fish Screens

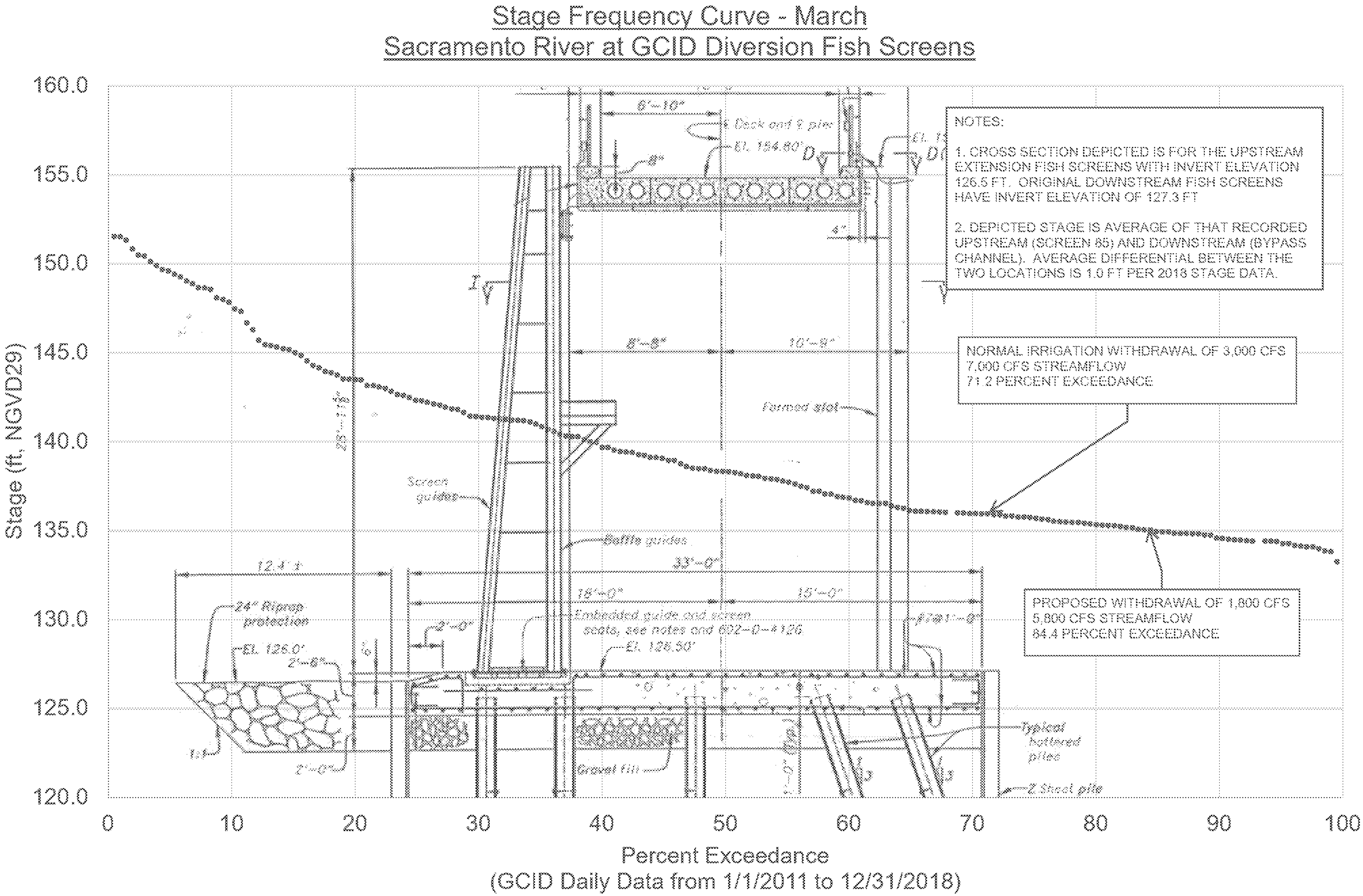


Stage Frequency Curve - January
Sacramento River at GCID Diversion Fish Screens

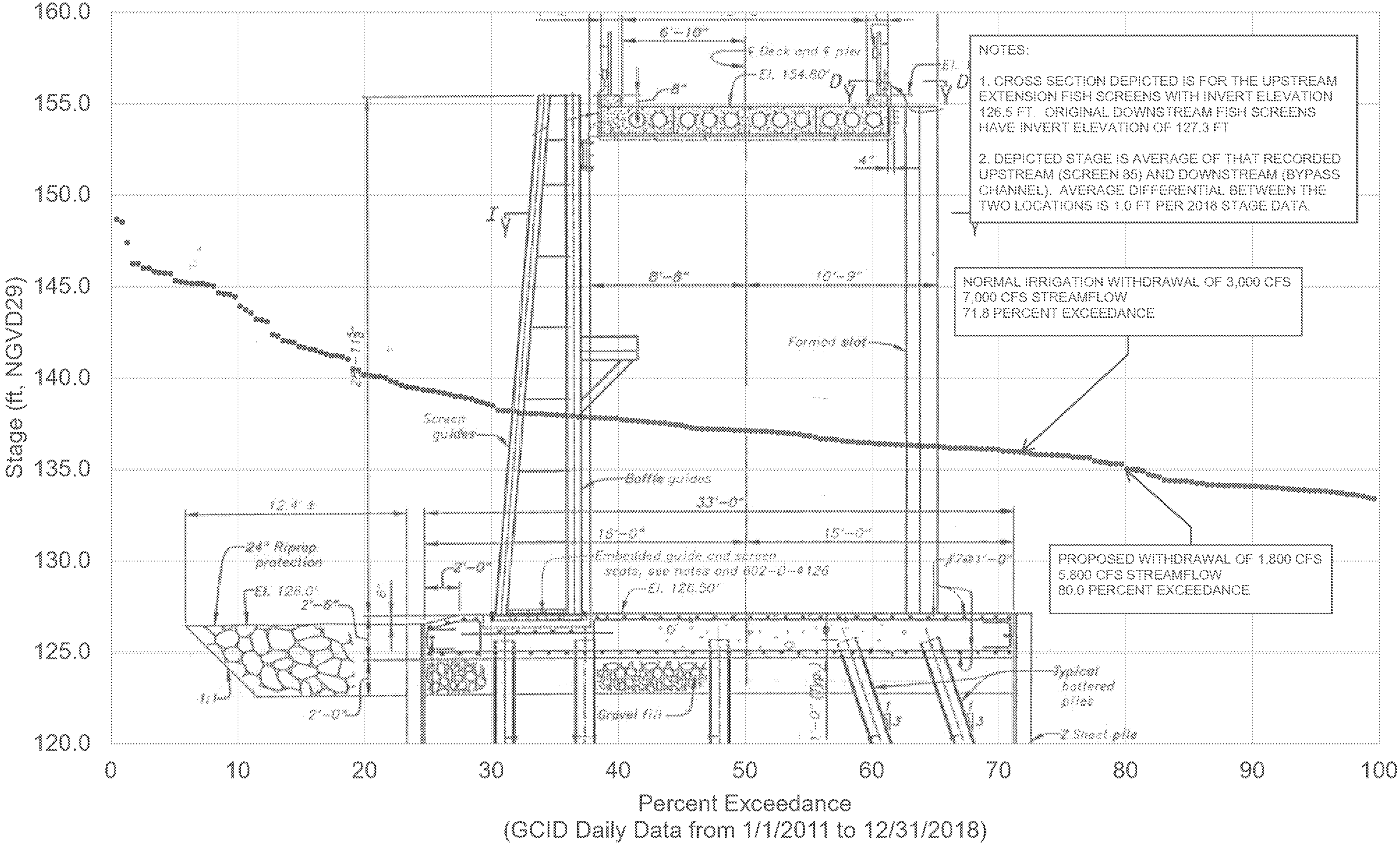


Stage Frequency Curve - February
Sacramento River at GCID Diversion Fish Screens

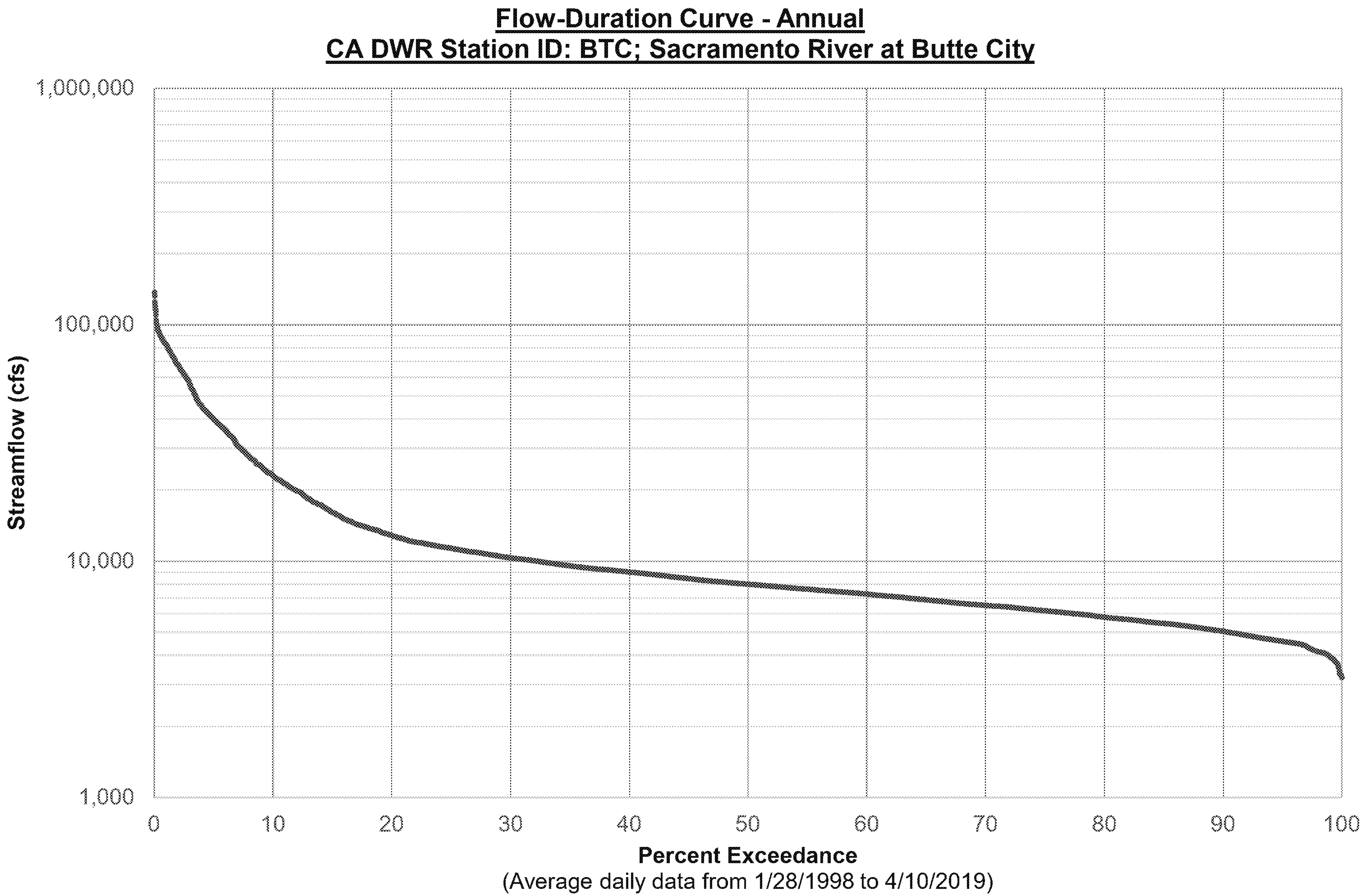



Stage Frequency Curve - March
Sacramento River at GCID Diversion Fish Screens
Stage (ft, NGVD29)
Percent Exceedance
(GCID Daily Data from 1/1/2011 to 12/31/2018)
NOTES:
1. CROSS SECTION DEPICTED IS FOR THE UPSTREAM EXTENSION FISH SCREENS WITH INVERT ELEVATION 126.5 FT. ORIGINAL DOWNSTREAM FISH SCREENS HAVE INVERT ELEVATION OF 127.3 FT
2. DEPICTED STAGE IS AVERAGE OF THAT RECORDED UPSTREAM (SCREEN 85) AND DOWNSTREAM (BYPASS CHANNEL). AVERAGE DIFFERENTIAL BETWEEN THE TWO LOCATIONS IS 1.0 FT PER 2018 STAGE DATA.
NORMAL IRRIGATION WITHDRAWAL OF 3,000 CFS
7,000 CFS STREAMFLOW
71.2 PERCENT EXCEEDANCE
PROPOSED WITHDRAWAL OF 1,800 CFS
5,800 CFS STREAMFLOW
84.4 PERCENT EXCEEDANCE
Screen guides
Baffle guides
Formed slot
24" Riprap protection
El. 126.0'
El. 126.50'
El. 154.60'
Gravel fill
Typical battered piles
Z Sheet pile
33'-0"
15'-0"
8'-8"
10'-8"
6'-10"
12.4' ±

Stage Frequency Curve - April
Sacramento River at GCID Diversion Fish Screens

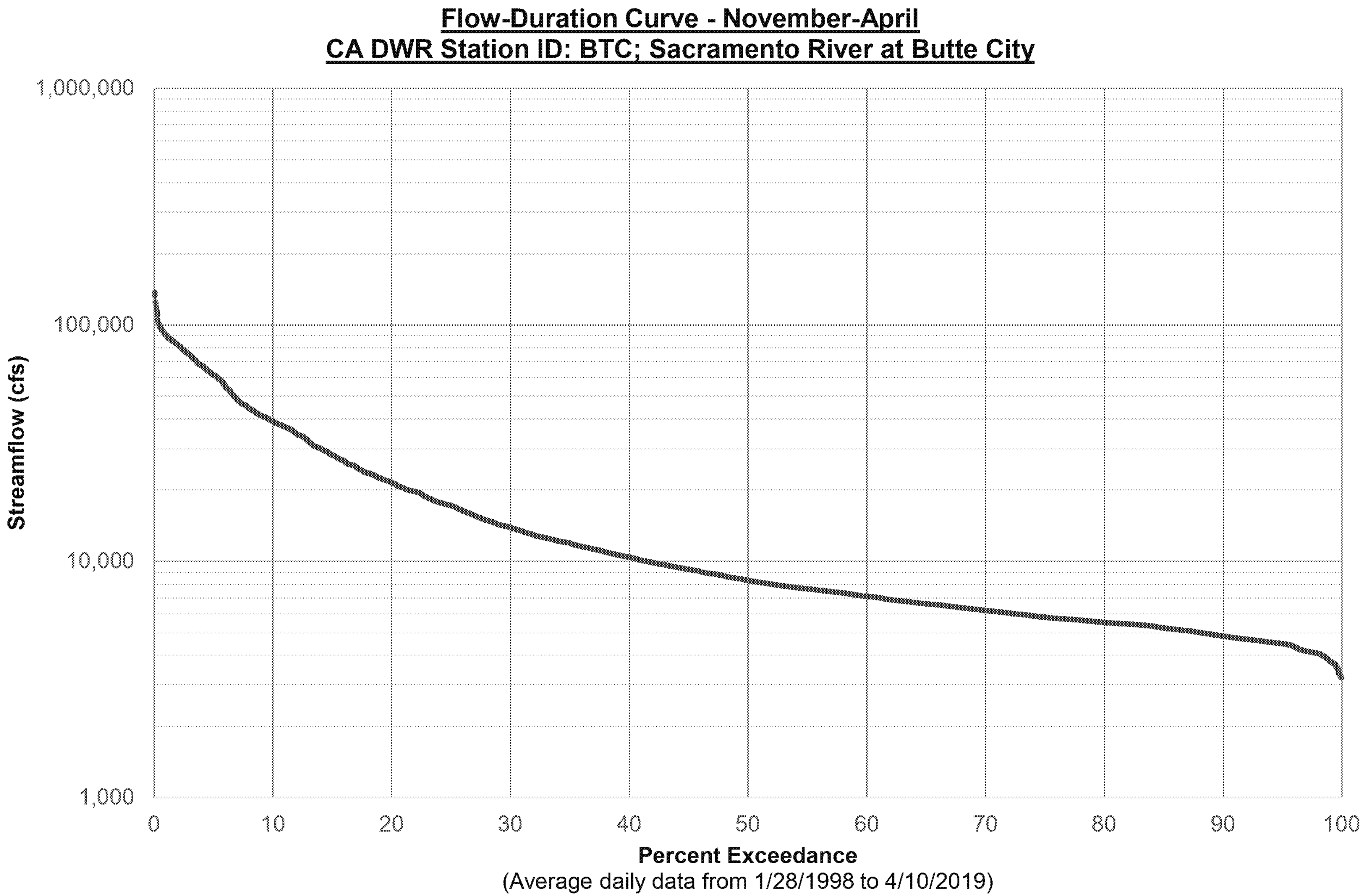


Attachment 3 – Delevan



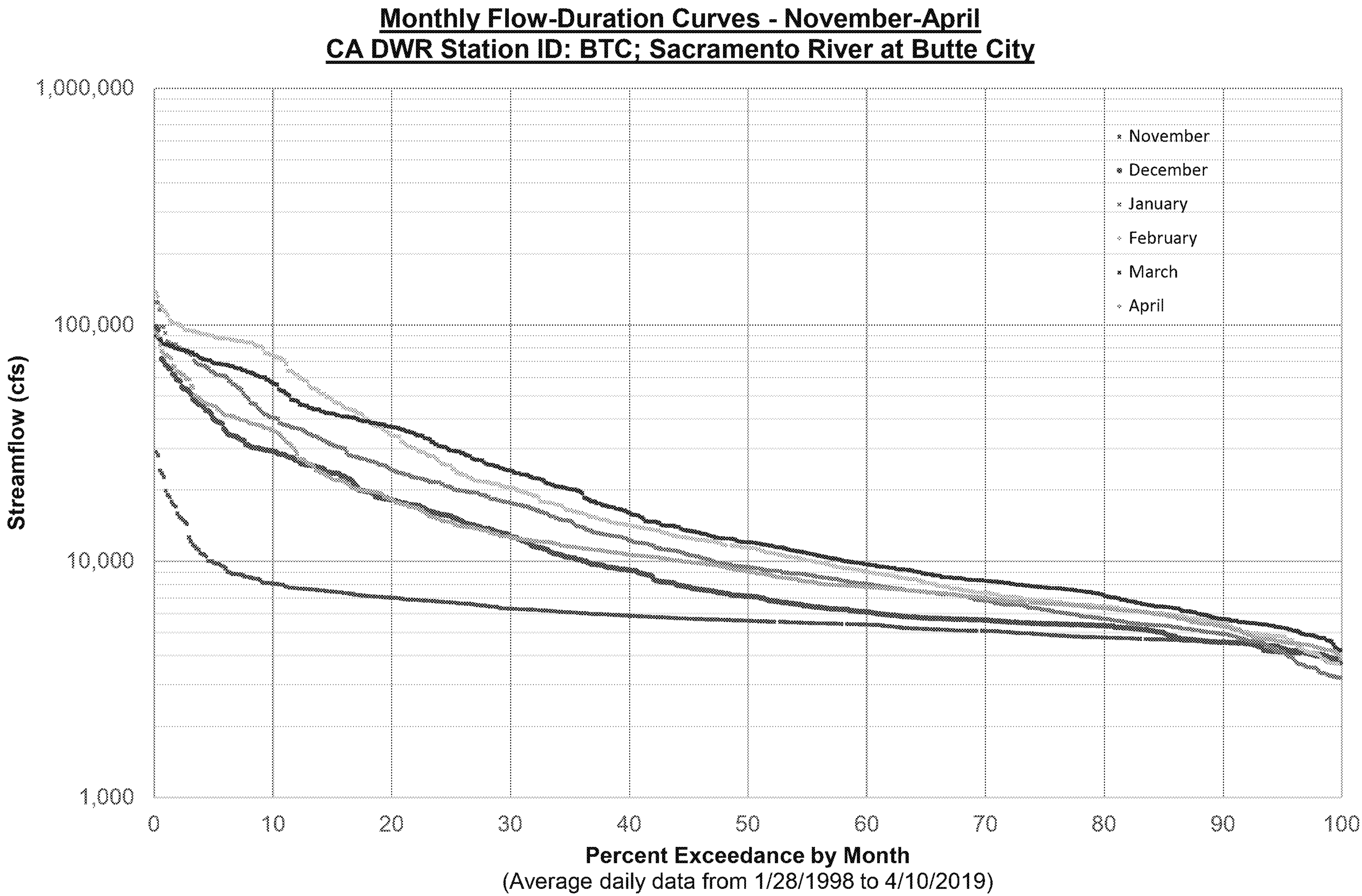
Flow-Duration Curve - Annual
CA DWR Station ID: BTC; Sacramento River at Butte City
1,000,000
100,000
10,000
1,000
Streamflow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedance
(Average daily data from 1/28/1998 to 4/10/2019)

3/25/2020



Flow-Duration Curve - November-April
CA DWR Station ID: BTC; Sacramento River at Butte City
1,000,000
100,000
10,000
1,000
Streamflow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedance
(Average daily data from 1/28/1998 to 4/10/2019)

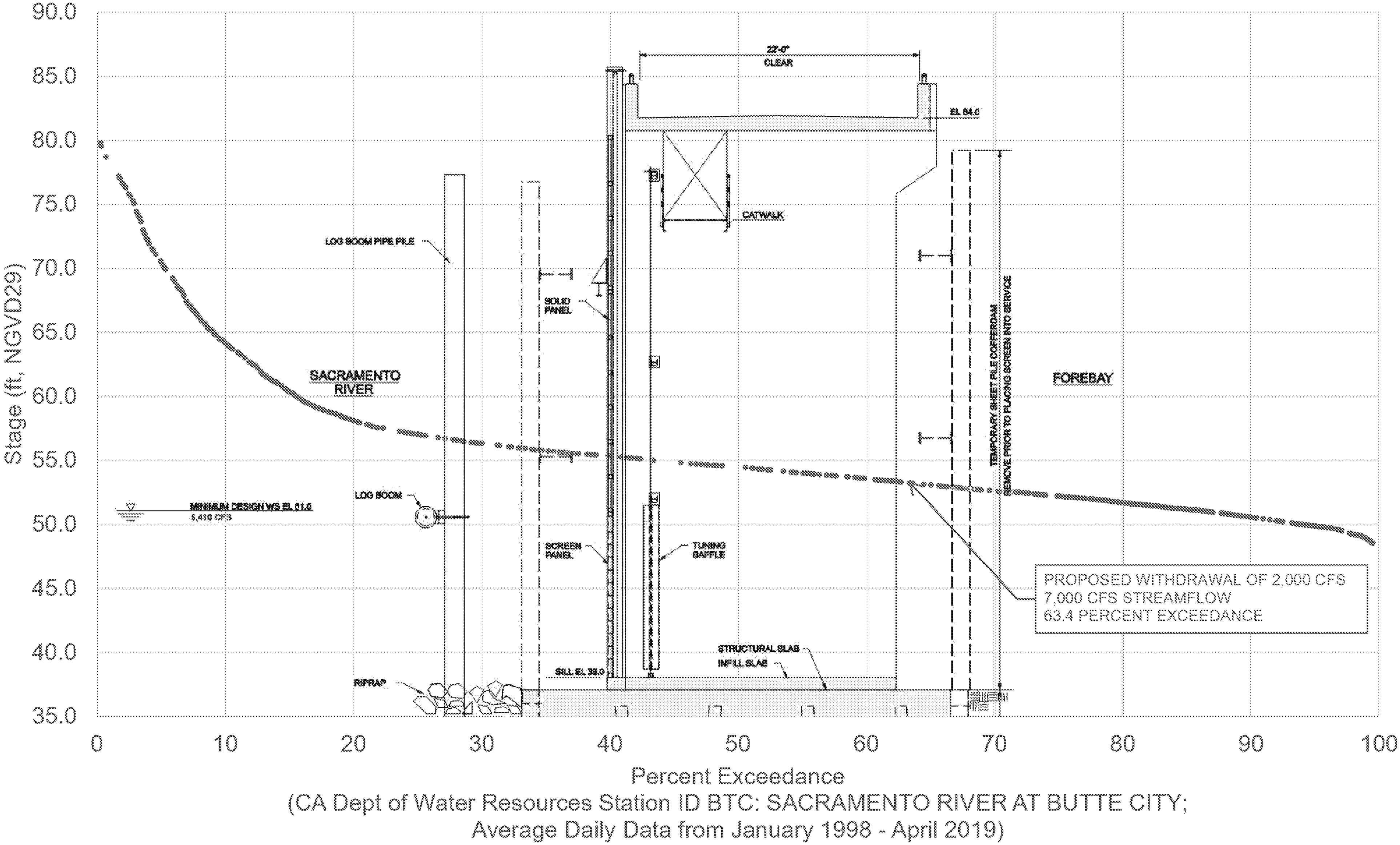
11/14/2019



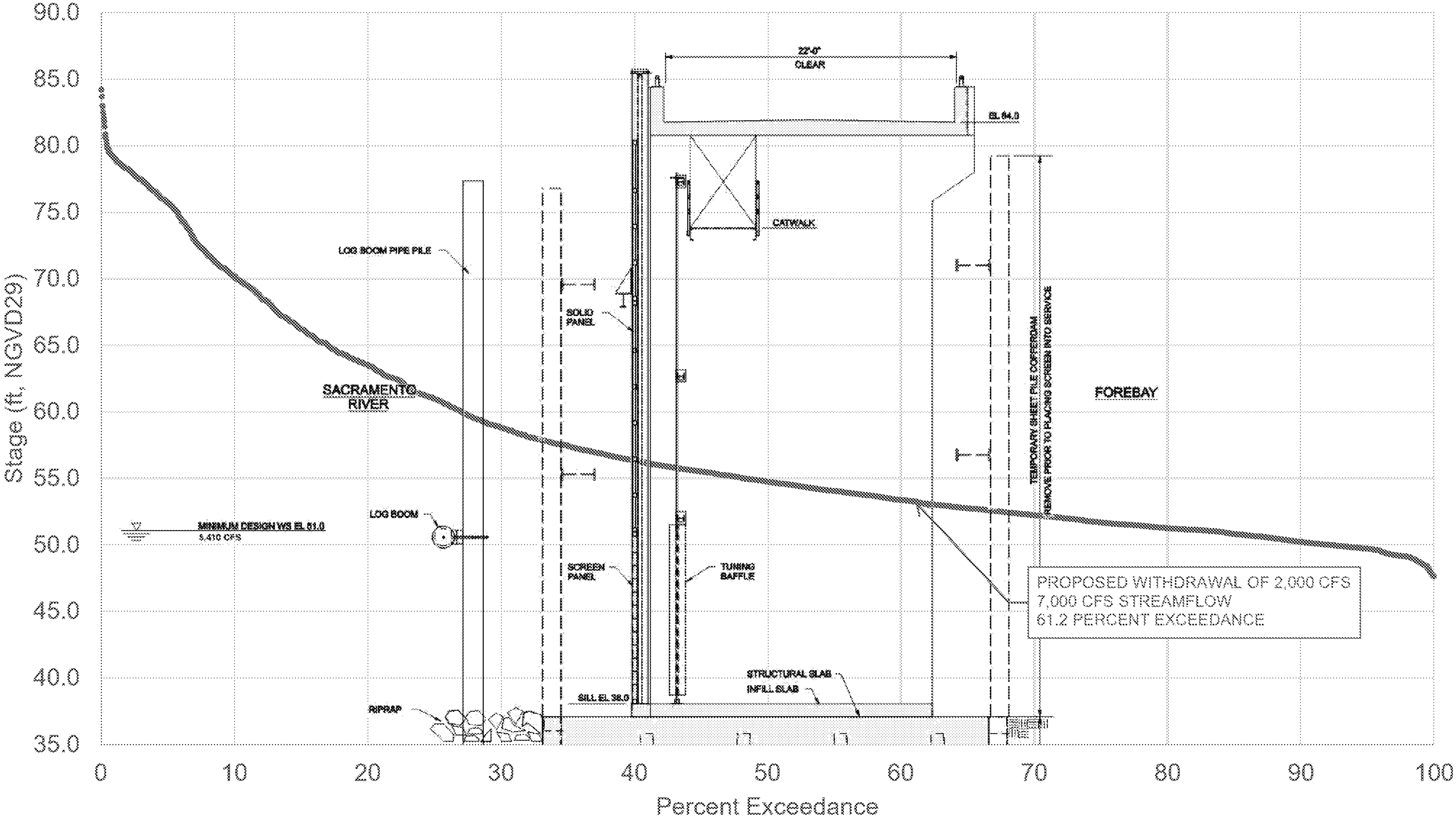
11/14/2019

Draft_0006267

Stage Frequency Curve - Annual
Sacramento River at Butte City, CA

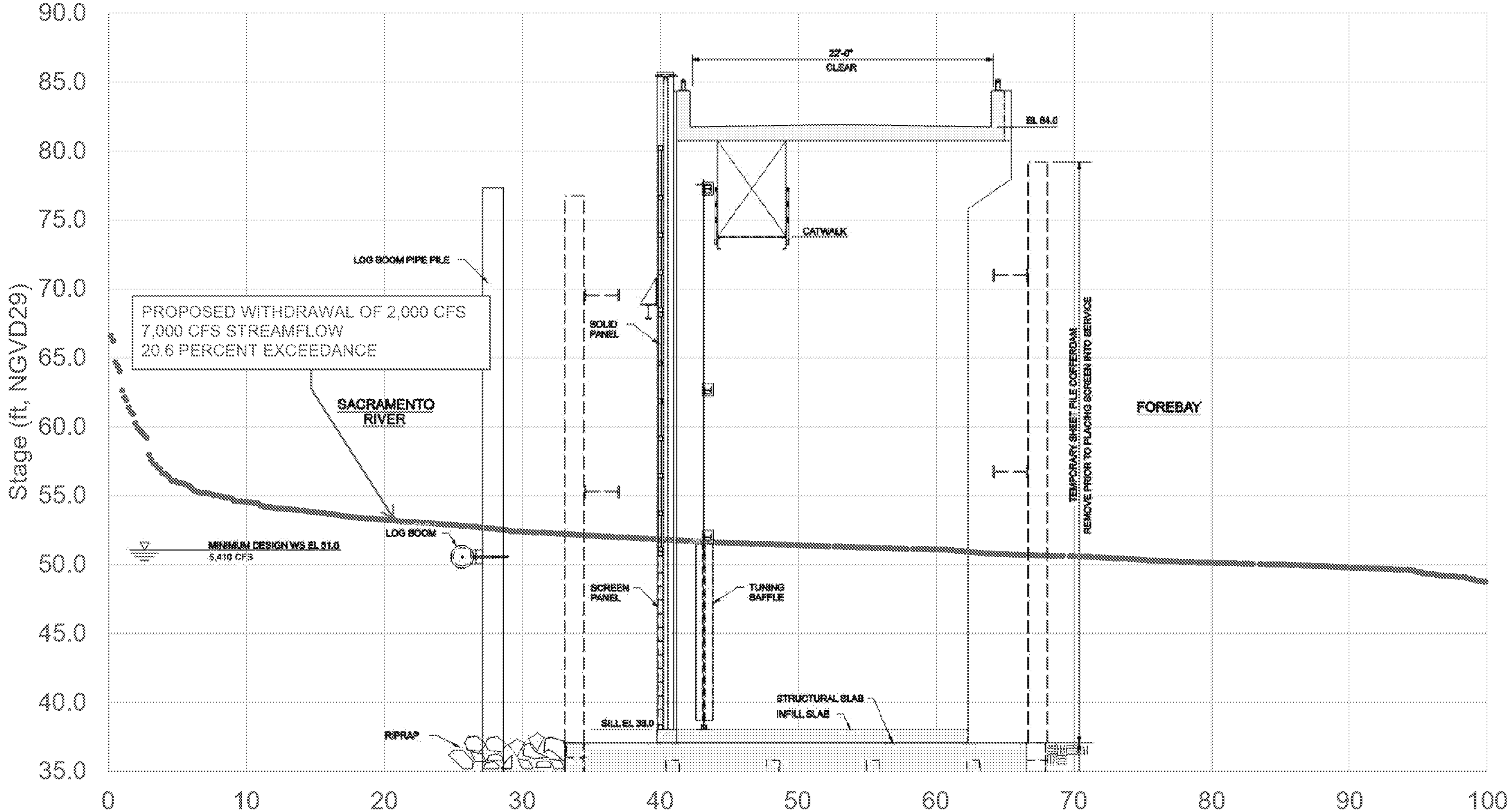


Stage Frequency Curve - November-April
Sacramento River at Butte City, CA



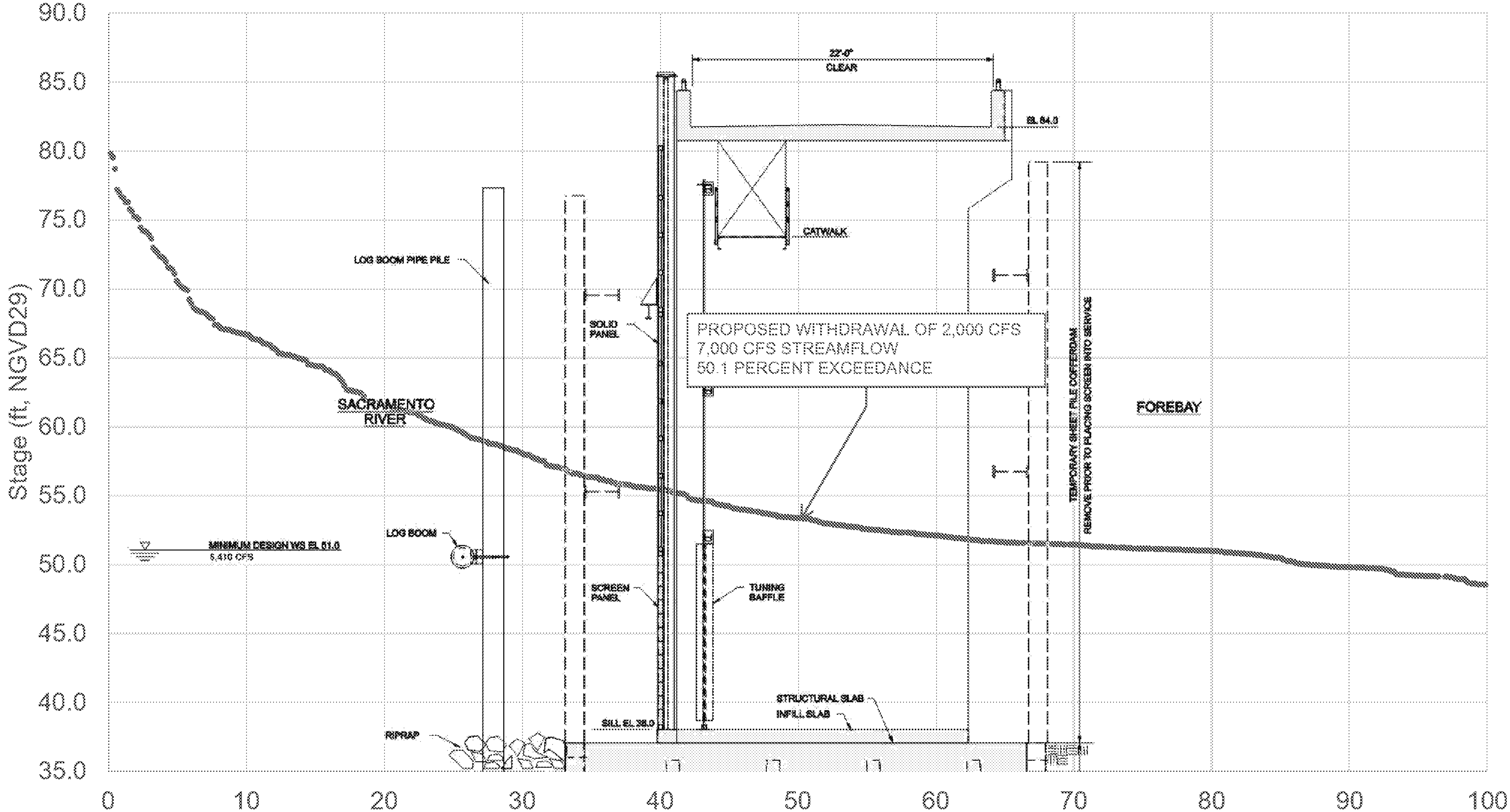
(CA Dept of Water Resources Station ID BTC: SACRAMENTO RIVER AT BUTTE CITY;
Average Daily Data from January 1998 - April 2019)

Stage Frequency Curve - November
Sacramento River at Butte City, CA



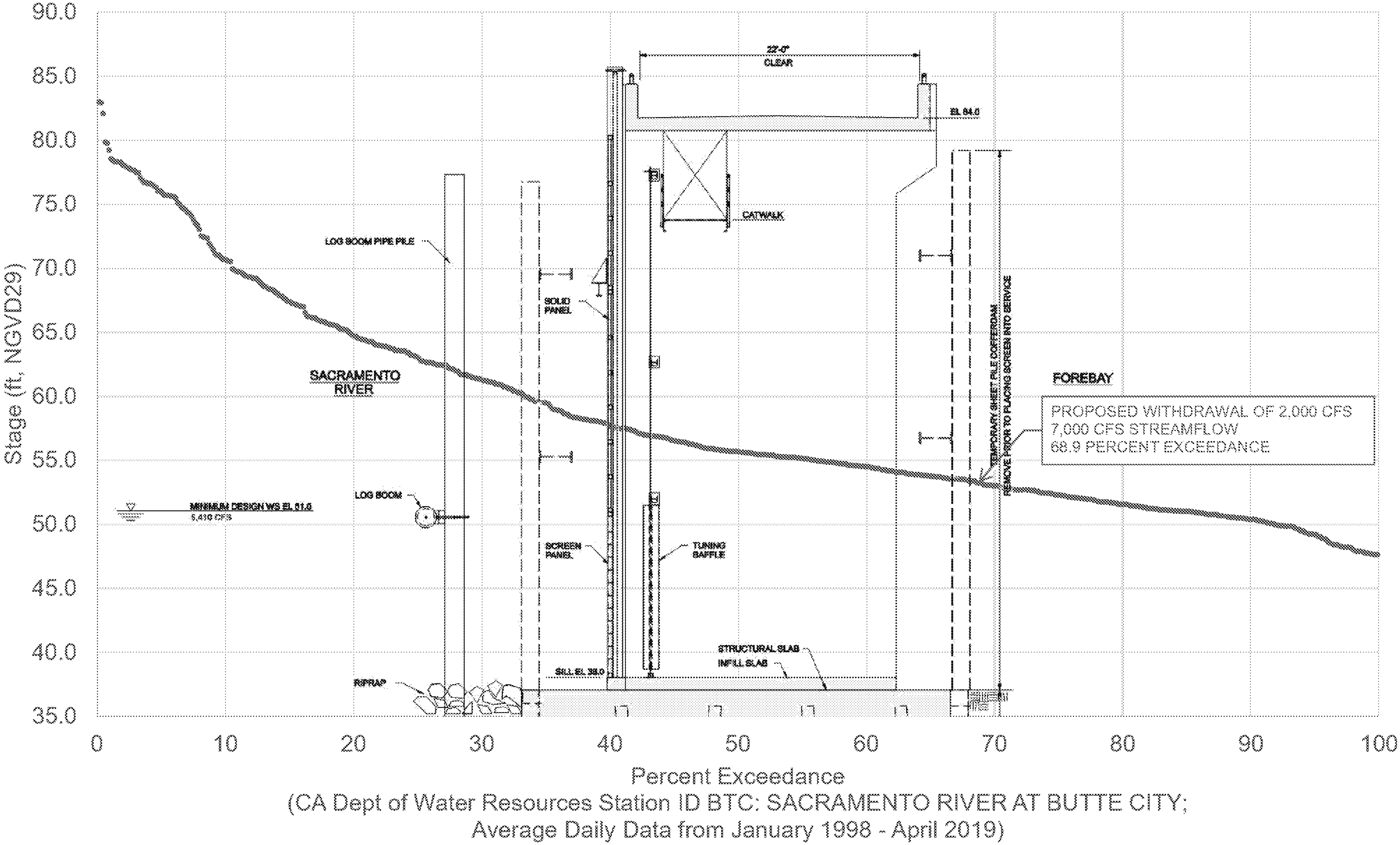
Percent Exceedance
(CA Dept of Water Resources Station ID BTC: SACRAMENTO RIVER AT BUTTE CITY;
Average Daily Data from January 1998 - April 2019)

Stage Frequency Curve - December
Sacramento River at Butte City, CA

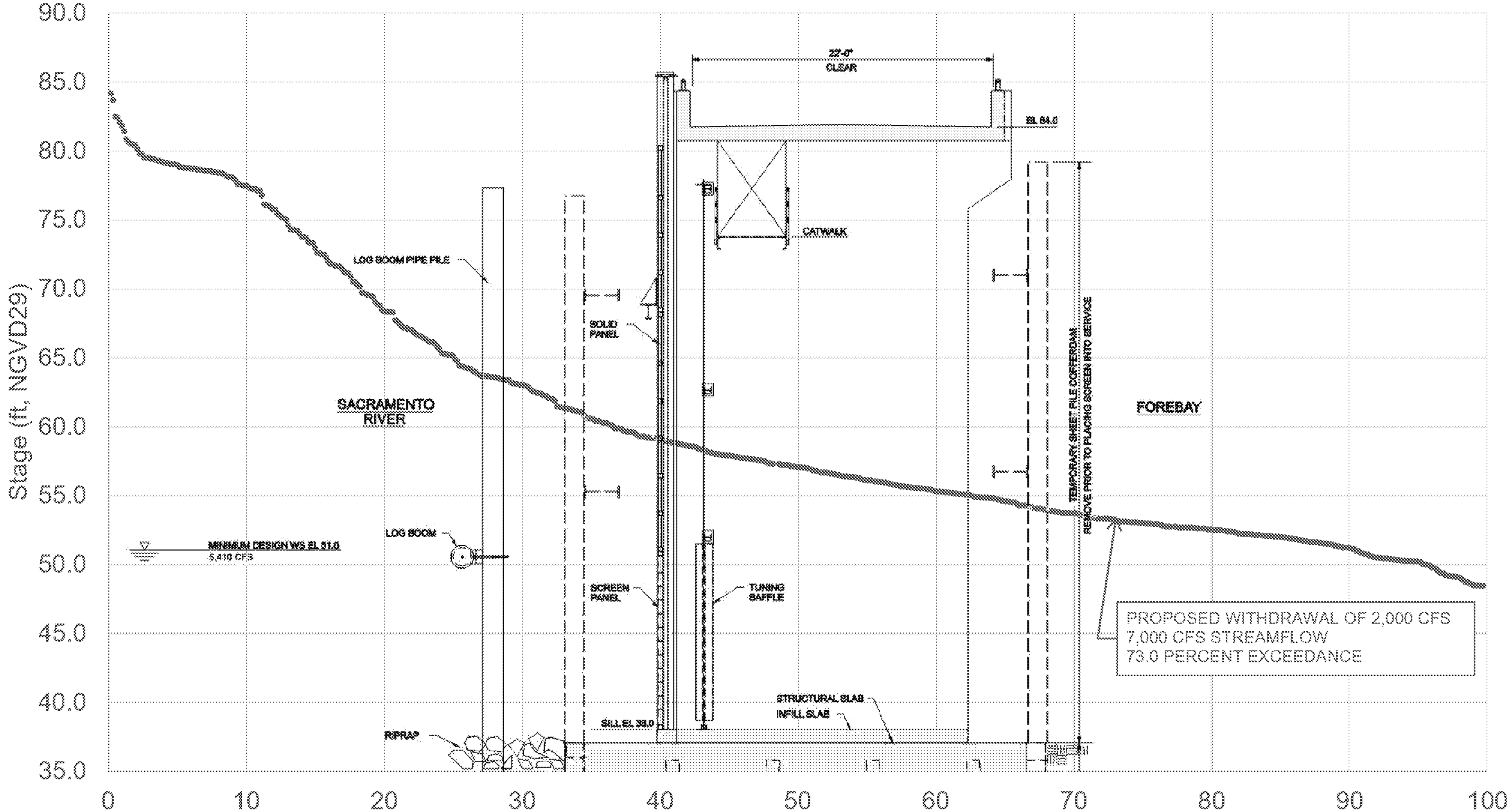


Percent Exceedance
(CA Dept of Water Resources Station ID BTC: SACRAMENTO RIVER AT BUTTE CITY;
Average Daily Data from January 1998 - April 2019)

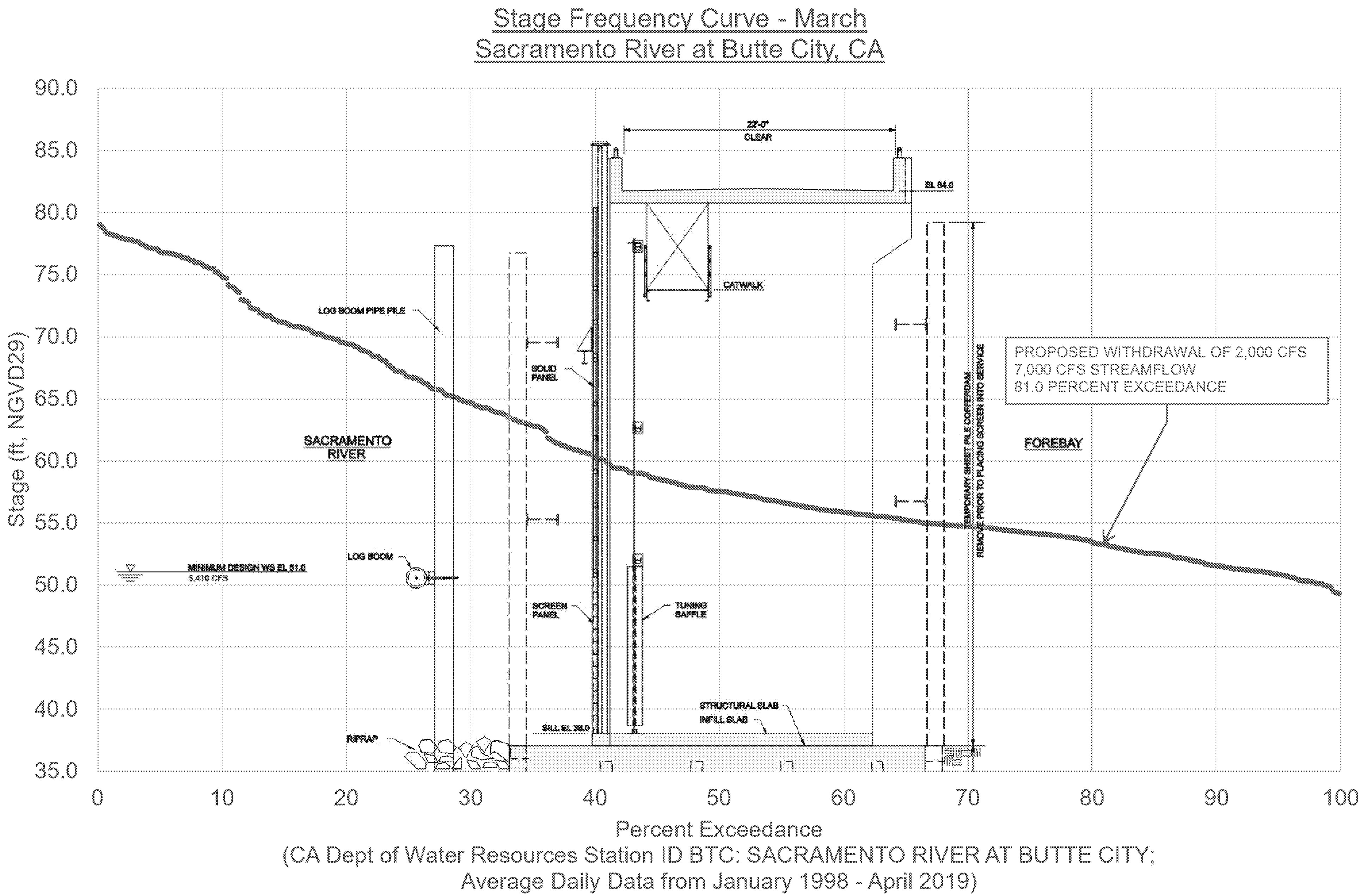
Stage Frequency Curve - January
Sacramento River at Butte City, CA



Stage Frequency Curve - February
Sacramento River at Butte City, CA

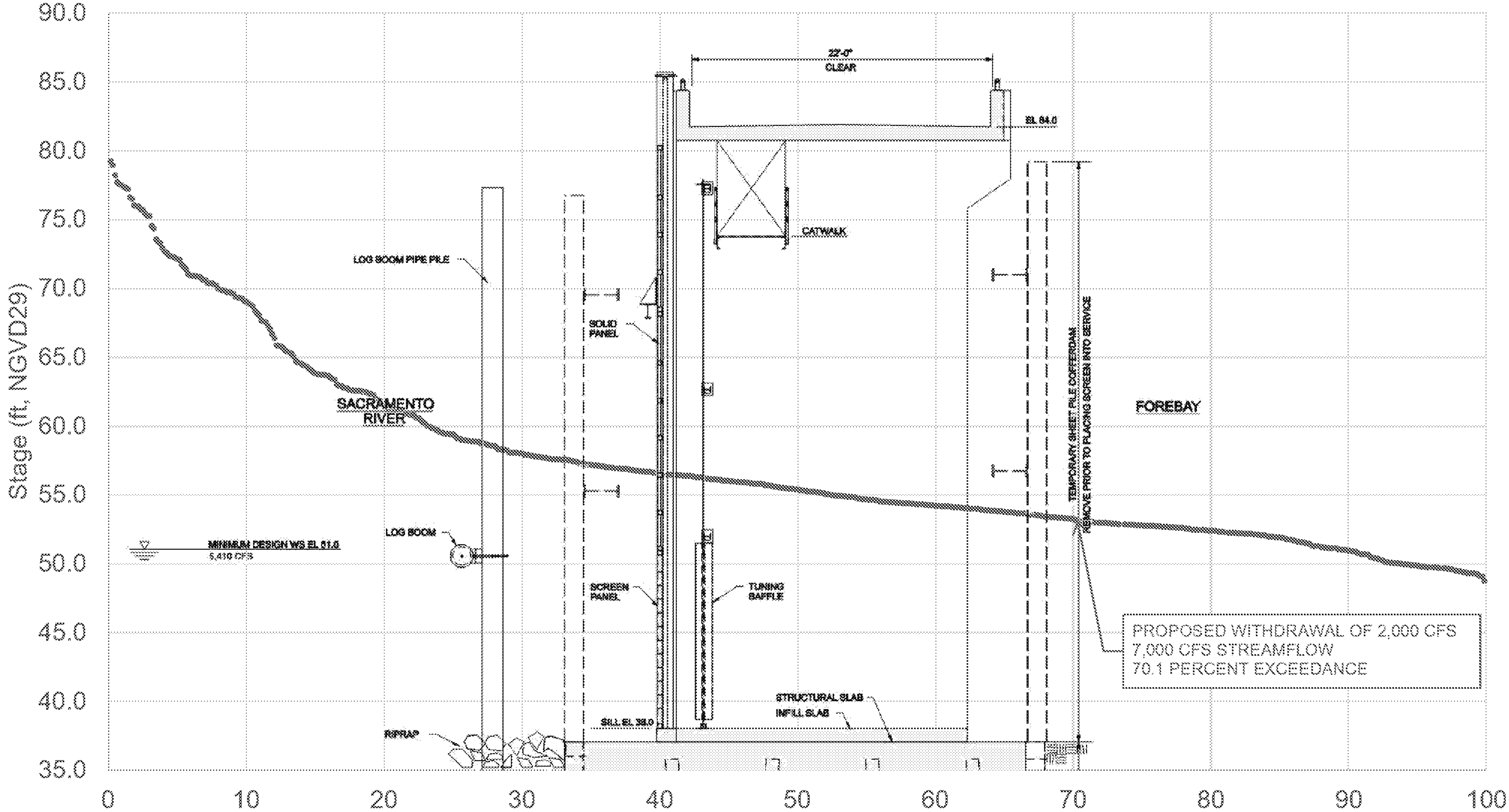


Percent Exceedance
(CA Dept of Water Resources Station ID BTC: SACRAMENTO RIVER AT BUTTE CITY;
Average Daily Data from January 1998 - April 2019)



Stage Frequency Curve - March
Sacramento River at Butte City, CA
Stage (ft, NGVD29)
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
0
10
20
30
40
50
60
70
80
90
100
22'-0" CLEAR
EL 84.0
CATWALK
LOG BOOM PIPE PILE
SOLID PANEL
PROPOSED WITHDRAWAL OF 2,000 CFS
7,000 CFS STREAMFLOW
81.0 PERCENT EXCEEDANCE
TEMPORARY SHEET PILE COFFERDAM
REMOVE PRIOR TO PLACING SCREEN INTO SERVICE
SACRAMENTO RIVER
FOREBAY
LOG BOOM
MINIMUM DESIGN WS EL 51.0
5,410 CFS
SCREEN PANEL
TUNING BAFFLE
STRUCTURAL SLAB
INFILL SLAB
SILL EL 38.0
RIPRAP
Percent Exceedance
(CA Dept of Water Resources Station ID BTC: SACRAMENTO RIVER AT BUTTE CITY;
Average Daily Data from January 1998 - April 2019)

Stage Frequency Curve - April
Sacramento River at Butte City, CA



Percent Exceedance
(CA Dept of Water Resources Station ID BTC: SACRAMENTO RIVER AT BUTTE CITY;
Average Daily Data from January 1998 - April 2019)

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/6/2021 4:25:45 PM
To: Marcia Kivett [MKivett@sitesproject.org]; Jerry Brown [jbrown@sitesproject.org]
Subject: RE: Red Bluff and Ham City Power Demand
Attachments: FeasibilityBODExcerpt-Power-20200206.docx

Hi Jerry,

Do you want to include any changes based on the discussion with Rob? My thought is the background doc gives a good description of where Sites is using power. Our discussion with Rob gave me a sense of where Reclamation might care about shifts in power generation, but I'm not sure that needs to be included in the attachment.

I reviewed the document and made some changes. While I think there may be a bit more detail than Reclamation needs, it provides a good overview of how Sites will be using power. We will need to talk to them about some of the timing differences for CVP power generation, and I think Richard identified those topics nicely in his email.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Marcia Kivett <MKivett@sitesproject.org>
Sent: Saturday, February 6, 2021 7:40 AM
To: Jerry Brown <jbrown@sitesproject.org>
Cc: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Subject: FW: Red Bluff and Ham City Power Demand

Jerry, this is what I sent Erin. I'm not sure if you all made changes after your meeting with Rob.

From: Marcia Kivett
Sent: Thursday, February 4, 2021 5:37 PM
To: Erin Heydinger <Erin.Heydinger@hdrinc.com>
Subject: FW: Red Bluff and Ham City Power Demand

Hey Erin,

See Jerry's email.

This was not a simple cut and paste but I think I've formatted it, so it looks ok-ish. I'm not sure if you want to keep all the content. Just delete what you do not need and please add a title. Let me know if you need me to do anything else.

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, February 4, 2021 4:56 PM
To: Marcia Kivett <MKivett@sitesproject.org>
Subject: FW: Red Bluff and Ham City Power Demand

Can you create a cut/paste from the "design basis TM" linked below of the following items from this report:
Section 1.1 Project description
Section 2.7 Electrical Supply – Design Criteria
Section 3.7 Electrical Supply - Facilities

This is to be a backgrounder we give to Reclamation tomorrow with the agenda for the Monday power meeting. The agenda is ready to go. Please provide draft for Erin to review before we send to Reclamation tomorrow afternoon.

Thanks

From: "Luu, Henry" <Henry.Luu@hdrinc.com>
Date: Thursday, February 4, 2021 at 3:32 PM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: RE: Red Bluff and Ham City Power Demand

Jerry,

I've inquired Pete…will let you know when he responds. The package we sent to PG&E is within the attached email.

Additional references:

- Design basis TM @ https://sitesreservoirproject.sharepoint.com/:b:/r/Engineering%26Geotechnical/WSIP%20Feasibility/Technical%20Memorandums/Final/HC_Conveyance/HC%20Feasibility%20Study%20Report%209Nov2020.pdf?csf=1&web=1&e=QJLZgx
- Hydroelectric Energy Recovery Valuation TM @ https://sitesreservoirproject.sharepoint.com/:b:/r/Engineering%26Geotechnical/WSIP%20Feasibility/Technical%20Memorandums/Final/HC_Conveyance/HydroEnergyRecovery_TM-Final.pdf?csf=1&web=1&e=pqEkzV

Henry H. Luu, PE
D 916.679.8857 M 916.754.7566

hdrinc.com/follow-us

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, February 4, 2021 2:58 PM
To: Luu, Henry <Henry.Luu@hdrinc.com>
Subject: Red Bluff and Ham City Power Demand

Would be good to get these numbers in terms of kilowatt hours per ac ft if possible.

~~TITLE~~Sites Reservoir – Feasibility Basis of Design Excerpt

~~1.1 Project Description~~

~~The project consists of a large reservoir, ancillary roads, and conveyance facilities. The Authority decided to segregate the design of these facilities into an HR (Segment H Reservoir) segment that is responsible for design of the reservoir features, including several dams, inlet/outlet tunnels at Golden Gate Dam, as well as relocation of roads displaced by the reservoir. The other segment is known as the HC (Segment H Conveyance) segment and includes improvements to the two existing diversion canals from the Sacramento River to the Project Area (Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal), regulating reservoirs (existing Funks Reservoir and new Terminal Regulating Reservoir), two pumping generating plants (PGP), large-diameter pipelines from each PGP to Sites Reservoir, and a large-diameter pipeline to convey water from the Tehama Colusa Canal (TCC) to the Colusa Basin Drain or Sacramento River near Dunnigan, California. Detailed descriptions of each facility are provided in the next section. An overall site plan of the project area is provided in Figure 1.~~

1.1.~~1~~ General Description of Facilities

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Following is a list of the individual new facilities and existing facilities requiring improvements.

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- Improvements to the TCC Authority Red Bluff Pumping Plant on the Sacramento River
- Glenn-Colusa Irrigation District (GCID) Canal Improvements upstream of the TRR
- Terminal Regulating Reservoir (TRR)
- TRR PGP
- TRR Pipelines
- Funks Reservoir – Sediment Removal
- Funks PGP
- Funks Pipelines
- Western Area Power Administration (WAPA) or Pacific Gas and Electric (PG&E) Substation/Switchyard
- Power Transmission Lines
- Dunnigan Pipeline
- Administration and Operations Building
- Maintenance and Storage Building
- Access Roads

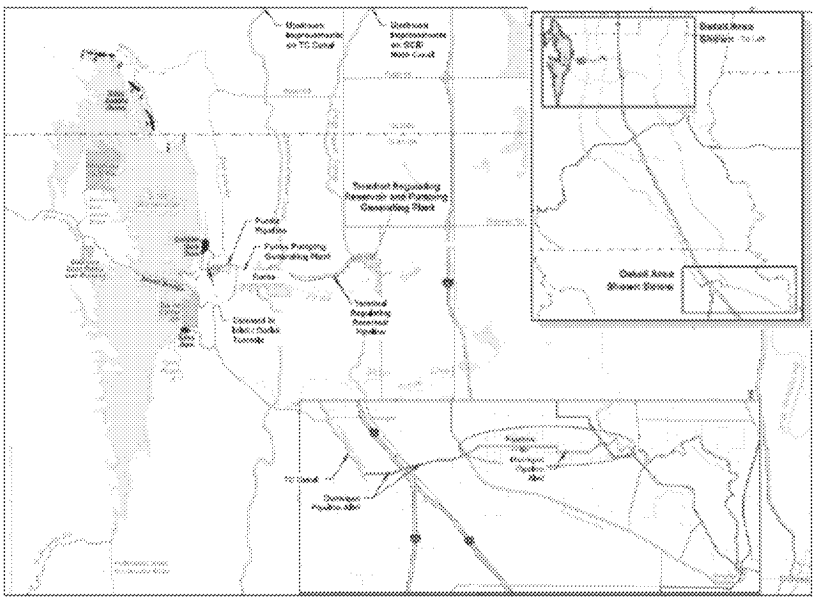

FIGURE 1: PROJECT AREA SITE PLAN

Improvements to the TCC Red Bluff Pumping Plant

The Red Bluff Diversion is located on the Sacramento River in Red Bluff, California. The facility includes a 2,500 cubic feet per second (cfs) capacity 1,180-foot-long fish screen structure, forebay, pumping plant(current capacity 2,000 cfs), an electrical switchyard, and a 660-foot-long access bridge, canal, and siphon under Red Bank Creek, to deliver water from the Sacramento River into the TCC and Corning Canal. This facility was constructed and put into operation in October 2012. The pumping plant was designed to accommodate the Sites Project and includes space to add two additional 250 cfs pumping units, bringing the total pumping capacity to 2,500 cfs.

GCID Main Canal Improvements

The GCID Main Canal delivers water from the Sacramento River to water users along its route, from its diversion point approximately 5 miles northwest of Hamilton City to southeast of the City of Williams. The canal is a 65-mile unlined earthen channel, with capacity varying from 3,000 cfs at the upstream end to 300 cfs at the southern terminus. Water conveyed by the canal is pumped by the Hamilton City Main Pump Station into the GCID Main Canal.

Improvements to the GCID Main Canal will include a 3,000 cfs headworks structure just downstream of the Hamilton City Diversion, two siphon structures (Willow Creek and Walker Creek), a railroad siphon at Willows, canal earthwork, and some canal bank gravel road improvements. The need for replacement of the siphons and railroad crossing will be determined after a canal hydraulic model is completed, as well as a condition assessment anticipated for early 2021.

TRR

This is a new reservoir that will be hydraulically connected to the GCID Main Canal about three miles east of Funks Reservoir. There are two alternative locations for the TRR that will be evaluated named the TRR West and TRR East. This report currently provides information on only the TRR East. Information on TRR West will be forthcoming in future reports.

TRR PGP

This is a pumping and generating plant that will be used to pump water from the TRR to the Sites Reservoir. This facility will also include hydroelectric turbines to generate electricity when flow is released from Sites Reservoir to the TRR and GCID Main Canal. As part of this PGP facility, there will also be an energy-dissipation facility that will allow releases back to the TRR as backup to the hydroelectric turbine facilities.

TRR Pipelines

These are two parallel, 12-foot-diameter pipelines used to convey water between the TRR PGP and the Sites Reservoir. These pipelines will connect from the piping manifold at TRR PGP to the downstream side of the two proposed 23-foot-diameter tunnels connected to the Site Reservoir inlet/outlet structure. The approximate length of these pipelines is 5 miles each.

Funks Reservoir

Reclamation constructed the Funks Reservoir in the mid-1970s with the intent of providing operational flexibility for the TCC. There are check structures on the TCC just upstream and downstream of the reservoir. The TCC is located about 1 mile east of the proposed Sites Reservoir. At the time of construction, the reservoir had a useable capacity of 1,170 acre-feet between operating levels of 199.5- and 205.2-feet elevation, and 1,080 acre-feet of inactive storage below elevation 199.5 feet, for a total capacity of 2,250 acre-feet; however, the addition of sediment from Funks Creek and the TCC have likely reduced the total storage volume.

Additionally, a cofferdam will be constructed within Funks Reservoir to facilitate construction of the TRR pipelines. The resulting storage volume reductions will be offset by sediment removal and excavation where storage capacity can be regained. The spillway has a capacity of 2,500 cfs. The project will remove accumulated sediment to recapture the design storage volume.

Funks PGP

This is a pumping and generating plant that will be used to pump water from Funks Reservoir to the Sites Reservoir. This facility will also include hydroelectric turbines to generate electricity when flow is released from Sites Reservoir to Funks Reservoir and, ultimately, the TCC. There will also be an energy-dissipation facility as part of this PGP facility that will allow releases back to Funks Reservoir as backup to the hydroelectric turbine facilities.

Funks Pipelines

These are 2 parallel, 12-foot-diameter pipelines used to convey water between the Funks PGP and the Sites Reservoir. These pipelines will connect from the piping manifold at Funks PGP to the downstream side of the two proposed 23-foot-diameter tunnels connected to the Site Reservoir inlet/outlet structure. The approximate length of these pipelines is 1 mile each.

Dunnigan Pipeline

The Dunnigan pipeline consists of either a 9-foot-diameter or 10.5-diameter pipeline that will be used to release water from the TCC to the Sacramento River. The concept is to release flow from Sites Reservoir to Funks Reservoir, where the flow will then go south about 40 miles to near the end of the TCC. At this point, flow will be diverted into the Dunnigan pipeline, where flow will head either to the Colusa Basin Drain (CBD, which flows to Sacramento River, or directly to the Sacramento River. If the pipeline discharges directly into the Sacramento River, a portion of the water will also be diverted and discharged in the CBD. The pipeline is about 4 miles long to the CBD, or 10 miles long if it goes directly to the Sacramento River.

WAPA or PG&E Substation/Switchyard

There are 230 kilovolt (kV) electrical transmission lines running near the proposed project area. Specifically, the WAPA transmission lines run very close to Funks Reservoir in a north-south direction, with a parallel 230 kV line owned by PG&E a few miles east of the WAPA transmission lines. It is anticipated that one of these transmission lines will be connected to provide power for the project, as well as receive generated electrical power from the hydroelectric turbines. Switchyards and substations will be needed to provide power to both the TRR and Funks sites.

Electrical Transmission Lines

Electrical transmission lines will be required to connect the WAPA or PGE 230 kV transmission lines to the TRR PGP and the Funks PGP.

Administration and Operations Building

At this time, staffing requirements for operating and maintaining the Sites facilities has not been defined, but an administration and operations building is anticipated to be needed.

Maintenance and Storage Building

A building is also expected to be required to provide maintenance and storage associated with the Project.

Access Roads

Access to the proposed TRR site would likely be from McDermott Road, which lies adjacent to the proposed reservoir. Access to the Funks complex (PGP and Reservoir) is currently accomplished using the O & M road along the TCC. A new access road will be required that allows larger equipment and year-round access. It is also anticipated that roads will be constructed within the TRR and Funks Pipeline easements, both to provide access to the pipelines and electrical power transmission lines but also as a secondary access road to the project facilities.

2.7 Electrical Supply

2.7.1 Point of Interconnection

The Preliminary 230kV Schematic Plan depicts the point of interconnection (POI) looping in and then back out of the new TRR substation (see Section 3). The TRR substation will then connect to the new Funks substation. This interconnection configuration is subject to approval by the Transmission Operator and the system operator, California Independent System Operator.

The POI, transmission and substation design criteria, dependent on the POI option, will incorporate the following references:

a. California General Order 95, Rules for Overhead Electric Line Construction
b. WAPA Service and Generation Interconnection Requirements
c. PG&E Interconnection Requirements
d. PG&E Substation Design Criteria PG&E and WAPA Transmission Line Design Criteria

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The latest edition and addenda of the following publications, as applicable, will be incorporated in the design specifications codes and standards sections.

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- ANSI
- IEEE
- Association of Edison Illuminating Companies
- Transmission Interconnections Handbook
- North America Electric Reliability Corporation Standards

•National Fire Protection Agency 70 National Electric Code
•National Electrical Safety Code (ANSI C2)

2.7.2 Transmission Lines

Codes and Standards

In addition to the POI requirements, transmissions lines will be designed in accordance with the latest edition and addenda of the following publications, as applicable, which will be incorporated in the design specifications.

•California Building Code 2016, Title 24 Vol. 2
•ASCE-113, Substation Structure Design Guide
•ASCE/SEI 7-05, Minimum Design Loads for Buildings and Other Structures
•ANSI/AISC 41-10, Seismic Provisions for Structural Steel Buildings

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2.7.3 Substations

The transmission operating voltage of 230 kV will be stepped down via transformer, to the 13.8 kV operating voltage of the turbine generators and the pump motors at each new pumping site. The proposed substations will use two 100 megavolt-ampere (MVA) transformers to step down the voltage. The transformers will be threewinding, to reduce nominal current ratings below 3,000 amperes and minimize short-circuit levels to comply with Arc Flash requirements in accordance with Occupational Safety and Health Administration regulations. This configuration will allow two independent, double-ended 13.8 kV switchgear lineups to reliably connect the motors and generators to the transmission system.

The substation design will include that the primary safety equipment, including breakers and utility grade relays, to disconnect the interconnection facilities immediately upon a fault detection on the 230 kV transmission system and the 13.8 kV pumping station systems, to minimize potential loss of life and property. When operating in the generation mode, the facility will automatically trip offline (disconnect from the transmission system) when the relays detect that power has been interrupted on the transmission line into the substation. Transmission line-protective equipment will perform one of the following, as stated anticipated to be in the Interconnection Agreement:

1. Automatically clear a fault and restore power.
2. Rapidly isolate only the faulted section so that the 230 kV system affected by any outage is minimized.

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The protection system will be designed with sufficient redundancy such that the failure of any one component will permit the substations to be safely and reliably isolated from the transmission system under fault conditions. Fiberoptic cable will be used for communication protection between each pumping station and the POI.

The substations will include a control enclosure containing power, control, relaying, monitoring and communications. The control enclosure will contain redundant, protective relays and supervisory control and data acquisition (SCADA)/remote telemetry units for transmitting information. The control enclosure will be designed to meet the Bulk Power Protection Criteria of the North America Electric Reliability Corporation Standards, as well Federal Energy Regulatory Commission or Transmission Operator (TO)/California Independent Service Operators (CALISO)-specific requirements.

The TO has standardized their protection requirements; however, system variables will impact the protection requirements, such as generator size and type, number of generators, fault duties, line characteristics (such as, voltage, impedance, and ampacity) and pre-existing protection schemes. For example, high-speed fault clearing may or may not be required to minimize equipment damage and potential impact to system stability.

3.7 Electrical Supply

3.7.1 Point of Interconnection

The point of interconnection (POI) for the project will require that an Application for Interconnection Request be submitted and processed under the CALISO Interconnection Process. The location of the POI to either the WAPA or PG&E 230-kV transmission lines will depend on the results of a system impact study (SIS), which will be required to be performed by the Transmission Operators (TOs), in conjunction with the independent system operator of the transmission system.

The interconnection application process includes that the project enter into a SIS agreement, which requires the project to compensate the TO for its actual costs to undertake the SIS. The TO will include in the agreement a non-binding estimate of the cost and a timeframe for completing the SIS. The SIS report will state the results of the power flow, short circuit, and stability analyses, and will provide the requirements or potential impediments to the requested POI, including a preliminary indication of the cost and length of time necessary to correct any problems identified in the SIS. The SIS report will also provide a preliminary list of facilities required to be upgraded to accommodate the supply of power to the project.

The application process then entails the TO performing a facilities study (FS). The Project will enter into a FS agreement, which requires the project to compensate the TO for its actual costs to perform the FS. The TO will include in the agreement a non-binding estimate of the cost and timeframe for completing the FS. Upon completion of the FS, the TO will provide the FS report. The report will specify the estimated cost of the equipment, engineering, procurement, and construction work needed to implement the conclusions of the SIS. The FS report will also identify the electrical switching configuration of the connection equipment, including: the transformer, switchgear, meters, and other station equipment. The report shall include a +/- 20 percent cost estimate of facilities necessary for the interconnection, and an estimate of the time required to complete the construction and installation of such facilities.

The application process then entails the project entering into the Interconnection Agreement, (IA) with the TO. The IA will require that the actual costs associated with the equipment, environmental, engineering, procurement, construction, and any other work needed to accomplish the interconnection be payable by the project. The IA will specify the interconnection and network facilities that will be required to interconnect the project.

The California Independent System Operator interconnection procedures place applications into groups, known as clusters, for projects that are interconnecting in the same area to be studied together.

This process began in September 2020 with PG&E and will begin with WAPA turbine and generator system designs become more developed.

3.7.2 Transmission Lines

A POI to a high-voltage electric transmission line will be required for the project. Interconnecting to the transmission system is necessary to provide for the supply of power to operate the large-horsepower pumps at both the Funks PGP, and the TRR East PGPt. In addition, the interconnection to the transmission system will allow Funks PGP and TRR PGP to send energy produced to the transmission system during the periods when they are using their turbines/generators.

Several existing high-voltage transmission lines are in the vicinity of the project; all of these run north to south. These transmission lines include two 230 kV lines owned and operated by WAPA, and four 230 kV lines owned and operated by PG&E. WAPA and PG&E are defined as the TO and the Transmission Operator of their respective high-voltage transmission lines. Each of these lines is a potential POI source for the project.

The Transmission Agency of Northern California, (TANC), owns a 500-kV, high-voltage transmission line that runs parallels to the WAPA lines; however, this transmission line is not considered to be a potential POI for the project. See Figures 6 and 7 for schematic sketches showing the WAPA and PG&E alternative POI arrangements, and the required transmission line lengths to the proposed Funks and TRR substations. Under either alternative POI, the power will be delivered to the project via looped (two circuits) 230 kV to the supply power for the pumps. The looped circuits would also receive power from the Funks PGP and TRR pPGP when their turbine/generators are operating. The looped circuits are typically installed on double-circuit steel monopole structures (poles), as shown earlier in Figure 2. The poles would be approximately 100 to 150 feet high and supported atop reinforced concrete foundations that are augured and designed in accordance with the results of the geotechnical investigation. The conductor size will be designed to match or be larger than the existing conductor size of the transmission line, which will be interconnected via the loop. One or two fiberoptic cables can be used as shield wire, the size of which will be determined by fault current requirements and TO telecommunication requirements.

In addition to the loop POI design, there will be two additional 230 kV transmission line radial taps installed between the Funks and TRR substations. The transmission line structures for these lines will be double-circuit, steel monopole structures, as shown in Figure 4. The poles would be approximately 100 to 150 feet high and supported atop reinforced concrete foundations that are designed in accordance with the results of the geotechnical investigation. The conductor size is estimated to be 795 kcmil aluminum conductor steel reinforced (ACSR). In some sections of the transmission line; the double-circuit, monopole tap lines may share a common ROW with the double-circuit, monopole looped circuits (see Section 2.9).

The configuration of the transmission lines will depend on the selected POI, which is described in the following subsections.

WAPA POI Option

This option proposes to loop the existing WAPA 230 kV Keswick-O'Banion transmission line into and out of the Funks substation, as shown schematically on Figure 3. The length of the looped, double-circuit, steel monopole line will be approximately 1 mile, in a generally westerly direction to Funks. Two new, three-pole, single-circuit structures will be cut into the existing transmission line; the existing wires between these two structures will be removed. The new conductors in the first spans toward Funks will be installed low on the poles to achieve the proper clearances as they cross under the existing TANC 500 kV transmission line to two, new, double-pole, single-circuit (or one, new, double-pole, double-circuit) steel H-Frame structures. Minimum phase-to-phase and phase-to-ground clearances will be in accordance with WAPA and TANC standards, and the state of California Public Utility Commission Rules for Overhead Electric Line Construction. Conductors will match or exceed the conductor size of the existing WAPA line.

Two, new, 230 kV, radial lines will also be constructed between the Funks and TRR substations, on double-circuit, steel, monopole structures, for a length of approximately 3.9 miles. H-Frame construction will be used at the crossings below the TANC 500 kV Line, the two WAPA 230 kV lines, and the four PG&E lines.

Although the structures between Funks and TRR will be designed to accommodate two 230 kV circuits, it is possible that only one circuit will be initially installed. The conductor will be 795 kcmil ACSR.

PG&E POI Option

This option proposes to loop the existing PG&E 230 kV Colusa-Vaca-Dixon #3 transmission line into and out of the TRR substation, as shown schematically on Figure 4. The length of the looped, double-circuit, steel monopole line will be approximately 1.7 miles, in a generally easterly direction to TRR. Two, new, monopole-pole, single-circuit structures will be cut into the existing transmission line; and the existing wires between these two structures will be removed. Conductors will match or exceed the conductor size of the existing PG&E line.

Two new 230 kV radial lines will also be constructed between the TRR and Funks substations, on double-circuit, steel monopole structures, for a length of approximately 3.9 miles. Single- or double-circuit, steel, H-Frame pole construction will be used at the crossings below the existing TANC 500 kV Line, the two WAPA 230 kV lines, and the four PG&E lines, to achieve proper minimum phase-to-phase and phase-to-ground clearances, in accordance with WAPA and TANC standards, and the State of California Public Utility Commission Rules for Overhead Electric Line Construction.

Although the structures between Funks and TRR will be designed to accommodate two 230 kV circuits, it is possible that only one circuit will be initially installed. The conductor will be 795 kcmil ACSR.

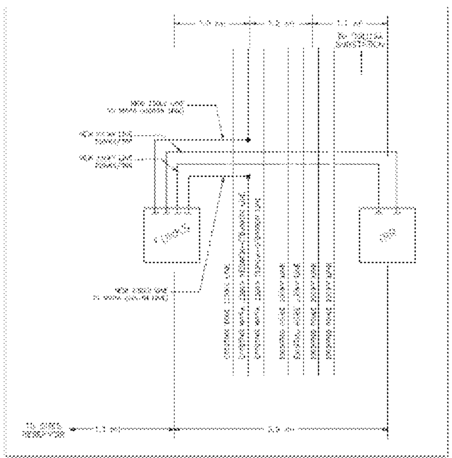

FIGURE 6: SCHEMATIC OF WAPA POI OPTION

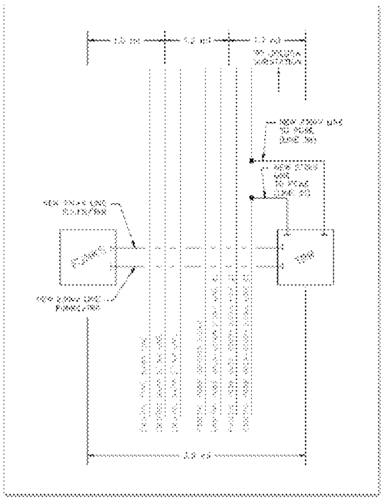

FIGURE 7: SCHEMATIC OF PG&E POI OPTION

3.7.3 Substations

Each pumping/hydroelectric generator substation at TRR and Funks Reservoir will have a new 230 kV to 13.8 kV substation. The substations will service a net pumping energy demand, estimated at 80 MVA at Funks and 90 MVA at the TRR site, totaling 170 MVA of demand load. In terms of generation, estimates indicate that Funks Reservoir will have a net generating capacity of 55.0 MVA and TRR will have 31 MVA. The project's total net generating capacity to the grid is estimated to be 86 MVA. The project estimated pumping energy requirements and power generation are summarized as shown in Tables 10 and 11.

TABLE 10: PROJECT PUMPING SUMMARY

Site	Net Pumping Power (MW)	Other Auxiliary Loads (MW)	Transformer and T Line Losses (MW)	Total Pumping Power (MW)	Total Pumping Power @ 0.85 Power Factor (PF) (MVA)
Funks	67.1	1	0.1	68.2	80.2
TRR	75.4	1	0.1	76.5	90.0
Total	142.4			144.7	170.2

TABLE 11: PROJECT GENERATING SUMMARY

Site	Net Generating Power (MW)	Other Auxiliary Loads (MW)	Transformer and T Line Losses (MW)	Total Power Generation (MW)	Total Power Generation @ 0.85 PF (MVA)
Funks	48.1	1	0.1	47.0	55.3
TRR	27.4	1	0.1	26.3	31.0
Total	75.5			73.3	86.2

The substations will be designed to for the total pumping power requirements (import) or total generation requirements (export).

From: Lecky, Jim [Jim.Lecky@icf.com]
Sent: 2/8/2021 8:06:00 AM
To: Spranza, John [john.spranza@hdrinc.com]
CC: Heydinger, Erin [erin.heydinger@hdrinc.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Hendrick, Mike [Mike.Hendrick@icf.com]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]; Briard, Monique [Monique.Briard@icf.com]
Subject: Re: Sending CalSim Model to Agencies

But ultimately we didn't adopt 10,700. I think it morphed into additional justification for the pulse flow. I suggest we have a discussion re the difference between base flow and pulse flows and decide wether to include that. Will this wait for our Wednesday call or should we find time today?

On Feb 8, 2021, at 6:34 AM, Spranza, John <John.Spranza@hdrinc.com> wrote:

Did we want to include an explanation of the approach we took to the 10,700 Wilkins flows? We spent a lot of time on that topic, and as we do not show a 10,700 flow some context might be a good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Saturday, February 6, 2021 4:35 PM
To: Lecky, Jim <Jim.Lecky@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Hendrick, Mike <Mike.Hendrick@icf.com>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks, this is perfect. I will include both the graphic and the table in additional tabs in the spreadsheet – one for Red Bluff and one for Hamilton City. I will send out a final draft package for your review either later this weekend or Monday.

CH – could you package the CalSim model and get it ready for distribution? If it works for all of you, I think I will post it to my OneDrive so I can manage the access.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Lecky, Jim <Jim.Lecky@icf.com>
Sent: Friday, February 5, 2021 5:05 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Hendrick, Mike <Mike.Hendrick@icf.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC

<Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Erin, just following up on Ali e-mail. Attached are two figures re screen performance form the report James Kapla prepared for CH2M. I am also attaching the report in case you don't have it. There are tables of the flow – diversion relationship in the report that are illustrative as well.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Friday, February 5, 2021 2:38 PM
To: Hendrick, Mike <Mike.Hendrick@icf.com>; Heydinger, Erin <erin.heydinger@hdrinc.com>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin for putting this together. I am good with Mike's comments below and have no additional comments. Minor editorial in Fremont Weir Notch – change "Versus no actional alternative . . ." to "Versus no action alternative . . ."

I am good with sending this out.

I do think we should eventually get a table and/or graphic together to show the screen functions at both fish screens. If we have these graphics, then lets copy them into a different sheet in the excel file. I think that people don't realized (as I didn't for a long time), that we simply cant take a lot of water at lower flows due to the screen function. I just feel like this will help our story and help people understand that this isn't a massive gulp of 3,900 cfs in all situations – this is a shaving off of flows. And scaled diversions aren't needed as the screen function does this for us.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <john.spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, February 5, 2021 9:35 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick, Mike <Mike.Hendrick@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please take a look at the attached spreadsheet and let me know what changes you have. Do we want something related to Reclamation spring pulse flows? We also have a more detailed description of NDOI from another document that I cut down. Let me know if you think we need more.

Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

Ali – this really focuses on modeling criteria and doesn't exactly get at what you were looking for on actual operations. I think we can use it as a starting point, though.

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 9:10 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer,

Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:55 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good. I also think we should include a summary table of the Alternatives. What about the diversion criteria? We could include those as attachments.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:47 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
~~~~~~

Good [afternoon],

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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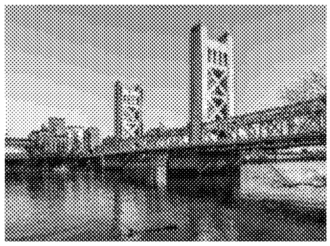
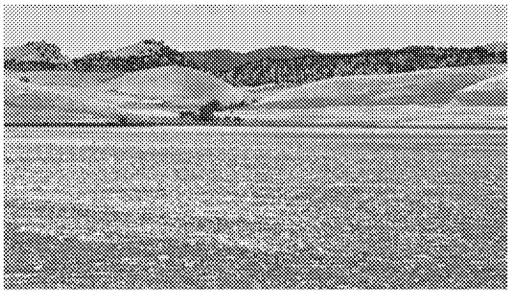
~~~~~~

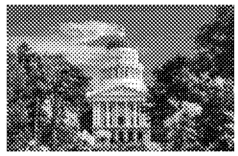

Sites Reservoir
Sites

21st Century Solution to California's Water Reliability Challenges

Sites Reservoir is a generational opportunity to construct a multi-benefit water storage project that helps **restore flexibility, reliability, and resiliency** to our statewide water supply

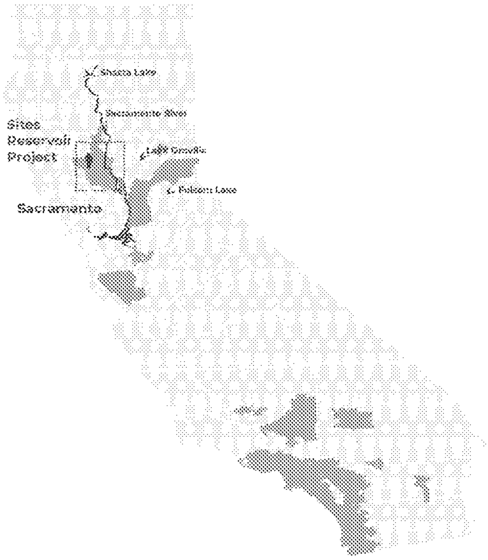




Sites

Our Strength is in Our Broad Statewide Participation

Diverse statewide representation of public agencies advancing Sites Reservoir



Participants include **counties, cities, water and irrigation districts**

Urban and **Rural**

Sacramento Valley

San Joaquin Valley

Bay Area

Southern California

Sites

Our Strength is in Our Broad Statewide Participation

Sacramento Valley

Carter Mutual Water Company
City of American Canyon
Colusa County
Colusa County Water Agency
Cortina Water District
Davis Water District
Dunnigan Water District
Glenn County
Glenn-Colusa Irrigation District
LaGrande Water District
Placer County Water Agency
Reclamation District 108
City of Roseville
Sacramento County Water Agency
City of Sacramento
Tehama-Colusa Canal Authority
Westside Water District
Western Canal Water District

Bay Area

Santa Clara Valley Water District
Zone 7 Water Agency

San Joaquin Valley

Wheeler Ridge-Maricopa Water Storage District

Southern California

Antelope Valley - East Kern Water Agency
Coachella Valley Water District
Desert Water Agency
Metropolitan Water District
San Bernardino Valley Municipal Water District
San Gorgonio Pass Water Agency
Santa Clarita Valley Water Agency

Sites

Rightsized to Meet Our Current and Future Water Supply Needs

Sites Reservoir has been designed and optimized to meet our water supply needs for today and in the future

The Sites Project Authority conducted a **rigorous Value Planning effort** to review the project's proposed operations and facilities **to develop a project that is "right sized" for our investors and participants** while still providing water supply reliability and enhancing the environment

Rightsizing the reservoir was **responsive to input** from **state and federal agencies, NGOs, elected officials, landowners and local communities**

The **feedback we received** through a robust outreach effort was **critical** to developing a reservoir that is the **right size for both people and the environment**

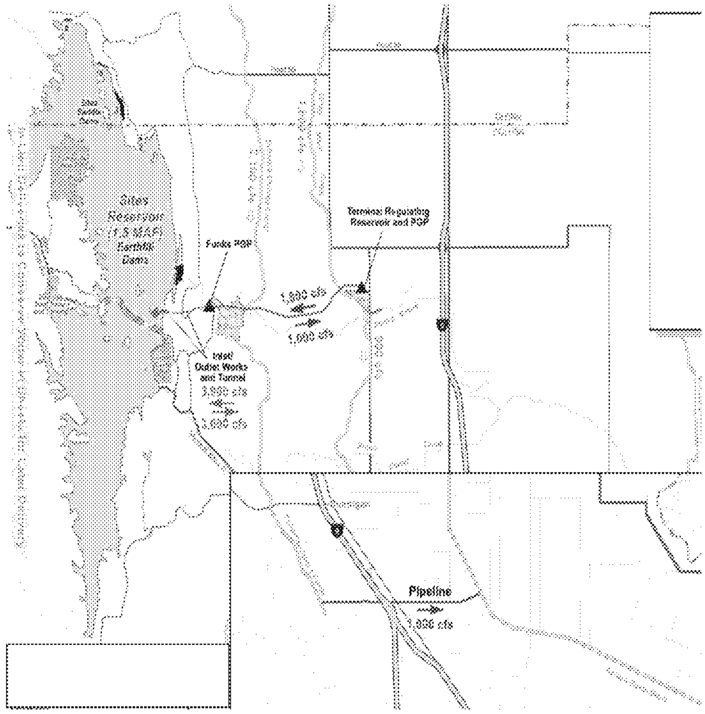
Sites

Rightsized to Meet Our Current and Future Water Supply Needs

1.5 million acre-feet

Utilizes the existing **Glenn-Colusa Irrigation District** and **Tehama-Colusa Canal Authority** canals to convey water to Sites Reservoir from the Sacramento River

Delivers water back to the Sacramento River through the **Tehama-Colusa Canal** and through the **Colusa Basin Drain** for participant deliveries and for the environment



Rightsized to Meet Our Current and Future Water Supply Needs

Member	Reservoir Participation(AFY)
Public Water Agencies	
North of Delta	52,142
South of Delta	140,750
Subtotal Public Water Agencies	192,892
State of CA	~ 40,000
Total Requirement	~230,000

Participant Demand

Participant water subscriptions allocated in the **current participation agreement**

Allocation of State of California water subscription is based on the **Proposition 1 water investment**

- Water for Delta Smelt
- Water for Refuges

Release Capacity from Sites

The "rightsized" project can deliver water to meet the demands of our participants and California's investment of water for the environment

Long term average ~240,000 AFY

Year Type	1,000 cfs Release Capacity (AFY) to the Colusa Basin Drain
Wet	90 - 120
Above Normal	260 - 290
Below Normal	245 - 275
Dry	355 - 385
Critically Dry	210 - 240

Sites

Assumed Diversion and Operations Criteria

Location	Criteria
Wilkins Slough Bypass Flow	8,000 cfs April/May 5,000 cfs all other times
Fremont Weir Notch	Prioritize the Fremont Weir Notch, Yolo Bypass preferred alternative, flow over weir within 5%
Flows into the Sutter Bypass System	No restriction due to flow over Moulton, Colusa, and Tisdale Weirs
Freeport Bypass Flow	Modeled WaterFix Criteria (applied on a daily basis) Post-Pulse Protection (applied on a moving 7-day average) Post-Pulse (3 levels) = January–March Level 2 starts January 1 Level 1 is initiated by the pulse trigger
Net Delta Outflow Index (NDOI) Prior to Project Diversions	44,500 cfs between March 1 and May 31

Assumed Release Criteria

Most releases occur in dry years for water supply and environmental benefits

Priority of releases assume the following:

- Provide water to project participants north and south of the delta
- Provide water to Cache Slough area via Yolo bypass
- Provide water for incremental Level 4 refuge deliveries
- Support Reclamation goals through exchanges

Deliveries to SWP contractors supplement Table A (start @ 85% allocation and more aggressive releases starting @ 65%)

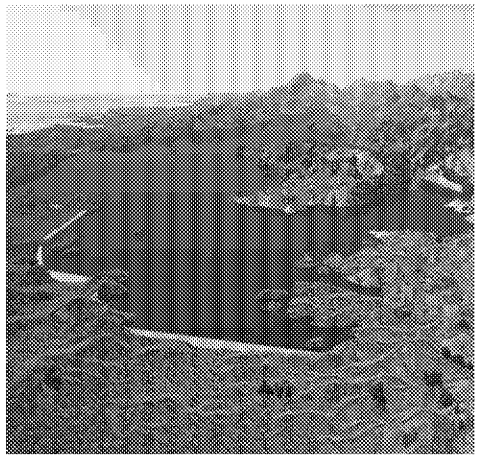
Rightsized to Meet Our Current and Future Water Supply Needs

The Value Planning process has **resulted** in a project that has a **smaller footprint** and **operated in a different manner** then originally designed

Due to these changes the Authority will **revise and recirculate its Draft EIR**

Work with **landowners, tribes, stakeholders, NGOs, and local communities** to develop a **collaborative environmental review process**

It is essential that we **build a project now that makes sense for all our participants** – local, state, and federal



Sites

Rightsized to Meet Our Current and Future Water Supply Needs

Reservoir Size (MAF)	1.5
Project Cost (2019$, billions)	$2.4 - $2.7
Contingency Cost (2019$, billions)	$0.6
Total Project Cost (2019$, billions)	$3.0 - $3.3
Annualized AFY release	240,000
Range of Annual Costs During Repayment Without WIFIA Loans (2020$, $/AF)	$650 - $710
Range of Annual Costs During Repayment With WIFIA Loans (2020$, $/AF)	$600 - $660

The rightsized project is **roughly $2 Billion less** then the 2017 preferred alternative

Cost savings primarily from the **removal** of the **Delevan Diversion** facility on the Sacramento River and the **Delevan Pipeline**

Lowered the Annual Cost during repayment ($/AF)

Significant savings to participants with finance through a **WIFIA** government backed loan

Sites

Provides Statewide Benefits for Generations to Come

Sites Reservoir provides many multi-layered benefits

Off-stream Storage
Does not create a barrier to native fish migration

Federal and State Agencies Manage Environmental Water
Adaptable to current and future conditions and priorities

Local Leadership and Cooperation
Aligns with Sacramento Valley's values and fosters regional and statewide collaboration

Cooperative Operation
Increases effectiveness and efficiency of existing water storage infrastructure

Adaptable to Climate Change
Contributes to system reliability and performance with climate change

Dry Year Water Supply
Reliable dry year water supply for California communities, farms and businesses

Recreational Opportunities
Provides northern Sacramento Valley with additional opportunities for recreation

Environmental Support
Provides environmental water in drier periods for native fish, and habitat for native species and birds

Sites

Provides Statewide Benefits for Generations to Come

Sites Reservoir provides water dedicated to environmental use

A significant portion of the **Sites Reservoir Project's annual water supplies will be dedicated to environment uses:**

- **Preserve cold-water** pool in **Lake Shasta** later into the summer months to support **salmon development, spawning and rearing**
- Provide a **reliable supply of refuge water** to improve **Pacific Flyway** habitat for **migratory birds** and other **native species**
- Provide **water dedicated** to help improve conditions for the **Delta Smelt**

Water dedicated for the environment provided by Sites Reservoir will be **managed by state resources agency managers** who will decide how, and when, this water would be used – creating a water asset for the state that **does not currently exist**

Sites

Possibilities of Environmental Water Uses

Member	Reservoir Participation(AFY)
Public Water Agencies	
North of Delta	52,142
South of Delta	140,750
Subtotal Public Water Agencies	192,892
State of CA	~ 40,000
Total Requirement	~230,000

Sites **creates a resource that can be managed for the benefit of the species.**

Water for the environment is **managed by state resource agencies.**

Potential Beneficiary
Level 4 refuge water
Enhanced Delta Ecosystem
Improve Survival of Anadromous Fish

There is **flexibility** to manage these benefits each year.

The range of possibilities will be covered in the recirculated Draft EIR.

Sites

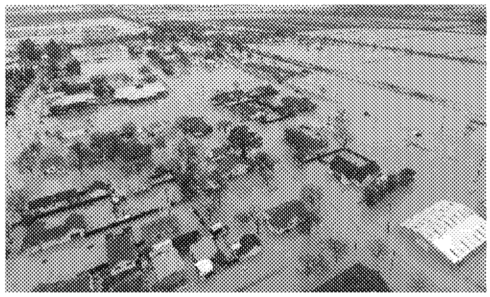
Provides Statewide Benefits for Generations to Come

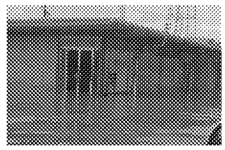
Sites Reservoir provides regional flood protection benefits

Provides significant **regional flood protection benefits** for the Sacramento Valley

Will capture and store **flood flows** that would normally impact the community of **Maxwell** - protecting homes, business and farms

Will help to **limit "down stream" flooding issues** by capturing storm flows that sometimes overwhelm the regions flood control facilities





Sites

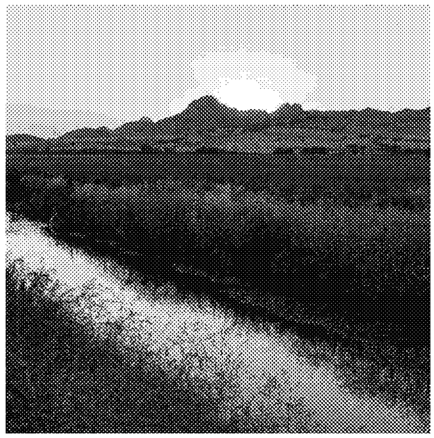
Provides Statewide Benefits for Generations to Come

Sites Reservoir will benefit the local and regional economy

Create hundreds of construction-related jobs during each year of the construction period, and **long-term jobs related to operations**

Creates **new recreation opportunities** in the Sacramento Valley which adds to the **region's economy**

Adding **resiliency** to the water supply will **strengthen the statewide economy** and **business** that rely on a reliable source of water for their operations – particularly agriculture



Sites

We are On-Track to Deliver This Vital Project for the People of California

Key Milestones Through 2021

- Meet **eligibility requirements under Prop 1 (WSIP)** in order to access the remainder of the $816 Million in funding
- **Recirculate Draft EIR for public comment, proactively engage stakeholders, develop responses to comments** to support environmental feasibility determination
- **Complete** Feasibility Report
- **Secure environmental permit certainty** and **draft permit applications**
- Update and **refine cost estimate** and **affordability analysis**
- **Develop Plan of Finance**
- Improve definition of **SWP/CVP** exchange, including **Operations Plan**
- **Enhance landowner, stakeholder & NGO engagement**
- **Develop Operating Agreement Term Sheets** with: DWR, USBR, TCCA, GCID, CBD Authority

Sites

Questions

Sites

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 2/8/2021 12:23:35 PM
To: Hendrick, Mike [Mike.Hendrick@icf.com]; Heydinger, Erin [erin.heydinger@hdrinc.com]; Lecky, Jim [Jim.Lecky@icf.com]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]; Briard, Monique [Monique.Briard@icf.com]
Subject: RE: Sending CalSim Model to Agencies

Erin,
We just had a call and discussed the 10,700 flow, I'm good with us not including any additional explanation. We will address it in the workshops and in one-on-ones with stakeholders and NGOs.

Jim is going to put together a one-pager on the rational behind using pulse flows rather than 10,700 set flow standard.

John Spranza

D 916.679.8858 M 818.640.2487

From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Monday, February 8, 2021 8:13 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

12-1 today for me…or 8-9 and 10-12 for tomorrow work on my end as well.

Mike H

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Monday, February 8, 2021 8:10 AM
To: Lecky, Jim <Jim.Lecky@icf.com>
Cc: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Hendrick, Mike <Mike.Hendrick@icf.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

I have time from 11 – 1 today, or 8-9 and 10-noon tomorrow.

John Spranza

D 916.679.8858 M 818.640.2487

From: Lecky, Jim <Jim.Lecky@icf.com>
Sent: Monday, February 8, 2021 8:06 AM
To: Spranza, John <John.Spranza@hdrinc.com>
Cc: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Hendrick, Mike <Mike.Hendrick@icf.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Briard, Monique <Monique.Briard@icf.com>
Subject: Re: Sending CalSim Model to Agencies

But ultimately we didn't adopt 10,700. I think it morphed into additional justification for the pulse flow. I suggest we have a discussion re the difference between base flow and pulse flows and decide wether to include that. Will this wait for our Wednesday call or should we find time today?

On Feb 8, 2021, at 6:34 AM, Spranza, John <John.Spranza@hdrinc.com> wrote:

Did we want to include an explanation of the approach we took to the 10,700 Wilkins flows? We spent a lot of time on that topic, and as we do not show a 10,700 flow some context might be a good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Saturday, February 6, 2021 4:35 PM
To: Lecky, Jim <Jim.Lecky@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Hendrick, Mike <Mike.Hendrick@icf.com>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks, this is perfect. I will include both the graphic and the table in additional tabs in the spreadsheet – one for Red Bluff and one for Hamilton City. I will send out a final draft package for your review either later this weekend or Monday.

CH – could you package the CalSim model and get it ready for distribution? If it works for all of you, I think I will post it to my OneDrive so I can manage the access.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Lecky, Jim <Jim.Lecky@icf.com>
Sent: Friday, February 5, 2021 5:05 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Hendrick, Mike <Mike.Hendrick@icf.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson

<laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Erin, just following up on Ali e-mail. Attached are two figures re screen performance form the report James Kapla prepared for CH2M. I am also attaching the report in case you don't have it. There are tables of the flow – diversion relationship in the report that are illustrative as well.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Friday, February 5, 2021 2:38 PM
To: Hendrick, Mike <Mike.Hendrick@icf.com>; Heydinger, Erin <erin.heydinger@hdrinc.com>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin for putting this together. I am good with Mike's comments below and have no additional comments. Minor editorial in Fremont Weir Notch – change "Versus no actional alternative . . ." to "Versus no action alternative . . ."

I am good with sending this out.

I do think we should eventually get a table and/or graphic together to show the screen functions at both fish screens. If we have these graphics, then lets copy them into a different sheet in the excel file. I think that people don't realized (as I didn't for a long time), that we simply cant take a lot of water at lower flows due to the screen function. I just feel like this will help our story and help people understand that this isn't a massive gulp of 3,900 cfs in all situations – this is a shaving off of flows. And scaled diversions aren't needed as the screen function does this for us.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <john.spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, February 5, 2021 9:35 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick, Mike <Mike.Hendrick@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please take a look at the attached spreadsheet and let me know what changes you have. Do we want something related to Reclamation spring pulse flows? We also have a more detailed description of NDOI from another document that I cut down. Let me know if you think we need more.

Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

Ali – this really focuses on modeling criteria and doesn't exactly get at what you were looking for on actual operations. I think we can use it as a starting point, though.

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 9:10 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson

<laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:55 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good. I also think we should include a summary table of the Alternatives. What about the diversion criteria? We could include those as attachments.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:47 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

---

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
~~~~~~

Good [afternoon],

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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~~~~~~

JACOBS

Memorandum

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F +1.916.920.8463
www.jacobs.com

Project Name	Sites Reservoir Project
Subject	CalSim II Models to Support the April 2021 Administrative Revised Draft EIR/SDEIS: No Action Alternative, Alternative 1A, Alternative 1B, Alternative 2, and Alternative 3
Attention	Ali Forsythe/Sites Project Authority; John Spranza/HDR; Erin Heydinger/HDR
From	Robert Leaf/JACOBS; Steve Micko/JACOBS; Reed Thayer/JACOBS
Date	February 9, 2021

1. Introduction

The Sites Reservoir Project team has developed model simulations to support quantitative analysis of Sites long-term operations as part of developing an Administrative Revised Draft EIR/SDEIS, for completion in April 2021.

The results of these model simulations are provided for informational and review purposes. If there are any questions regarding the results of these simulations, please contact the modeling team.

2. Modeled Scenarios

Model results are provided for the alternatives tabulated below.

Model Name	**Label Name (as seen in spreadsheet)**	**Description**
No Action Alternative 011221	NAA 011221	Baseline simulation (Reclamation 2020 Benchmark)
Alternative 1A 011221	ALT 1A 011221	1.5 MAF Reservoir
Alternative 1B 011221	ALT 1B 011221	1.5 MAF Reservoir with 91 TAF of Reclamation Investment
Alternative 2 011221	ALT 2 011221	1.27 MAF Reservoir
Alternative 3 020121	ALT 3 020121	1.5 MAF Reservoir with 345 TAF of Reclamation Investment

The CalSim II model was used to simulate Sites Reservoir, CVP, and SWP water operations, including reservoir operations, river flows and diversions at key project-related locations.

The CalSim II models used were developed in coordination with and reviewed by Sites Project Authority (Authority), and revised according to direction provided by the Authority.

This model (CalSim II) has been jointly developed by Reclamation and the California Department of Water Resources (DWR) over many years. This model is useful so long as the results are interpreted consistent with the model limitations.

3. Model Simulations for Modeled Scenarios

3.1 CalSim II Simulations

CalSim II studies for No Action Alternative 011221, Alternative 1A 011221, Alternative 1B 011221, Alternative 2 011221 and Alternative 3 020121 are provided. Results DV file (2020D09EDV_sp.DSS) is found in the "DSS/Output" sub-directory.

A Trend Reporting spreadsheet, NODOS_Trend_Reporting_rev40dpcy_DV6_HistClim_CALSIM_NAA_ALT1A_011221_ALT1B_011221_ALT2_011221_ALT3_020121.xlsm, is provided in the "_Spreadsheets" directory.

4. Trend Reporting Spreadsheet

The trend reporting spreadsheet is designed to provide easy viewing of multiple scenarios. Please focus on the "Report - ALL (DASHBOARD)" tab. At this tab, you can select the parameter that you wish to evaluate, the type of statistic that you would like to view (e.g. averages, water-year type averages, dry periods), and the seasonal period (e.g. individual months, water year, CVP contract year, selected seasons). There is also an option to convert flow data in CFS to volume in TAF/month.

This tab presents data in the following formats:

- Results Table
- Bar chart of results
- Timeseries of selected statistic
- Exceedance plot (displays all data for the selected seasonal period; is not affected by "select statistic")
- Monthly Pattern (displays the selected statistic for each month; is not affected by "select seasonal period")
- Overall timeseries (includes entire timeseries, not affected by "select statistic" or "select seasonal period").

Not all statistics or seasonal periods should be used for all parameters. For example, seasonal averages or annual averages of reservoir storage do not provide value.

If reviewing results by water year type, please note that water year type averages are calculated based on calendar year, not water year.

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/9/2021 2:50:39 PM
To: Hendrick, Mike [Mike.Hendrick@icf.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Spranza, John [john.spranza@hdrinc.com]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]; Lecky, Jim [Jim.Lecky@icf.com]
CC: Briard, Monique [Monique.Briard@icf.com]
Subject: RE: Sending CalSim Model to Agencies
Attachments: SitesRDEIRSDEIS-ModelingCriteria-20210209.pdf

Hi all,

Please see attached for the proposed final package to send to the agencies – please take a look and make sure I incorporated the changes sufficiently. I will send this out this evening assuming I hear back from the CH team that it looks good from their perspective.

I added some notes on the diversions at Red Bluff and Hamilton City (as well as the graphics/tables Jim sent) and also included a note that the spring pulse flow action in ROC on LTO is in the baseline and, therefore, all of the action alternatives.

Mike – on the deal pool, the model assumes 120 TAF for water quality purposes for any water that is going to the Sacramento River. However, it assumes storage could be drawn down further for local uses. Based on modeling it never gets below 60 TAF. From an engineering perspective, the reservoir is physically able to draw down to about 18 TAF. We will need to verify the true dead pool from a water quality perspective once we have a chance to look at the reservoir water quality results that the ICF team will be evaluating.

Thanks!
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, February 5, 2021 9:35 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick, Mike <Mike.Hendrick@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please take a look at the attached spreadsheet and let me know what changes you have. Do we want something related to Reclamation spring pulse flows? We also have a more detailed description of NDOI from another document that I cut down. Let me know if you think we need more.

Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

Ali – this really focuses on modeling criteria and doesn't exactly get at what you were looking for on actual operations. I think we can use it as a starting point, though.

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 9:10 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:55 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good. I also think we should include a summary table of the Alternatives. What about the diversion criteria? We could include those as attachments.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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Subject: RE: Sending CalSim Model to Agencies

Sounds good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
~~~~~~

Good [afternoon],

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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~~~~~~

Criteria	Purpose	Description
Baseline		
Baseline Model	Update assumed operations to reflect current requirements and conditions.*	CalSim II 2020 Benchmark developed by Reclamation in coordination with DWR and CDFW.
Fixed Flows?		
American River	Allow flexibility	No - flows allowed to change
Trinity River Fixed	Reflect real conditions	Yes - flows held constant
Sites Facilities		
Sites Reservoir		
Reservoir capacity	Reflect project design	1.5 MAF for Alternatives 1 and 3, 1.3 MAF for Alternative 2
Dead pool size	Reflects project design and water quality considerations	120 TAF for export, 60 TAF for local use
Red Bluff Diversion/Tehama-Colusa Canal Authority Canal		
Diversion capacity	Reflect capacity at site	Up to 2,100 cfs - see following pages for description of diversion function
Bypass flow	Stabilize flow, protect redds	3,250 cfs
Hamilton Diversion/Glenn-Colusa Irrigation District Main Canal		
Diversion capacity	Reflect capacity at site	1,800 cfs
Bypass flow	Ensure proper fish screen function in oxbow	Up to 4,000 cfs - see following pages for description of diversion function
Glenn-Colusa Irrigation District maintenance window	Maintain earthen canal	2 weeks (January/February)
Dunnigan Pipeline		
Release capacity	Reflect design limit	1,000 cfs
Terminus	Reflect design	Colusa Basin Drain for Alt 1 and Alt 3, Sacramento River with turnout to Colusa Basin Drain for Alt 2
Location-Specific Regulations		
Bend Bridge Pulse Protection	Survival of emigrating juvenile salmon	Every pulse
Scaled Diversions	Ensure proper screen function	Rate of diversion controlled by screen design (see following pages)
Wilkins Slough Bypass Flow	Facilitate hatchery fish release	8,000 cfs in April and May; 5,000 cfs all other times

Criteria	Purpose	Description
Fremont Weir Notch Criteria	Limit encroachment on Reclamation obligation, maintain frequency and duration of spills	Versus no action alternative, there can be no more than 1% reduction in flow over weir when spill is less than 600 cfs and no more than a 10% reduction when flow over weir is between 600 and 6,000 cfs. No restriction when flows are greater than 6,000 cfs.
Net Delta Outflow Index (NDOI)	Do not impact implementation of existing regulations	Operations consistent with D-1641 as amended
X2	Do not impact implementation of existing regulations	Operations consistent with 2019 BO, CA DWR ITP
Delta Water Quality	Do not impact implementation of existing regulations	Operations with D-1641 as amended
*Note: Spring pulse flow protection as identified in the 2019 ROC on LTO BiOp is included in the baseline and is preserved in all action alternatives.		

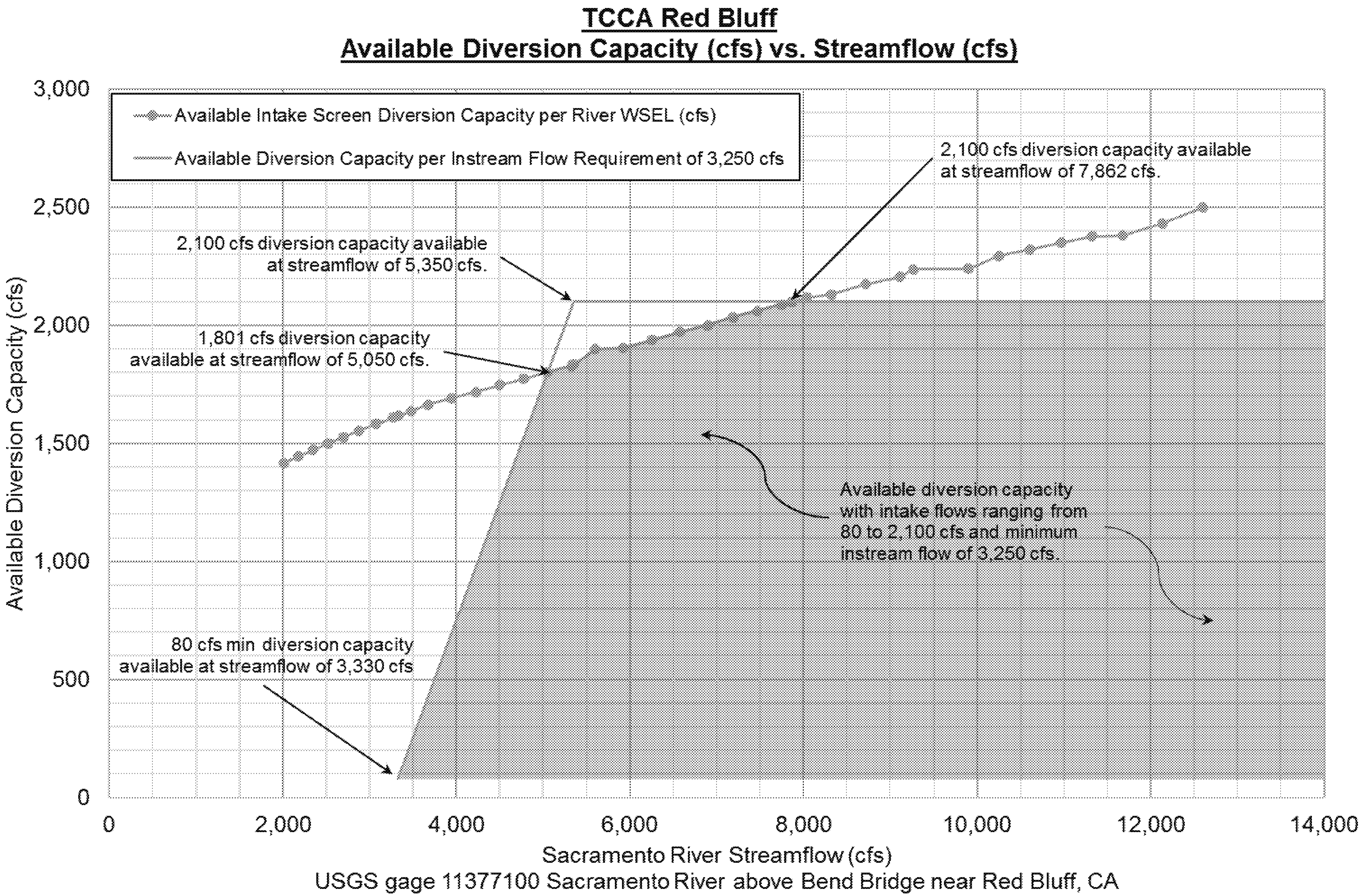
TCCA Red Bluff Facility Operations

Table 3. TCCA Red Bluff Available Diversion Capacity by Streamflow
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Streamflow at Gage (cfs)	River WSEL at U/S Work Point (feet, NAVD88)	Available Facility Diversion Capacity (cfs)
2,010	241.2	1,417
2,175	241.3	1,445
2,350	241.4	1,472
2,525	241.5	1,500
2,700	241.6	1,527
2,875	241.7	1,554
3,075	241.8	1,582
3,275	241.9	1,609
3,330	241.9	1,617
3,475	242.0	1,637
3,675	242.1	1,664
3,950	242.2	1,692
4,225	242.3	1,719
4,500	242.4	1,746
4,775	242.5	1,774
5,050	242.6	1,801
5,325	242.7	1,829
5,350	242.7	1,835
5,600	242.9	1,900
5,925	243.1	1,904
6,250	243.2	1,938
6,575	243.4	1,973
6,900	243.5	2,000
7,184	243.6	2,034
7,468	243.7	2,062
7,751	243.8	2,089
7,862	243.8	2,100
8,035	243.9	2,117
8,319	244.0	2,130

8,714	244.1	2,175
9,109	244.3	2,206
9,266	244.4	2,237
9,898	244.5	2,240
10,254	244.6	2,295
10,610	244.7	2,322
10,965	244.8	2,350
11,321	244.9	2,377
11,677	245.0	2,380
12,139	245.1	2,432
12,600	245.2	2,500

(light shading)	Diversions limited by instream flow requirement of 3,250 cfs
(medium shading)	Diversions limited by River WSEL and submerged screen area
(dark shading)	No restrictions (assumes use of future Pump Nos. 2 and 10)


TCCA Red Bluff
Available Diversion Capacity (cfs) vs. Streamflow (cfs)
Available Intake Screen Diversion Capacity per River WSEL (cfs)
Available Diversion Capacity per Instream Flow Requirement of 3,250 cfs
2,100 cfs diversion capacity available at streamflow of 7,862 cfs.
2,100 cfs diversion capacity available at streamflow of 5,350 cfs.
1,801 cfs diversion capacity available at streamflow of 5,050 cfs.
Available diversion capacity with intake flows ranging from 80 to 2,100 cfs and minimum instream flow of 3,250 cfs.
80 cfs min diversion capacity available at streamflow of 3,330 cfs
Available Diversion Capacity (cfs)
0
500
1,000
1,500
2,000
2,500
3,000
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
Sacramento River Streamflow (cfs)
USGS gage 11377100 Sacramento River above Bend Bridge near Red Bluff, CA

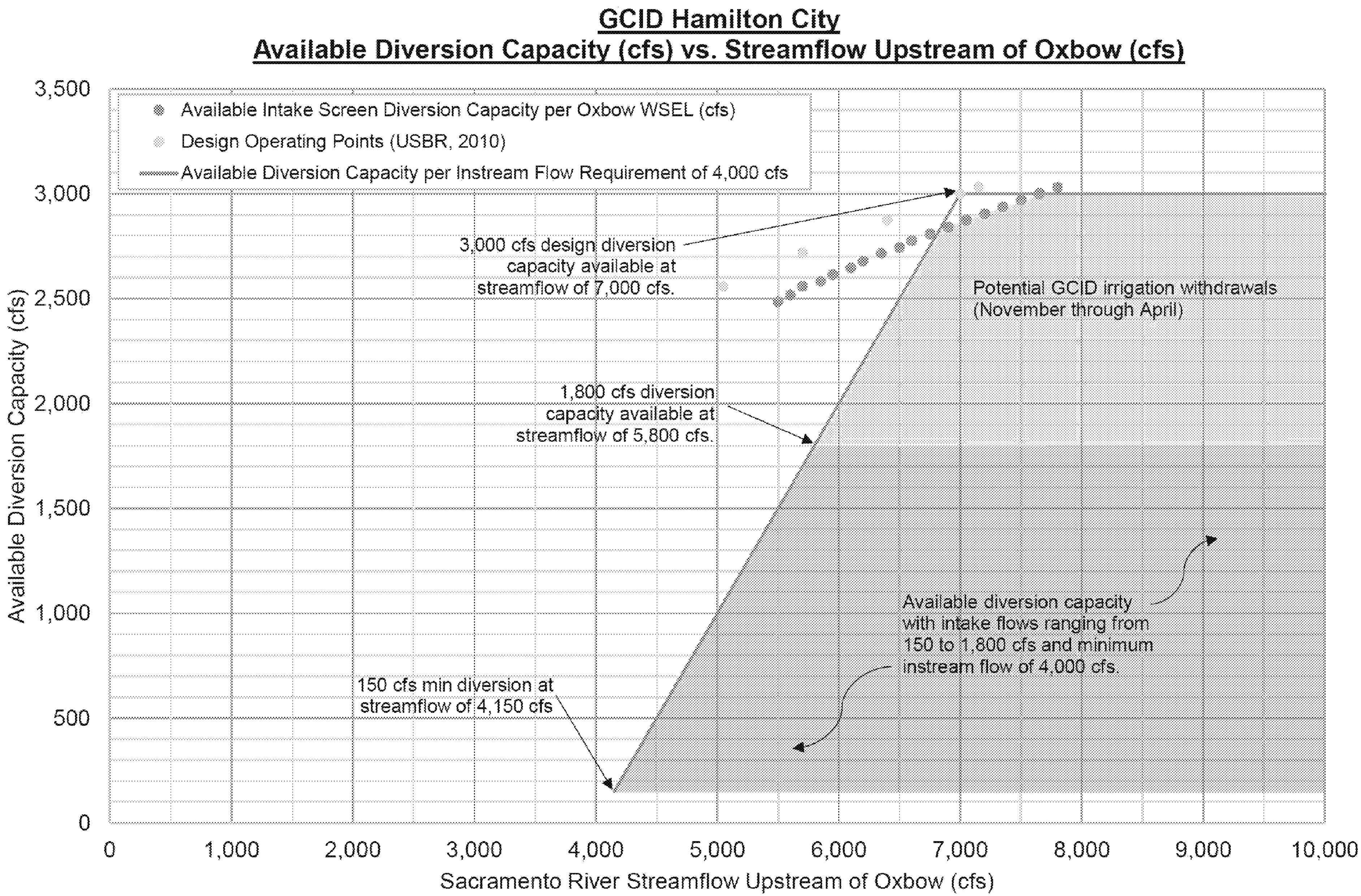
GCID Hamilton City Facility Operations

Table 4. GCID Hamilton City Available Diversion Capacity by Streamflow
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Streamflow Upstream of Oxbow (cfs)	River WSEL at U/S Oxbow (feet, NGVD29)	Available Facility Diversion Capacity (cfs)
900	132.5	1,744
938	132.6	1,777
977	132.7	1,809
1,018	132.8	1,841
1,061	132.9	1,873
1,105	133.0	1,906
1,151	133.1	1,938
1,200	133.2	1,970
1,250	133.3	2,002
2,690	133.4	2,035
2,765	133.5	2,067
2,842	133.6	2,099
2,921	133.7	2,131
3,002	133.8	2,164
3,086	133.9	2,196
3,172	134.0	2,228
3,260	134.1	2,260
3,351	134.2	2,292
3,445	134.3	2,325
3,541	134.4	2,357
3,639	134.5	2,389
3,741	134.6	2,421
3,845	134.7	2,454
3,952	134.8	2,486
4,062	134.9	2,518
4,176	135.0	2,559
4,292	135.1	2,583
4,412	135.2	2,615
4,534	135.3	2,647
4,661	135.4	2,679

4,791	135.5	2,717
4,924	135.6	2,744
5,061	135.7	2,776
5,203	135.8	2,808
5,348	135.9	2,841
5,497	136.0 (begin possible gravity diversion)	2,874
5,650	136.1	2,905
5,807	136.2	2,937
5,969	136.3	2,969
6,135	136.4	3,002
6,306	136.5	3,031

(light shading)	Diversions limited by instream flow requirement of 4,000 cfs
(dark shading)	No restrictions, assuming GCID irrigation withdrawals are less than approximately 1,000 cfs



Draft_0006330

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/9/2021 3:19:09 PM
To: Spranza, John [john.spranza@hdrinc.com]; Hendrick, Mike [Mike.Hendrick@icf.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]; Lecky, Jim [Jim.Lecky@icf.com]
CC: Briard, Monique [Monique.Briard@icf.com]
Subject: RE: Sending CalSim Model to Agencies
Attachments: SitesRDEIR-SDEIS-AlternativesDescription-20210209.pdf

I am also proposing to include the attached description of the alternatives.

For the diversions – these are the operations that are assumed in CalSim, so monthly timestep. Maybe I can add some wording to clarify that instantaneous diversions could be higher.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 9, 2021 3:11 PM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Erin,
As we will be diverting "plus losses" would we want to include the anticipated diversion rate to make up for those losses? I'm not sure the losses would be a significant volume, but if it is more than the 2,100 and 1,800, we might want to include something.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 9, 2021 2:51 PM
To: Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please see attached for the proposed final package to send to the agencies – please take a look and make sure I incorporated the changes sufficiently. I will send this out this evening assuming I hear back from the CH team that it looks good from their perspective.

I added some notes on the diversions at Red Bluff and Hamilton City (as well as the graphics/tables Jim sent) and also included a note that the spring pulse flow action in ROC on LTO is in the baseline and, therefore, all of the action alternatives.

Mike – on the deal pool, the model assumes 120 TAF for water quality purposes for any water that is going to the Sacramento River. However, it assumes storage could be drawn down further for local uses. Based on modeling it never gets below 60 TAF. From an engineering perspective, the reservoir is physically able to draw down to about 18 TAF. We will need to verify the true dead pool from a water quality perspective once we have a chance to look at the reservoir water quality results that the ICF team will be evaluating.

Thanks!
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

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Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

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Subject: RE: Sending CalSim Model to Agencies

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

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Sent: Tuesday, February 2, 2021 8:55 AM
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Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

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Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
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Subject: RE: Sending CalSim Model to Agencies

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John Spranza

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From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!

~~~~~~

Good [afternoon],

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
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~~~~~~

Sites RDEIR/SDEIS Alternatives Summary

Facilities / Operations	Alternative 1	Alternative 2	Alternative 3
Reservoir Size	1.5 MAF	1.3 MAF	1.5 MAF
Hydropower	Incidental upon release	Same as Alt 1	Same as Alt 1
Diversion Locations	Red Bluff Pumping Plant and Hamilton City	Same as Alt 1	Same as Alt 1
Conveyance Release / Dunnigan Release	1,000 cubic feet per second (cfs) into new Dunnigan Pipeline to Colusa Basin Drain	1,000 cfs into new Dunnigan Pipeline to Sacramento River. Partial release into the Colusa Basin Drain	Same as Alt 1
Reclamation Involvement	1A: Operational Exchanges Only • Within Year Exchanges • Real-time Exchanges 1B: Funding Partner up to 7% Cost-Share, Including Operational Exchanges	Operational Exchanges • Within Year Exchanges • Real-time Exchanges	Same as Alt 1B, but up to 25% investment
DWR Involvement	Operational Exchanges with Oroville and use of SWP facilities South-of-Delta	Same as Alt 1	Same as Alt 1
Route to West Side of Reservoir	Bridge across reservoir	Paved road around southern end of reservoir	Same as Alt 1

Draft HC Operations and Maintenance Technical Memorandum

To:	Sites Project Authority
CC:	Henry Luu, P.E. (HDR)
Date:	February 26, 2021
From:	Peter Rude, PE, Jeff Smith, PE
Quality Review by:	
Authority Agent Review by:	Henry Luu, P.E. (HDR)
Subject:	Operations and Maintenance for HC Facilities

Acronyms and Abbreviations

1.0 Introduction

The project consists of a large reservoir, ancillary roads, and conveyance facilities. The Site Joint Power Authority (Authority) decided to segregate the design of these facilities into an HR (Segment H Reservoir) segment that is responsible for design of the reservoir features, including several dams, inlet/outlet tunnels at Golden Gate Dam, as well as relocation of roads displaced by the reservoir. The other segment is known as the HC (Segment H Conveyance) segment and includes improvements to the two existing diversion canals from the Sacramento River to the Project Area (Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal), regulating reservoirs (existing Funks Reservoir and new Terminal Regulating Reservoir), two pumping generating plants (PGP), large-diameter pipelines from each PGP to Sites Reservoir, and a large-diameter pipeline to convey water from the Tehama Colusa Canal (TCC) to the Colusa Basin Drain or Sacramento River near Dunnigan, California.

Detailed descriptions of each facility are provided in the next section. An overall site plan of the project area is provided in Figure 1.

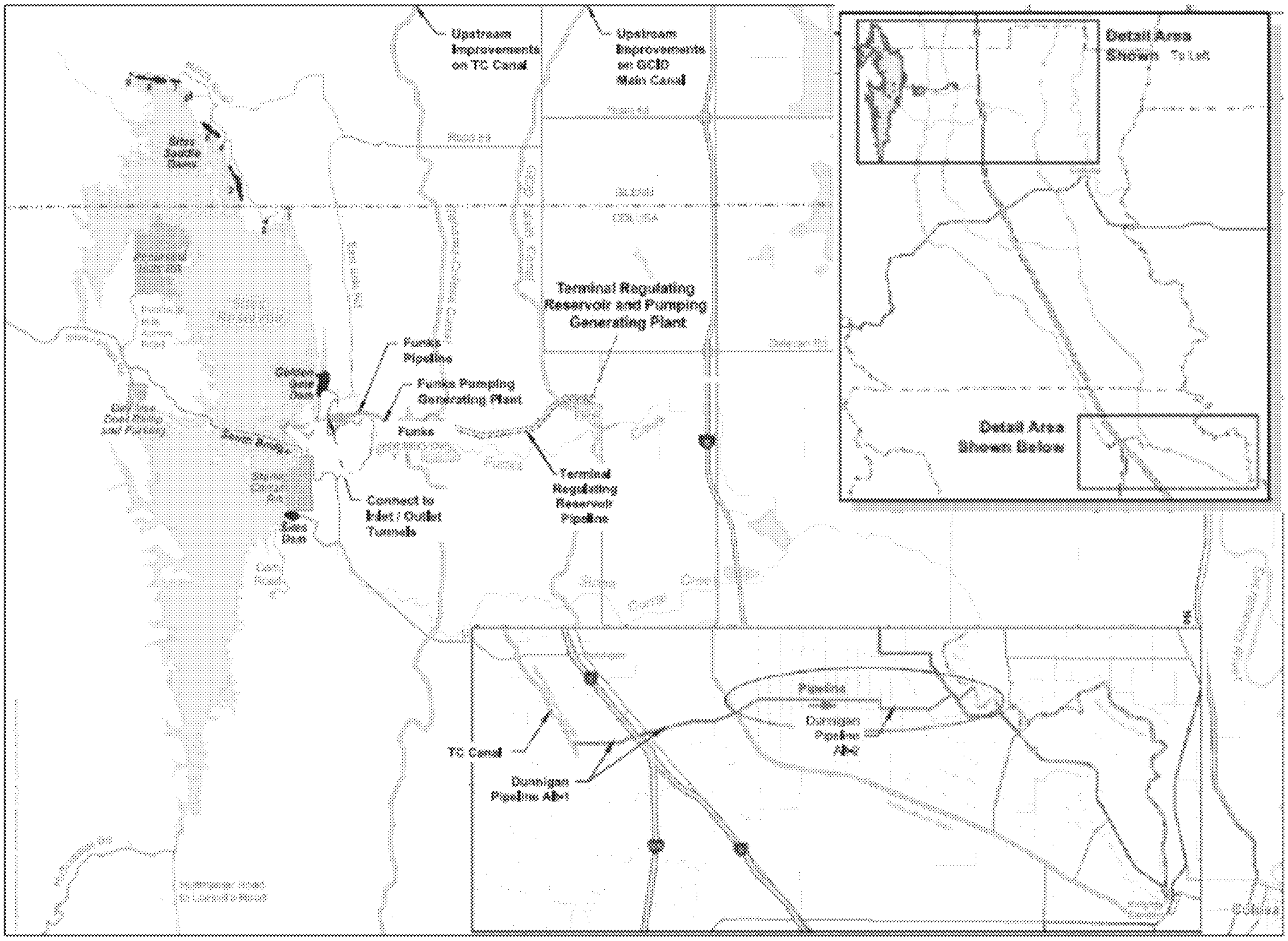

Figure 1: PROJECT AREA site PLAN

1.1 General Description of Facilities

Following is a list of the individual new facilities and existing facilities requiring improvements.

- Improvements to the TCC Authority Red Bluff Pumping Plant on the Sacramento River
- Glenn-Colusa Irrigation District (GCID) Canal Improvements upstream of the TRR
- Terminal Regulating Reservoir (TRR)
- TRR PGP
- TRR Pipelines
- Funks Reservoir – Sediment Removal
- Funks PGP
- Funks Pipelines
- Western Area Power Administration (WAPA) or Pacific Gas and Electric (PG&E) Substation/Switchyard
- Power Transmission Lines
- Dunnigan Pipeline
- Administration and Operations Building
- Maintenance and Storage Building
- Access Roads

1.1.1 Improvements to the TCC Red Bluff Pumping Plant

The Red Bluff Diversion is located on the Sacramento River in Red Bluff, California. The facility includes a 2,500 cubic feet per second (cfs) capacity 1,180-foot-long fish screen structure, forebay, pumping plant (current capacity 2,000 cfs), an electrical switchyard, and a 660-foot-long access bridge, canal, and siphon under Red Bank Creek, to deliver water from the Sacramento River into the TCC and Corning Canal. This facility was constructed and put into operation in October 2012. The pumping plant was designed to accommodate the Sites Project and includes space to add two additional 250 cfs pumping units, bringing the total pumping capacity to 2,500 cfs.

1.1.2 GCID Main Canal Improvements

The GCID Main Canal delivers water from the Sacramento River to water users along its route, from its diversion point approximately 5 miles northwest of Hamilton City to southeast of the City of Williams. The canal is a 65-mile unlined earthen channel, with capacity varying from 3,000 cfs at the upstream end to 300 cfs at the southern terminus. Water conveyed by the canal is pumped by the Hamilton City Main Pump Station into the GCID Main Canal.

Improvements to the GCID Main Canal will include a 3,000 cfs headworks structure just downstream of the Hamilton City Diversion, two siphon structures (Willow Creek and Walker Creek), a railroad siphon at Willows, canal earthwork, and some canal bank gravel road improvements. The need for replacement of the siphons and railroad crossing will be determined after a canal hydraulic model is completed, as well as a condition assessment anticipated for early 2021.

1.1.3 TRR

This is a new reservoir that will be hydraulically connected to the GCID Main Canal about three miles east of Funks Reservoir and just upstream of the Funks Creek Siphon at Mile Post 41.3 on the GCID Main Canal. The foot print of the TRR is approximately 130 acres and the storage volume is approximately 600 acre-feet. The TRR would also include gates to control water flow in and out of the GCI Main Canal. There are two alternative locations for the TRR, one on the east side of the GCID Main Canal (TRR East) and one on the west side of the GICD Main Canal (TRR West).

1.1.4 TRR PGP

This is a pumping and generating plant that will be used to pump water from the TRR to the Sites Reservoir. This facility will also include hydroelectric turbines to generate electricity when flow is released from Sites Reservoir to the TRR and GCID Main Canal. As part of this PGP facility, there will also be an energy-dissipation facility that will allow releases back to the TRR as backup to the hydroelectric turbine facilities.

1.1.5 TRR Pipelines

These are two parallel, 12-foot-diameter pipelines used to convey water between the TRR PGP and the Sites Reservoir. These pipelines will connect from the piping manifold at TRR PGP to the downstream side of the two proposed 23-foot-diameter tunnels connected to the Site Reservoir inlet/outlet structure. The approximate length of these pipelines is 5 miles each.

1.1.6 Funks Reservoir

Reclamation constructed the Funks Reservoir in the mid-1970s with the intent of providing operational flexibility for the TCC. There are check structures on the TCC just upstream and downstream of the reservoir. The TCC is located about 1 mile east of the proposed Sites Reservoir. At the time of construction, the reservoir had a useable capacity of 1,170 acre-feet between operating levels of 199.5- and 205.2-feet elevation, and 1,080 acre-feet of inactive storage below elevation 199.5 feet, for a total capacity of 2,250 acre-feet; however, the addition of sediment from Funks Creek and the TCC have likely reduced the total storage volume. Additionally, a cofferdam will be constructed within Funks Reservoir to facilitate construction of the TRR pipelines. The resulting storage volume reductions will be offset by sediment removal and excavation where storage capacity can be regained. The spillway has a capacity of 2,500 cfs. The project will remove accumulated sediment to recapture the design storage volume.

1.1.7 Funks PGP

This is a pumping and generating plant that will be used to pump water from Funks Reservoir to the Sites Reservoir. This facility will also include hydroelectric turbines to generate electricity when flow is released from Sites Reservoir to Funks Reservoir and, ultimately, the TCC. There will also be an energy-dissipation facility as part of this PGP facility that will allow releases back to Funks Reservoir as backup to the hydroelectric turbine facilities.

1.1.8 Funks Pipelines

These are 2 parallel, 12-foot-diameter pipelines used to convey water between the Funks PGP and the Sites Reservoir. These pipelines will connect from the piping manifold at Funks PGP to the downstream side of the two proposed 23-foot-diameter tunnels connected to the Site Reservoir inlet/outlet structure. The approximate length of these pipelines is 1 mile each.

1.1.9 Dunnigan Pipeline

The Dunnigan pipeline consists of either a 9-foot-diameter or 10.5-diameter pipeline that will be used to release water from the TCC to the Sacramento River. The concept is to release flow from Sites Reservoir to Funks Reservoir, where the flow will then go south about 40 miles to near the end of the TCC. At this point, flow will be diverted into the Dunnigan pipeline, where flow will head either to the Colusa Basin Drain (CBD, which flows to Sacramento River, or directly to the Sacramento River. If the pipeline discharges directly into the Sacramento River, a portion of the water will also be diverted and discharged in the CBD. The pipeline is about 4 miles long to the CBD, or 10 miles long if it goes directly to the Sacramento River.

1.1.10 WAPA or PG&E Substation/Switchyard

There are 230 kilovolt (kV) electrical transmission lines running near the proposed project area. Specifically, the WAPA transmission lines run very close to Funks Reservoir in a north-south direction, with a parallel 230 kV line owned by PG&E a few miles east of the WAPA transmission lines. It is anticipated that one of these transmission lines will be connected to provide power for the project, as well as receive generated electrical power from the hydroelectric turbines. Switchyards and substations will be needed to provide power to both the TRR and Funks sites.

1.1.11 Electrical Transmission Lines

Electrical transmission lines will be required to connect the WAPA or PGE 230 kV transmission lines to the TRR PGP and the Funks PGP.

1.1.12 Administration and Operations Building

At this time, staffing requirements for operating and maintaining the Sites facilities has not been defined, but an administration and operations building is anticipated to be needed.

1.1.13 Maintenance and Storage Building

A building is also expected to be required to provide maintenance and storage associated with the Project.

1.1.14 Access Roads

Access to the proposed TRR site would likely be from McDermott Road, which lies adjacent to the proposed reservoir. Access to the Funks complex (PGP and Reservoir) is currently accomplished using the O & M road along the TCC. A new access road will be required that allows larger equipment and year-round access. It is also anticipated that roads will be constructed within the TRR and Funks Pipeline easements, both to provide access to the pipelines and electrical power transmission lines but also as a secondary access road to the project facilities.

1.2 Purpose and Scope

The purpose of this task is to prepare a description of the inspection and O&M activities associated with each of the HC project facilities. This task supports the Sites Project Feasibility Report but is not intended to serve as a detailed inspection and O&M manual that would be used for the constructed facilities.

1.3 Limitations

The scope of work for this TM was restricted to the development of the inspection and O&M activities for the Sites Reservoir under the Conveyance (HC) contract. O&M for the reservoir (facilities are separately considered in a companion TM for the HR contract.

This TM is intended for the sole use of the Sites Project Authority. The scope of services performed may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or of the findings, conclusions, or recommendations presented herein is at the sole risk of said user.

2.0 Facility Operation and Maintenance

This section provides a typical operation and maintenance activities associated with each of the individual facilities.

2.1 TCC Red Bluff Pumping Plant

The TCC Red Bluff Pumping Plant is an existing facility that has a detailed operation and maintenance plan developed when the facility was constructed. The addition of the two pumps and associated electrical equipment is not anticipated to change the current O&M activities since this Project is only replicating existing equipment. Although it may take a little more time to perform the O&M activities for these two additional pumps, the types of activities will remain the same.

2.2 GCID Main Canal Improvements

Improvements to the GCID canal entail replacement of existing structures and addition of earthwork to provide greater reliability. The GCID Main Canal is owned and operated by GCID who are responsible for operating and maintaining the canal.

2.3 Terminal Regulating Reservoir

For TRR, regular inspections are included as part of the everyday operations where a worker periodically drives around to visually inspect the facilities for major obvious issues. Special inspection and additional items include the following:

- Annual dam safety inspection

- Five-year dam safety inspection using a dam safety inspection team of experienced consultants from various firms appointed by DSOD
- Quarterly vegetation/weed abatement (e.g. hydrophilic plant control) and rodent control activities along perimeter length of embankment
- Annual preventative leak location survey of the reservoir liner
- Bi-monthly instrumentation monitoring and maintenance
- Annual debris removal at spillway outfall to Funks creek

2.4 TRR and Funks Pumping Generating Plants

The TRR Pumping Generating Plant includes several features that require individual attention. These individual facilities include the 1) pumping plant, 2) hydroelectric turbines, 3) energy dissipating units, and 4) electrical switchgear.

2.4.1 Pumping Plant

The pumping plant consists of the large vertical turbine pump units tht includes the motors and pumps. Operation of these units assumes control is dictated by starting up and shutting down pump motor, as well as fluctuating speed by a predisposed program within a programmable logic controller.

Maintenance of pumps requires a variety of activities at specific intervals as follows:

- Annually examine impeller thoroughly for cavitation or other damage. Use a nondestructive test to check for cracks in impeller vanes.
- Annually check condition of interior coating of pump casing and suction inlet
- Annually check top and bottom wearing ring clearances at four points, 90 degrees apart. Compare to the design clearance and previous readings. If clearance is approaching 200 percent of design clearance, schedule wearing ring replacement.
- Weekly check flow and pressure of packing cooling water. Check for excessive heat and for leakage past the packing. Tighten the packing gland as leakage becomes excessive and grease the packing box when required.
- Weekly check the packing gland for excessive leakage.
- Daily check the bearing temperature and lubricant level.
- Annually take oil sample from all bearings, preferably while unit is running some time before a scheduled outage.
- Annually thoroughly inspect stress carrying parts of rotor for cracks. Check bolted connections for tightness and any evidence of movement. Check stator frame for loose connections, cracks, or other damage. Check stator air gap at a minimum of four positions, top, and bottom.
- Annually clean exterior surfaces of coils and check for leaks.

2.4.2 Hydroelectric Turbines

Operation of these units assumes control is dictated by s predisposed program within a programmable logic controller tht helps to control the turbine for a given flowrate.

Maintenance of these generators requires a variety of activities at specific intervals as follows:

- Annually examine runner thoroughly for cavitation or other damage. Use a nondestructive test to check for cracks in runner buckets.
- Annually check condition of interior coating of spiral case and draft tube
- Annually check top and bottom wearing ring clearances at four points, 90 degrees apart. Compare to the design clearance and previous readings. If clearance is approaching 200 percent of design clearance, schedule wearing ring replacement.

- Weekly check flow and pressure of packing cooling water. Check for excessive heat and for leakage past the packing. Tighten the packing gland as leakage becomes excessive and grease the packing box when required.
- Annually measure clearance between gates at the top, middle, and bottom with feeler gauges with gates closed and the servomotor pressure released. Check clearance between wicket gates and upper and lower facing plates. Check gates and facing plates for cavitation damage, corrosion, or other damage.
- Annually observe servomotor, shift ring, and wicket gate linkage as it is moved through its full range of motion in both directions.
- Weekly check the packing gland for excessive leakage.
- Daily check the bearing temperature and lubricant level.
- Annually
- Check shaft runout with dial indicator or with proximity probes and a strip chart recorder. At minimum, check runout at full load, and if possible, record the runout as the unit is loaded from speed-no-load to full load.
- Annually take oil sample from all bearings, preferably while unit is running some time before a scheduled outage.
- Annually thoroughly inspect stress carrying parts of rotor for cracks. Check bolted connections for tightness and any evidence of movement. Check stator frame for loose connections, cracks, or other damage. Check stator air gap at a minimum of four positions, top, and bottom.
- Annually clean exterior surfaces of coils and check for leaks.
- Monthly check condition of brake air line filters and lubricators. If lubricator is not installed, operate unit jacks to lubricate brake cylinders.
- Annually measure brake shoe thickness and check condition of brake ring.

2.4.3 Energy Dissipating Units

The energy dissipating units are anticipated to be fixed cone valve type. These units require little maintenance due to their simple moving parts combined with high strength materials that make them resilient. Maintenance of these valves primarily involves visual inspection and lubrication of bearings as needed.

2.4.4 Electrical Switchgear

The following are tests that ae performed on an annual basis.

Visual/Mechanical Inspections

- General Visual and Mechanical Inspections
- Moisture and Corona Inspections
- Wiring and Bolted Connection Checks
- General Wiring Checks
- Moving Parts and Interlocks
- Insulators and Barrier Checks

Electrical Tests

- Bolted Connection Electrical Tests
- Insulation Electrical Tests
- Dielectric Withstand Tests
- Control Wiring Electrical Tests
- Instrument Transformers
- Circuit Breakers and Switches
- Control Power Transfer Scheme
- Metering Electrical Tests
- Current Injection Tests

- System Function Test
- Cubicle Heaters
- Surge Arresters
- Dual-Source Phasing Check

2.5 TRR, Funks, and Dunnigan Pipelines

The TRR pipelines require very minimal maintenance but will require the following to provide a longer life.

- Annually check cathodic protection test stations voltage drop readings as an indicator of the useful status of the CP system
- Every five years, drain the pipelines and perform a visual inspection of the lining of the pipe and make repairs as needed.
- Annually check all valves (including appurtenances) by opening and closing to make sure they are operational.
- Annually check the surge protection system including the compressors and instrumentation to ensure the surge system is functioning as intended.

For the energy dissipating valves on the Colusa Basin Drain discharge facility, periodic visual inspection and lubrication of bearings is all that is required.

2.6 Substations

- Annually perform visual inspection of electrical equipment
- Annually perform Thermo-scan of electrical equipment

2.7 Electrical Transmission Lines

- Twice a year use helicopter or drones to fly over lines and identify hardware, insulator , conductor, and structure issues
- Twice a year use infrared inspection to identify hot spots on splices and at conductor attachment hardware
- Every 5 years use foot patrol inspection to identify issues not captured by aerial patrols
- Every twenty years, perform tower inspection/tower footer repair including pole painting for galvanized poles
- Every three years, perform tree trimming as required

3.0 Facility Operation and Maintenance Costs

This section provides a typical operation and maintenance costs associated with each of the individual facilities.

From: Lecky, Jim [Jim.Lecky@icf.com]
Sent: 2/9/2021 4:53:59 PM
To: Heydinger, Erin [erin.heydinger@hdrinc.com]; Spranza, John [john.spranza@hdrinc.com]; Hendrick, Mike [Mike.Hendrick@icf.com]; Alicia Forsythe [aforsythe@sitesproject.org]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]
CC: Briard, Monique [Monique.Briard@icf.com]
Subject: RE: Sending CalSim Model to Agencies

Is this about seepage and evaporation from the canals? Do we have a sense of the volume of losses? I would expect losses to be small at TCCA canal since its lined. GCID may be a different story. As far as I can tell this issue was not discussed in the 2017 DEIS and I would be reluctant to bring it up if we don't have a sense of volume that would need be replaced.

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 9, 2021 3:46 PM
To: John Spranza <John.Spranza@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Quick update on the diversions – max pumping at Red Bluff is 2500 cfs and at GCID is 3000 cfs. However, the TRR and Funks PGPs are 1,800 and 2,100 cfs respectively, so we wouldn't be able to pump more than that into Sites. Open to any suggestions on how we communicate that into the table. Maybe the "plus losses between diversions and pumping generating plants" is sufficient.

Thanks!

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Heydinger, Erin
Sent: Tuesday, February 9, 2021 3:19 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

I am also proposing to include the attached description of the alternatives.

For the diversions – these are the operations that are assumed in CalSim, so monthly timestep. Maybe I can add some wording to clarify that instantaneous diversions could be higher.

Erin

Erin Heydinger PE, PMP

D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 9, 2021 3:11 PM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Erin,
As we will be diverting "plus losses" would we want to include the anticipated diversion rate to make up for those losses? I'm not sure the losses would be a significant volume, but if it is more than the 2,100 and 1,800, we might want to include something.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 9, 2021 2:51 PM
To: Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please see attached for the proposed final package to send to the agencies – please take a look and make sure I incorporated the changes sufficiently. I will send this out this evening assuming I hear back from the CH team that it looks good from their perspective.

I added some notes on the diversions at Red Bluff and Hamilton City (as well as the graphics/tables Jim sent) and also included a note that the spring pulse flow action in ROC on LTO is in the baseline and, therefore, all of the action alternatives.

Mike – on the deal pool, the model assumes 120 TAF for water quality purposes for any water that is going to the Sacramento River. However, it assumes storage could be drawn down further for local uses. Based on modeling it never gets below 60 TAF. From an engineering perspective, the reservoir is physically able to draw down to about 18 TAF. We will need to verify the true dead pool from a water quality perspective once we have a chance to look at the reservoir water quality results that the ICF team will be evaluating.

Thanks!
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, February 5, 2021 9:35 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick, Mike <Mike.Hendrick@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please take a look at the attached spreadsheet and let me know what changes you have. Do we want something related to Reclamation spring pulse flows? We also have a more detailed description of NDOI from another document that I cut down. Let me know if you think we need more.

Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

Ali – this really focuses on modeling criteria and doesn't exactly get at what you were looking for on actual operations. I think we can use it as a starting point, though.

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 9:10 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

---

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:55 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good. I also think we should include a summary table of the Alternatives. What about the diversion criteria? We could include those as attachments.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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John Spranza

D 916.679.8858 M 818.640.2487

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Ali

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

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if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
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[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

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Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]
~~~~~~

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Lecky, Jim [Jim.Lecky@icf.com]
Sent: 2/9/2021 4:59:02 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Spranza, John [john.spranza@hdrinc.com]; Heydinger, Erin [erin.heydinger@hdrinc.com]; Hendrick, Mike [Mike.Hendrick@icf.com]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]
CC: Briard, Monique [Monique.Briard@icf.com]
Subject: RE: Sending CalSim Model to Agencies

As usual Ali has the answer. I agree replacing loses would likely not take much additional pumping.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 9, 2021 4:31 PM
To: John Spranza <John.Spranza@hdrinc.com>; Heydinger, Erin <erin.heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

This table is on modeling criteria. I don't think the model accounted for losses. So maybe an asterisk on the 2,100 cfs and 1,800 cfs and a note at the bottom saying, "Actual diversions would be slightly higher to account for losses". Or something like that. I don't think it needs to be super specific but our diversions would be slightly higher to account for losses between the diversion and Sites.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

---

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 9, 2021 4:16 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

I'd like the group's thoughts on this, but I would presume that the public and agencies are going to want to know the max pumping rate that could occur from each diversion.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 9, 2021 3:46 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Quick update on the diversions – max pumping at Red Bluff is 2500 cfs and at GCID is 3000 cfs. However, the TRR and Funks PGPs are 1,800 and 2,100 cfs respectively, so we wouldn't be able to pump more than that into Sites. Open to any suggestions on how we communicate that into the table. Maybe the "plus losses between diversions and pumping generating plants" is sufficient.

Thanks!

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Heydinger, Erin
Sent: Tuesday, February 9, 2021 3:19 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

I am also proposing to include the attached description of the alternatives.

For the diversions – these are the operations that are assumed in CalSim, so monthly timestep. Maybe I can add some wording to clarify that instantaneous diversions could be higher.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 9, 2021 3:11 PM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Erin,

As we will be diverting "plus losses" would we want to include the anticipated diversion rate to make up for those losses? I'm not sure the losses would be a significant volume, but if it is more than the 2,100 and 1,800, we might want to include something.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 9, 2021 2:51 PM
To: Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please see attached for the proposed final package to send to the agencies – please take a look and make sure I incorporated the changes sufficiently. I will send this out this evening assuming I hear back from the CH team that it looks good from their perspective.

I added some notes on the diversions at Red Bluff and Hamilton City (as well as the graphics/tables Jim sent) and also included a note that the spring pulse flow action in ROC on LTO is in the baseline and, therefore, all of the action alternatives.

Mike – on the deal pool, the model assumes 120 TAF for water quality purposes for any water that is going to the Sacramento River. However, it assumes storage could be drawn down further for local uses. Based on modeling it never gets below 60 TAF. From an engineering perspective, the reservoir is physically able to draw down to about 18 TAF. We will need to verify the true dead pool from a water quality perspective once we have a chance to look at the reservoir water quality results that the ICF team will be evaluating.

Thanks!
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

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To: Alicia Forsythe <aforsythe@sitesproject.org>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick, Mike <Mike.Hendrick@icf.com>
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Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us
~~~~~~

From: Micko, Steve/SAC [Steve.Micko@jacobs.com]
Sent: 2/9/2021 9:14:53 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Spranza, John [john.spranza@hdrinc.com]; Heydinger, Erin [erin.heydinger@hdrinc.com]; Hendrick, Mike [mike.hendrick@icf.com]; Laurie Warner Herson [laurie.warner.herson@phenixenv.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]
CC: Briard, Monique [Monique.Briard@icf.com]
Subject: RE: Sending CalSim Model to Agencies

Hi Erin,

Thank you for compiling this!

A few questions/comments:

- I think we could remove the American River row from the Fixed Flows section
- Should we note that Bend Bridge Pulse Protection has been updated?
- In the NDOI row, I suggest we state that CA SWP ITP requirements are also considered
- In the X2 row, I suggest we replace "CA DWR ITP" with "CA SWP ITP"
- In the Delta Water Quality row, I suggest we replace "D-1641 as amended" with "Delta Water Quality Requirements"

Best,
Steve

From: Lecky, Jim <Jim.Lecky@icf.com>
Sent: Tuesday, February 9, 2021 4:59 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <john.spranza@hdrinc.com>; Heydinger, Erin <erin.heydinger@hdrinc.com>; Hendrick, Mike <mike.hendrick@icf.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: [EXTERNAL] RE: Sending CalSim Model to Agencies

As usual Ali has the answer. I agree replacing loses would likely not take much additional pumping.

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 9, 2021 4:31 PM
To: John Spranza <John.Spranza@hdrinc.com>; Heydinger, Erin <erin.heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

This table is on modeling criteria. I don't think the model accounted for losses. So maybe an asterisk on the 2,100 cfs and 1,800 cfs and a note at the bottom saying, "Actual diversions would be slightly higher to account for losses". Or something like that. I don't think it needs to be super specific but our diversions would be slightly higher to account for losses between the diversion and Sites.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

---

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 9, 2021 4:16 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

I'd like the group's thoughts on this, but I would presume that the public and agencies are going to want to know the max pumping rate that could occur from each diversion.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 9, 2021 3:46 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Quick update on the diversions – max pumping at Red Bluff is 2500 cfs and at GCID is 3000 cfs. However, the TRR and Funks PGPs are 1,800 and 2,100 cfs respectively, so we wouldn't be able to pump more than that into Sites. Open to any suggestions on how we communicate that into the table. Maybe the "plus losses between diversions and pumping generating plants" is sufficient.

Thanks!

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Heydinger, Erin
Sent: Tuesday, February 9, 2021 3:19 PM
To: Spranza, John <John.Spranza@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

I am also proposing to include the attached description of the alternatives.

For the diversions – these are the operations that are assumed in CalSim, so monthly timestep. Maybe I can add some wording to clarify that instantaneous diversions could be higher.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 9, 2021 3:11 PM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Erin,
As we will be diverting "plus losses" would we want to include the anticipated diversion rate to make up for those losses? I'm not sure the losses would be a significant volume, but if it is more than the 2,100 and 1,800, we might want to include something.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 9, 2021 2:51 PM
To: Hendrick, Mike <Mike.Hendrick@icf.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please see attached for the proposed final package to send to the agencies – please take a look and make sure I incorporated the changes sufficiently. I will send this out this evening assuming I hear back from the CH team that it looks good from their perspective.

I added some notes on the diversions at Red Bluff and Hamilton City (as well as the graphics/tables Jim sent) and also included a note that the spring pulse flow action in ROC on LTO is in the baseline and, therefore, all of the action alternatives.

Mike – on the deal pool, the model assumes 120 TAF for water quality purposes for any water that is going to the Sacramento River. However, it assumes storage could be drawn down further for local uses. Based on modeling it never gets below 60 TAF. From an engineering perspective, the reservoir is physically able to draw down to about 18 TAF. We will need to verify the true dead pool from a water quality perspective once we have a chance to look at the reservoir water quality results that the ICF team will be evaluating.

Thanks!
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

hdrinc.com/follow-us

From: Hendrick, Mike <Mike.Hendrick@icf.com>
Sent: Friday, February 5, 2021 10:58 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>
Cc: Briard, Monique <Monique.Briard@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Thanks Erin,

A few comments/questions via Jim and I:

1. More of a curiosity for me than anything else, can I get more information on the Dead Pool? How is water available? What is the 120 TAF and 60 TAF for local use? Sorry if I missed this somewhere.
2. We have concerns on the "no" in the scaled diversion row and suggest the following edits
a. Replace the purpose with "ensure proper screen function"
b. Replace description with "rate of diversion controlled by screen design"
c. Red Bluff Diversion fish screen is not fully functional (i.e. capable of screening 2100 cfs) until the river is at 8,000 cfs. Rob Leaf indicated in one of our modeling calls that these functional elements of screen design are incorporated in the model.
3. To verify: In the USBR's 2019 Biological Assessment for LTO, they committed to providing spring pulses up to 150 TAF if projected May 1 storage was greater than 4 MAF. Are we committing to not diverting that water. It is uncertain if this action is included in the baseline for CalSim runs?
4. For reader convenience, please increase the size of the description box for Fremont Weir so the reader can see the whole description.
5. We have no objection to sending the CalSim model package.

Thanks

Mike H

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, February 5, 2021 9:35 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; John Spranza <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Micko, Steve/SAC <Steve.Micko@jacobs.com>; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick,

Mike <Mike.Hendrick@icf.com>
Subject: RE: Sending CalSim Model to Agencies

Hi all,

Please take a look at the attached spreadsheet and let me know what changes you have. Do we want something related to Reclamation spring pulse flows? We also have a more detailed description of NDOI from another document that I cut down. Let me know if you think we need more.

Looping in the aquatics team too. I am proposing this be attached to the CalSim model package when we send it to the agencies (shooting for early next week).

Ali – this really focuses on modeling criteria and doesn't exactly get at what you were looking for on actual operations. I think we can use it as a starting point, though.

Thanks,
Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 9:10 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I agree. I'd like to review the diversion criteria document before we send to the agencies.

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

---

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:55 AM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think those would be great additions. Have it all in one place and one packet.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:49 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good. I also think we should include a summary table of the Alternatives. What about the diversion criteria? We could include those as attachments.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Tuesday, February 2, 2021 8:47 AM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Sounds good.

John Spranza

D 916.679.8858 M 818.640.2487

From: Alicia Forsythe <aforsythe@sitesproject.org>
Sent: Tuesday, February 2, 2021 6:24 AM
To: Spranza, John <John.Spranza@hdrinc.com>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

I think the email looks good. Let's give them a sense of when we plan to reach out to them. Like we plan to schedule meetings later this month. Or something so they have a sense of the priority to put on reviewing the materials and when their questions will be answered.

Let's also include NMFS and Amanda with the State Board. Not sure Amanda will have the expertise to review it, but lets get it to her also.

I think as this is modeling results – and not the interpretation of those results – that Erin should send it out. She will be a great clearinghouse for questions on the model and results and can work with CH on these. John, when we get into the fisheries effects, I think that's where you take the lead. Lets also just have Erin send them all since, yes, I can't send them to Reclamation (4 months to go!).

Erin, we should likely wait for the revised Alternative 3 so we send one set of results and not have to correct them. But go ahead and get these out when you're ready.

Ali

Alicia Forsythe | Environmental Planning and Permitting Manager | Sites Reservoir Project | 916.880.0676 | aforsythe@sitesproject.org | www.SitesProject.org

From: Spranza, John <John.Spranza@hdrinc.com>
Sent: Sunday, January 31, 2021 2:49 PM
To: Heydinger, Erin <erin.heydinger@hdrinc.com>; Alicia Forsythe <aforsythe@sitesproject.org>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: RE: Sending CalSim Model to Agencies

Are we going to send the agencies the PDF's results, plus the actual model like we did last time? If so, I think the email is fine, maybe a few tweaks if anything.

if Ali does not feel it's appropriate for her to send it I would be happy to given I have been sending agency updates for the last few years.

John Spranza

D 916.679.8858 M 818.640.2487

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Friday, January 29, 2021 6:21 PM
To: Alicia Forsythe <aforsythe@sitesproject.org>; Spranza, John <John.Spranza@hdrinc.com>; Laurie Warner Herson <laurie.warner.herson@phenixenv.com>; Rob Leaf <Rob.Leaf@jacobs.com>; steve.micko@jacobs.com; Thayer, Reed/SAC <Reed.Thayer@jacobs.com>
Subject: Sending CalSim Model to Agencies

Hi all,

Below is a draft email that would go out to various agencies along with a link to the CalSim model with all three alternatives. I'm thinking CDFW, DWR, Reclamation, and USFWS. Anybody else? Please let me know if you have any proposed changes or additions. Thanks and have a great weekend!
~~~~~~

Good [afternoon],
~~~~~~

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link:

[CH OneDrive? Or Sites? We have a @sitesproject OneDrive we could use]

The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer. In addition, we will reach out to you for further discussions related to the project's permit applications that are currently under development.

Best,

[who is the best person to send this? Maybe Ali but not sure if she can send to Reclamation?]

Erin Heydinger, PE, PMP
Asst. Project Manager
Water/Wastewater

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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ZACH THURMAN
Superintendent/Principal

MAXWELL UNIFIED SCHOOL DISTRICT

515 W. Oak Street • P.O. Box 788
Maxwell, California 95955-0788

DISTRICT / HIGH SCHOOL
(530) 438-2291
Fax (530) 438-2693

DISTRICT BUSINESS OFFICE
(530) 438-2052
Fax (530) 438-2693

ELEMENTARY SCHOOL
(530) 438-2401
Fax (530) 438-2460

Maxwell Unified School District
P.O. Box 788
Maxwell, CA 95955
(530)438-2052

May 9, 2018

Mr. Fritz Durst, Chair
Sites Project Authority
P.O. Box 517
Maxwell, CA 95955

Mr. Durst and Members of Sites Project Authority:

This letter is being written on behalf of the Maxwell Unified School District with respect to the Sites Reservoir Project. I, along with the Maxwell Unified School District Board of Trustees, have discussed the following points as possible effects the project may have on the Maxwell Unified School District:

1. We are concerned about the accommodation of students that attend Maxwell schools from Sites Valley, Bear Valley, Leesville and the Stonyford area. We understand that this is one of the key factors driving the inclusion of the bridge substituting for Maxwell-Sites Road. We understand that Colusa County has commented about this bridge and have suggested an alternative route around the southern portion of the proposed reservoir. Our district may incur a loss in average daily attendance funding if we see a reduction in students who are unable to get to our district because of construction and the change in road access from the areas of Sites, Bear Valley, Leesville, Stonyford and Elk Creek. In addition, this reduction in students could affect our funding band for our necessary Small School District funding.
2. We are concerned about the possible increase in our transportation costs if there are longer bus routes due to changes in roadways. In addition, we may have increased costs/time for bus staff due to construction wait times, etc. If the suggested alternative route from Colusa County is adopted it will cause increased cost/travel time. We also wish to note safety concerns for our staff and students that will be navigating the construction areas. We request to meet with the General Manager and Sites Reservoir leadership to address our transportation concerns and find ways to mitigate our impacts.
3. We anticipate a fiscal loss to our district in property tax roll monies received from properties that will be sold to the Sites Reservoir and are no longer generating funds for the district. We strongly suggest that Sites Project Authority develop a process to replace the loss of property tax for acquired lands and ensure there is no decrease in funding to our school district.

ZACH THURMAN
Superintendent/Principal

MAXWELL UNIFIED SCHOOL DISTRICT

515 W. Oak Street • P.O. Box 788
Maxwell, California 95955-0788

DISTRICT / HIGH SCHOOL
(530) 438-2291
Fax (530) 438-2693

DISTRICT BUSINESS OFFICE
(530) 438-2052
Fax (530) 438-2693

ELEMENTARY SCHOOL
(530) 438-2401
Fax (530) 438-2460

4. We have many concerns over the increased traffic through Maxwell due to the long period of construction and following the opening of the reservoir, due to increased recreation. Many of our students walk to our campuses, one of which is located on Oak Street and the Maxwell-Sites road. We have numerous school, sporting, and community events at ours schools in the afternoons, evenings, and weekends. Our town pool is located at our High School throughout the summer. What precautions in terms of added CHP/Sheriff staffing, adequate signage, increased safe road crossings, automated signage or crossing buttons, sidewalks, speed deterrents, etc. will be provided to keep our students safe as they travel to and from school and school events? We request to meet with the General Manager and Sites Reservoir leadership to develop appropriate mitigation and assistance.
5. We anticipate a temporary influx of students for the District as families of dam workers may move to the area and enroll their students in Maxwell Schools. We will require assistance in mitigating any costs if our enrollment numbers increase temporarily with the possibility of decreasing when the project is finished. The District will need to add additional classrooms, purchase more curriculum and supplies, increase transportation, and increase staff to accommodate students during the construction phase of the project. We request to meet with the General Manager and Sites Reservoir leadership to develop appropriate assistance measures to mitigate our costs and impacts.

Our expectation is that the Sites Project Authority considers and mitigates the impacts the Sites Reservoir Project will have on the students, staff and stakeholders of the Maxwell Unified School District. We request direct discussion, collaboration and accommodation of these concerns including long-term budgeting of funds to compensate the District for impacts.

Sincerely,

Zach Thurman

Zach Thurman
Superintendent
Maxwell Unified School District

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/10/2021 4:09:17 PM
To: Davis-Fadtke, Kristal@Wildlife [Kristal.Davis-Fadtke@wildlife.ca.gov]; Evan Sawyer - NOAA Federal [evan.sawyer@noaa.gov]; Miller, Aaron@DWR [Aaron.miller@water.ca.gov]; Davis, Ryan A [rdavis@usbr.gov]; Sumer, Derya [dsumer@usbr.gov]; Lee Bergfeld [Bergfeld@mbkengineers.com]; Montgomery, Amanda@Waterboards [Amanda.Montgomery@waterboards.ca.gov]; Sherrick, Robert@Wildlife [Robert.Sherrick@Wildlife.ca.gov]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Spranza, John [john.spranza@hdrinc.com]; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Lecky, Jim [Jim.Lecky@icf.com]; Hendrick, Mike [Mike.Hendrick@icf.com]
Subject: Sites CalSim II Model
Attachments: SitesRDEIRSDEIS-Alternatives-ModelingCriteria-20210210.pdf

Good afternoon,

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link (you may have also received a separate email notification):

https://hdrinc-my.sharepoint.com/:f:/p/eheydinger/Eq1KZrFyTgRErqjOkmGMwL4BP3Boe3Jlenj9zs8b2Eukjg

The link includes CalSim models for the No Action Alternative as well as four operating options as described in the attached document. The "spreadsheets" folder includes an Excel file that summarizes the CalSim output. THe link above only works for the folks on this email thread. Please let me know if you would like access granted to others.

We recognize these models will take some time to review. The Authority will also be posting the draft Project Description on its website next week that may be of interest to all of you. So, to allow for adequate review time we will be scheduling a workshop to discuss the models during early March - likely the week of March 8th. The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer.

Please don't hesitate to reach out with any questions.

Best,
Erin

Erin Heydinger, PE, PMP
Sites Reservoir Integration Lead for Operations

HDR
2379 Gateway Oaks Dr, #200
Sacramento, CA 95833
D 916.679.8863 M 651.307.9758

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From: Alicia Forsythe [ali@forsythe-group.com]
Sent: 2/11/2021 11:18:38 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: Sites Reservoir, terrestrial species models

Alicia Forsythe | Forsythe Group | 916.880.0676 | ali@forsythe-group.com

From: Kearns, Zachary@Wildlife <Zachary.Kearns@Wildlife.ca.gov>
Sent: Wednesday, February 10, 2021 3:29 PM
To: Berryman, Ellen <Ellen.Berryman@icf.com>; Cordova, Daniel A <dcordova@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Torres, Juan@Wildlife <Juan.Torres@wildlife.ca.gov>; Boyd, Ian@Wildlife <Ian.Boyd@Wildlife.ca.gov>; Wilson, Billie@Wildlife <Billie.Wilson@wildlife.ca.gov>
Cc: John Spranza <John.Spranza@hdrinc.com>; Briard, Monique <Monique.Briard@icf.com>; Haire, Jennifer <Jennifer.Haire@icf.com>; Alicia Forsythe <ali@forsythe-group.com>; Davis-Fadtke, Kristal@Wildlife <Kristal.Davis-Fadtke@wildlife.ca.gov>; Barker, Kelley@Wildlife <Kelley.Barker@wildlife.ca.gov>
Subject: RE: Sites Reservoir, terrestrial species models

Hi Ellen,

Thank you for the opportunity to review and comment on the habitat model descriptions. Following our review, CDFW does not have any substantive comments or change requests for these documents. Regarding the vernal pool species, Keck's checkermellow, and valley elderberry longhorn beetle, CDFW recommends consultation with USFWS, as we do not have specific expertise with these species.

For future comments, we would like to coordinate with USFWS to ensure any comments would not contradict theirs. Ian Boyd mentioned the initial contact was Lauren Sullivan, but I wanted to check in and see if that was still the case, or if there was a new contact I could reach out to.

Internally, we are trying to increase our inter-branch information sharing regarding Sites, so I would like to request that Kristal Davis-Fadke (cc'd here) be included in further communications and work requests, if at all possible.

I hope you have a great rest of your week!

Sincerely,

Zach Kearns
Environmental Scientist
(916) 358-1134
1701 Nimbus Rd.
Rancho Cordova, CA 95670
CALIFORNIA DEPARTMENT OF
FISH and WILDLIFE

From: Berryman, Ellen <Ellen.Berryman@icf.com>
Sent: Wednesday, January 20, 2021 11:20 AM
To: Cordova, Daniel A <dcordova@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Torres, Juan@Wildlife

<Juan.Torres@wildlife.ca.gov>; Boyd, Ian@Wildlife <Ian.Boyd@Wildlife.ca.gov>; Kearns, Zachary@Wildlife <Zachary.Kearns@Wildlife.ca.gov>; Wilson, Billie@Wildlife <Billie.Wilson@wildlife.ca.gov>
Cc: John Spranza <John.Spranza@hdrinc.com>; Briard, Monique <Monique.Briard@icf.com>; Haire, Jennifer <Jennifer.Haire@icf.com>; Alicia Forsythe <ali@forsythe-group.com>
Subject: RE: Sites Reservoir, terrestrial species models

Oops – I meant February 11 for feedback. 😉 I had the November calendar open when I wrote this.

From: Berryman, Ellen
Sent: Wednesday, January 20, 2021 11:13 AM
To: Cordova, Daniel A <dcordova@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Torres, Juan@Wildlife <Juan.Torres@wildlife.ca.gov>; Boyd, Ian@Wildlife <Ian.Boyd@Wildlife.ca.gov>; Kearns, Zachary@Wildlife <Zachary.Kearns@Wildlife.ca.gov>; Wilson, Billie@Wildlife <Billie.Wilson@wildlife.ca.gov>
Cc: Spranza, John <John.Spranza@hdrinc.com>; Briard, Monique <Monique.Briard@icf.com>; Haire, Jennifer <Jennifer.Haire@icf.com>; Alicia Forsythe <ali@forsythe-group.com>
Subject: Sites Reservoir, terrestrial species models

Greetings BOR and CDFW folks,

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The attachments include both state and federally listed species, so you can disregard the species not relevant to your respective agency. Dan, as we discussed earlier, we're sending the models to BOR for review before forwarding to USFWS.

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Feel free to email or call me at (530) 798-1945 if you have any questions or which to discuss anything.
Thank you!!!
Ellen

From: Alicia Forsythe [ali@forsythe-group.com]
Sent: 2/11/2021 11:46:11 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: Sites Reservoir, terrestrial species models

Alicia Forsythe | Forsythe Group | 916.880.0676 | ali@forsythe-group.com

From: Berryman, Ellen <Ellen.Berryman@icf.com>
Sent: Thursday, February 11, 2021 11:40 AM
To: Kearns, Zachary@Wildlife <Zachary.Kearns@Wildlife.ca.gov>; Cordova, Daniel A <dcordova@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Torres, Juan@Wildlife <Juan.Torres@wildlife.ca.gov>; Boyd, Ian@Wildlife <ian.boyd@wildlife.ca.gov>; Wilson, Billie@Wildlife <Billie.Wilson@wildlife.ca.gov>
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Subject: RE: Sites Reservoir, terrestrial species models

Thanks Zach,
I appreciate your timely review. In regard to coordination with USFWS, this is something BOR was going to initiate following their review of the models.
Dan, can you let us know the status of BOR review and sharing the model descriptions with USFWS?
Thanks!
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Sent: Wednesday, February 10, 2021 3:29 PM
To: Berryman, Ellen <Ellen.Berryman@icf.com>; Cordova, Daniel A <dcordova@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Torres, Juan@Wildlife <Juan.Torres@wildlife.ca.gov>; Boyd, Ian@Wildlife <ian.boyd@wildlife.ca.gov>; Wilson, Billie@Wildlife <Billie.Wilson@wildlife.ca.gov>
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I hope you have a great rest of your week!

Sincerely,

Zach Kearns
Environmental Scientist
(916) 358-1134
1701 Nimbus Rd.
Rancho Cordova, CA 95670

CALIFORNIA DEPARTMENT OF
FISH and WILDLIFE

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Sent: Wednesday, January 20, 2021 11:20 AM
To: Cordova, Daniel A <dcordova@usbr.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Torres, Juan@Wildlife <Juan.Torres@wildlife.ca.gov>; Boyd, Ian@Wildlife <Ian.Boyd@Wildlife.ca.gov>; Kearns, Zachary@Wildlife <Zachary.Kearns@Wildlife.ca.gov>; Wilson, Billie@Wildlife <Billie.Wilson@wildlife.ca.gov>
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From: Alicia Forsythe [ali@forsythe-group.com]
Sent: 2/11/2021 2:54:39 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: [EXTERNAL] RE: Sites Reservoir, terrestrial species models

----
Alicia Forsythe | Forsythe Group | 916.880.0676 | ali@forsythe-group.com

From: Cordova, Daniel A <dcordova@usbr.gov>
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To: Berryman, Ellen <Ellen.Berryman@icf.com>; Kearns, Zachary@Wildlife <Zachary.Kearns@Wildlife.ca.gov>; Dekar, Melissa D <mdekar@usbr.gov>; Torres, Juan@Wildlife <Juan.Torres@wildlife.ca.gov>; Boyd, Ian@Wildlife <ian.boyd@wildlife.ca.gov>; Wilson, Billie@Wildlife <Billie.Wilson@wildlife.ca.gov>
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Subject: Re: [EXTERNAL] RE: Sites Reservoir, terrestrial species models

Hi Ellen,

I had these on my to-do list today and didn't get to them. I should tomorrow. Once USBR has worked thru them with you, we'll share with FWS and put them in touch with Zach and other appropriate folks.

Dan

Dan Cordova
Natural Resources Specialist
Environmental Compliance and Conservation Branch
Bureau of Reclamation | California-Great Basin | Interior Region 10
Sacramento, CA
916-978-5483

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This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

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From: Micko, Steve/SAC [Steve.Micko@jacobs.com]
Sent: 1/6/2021 1:39:37 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Heydinger, Erin [erin.heydinger@hdrinc.com]; Spranza, John [john.spranza@hdrinc.com]; Lecky, Jim [jim.lecky@icf.com]; Hendrick, Mike [mike.hendrick@icf.com]; Chris Fitzer [cfitzer@esassoc.com]
CC: Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; Whittington, Chad/SAC [Chad.Whittington@jacobs.com]; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]
Subject: Sites: Bend Bridge Pulse Protection Diversion Criteria

Hi all,

As discussed in recent meetings, actual diversion operations will depend on fish monitoring data.
However, CalSim II is a hydrologic-based operations model that considers monthly average flow.
Therefore, a flow-based set of criteria were developed to estimate diversion criteria that protect pulses of out-migrating fishes.
These criteria are designed to represent frequency/duration of pulse protection periods in CalSim.

New pulse protection criteria are outlined below:

1. Season:
a. Pulse protection can be initiated in October through May
2. Initiation:
a. 3-day moving average Sacramento River flow at Bend Bridge must exceed 8,000 cfs,
b. And the 3-day moving average tributary flow upstream of Bend Bridge (Cow Creek, Cottonwood Creek, and Battle Creek) must exceed 2,500 cfs
3. Duration:
a. Pulse protection lasts for 7 days upon initiation
4. Re-setting condition:
a. After completion of a pulse protection period, the following conditions must occur before another pulse event is triggered:
i. 3-day moving average of Bend Bridge flow was less than 7,500 cfs for 7 consecutive days,
ii. 3-day moving average tributary flow up upstream of Bend Bridge (Cow Creek, Cottonwood Creek, and Battle Creek) was less than 2,500 cfs for 7 consecutive days

As compared to original pulse protection criteria, the Sacramento River at Bend Bridge flow threshold is significantly reduced (from 15,000 cfs to 8,000 cfs).
The flow threshold was reduced because Sacramento River at Bend Bridge flow of 8,000 cfs corresponds to 10,700 cfs at Sacramento River near Wilkins Slough.

A sensitivity simulation of the “iteration 2” CalSim II model, with revised Bend Bridge Pulse Protection criteria, was conducted.
As compared to original pulse protection criteria, long-term average annual releases from Sites decrease by 1 TAF with revised criteria.
Table 1 shows the average annual Sites releases over the full simulation period and by water year type.

Table 1. Total Sites Release by WYT– Iteration 2 CalSim Scenarios with Old and New Pulse Protection Criteria.

	Long-Term	Wet	Above Normal	Below Normal	Dry	Critically Dry
ALT 1 111820 NoFrpt – Old Pulse Criteria	220	85	183	206	385	322
ALT 1 111820 NoFrpt – New Pulse Criteria	219	87	180	203	382	319

The figures below show the 3-day moving average Sacramento River flow at Bend Bridge and Wilkins Slough and tributary flow upstream of Bend Bridge (Cow Creek, Cottonwood Creek, and Battle Creek) for each year in the Daily Model (10/1/2008 – 5/31/2018).
The orange highlighting represents periods of pulse protection when Sites diversions would be restricted.
Pulse protection periods commence at the onset of rain events in the Sacramento Valley.
Another pulse may only be considered after the falling limb of storm events complete.

Please let me know if you have any questions, or if you would like to discuss.

Best,
Steve

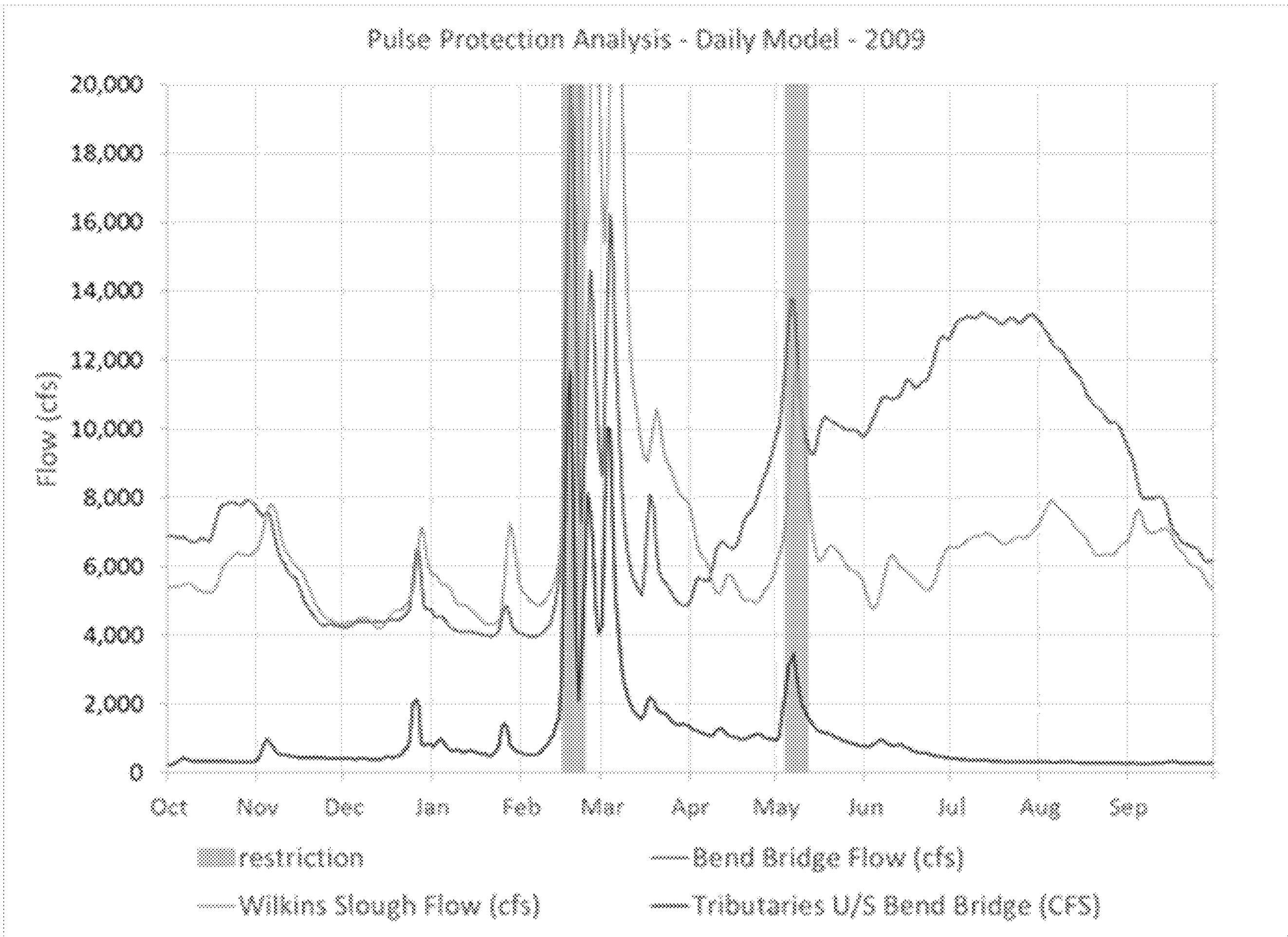


Figure 1. Pulse Protection Analysis – Water Year 2009.

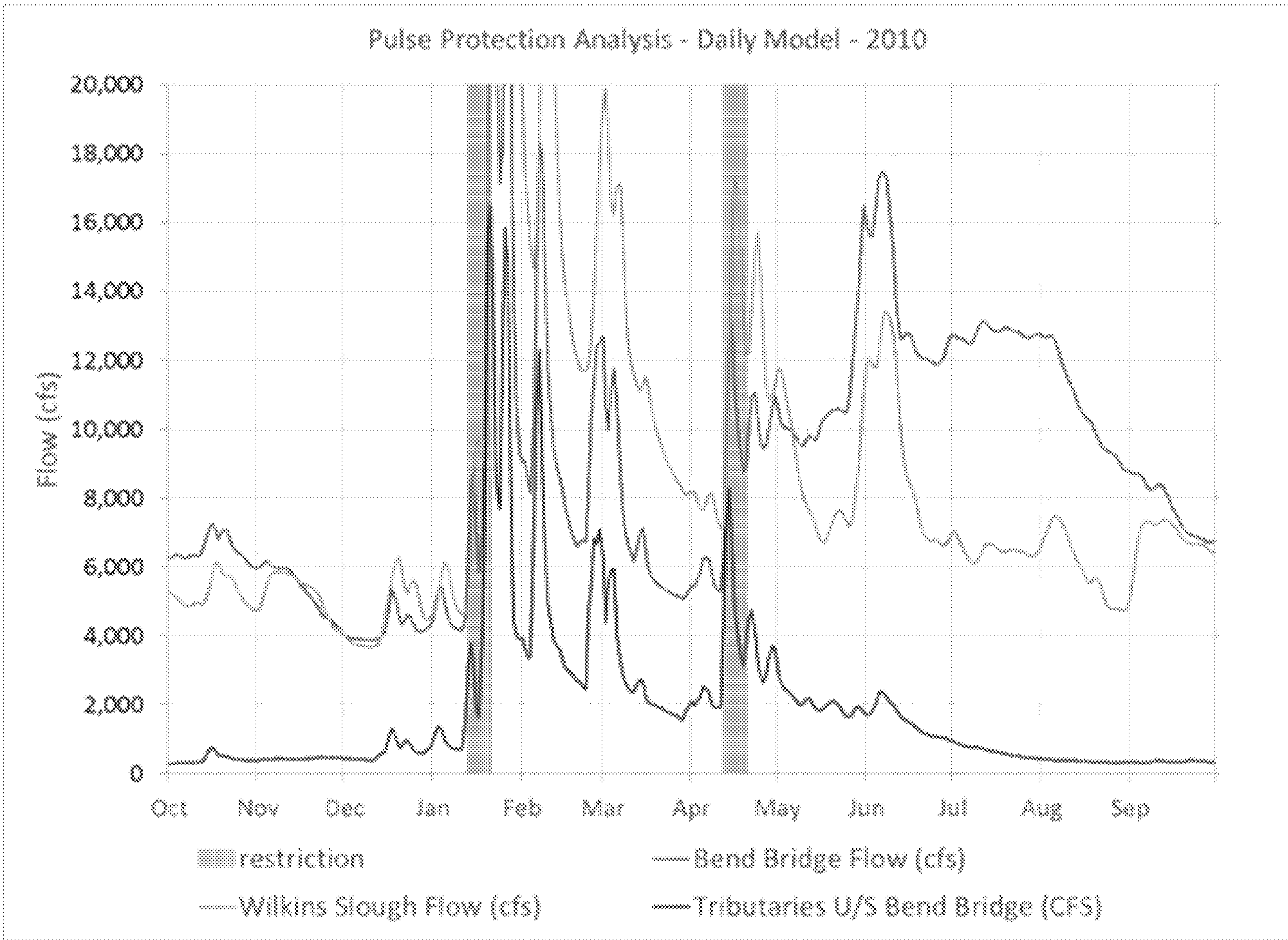


Figure 2. Pulse Protection Analysis – Water Year 2010.

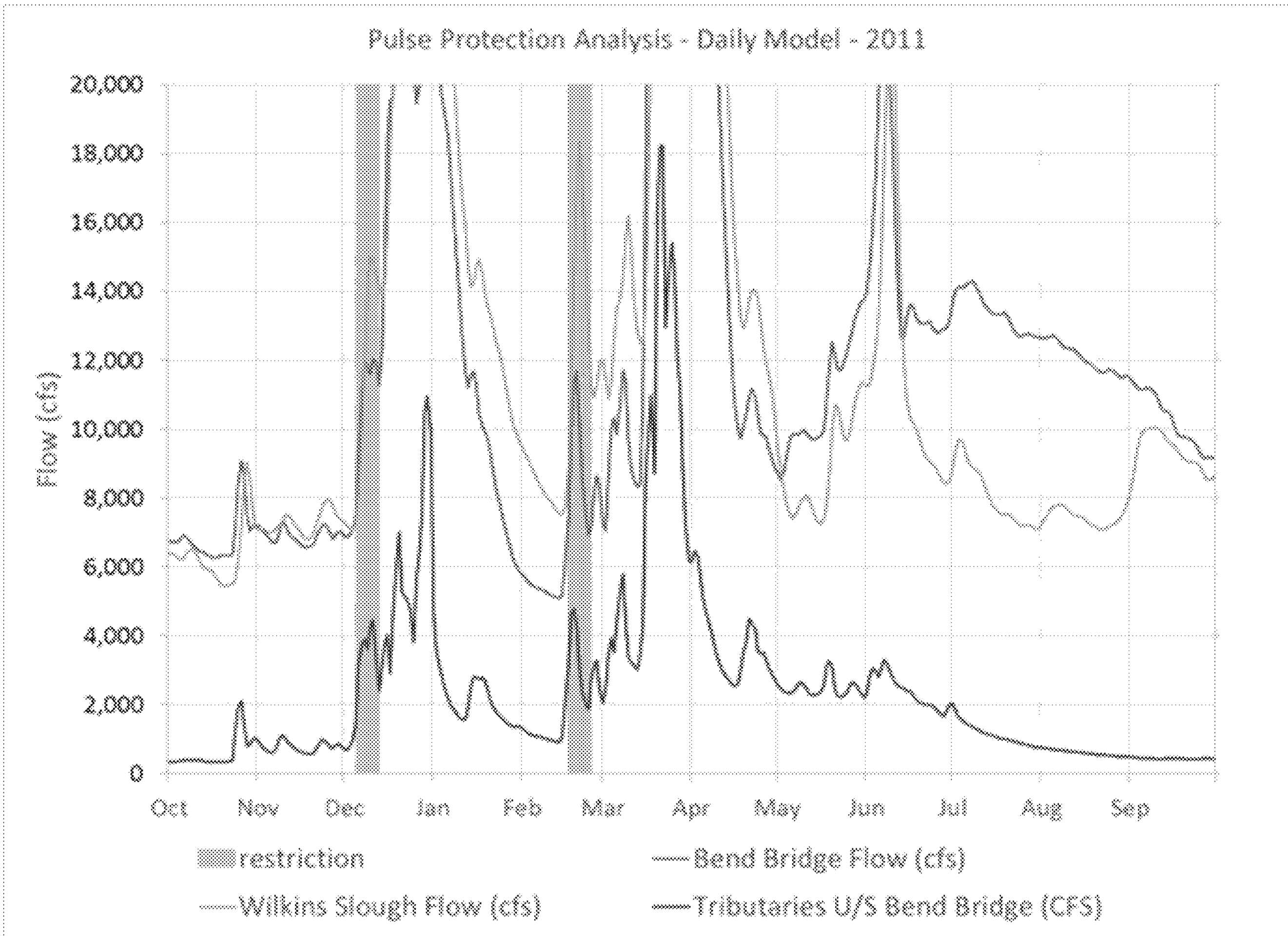


Figure 3. Pulse Protection Analysis – Water Year 2011.

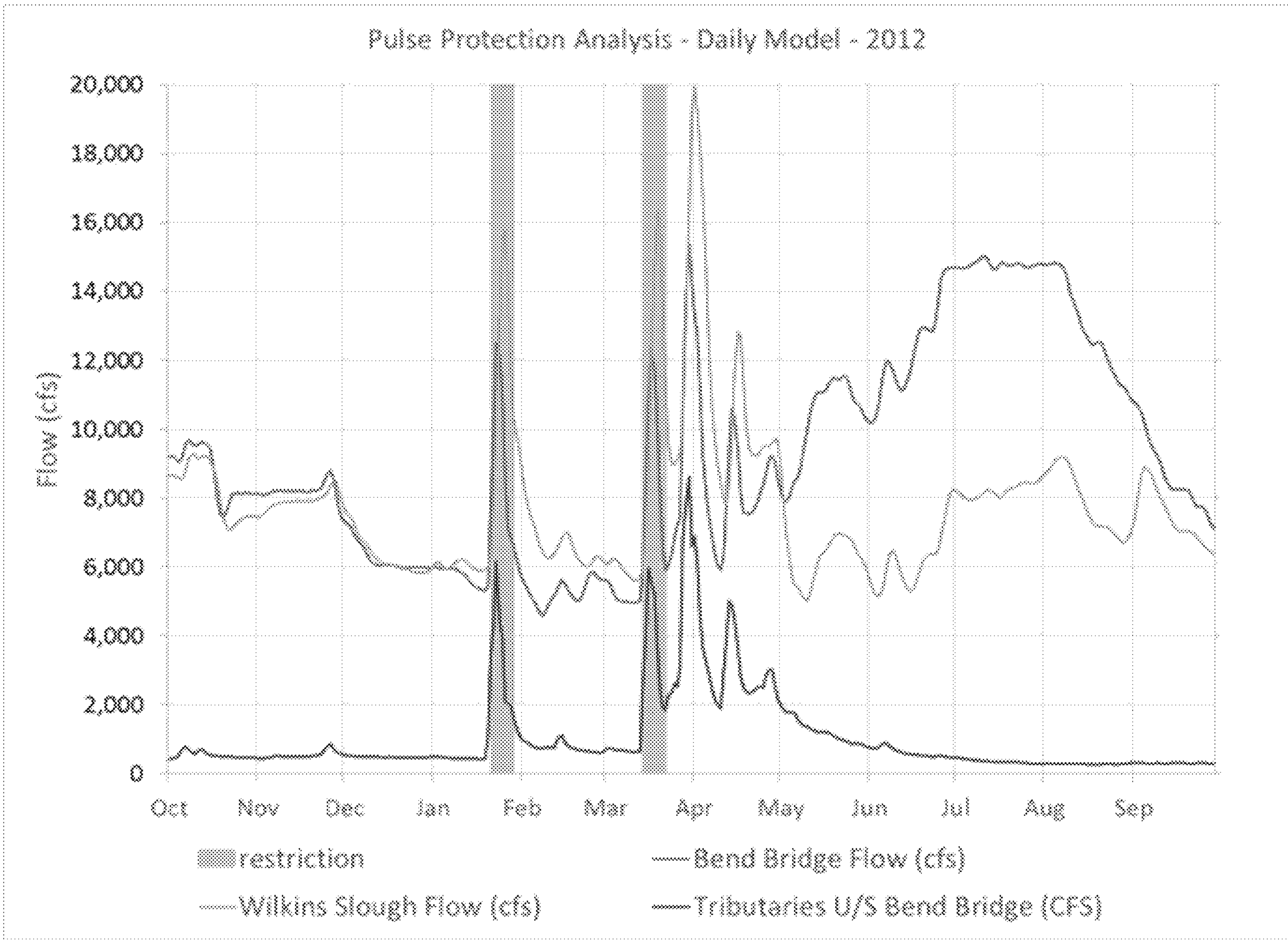


Figure 4. Pulse Protection Analysis – Water Year 2012.

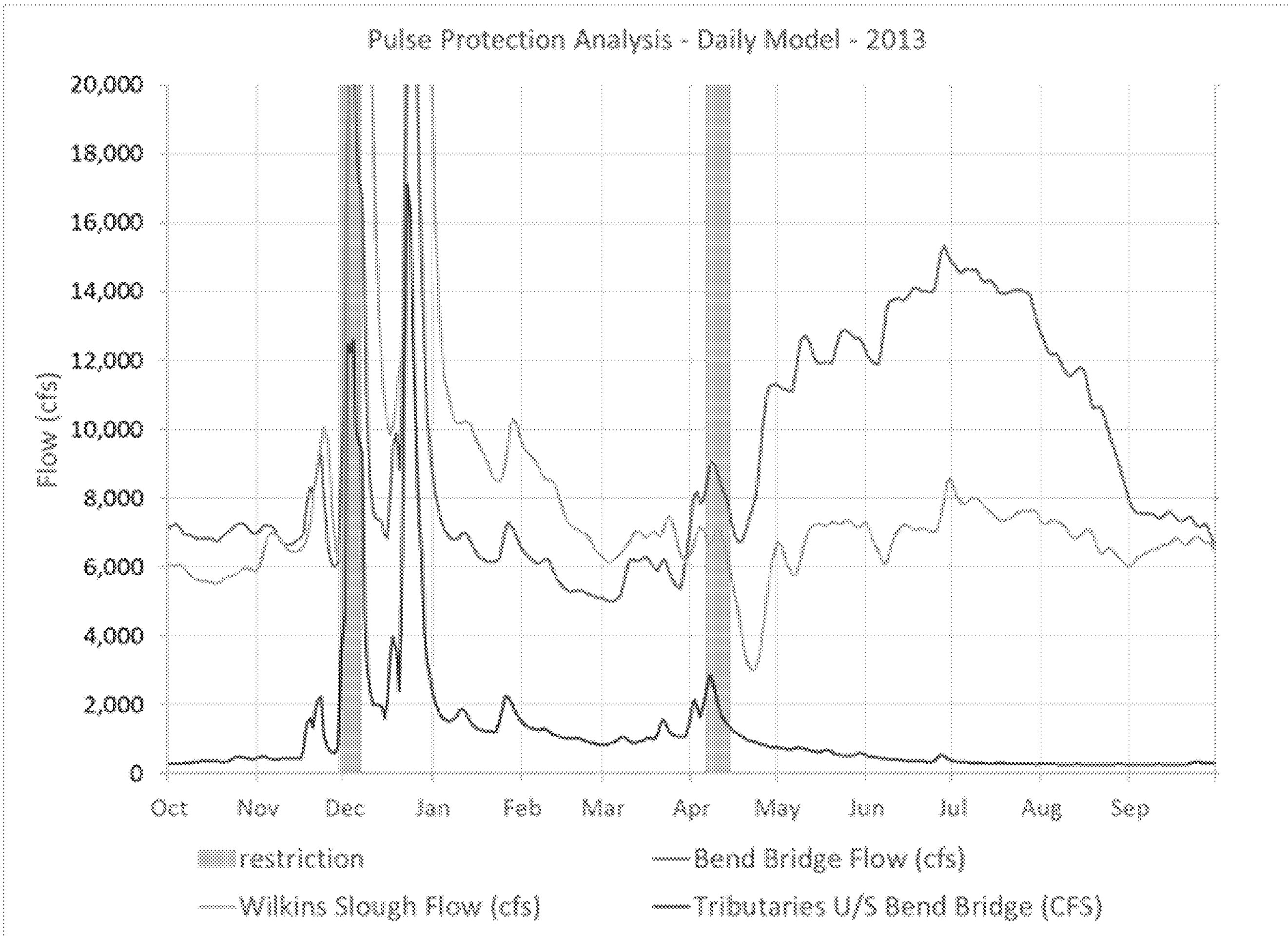


Figure 5. Pulse Protection Analysis – Water Year 2013.

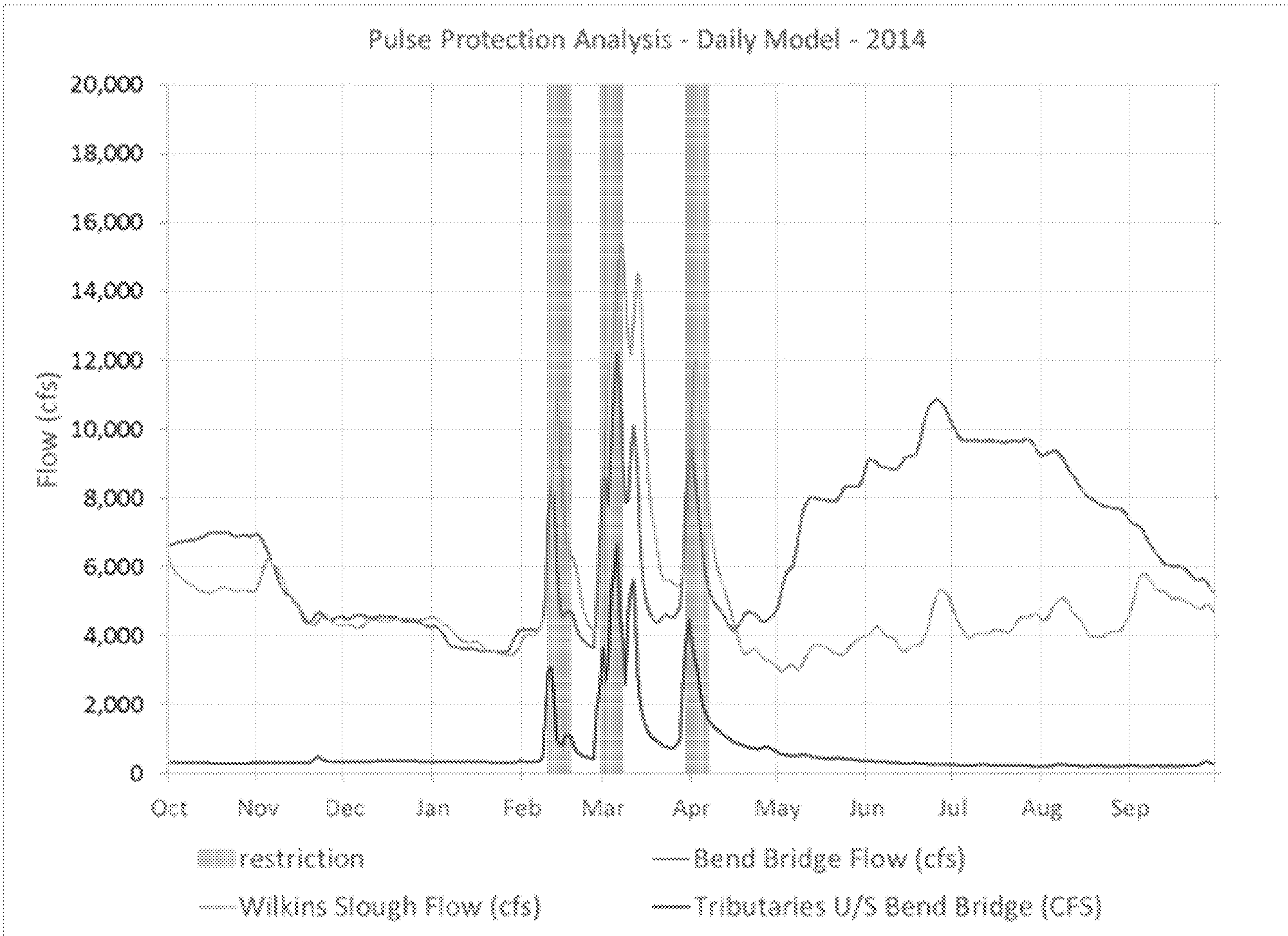


Figure 6. Pulse Protection Analysis – Water Year 2014.

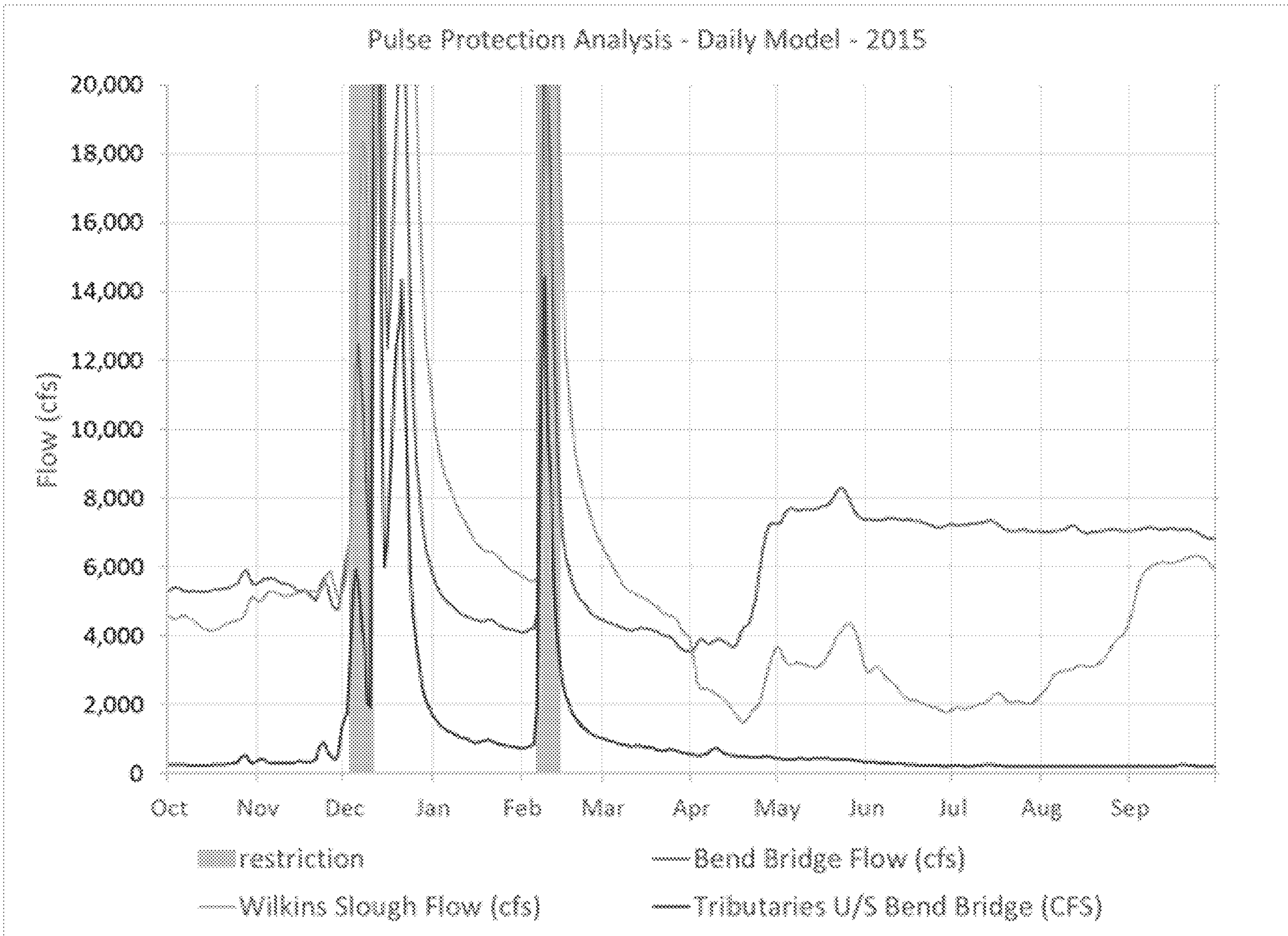


Figure 7. Pulse Protection Analysis – Water Year 2015.

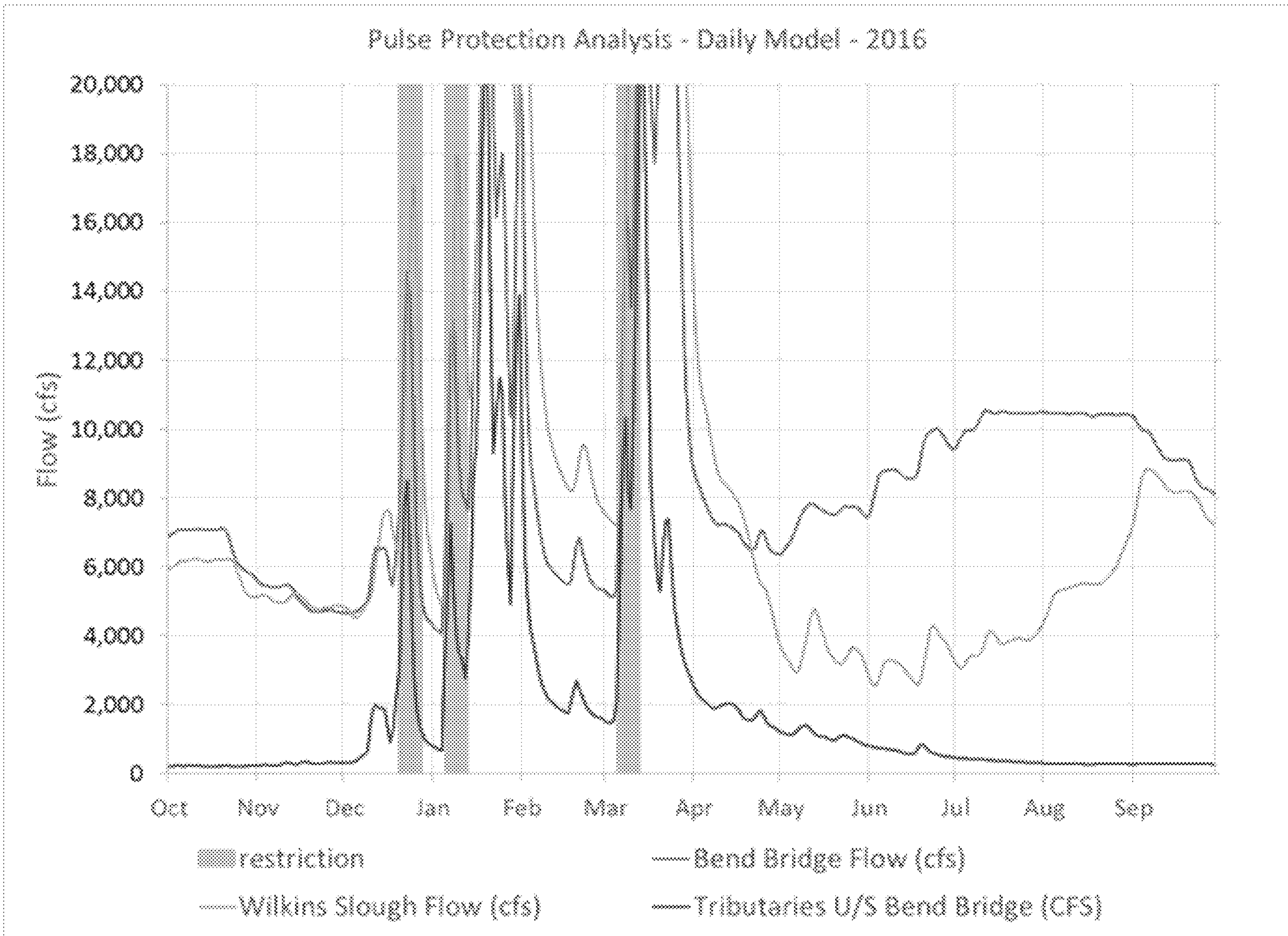


Figure 8. Pulse Protection Analysis – Water Year 2016.

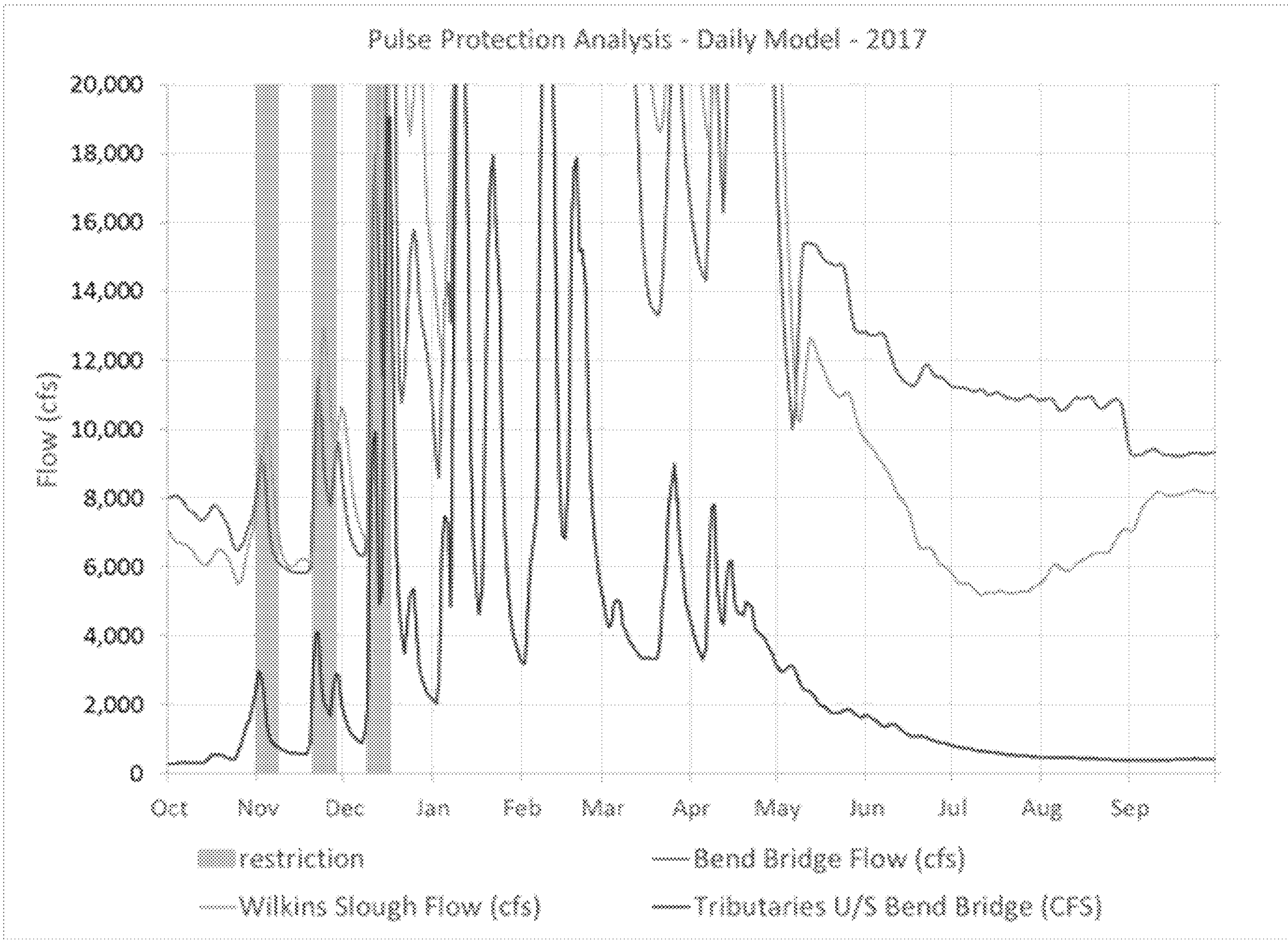


Figure 9. Pulse Protection Analysis – Water Year 2017.

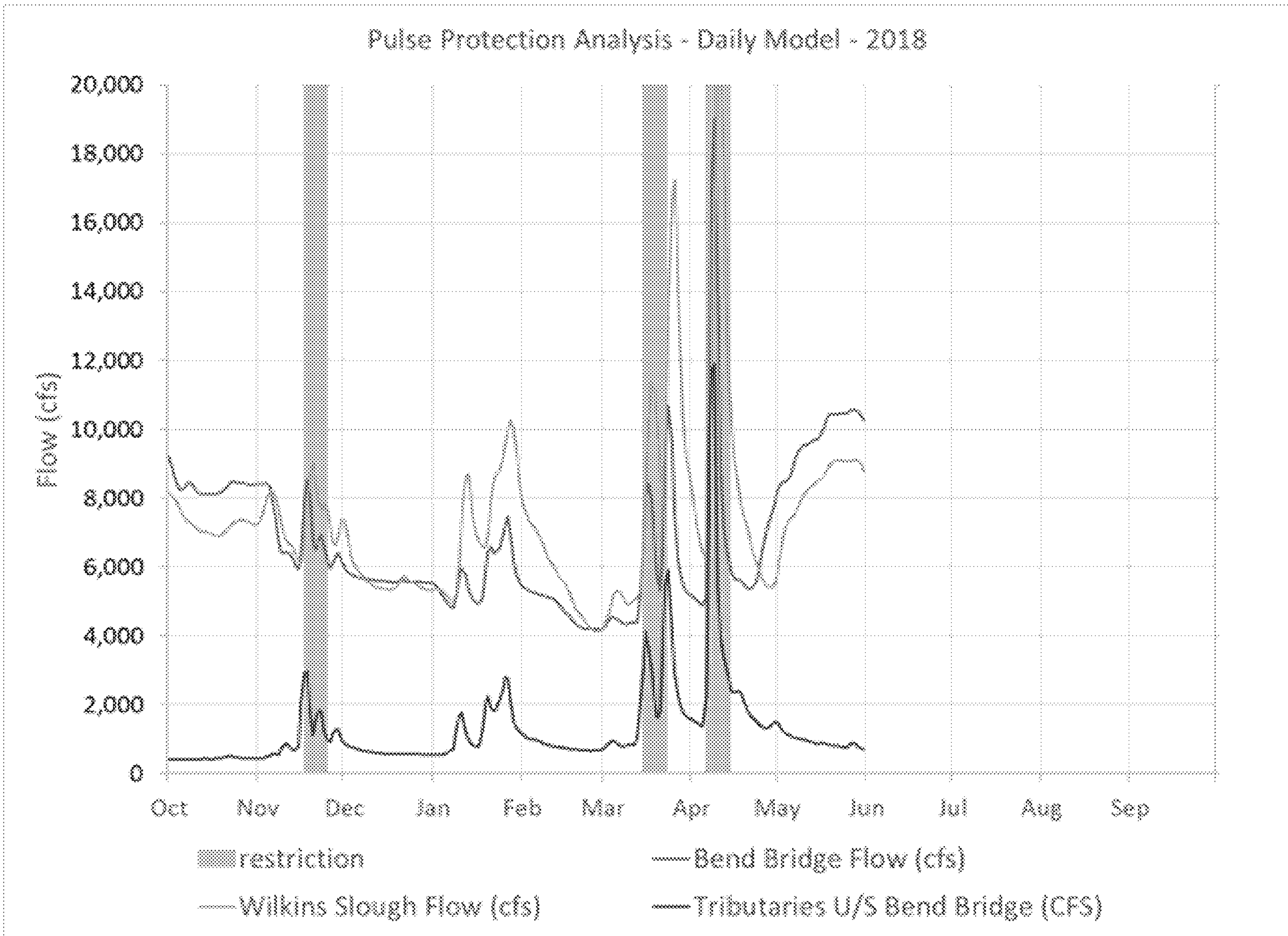


Figure 10. Pulse Protection Analysis – Water Year 2018.

Steve Micko, PE | Jacobs | Associate Water Resources Engineer
O:916.286.0358 | M:408.834.6614 | Steve.Micko@jacobs.com
2485 Natomas Park Drive Suite 600 | Sacramento, CA 95833

TCCA Red Bluff Facility Operations

Table 3. TCCA Red Bluff Available Diversion Capacity by Streamflow
Sites Project Authority – Sacramento River Intake Fish Screen Operations

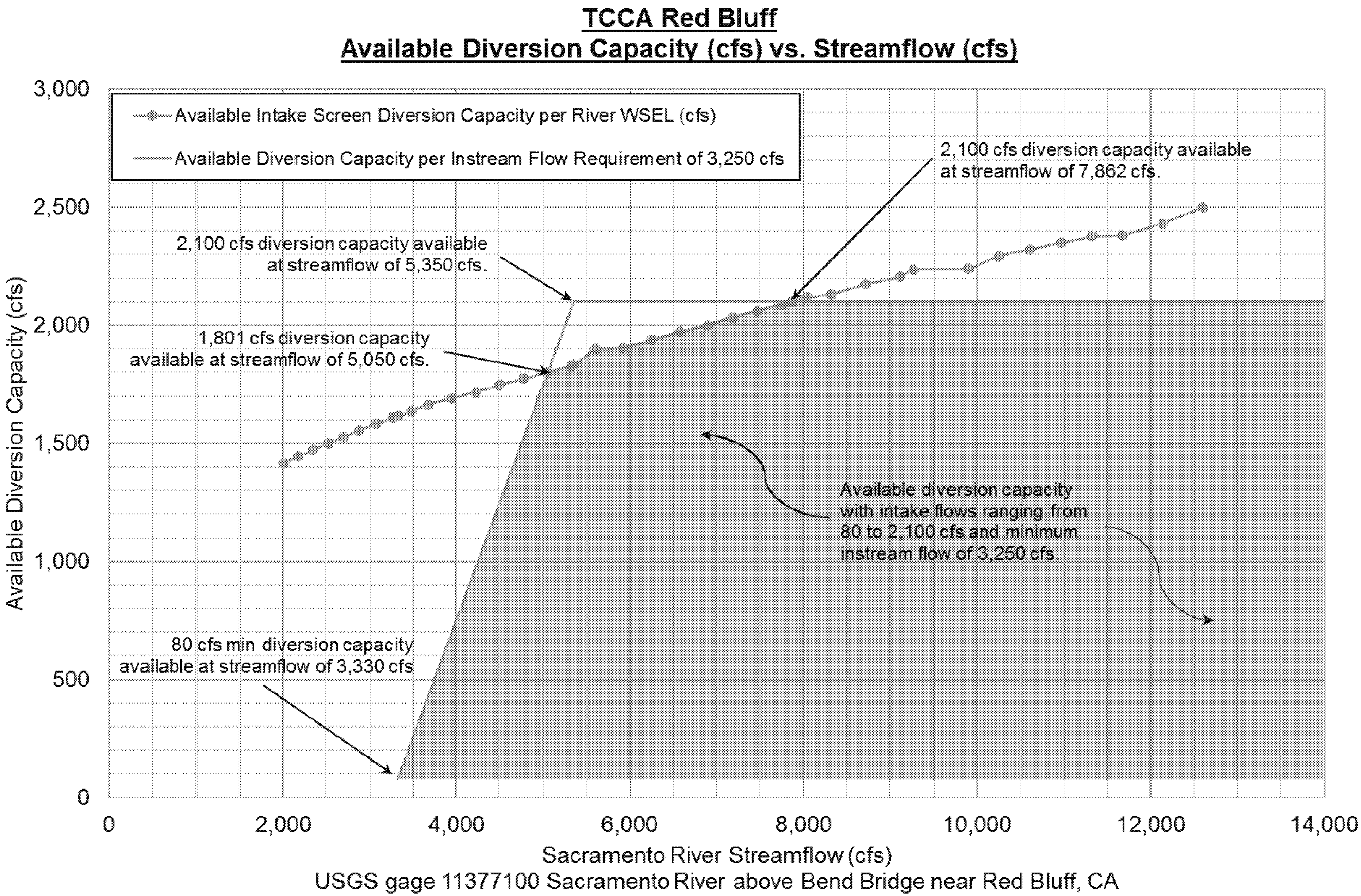
Streamflow at Gage (cfs)	River WSEL at U/S Work Point (feet, NAVD88)	Available Facility Diversion Capacity (cfs)
2,010	241.2	1,417
2,175	241.3	1,445
2,350	241.4	1,472
2,525	241.5	1,500
2,700	241.6	1,527
2,875	241.7	1,554
3,075	241.8	1,582
3,275	241.9	1,609
3,330	241.9	1,617
3,475	242.0	1,637
3,675	242.1	1,664
3,950	242.2	1,692
4,225	242.3	1,719
4,500	242.4	1,746
4,775	242.5	1,774
5,050	242.6	1,801
5,325	242.7	1,829
5,350	242.7	1,835
5,600	242.9	1,900
5,925	243.1	1,904
6,250	243.2	1,938
6,575	243.4	1,973
6,900	243.5	2,000
7,184	243.6	2,034
7,468	243.7	2,062
7,751	243.8	2,089
7,862	243.8	2,100
8,035	243.9	2,117
8,319	244.0	2,130

8,714	244.1	2,175
9,109	244.3	2,206
9,266	244.4	2,237
9,898	244.5	2,240
10,254	244.6	2,295
10,610	244.7	2,322
10,965	244.8	2,350
11,321	244.9	2,377
11,677	245.0	2,380
12,139	245.1	2,432
12,600	245.2	2,500

Diversions limited by instream flow requirement of 3,250 cfs

Diversions limited by River WSEL and submerged screen area

No restrictions (assumes use of future Pump Nos. 2 and 10)



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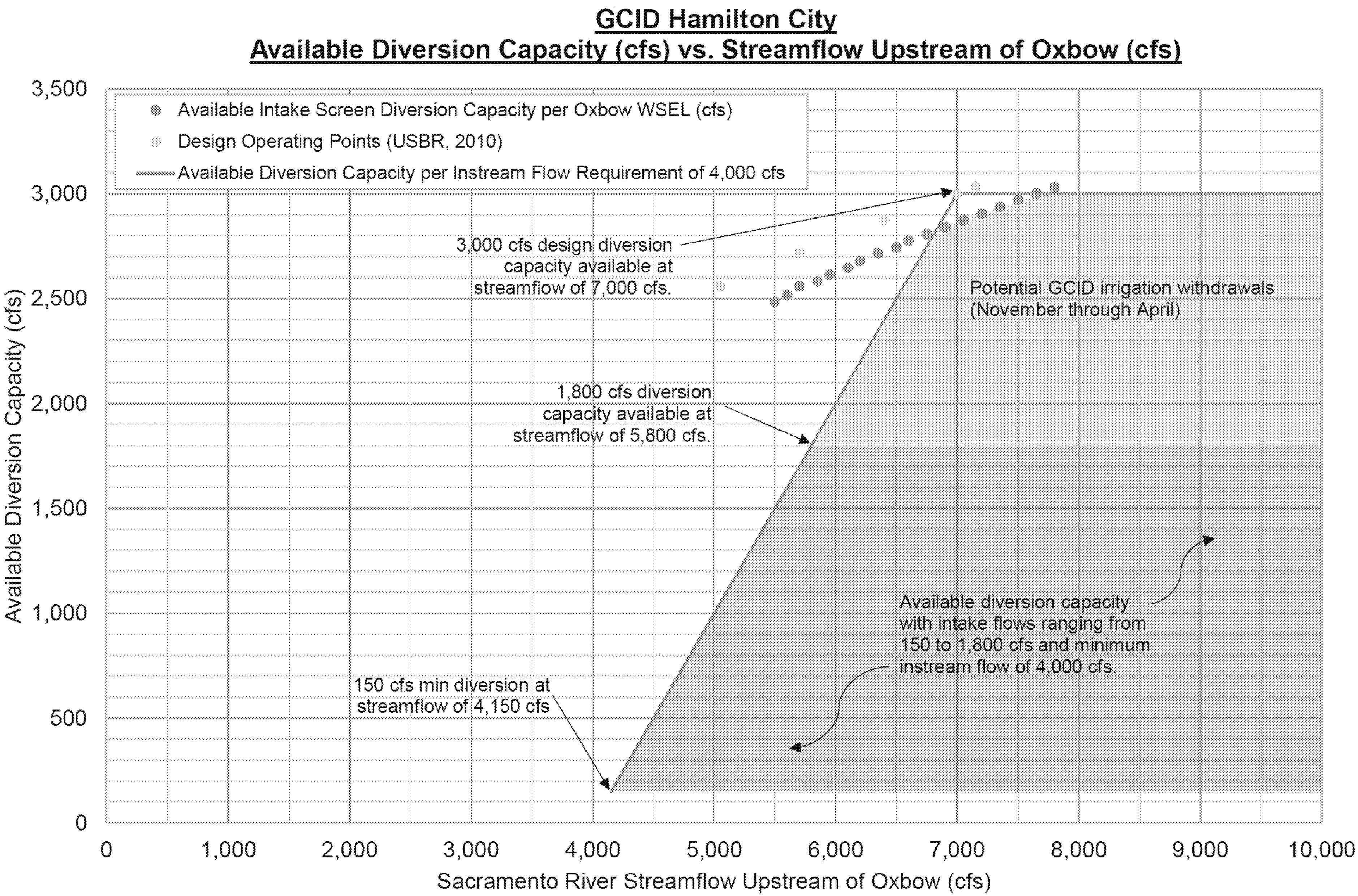
GCID Hamilton City Facility Operations

Table 4. GCID Hamilton City Available Diversion Capacity by Streamflow
Sites Project Authority – Sacramento River Intake Fish Screen Operations

Streamflow Upstream of Oxbow (cfs)	River WSEL at U/S Oxbow (feet, NGVD29)	Available Facility Diversion Capacity (cfs)
900	132.5	1,744
938	132.6	1,777
977	132.7	1,809
1,018	132.8	1,841
1,061	132.9	1,873
1,105	133.0	1,906
1,151	133.1	1,938
1,200	133.2	1,970
1,250	133.3	2,002
2,690	133.4	2,035
2,765	133.5	2,067
2,842	133.6	2,099
2,921	133.7	2,131
3,002	133.8	2,164
3,086	133.9	2,196
3,172	134.0	2,228
3,260	134.1	2,260
3,351	134.2	2,292
3,445	134.3	2,325
3,541	134.4	2,357
3,639	134.5	2,389
3,741	134.6	2,421
3,845	134.7	2,454
3,952	134.8	2,486
4,062	134.9	2,518
4,176	135.0	2,559
4,292	135.1	2,583
4,412	135.2	2,615
4,534	135.3	2,647
4,661	135.4	2,679

4,791	135.5	2,717
4,924	135.6	2,744
5,061	135.7	2,776
5,203	135.8	2,808
5,348	135.9	2,841
5,497	136.0 (begin possible gravity diversion)	2,874
5,650	136.1	2,905
5,807	136.2	2,937
5,969	136.3	2,969
6,135	136.4	3,002
6,306	136.5	3,031

(light shading)	Diversions limited by instream flow requirement of 4,000 cfs
(dark shading)	No restrictions, assuming GCID irrigation withdrawals are less than approximately 1,000 cfs


GCID Hamilton City
Available Diversion Capacity (cfs) vs. Streamflow Upstream of Oxbow (cfs)
Available Intake Screen Diversion Capacity per Oxbow WSEL (cfs)
Design Operating Points (USBR, 2010)
Available Diversion Capacity per Instream Flow Requirement of 4,000 cfs
3,000 cfs design diversion capacity available at streamflow of 7,000 cfs.
Potential GCID irrigation withdrawals (November through April)
1,800 cfs diversion capacity available at streamflow of 5,800 cfs.
Available diversion capacity with intake flows ranging from 150 to 1,800 cfs and minimum instream flow of 4,000 cfs.
150 cfs min diversion at streamflow of 4,150 cfs
Available Diversion Capacity (cfs)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Sacramento River Streamflow Upstream of Oxbow (cfs)

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 2/12/2021 4:59:36 PM
To: Lecky, Jim [jim.lecky@icf.com]; steve.micko@jacobs.com
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Heydinger, Erin [erin.heydinger@hdrinc.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; Hendrick, Mike [mike.hendrick@icf.com]
Subject: RE: Bypass flow description

Great input. Thanks.

John Spranza

D 916.679.8858 M 818.640.2487

From: Lecky, Jim <Jim.Lecky@icf.com>
Sent: Friday, February 12, 2021 3:47 PM
To: Micko, Steve/SAC <Steve.Micko@jacobs.com>; Spranza, John <John.Spranza@hdrinc.com>
Cc: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <Erin.Heydinger@hdrinc.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Hendrick, Mike <mike.hendrick@icf.com>
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To: John Spranza <John.Spranza@hdrinc.com>
Cc: Alicia Forsythe <aforsythe@sitesproject.org>; Heydinger, Erin <erin.heydinger@hdrinc.com>; Leaf, Rob/SAC <Rob.Leaf@jacobs.com>; Lecky, Jim <Jim.Lecky@icf.com>; Hendrick, Mike <Mike.Hendrick@icf.com>
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1.1 Diversion Restriction Criteria to Protect Pulse Flow Conditions:

The following is assumed as part of the potential Sites Project winter diversion operating criteria that will be included in the modeling for the revised Draft EIR/EIS and Feasibility Study. These assumptions are for modeling purposes only and have been generalized for use in monthly and daily operations analysis.

1. Monitoring of flows for pulse protection occurs at Sacramento River at Bend Bridge (Bend Bridge). Using Bend Bridge flow measurements to identify pulse signals favors preservation of pulse flow conditions that connect the spawning and rearing habitat (below Keswick Dam) to the full outmigration pathway (to the Pacific Ocean), and utilizes existing flow monitoring infrastructure. Use of Bend Bridge flows underestimates flow contributions from downstream tributaries to formation of pulse flow conditions at specific locations of interest on the Sacramento River, e.g. Wilkins Slough, Fremont Weir, or Rio Vista. Monitoring at any of these other three alternative locations would be downstream of both intakes for the project, and require consideration of other facilities operations. Bend Bridge was assumed as a reasonable simplification for modeling purposes only.

2. The period for pulse protection extends from October through May to address outmigration of juvenile winter-, spring-, fall- and late fall-run Chinook salmon, as well as a portion of the steelhead juvenile outmigration period. It is recognized that research regarding the benefits of pulse flows is ongoing, and further research and adaptive management would be utilized to develop and refine a pulse flow protection strategy for fish migration, and as such, this assumption was used for modeling and informational purposes only.

3. Pulse flows are defined by peaks in the impaired hydrograph, rather than scheduled operational events. The peak flows considered originate primarily from tributaries (precipitation-generated flows) that flow into the Mainstem Sacramento River downstream of Keswick Dam. These events maintain variability in pulse flow occurrence that is necessary to protect adaptive response behavior to flow conditions and enhance the turbidity effects as noted by Cavallo (2010).

4. If the 3-day trailing average of Bend Bridge flows exceeds 8,000~~15,000~~ cfs and 3-day trailing average tributary flow upstream of Bend Bridge (Cow Creek, Cottonwood Creek and Battle Creek) exceeds 2,500 cfs, a pulse event is initiated if the previous day was not already in a pulse event. This flow level is consistent with NOAA NMFS (reference Cyril Michel paper?) ~~SWRCB (2010)~~ recommendations of 10,700~~20,000~~ cfs at Wilkins Slough (considering increases from tributary inflows).

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File Provided Natively

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From: Spranza, John [John.Spranza@hdrinc.com]
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To: Lecky, Jim [jim.lecky@icf.com]; steve.micko@jacobs.com
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Operations and Maintenance Technical Memorandum

Sites Program Management Team

To: Sites Project Authority

CC: Henry Luu, P.E. (HDR)

Date: February 12, 2021

From: Michael Forrest, P.E., G.E.; Mike Smith, P.E., G.E; Idit Zarchi, P.E.; Howard Michael, P.E.; Syed Kazmi, P.E.; Abrie Horak (AECOM)

Quality Review by:

Authority Agent Review by: Henry Luu, P.E. (HDR)

Subject: Operations and Maintenance for HR Facilities – In-progress Working Draft Task Order No. 2, Task HR58.3

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Acronyms and Abbreviations

ABME	Area Bridge Maintenance Engineers
Authority	Sites Project Authority
Caltrans	California Department of Transportation
cfs	cubic feet per second
CY	cubic yards
DSOD	State of California Department of Water Resources, Division of Safety of Dams
DWR	California Department of Water Resources
I/O	Inlet/Outlet Works
MAF	million-acre-foot
MUTCD	Manual on Uniform Traffic Control Devices
NMWS	normal maximum reservoir water surface
O&M	operations and maintenance
ROV	remotely operated vehicle
SM&I	Caltrans Structures and Bridge Maintenance
TM	technical memorandum

1. Introduction

1.1 Project Overview and Reservoir Alternatives

The Sites Project Authority (Authority) is preparing a feasibility-level evaluation for a 1.5-million-acre-foot (MAF) reservoir as a preferred alternative for the Sites Reservoir Project. Figure 1-1 shows the location of Sites Reservoir, and the various dams, roads, and other features to be constructed to form the reservoir. Sites Reservoir would have a nominal total storage capacity of 1.5 MAF. Table 1-1 outlines key aspects of the reservoir.

Table 1-1. Sites Reservoir

Total Storage Capacity	1.5 MAF
Active Storage Capacity	1.4 MAF
Approximate Inundation Area	13,200 acres
Dam/Saddle Dam Crest Elevation (Without Camber)	517 feet
Normal Maximum Reservoir Water Surface Elevation	498 feet
Minimum Operating Water Elevation	340 feet
Top of Dead Pool Elevation	300 feet
Inlet/Outlet Facilities Conveyance Capacity:	
Tehama-Colusa Canal	2,100 cfs
Glenn-Colusa Irrigation District Canal	1,800 cfs

cfs = cubic feet per second

MAF = million acre feet

The reservoir boundaries and water surface elevations provided in Table 1-1 are based on topographic information provided by the California Department of Water Resources (DWR) for their use on the project. New topographic information will be obtained for the reservoir site in future phases of the project. The information provided in Table 1-1 should be verified when the new surveys are completed.

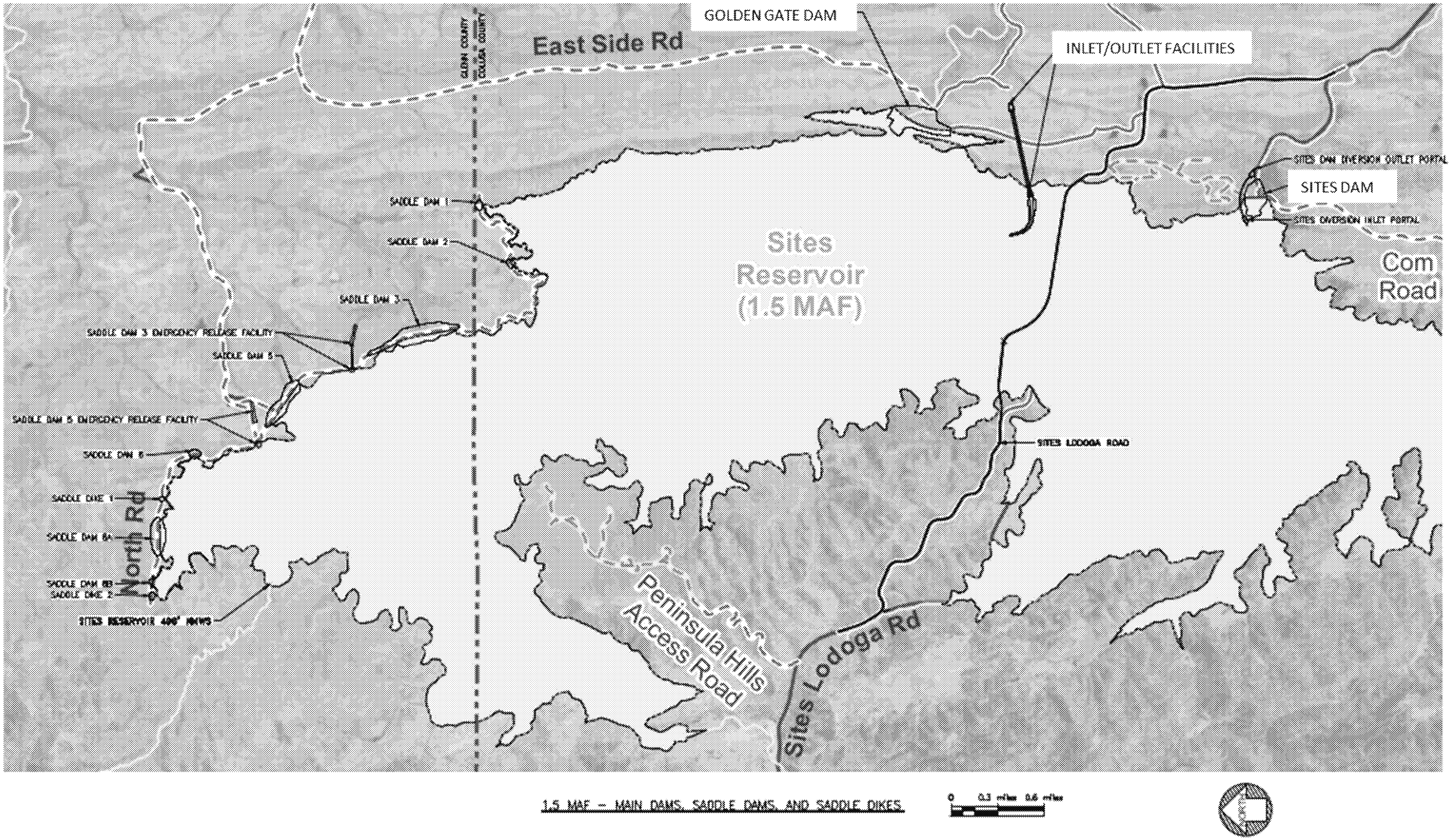

Figure1-1. Alternative 1 Reservoir

[redacted]

The key dimensions of the facilities are included in Table 1-2.

- Main Dams, Saddle Dams and Dikes, and Reservoir Rim: The Sites Reservoir dams include two main dams, Golden Gate Dam on Funks Creek and Sites Dam on Stone Corral Creek, and saddle dams and dikes on the reservoir rim on tributaries to the Hunters Creek drainage.
- Spillway: This structure is a concrete overflow spillway located at Saddle Dam 8B that would discharge into Hunters Creek to the north.
- I/O Works: These facilities include a vertical tower with multiple intake levels connected to two inlet/outlet tunnels. These provide for normal reservoir operation and for making the major portion of emergency reservoir releases that will be required by DSOD as part of dam permitting. The tunnels connect to reservoir conveyance pipelines (HC) at the downstream tunnel portal.
- Sites Dam Outlet Works: This outlet works tunnel would be located in the north abutment of Sites Dam; it would be used initially for construction diversion for both main dams and subsequently for stream maintenance and a portion of the emergency reservoir releases to Stone Corral Creek after construction.
- Emergency Release Structures: These structures provide emergency release capacity to supplement the release capacities at the I/O Works and Sites Dam tunnel. They include intakes and tunnels located at Saddle Dams 3 and 5 for Alternative 1 only; they would discharge to Hunter's Creek tributaries on the north side of the reservoir.
- Roads: Roads include local roads (recreational use and public access), maintenance roads, and construction access roads.
- Bridges: Two bridges crossing the reservoir (lengths of 1,400 feet and 1,633 feet for the west bridge and east bridge, respectively) with fill prisms, providing an east-west connection from rural communities of Maxwell, Lodoga, and Stonyford for Alternative 1 only. For Alternative 2, there will be a southern road alignment around the south end of reservoir, providing an east-west connection from Maxwell to the rural communities of Lodoga and Stonyford.

Table 1-2. Reservoir Facility Descriptions

Reservoir Elevation at full pool (feet)	498.0
Reservoir Area at full pool (acres)	13,200
Dam / Dike Crest Elevation (feet) (without camber)	517.0
Main Dams	2 main dams – see below
Saddle Dams	7 saddle dams and 2 saddle dikes – see below
Dam / Dike:	Max. Ht. Above Streambed / Crest Length (ft)
Golden Gate Dam	287 / 2,221
Sites Dam	267 / 781
Saddle Dam 1	27 / 318
Saddle Dam 2	57 / 250
Saddle Dam 3	107 / 3,422
Saddle Dam 5	77 / 1,894
Saddle Dam 6	47 / 362
Saddle Dam 8A	82 / 1,300
Saddle Dam 8B	37 / 475
Saddle Dike 1	12 / 122
Saddle Dike 2	12 / 198
Saddle Dike 3	Not required
I/O Tower	Top elev. 558 ft. 258 ft high / 7 elevations to draw water from reservoir
I/O Tunnels	Approx. 3,110 ft long/Dual 23 ft Internal diameter tunnels
Sites Diversion/Outlet Tunnels	Approx. 1,590 ft long/12 ft internal diameter tunnel
Emergency Release System (on north rim)	Two emergency release systems located at Saddle Dams 3 and 5
Spillway	Weir crest length = 85.5 feet, crest elevation = 504 feet

ft = feet
I/O = Inlet/outlet works
MAF = million acre feet

1.2 Purpose and Scope

The purpose of this task is to prepare a description of the inspection and O&M activities associated with each of the HR project facilities. This TM also includes a general description of the dam safety monitoring program, including instrumentation, monitoring seismic activity and maintenance. This task supports the Sites Project Feasibility Report, but does not purport to be a detailed inspection and O&M manual that would be used for the constructed facilities.

1.3 Limitations

The scope of work for this TM was restricted to the development of the inspection and O&M activities for the Sites Reservoir under the Reservoir (HR) contract. O&M for the conveyance facilities are separately considered in a companion TM for the HC contract.

AECOM represents that our services were conducted in a manner consistent with the standard of care ordinarily applied as the state of practice in the profession, within the limits prescribed by our client.

2 Inspection and O&M for HR Facilities.

Table 2-1 presents a simplified summary of inspection and O&M for the HR facilities for the dams, spillway, inlet/outlet works (I/O), high-level emergency release structures, roads, and bridges. Table 2-1 shows the estimated frequency and the level of labor and equipment that may be needed for inspection and O&M. This table was also used for estimating the annualized costs for inspection and O&M.

3 Dams, Abutments, Rim and Spillway

3.1 Inspection

3.1.1 Visual Inspections

Visual inspections are an integral part of evaluating the performance of the dams. Systematic visual inspections of the dams will be required once filling has commenced. The visual inspections will be carried out by walking a prescribed route at the dams. Visual observations include, but are not limited to, the following:

- Deformation and Cracking: Cracks, bulges, alignment deviations in the crest, depressions, sinkholes, slides.
- Seepage: Seepage at the downstream face or abutments, turbid or cloudy seepage, evidence of piping (internal erosion of embankment or foundation materials) or transport of materials.
- Surface Conditions: Erosion gullies, excessive vegetation that can obscure observation, rodent burrows, debris, and condition of the riprap on the upstream face of the dams
- Rim observations would include erosion or slumps on the reservoir side and seeps or slumps on the outboard side of the rim.

If unusual conditions are observed, more frequent visual inspections (such as daily) and further investigation of that condition would be undertaken. Also, more frequent visual inspections would be performed after earthquakes that are felt in the site or after major rain storm events. Instrumentation data would also be monitored and recorded more frequently after earthquakes. Monitoring would include more frequent data recording for seepage to check for increased flow, and the piezometers would be read more frequently. Action items, such as needed repairs or follow-up on specific inspections, will be identified and brought to the attention of engineers.

Dams and abutments inspection frequencies are presented in Table 2-1.

[redacted]

Table 2-1. Summary of Inspection and O&M for HR Facilities

Feature	Inspection or O&M Est. Frequency / Duration	No. of Staff & Type	No. of Pick-up Trucks / Equipment as noted
1. Dams and Abutments	**Inspection:** First 5 years, daily / 1 day Years 6-10, weekly / 1 day Years 11 – onward,- monthly / 1 day **O&M:** Annually / 4 days	 6 inspectors 6 inspectors 6 inspectors 2 inspectors 2 laborers 2 operators 2 truck drivers	 6 (pick-up trucks) 6 6 4 pick-up trucks; 2 each dump trucks, backhoes, light walk-behind compactors, with operators
Monument surveys (by subcontractor)	**Inspection (Surveys):** Semi-annually / 2 days	1 crew chief 5 techs	6 pick-up trucks; Survey/GPS instruments
Replace instrumentation (by subcontractor)	**O&M:** 25 years / 25 days each time	2 inspectors 2 drill rig operators 2 drill helpers 2 laborers	4pick-up trucks; 2 rotary drill rigs, 2 flat-bed supply trucks, with operators
[redacted]			
2. Reservoir Rim and Spillway	**Inspection:** First 5 years, weekly / 2 days Years 6-10, quarterly/2 days > 10 years, monthly / 2 days **O&M:** Annually / 4 days	 2 inspectors 2 inspectors 2 inspectors 2 inspectors 2 laborers 2 operators 2 truck drivers	 2 + ATV 2 +ATV 2 +ATV 4 pick-up trucks; 2 each dump trucks, backhoes, light walk-behind compactors, with operators
[redacted]			
3. Inlet/Outlet Works, Sites Dam Outlet and Emergency Release Structures	**Inspection:** First 5 years, weekly / 2 days Years 6-10, monthly/2 days >10 years, quarterly / 2 days **O&M:** Annually / 4 days	 2 inspectors 2 inspectors 2 inspectors 2 inspectors 2 laborers	 2 2 2 2 2
Mechanical equipment/gates/valves (by subcontractor)	**Inspection:** Semi-annually / 1 day >6 years, annually/2 days 5 years for tunnel ROV / 8 days **O&M:** 25 years / 8 days each time	 2 inspectors 2 inspectors 4 inspectors 1 foreman 2 laborers 3 operators	 2 2 4 4 pick-up trucks; crane to lift valves, 1 flat-bed truck to haul valves for refurbishment & return with refurbished valves, with operators

[redacted]

[redacted]			
4. Roads – Sites Lodoga Road Causeway Local Roads Main. Roads	**Inspection:** Years 1-5, 3 months/2 days >5 years, 6 months / 2 days **O&M:** Every 3 years / 2 days	 1 inspector 1 inspector 2 inspectors 2 laborers 2 operators 2 drivers	 1 1 4 pick-up trucks; 2 each dump trucks, backhoes, light walk-behind compactors, with operators
[redacted]			
5. Bridges	**Inspection:** Monthly / 1 day **O&M:** Annually / 2 days	 2 inspectors 1 inspector 3 laborers 1 operator	 2 4 pick-up trucks, cherry pick crane & operator

1. Routine O&M (Maintenance, Management, Repair, and Operation) for feasibility study O&M cost estimate (AACE Class 5).
2. Engineer inspection report preparation:
   Initial filling, assume first 5 years (can vary greatly): assume 80 hours/month for 5 years
   Long-term: assume 160 hours/year after end of year 5
3. Additional HR O&M staff that would be involved, assume: 1 records admin. assistant (2 hrs/day); 2 O&M maintenance staff (2 hrs/day each).

3.1.2 Instrumentation Data and Monitoring

Instrumentation will be installed in the dam embankment and foundation, downstream of the dam, and in the abutments. The primary objective of the instrumentation is to provide data to evaluate whether the dam is performing as expected and to warn of changes that could impair dam safety.

Instrumentation data will initially be used to evaluate the behavior of the dam during the first filling of the reservoir and whether conditions are consistent with the design assumptions. During long-term operation of the project, instrumentation data will also be used to monitor the performance of the dam. As data are compiled, trends under normal operation will be established, and the significance of variations under unusual events or loads, such as earthquakes, can be evaluated.

Instrumentation will be installed to enable monitoring of the following performance parameters:

- Piezometer Water Levels: Water levels within the downstream shell zone, will be monitored to check for potential saturation of the shell zone. Water levels for foundation piezometers will be monitored to check piezometric pressures in the foundation.
- Seepage (Seepage weirs): Seepage rates will be measured at the dam toe to check for potential internal problems in the dam. In addition, clarity or turbidity of the seepage will be monitored; turbid seepage could indicate piping. Turbidity indicates that material is migrating from the foundation and/or from the dam embankment.
- Embankment Movement (Inclinometer and survey monuments): Horizontal and vertical surface movements of the embankments will be monitored by surveys to check for settlement and deformation. Horizontal movements of the embankment will also be monitored with an inclinometer.
- Earthquake Accelerations (Accelerographs): Accelerations at the dam crest and left abutment will be measured by accelerographs.
- Reservoir Level: Reservoir levels will be monitored to correlate with seepage and piezometric data.

The data recording frequencies are indicated in Table 2-1 and would be increased of any if the of the following is observed:

- Unusual conditions are observed during visual inspections.

[redacted]

- Rapidly changing instrumentation data are recorded.
- Established trends in data change.
- Piezometer readings exceed pre-established levels.
- After earthquakes that trigger at least one of the accelerographs or are felt at the dam site.
- After major rainstorms.

3.2 Maintenance

Maintenance of the dams will include:

- Standard maintenance:
  - Trim vegetative growth on the downstream face of the dam, abutments, and the toe on a regular basis.
  - Clear the spillway channels of trees and shrubs.
  - Clean out and fill rodent holes with hand-tamped sandy gravel materials.
  - Repair erosion rills.
  - Clean out any debris on the downstream face, abutments, access road ditches, approach channel to the Saddle Dam 8B spillway structure.
- Following any major rain storm event:
  - Observe the downstream face of the dam for signs of erosion, and repair any erosional features.
  - Observe culverts for blockage, and clear as necessary.

4 Inlet/Outlet Works and Sites Dam Outlet

4.1 Inspection

Trained operators will conduct periodic inspections of the Inlet/Outlet Works at Golden Gate Dam and the Outlet Works at Sites Dam. Inspections of the intake/outlet works would include the following:

- Checking gates, valves, screens and operators for leaks, corrosion, rust, or unusually large vibrations.
- Actuating gates and valves periodically to confirm functionality without unnecessary discharges.
- Inspecting concrete structures and lining for significant cracks, areas of spalling, voids, and joints.
- Inspecting Stone Corral creek channel for erosion.

Inundated infrastructure, such as the inlets and tunnels, will likely be inspected with remotely operated vehicles (ROVs). Above-ground infrastructure, such as the Sites Dam outlet structure, can be inspected by crews and operators.

4.2 Maintenance

Regular maintenance of the screens at the I/O tower or Sites inlet is not anticipated. However, at the I/O tower they should have any accumulated debris scraped off of them once they are hoisted above the water surface. For all instrumentation and electrical components, routine maintenance such as calibration or testing, should be performed as stated in the manufacturer's O&M manuals. Refurbishment or replacement of gates and valves, both at the I/O tower and Sites inlet and outlet structures, would need to occur periodically as noted in Table 2-1.

If inspections of concrete structure and linings reveals significant defects, maintenance will be required to repair or replace concrete as needed.

4.3 Operation

During typical operations the I/O ports at the tower will be opened based on inflow/outflow demands, port submergence considerations, and desired water quality characteristics (e.g. temperature, dissolved oxygen, etc.). The Sites Dam outlet will typically have a valve open to convey instream beneficial releases to Stone Corral Creek, in accordance with environmental requirements.

In an emergency situation both the I/O works and the Sites Dam Outlet will be operated to drawdown the reservoir according to DSOD emergency drawdown requirements.

5 High Level Emergency Release Structures

5.1 Inspection

Trained operators will conduct periodic inspections of the high-level emergency release structures. Inspections would include the following:

- Checking gates, valves, and operators for leaks, corrosion, rust, or unusually large vibrations.
- Actuating gates and valves periodically to confirm functionality without discharging flows.
- Inspecting concrete structures and lining for significant cracks, areas of spalling, voids, and joints.
- Inspecting Stone Corral creek channel for erosion (following emergency releases).

Inundated infrastructure, such as the inlets and tunnels, will likely be inspected with ROVs. Above-ground infrastructure, such as the outlet structures, can be inspected by crews and operators.

5.2 Maintenance

Trashracks should periodically have any accumulated debris scraped off of them. For all instrumentation and electrical components, routine maintenance such as calibration or testing should be performed as stated in the manufacturer's O&M manuals. Refurbishment or replacement of gates and valves would need to occur periodically as noted in Table 2-1.

If inspections of concrete structure and linings reveals significant defects, maintenance will be required to repair or replace concrete as needed.

5.3 Operation (Emergency)

In an emergency situation the high level emergency release structures will be operated to drawdown the reservoir according to DSOD emergency drawdown requirements.

6 Roads

6.1 Functional Classification

The maintenance level assigned to a road considers the road functional classification, traffic volume, road condition, surface type, travel speed, user comfort and convenience, user safety, budget constraints, and environmental concerns.

Three types of roads have been defined for this Sites Reservoir project to provide for three functions: Local Access, Construction Access, and Maintenance Access. Local Access roads are Colusa County and Glenn County roads used for conveyance of the general traveling public. These roads will be maintained by the agency having jurisdiction of the roadway. Construction Access roads are specific to construction equipment/material transport and utilize Local Access roads in part.

6.2 Operations

6.2.1 Local Access Roads

The Local Access Road classification is assigned to roads that provide a high degree of user comfort and convenience. These roads are two lanes with shoulders, paved facilities and have the following attributes:

- Provides a high degree of user comfort and convenience for drivers in a standard passenger car (daily and during temporary construction operations)
- Provides smooth road surface, free of obstructions and debris
- Inspires confidence in the driver's expectations that hazards will be few and identified well in advance with clear visibility.
- Provides a visually pleasing roadway.
- Provides driver guidance and follows the requirements of the "Manual on Uniform Traffic Control Devices" (MUTCD) for signs and markings.
- Operates with higher traffic volume and speeds.
- Provides drainage via culverts.
- Functions as an arterial or collector.
- Provides a smooth paved road surface with lane striping and defined shoulders
- Operates as an access controlled facility
- Maintained by the local agency having jurisdiction – Glenn or Colusa Counties

6.2.2 Maintenance Access Roads

Maintenance Access Roads The Maintenance Access Road classification is assigned to roads open and maintained for travel by a driver in a standard passenger car. User comfort and convenience are not considered priorities. These roads have restricted access (maintenance personnel and adjacent landowners) are often unpaved gravel roads and have the following attributes:

- Are passable to drivers in passenger cars.
- Usually do not consider user comfort and convenience priorities.
- Are subject to the requirements MUTCD for signs.
- Provides a single lane with turnouts visible from either direction.
- Operates typically at low speeds.
- Functions as a local or collector.
- Operates with low- to moderate-traffic volume.
- Provides drainage via a combination of dips and culverts.
- Typically, may have wash-boarding.

6.3 Inspection and Maintenance

6.3.1 Local Access Roads Maintenance

Maintenance of Local Access roadways will be the responsibility of the local agency having jurisdiction of the roadway – Glenn or Colusa Counties.

Traveled way and shoulders. Maintain to provide for the protection of investment and resource values, and for a high degree of user comfort and convenience for all motor vehicles including standard passenger cars.

Drainage. Drain as necessary to keep drainage facilities functional and prevent unacceptable environmental damage while maintaining a high degree of user comfort and convenience.

Roadway. Control vegetation to provide sight distance. Repair and/or remove slides, slumps and debris to provide passage by the traveling public and to control resource damage. Surface repair includes pothole patching, crack sealing, chip sealing and removal of unsuitable material.

Roadside. Clean up litter in accordance with road management objectives. Remove trees that threaten safety to the general public and maintain vegetation as required. Cut and remove fallen trees for appropriate horizontal clearance. Remove debris and maintain fencing. Remove graffiti from roadside signs and barrier rails.

Structures. Maintain all structures (e.g., culverts) to provide for passage of traffic and to preserve structures for future use. Remove graffiti from columns, barrier rails, etc..

Traffic service. Install and maintain appropriate route markers, warning, regulatory, and guide signs, and other traffic control devices as warranted in a sign plan. Maintain centerlines, edge stripes, and other pavement and curb markings as needed.

Maintenance Cycle. Typically, annually.

6.3.2 Maintenance Access Roads Maintenance

Maintenance Access roads are specific for the use to maintain facilities. Maintenance of Maintenance Access roadways would be the responsibility of the Sites Authority, unless used by the contractor; then maintenance responsibility would be that of the contractor until the Authority takes ownership.

Traveled way and shoulders. Maintain to provide travel by drivers in standard passenger cars. Some surface roughness is acceptable. Maintain a traveled way crown or cross slope to provide adequate drainage. Replace the base course and surfacing as needed to protect the resources.

Drainage. Drain as necessary to keep drainage facilities functional and prevent unacceptable environmental damage while maintaining passage for drivers in standard passenger cars.

Roadway. Control vegetation to provide sight distance. Repair and/or remove slides, slumps and debris to provide passage by the traveling public and to control resource damage. Blade surface to maintain template and drainage. Surface is compact, crowned or sloped to drain without segregation of surface materials – no ruts or rills. Suitable material is recovered and incorporated. Unsuitable material is removed. Surface repair may include pothole patching, crack sealing, chip sealing and removal of unsuitable material.

Roadside. Clean up litter in accordance with road management objectives. Remove trees that threaten safety and maintain vegetation as required. Remove logs and debris when interfering with drainage or operation of maintenance equipment. Remove debris and maintain fencing. Remove debris and maintain fencing. Remove graffiti from roadside signs and barrier rails.

Structures. Maintain all structures (e.g., culverts) to provide for passage of traffic and to preserve structures for future use. Remove graffiti from columns, barrier rails, etc..

Traffic service. Install and maintain appropriate route markers, warning, regulatory, and guide signs and other traffic control devices as warranted in a sign plan.

Maintenance Cycle. Typically, 3 years.

7 Bridges

7.1 Inspection and Maintenance

It is assumed that County would be providing maintenance services generally in response to a problem on a bridge that affects public safety or the structural integrity of the structure. However, for periodic engineering Inspections, County would have arrangements with Caltrans to perform Inspection and Maintenance services. Caltrans "Maintenance Manual, Chapter H" is therefore used primarily in listing the below information. It is anticipated that the County will periodically re-surface and re-stripe the bridge. Signage may also be replaced and guardrails may be painted.

7.2 Inspections by Caltrans Area Bridge Maintenance Engineers

To comply with federal regulations, bridge structures would be periodically inspected by Caltrans Structures and Bridge Maintenance (SM&I) Area Bridge Maintenance Engineers (ABME), and more frequently when the need is determined by the ABME. Work recommendations are made for any corrective actions required.

When work recommendations are made, the recommendations will suggest the work be done either by contract or by maintenance crews. These recommendations are for guidance and the County has the flexibility to accomplish the work by any means available. However, it should be noted that many of the repair recommendations affect structural components and are engineered solutions. Therefore, the repair recommendations, methods, and procedures would need to be followed. Often, the ABME will require assistance from the County crews to perform the bridge Inspections. Each work recommendation is identified by action type, target completion time, and accompanied by an estimated cost to do the work. SM&I staff would be contacted if assistance is needed in marking work complete.

7.3 Inspections by County Maintenance

Periodic walk through inspections would be made by County to detect obvious defects, hazards or potential problems and also to monitor known problems. The purpose of these inspections is to supplement the more detailed, but less frequent inspections by the ABME. Special attention should be given to any condition that affects the safety and/or structural capacity. If there is a question as to the relevance of a structural condition, the ABME would be notified.

When major defects or hazards are found, they would be immediately reported to SM&I. If an emergency condition exists, appropriate action would be taken as soon as possible to provide for public safety and to prevent further structural damage from occurring. This includes, but is not limited to, restricting traffic on the bridge or closing it completely, installing temporary support systems, or making temporary repairs. After a major storm, earthquake, or other natural event that may cause damage to bridges, the County would inspect all bridges in the affected area for signs of damage. Any damage found should be reported to SM&I.

7.4 Post-earthquake Inspections

Post bridge earthquake inspections will be conducted under the direction of SM&I ABME's, and Structure Construction Engineers depending on the level of intensity and extent of damage. SM&I would be notified of any earthquake-related damage.

An earthquake of less than 5.5 magnitude is considered too low to cause bridge damage. Although unexpected, any earthquake related damage found by County Maintenance personnel would be reported to SM&I in Sacramento. For earthquake magnitudes higher than 5.5 magnitude, ABME's team would carry out inspections.

7.5 Minor Defects

Minor defects are those that can be corrected with little or no risk of structure collapse or rendering of damage to adjacent or related members while making repairs or replacements and include the following:

- Damaged or misplaced clearance markers.
- Damaged or missing advisory and warning signs
- Damaged or deteriorated railings
- Uneven or cracked approach and deck surfacing.
- Joint Seals
- Accumulated drift adjacent to bents and piers.
- Minor erosion.
- Accumulated dirt or debris on decks
- Plugged drains.
- Settlement or roughness of approach.
- Fire hazards.
- Faulty electrical contacts

7.6 Major Defects

Some defects are considered major because they involve individual members that affect the structural stability of an entire span, thus requiring underpinning of the span or supplementing of the member before removal and include:

- Bent or damaged girders
- Cracked or spalled concrete members
- Defective bearings
- Joint Seal Assemblies
- Settled bents or piers
- Major erosion or scour
- Extensive fire damage

8 Annualized Cost of Operations and Maintenance

To be done yet

Ref: Appendix A. Estimated O&M Costs

9 Equipment Use Tables for O&M

AQ tables submitted

Ref: Appendix B. Equipment Use Tables for O&M

10 References

Operations and Maintenance Technical Memorandum

Sites Program Management Team

To:	Sites Project Authority
CC:	Henry Luu, P.E. (HDR)
Date:	February 12, 2021
From:	Michael Forrest, P.E., G.E.; Mike Smith, P.E., G.E; Idit Zarchi, P.E.; Howard Michael, P.E.; Syed Kazmi, P.E.; Abrie Horak (AECOM)
Quality Review by:	
Authority Agent Review by:	Henry Luu, P.E. (HDR)
Subject:	Operations and Maintenance for HR Facilities – In-progress Working Draft Task Order No. 2, Task HR58.3

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Acronyms and Abbreviations

ABME	Area Bridge Maintenance Engineers
Authority	Sites Project Authority
Caltrans	California Department of Transportation
cfs	cubic feet per second
CY	cubic yards
DSOD	State of California Department of Water Resources, Division of Safety of Dams
DWR	California Department of Water Resources
I/O	Inlet/Outlet Works
MAF	million-acre-foot
MUTCD	Manual on Uniform Traffic Control Devices
NMWS	normal maximum reservoir water surface
O&M	operations and maintenance
ROV	remotely operated vehicle
SM&I	Caltrans Structures and Bridge Maintenance
TM	technical memorandum

1. Introduction

1.1 Project Overview and Reservoir Alternatives

The Sites Project Authority (Authority) is preparing a feasibility-level evaluation for a 1.5-million-acre-foot (MAF) reservoir as a preferred alternative for the Sites Reservoir Project. Figure 1-1 shows the location of Sites Reservoir, and the various dams, roads, and other features to be constructed to form the reservoir. Sites Reservoir would have a nominal total storage capacity of 1.5 MAF. Table 1-1 outlines key aspects of the reservoir.

Table 1-1. Sites Reservoir

Total Storage Capacity	1.5 MAF
Active Storage Capacity	1.4 MAF
Approximate Inundation Area	13,200 acres
Dam/Saddle Dam Crest Elevation (Without Camber)	517 feet
Normal Maximum Reservoir Water Surface Elevation	498 feet
Minimum Operating Water Elevation	340 feet
Top of Dead Pool Elevation	300 feet
Inlet/Outlet Facilities Conveyance Capacity:	
Tehama-Colusa Canal	2,100 cfs
Glenn-Colusa Irrigation District Canal	1,800 cfs

cfs = cubic feet per second

MAF = million acre feet

The reservoir boundaries and water surface elevations provided in Table 1-1 are based on topographic information provided by the California Department of Water Resources (DWR) for their use on the project. New topographic information will be obtained for the reservoir site in future phases of the project. The information provided in Table 1-1 should be verified when the new surveys are completed.

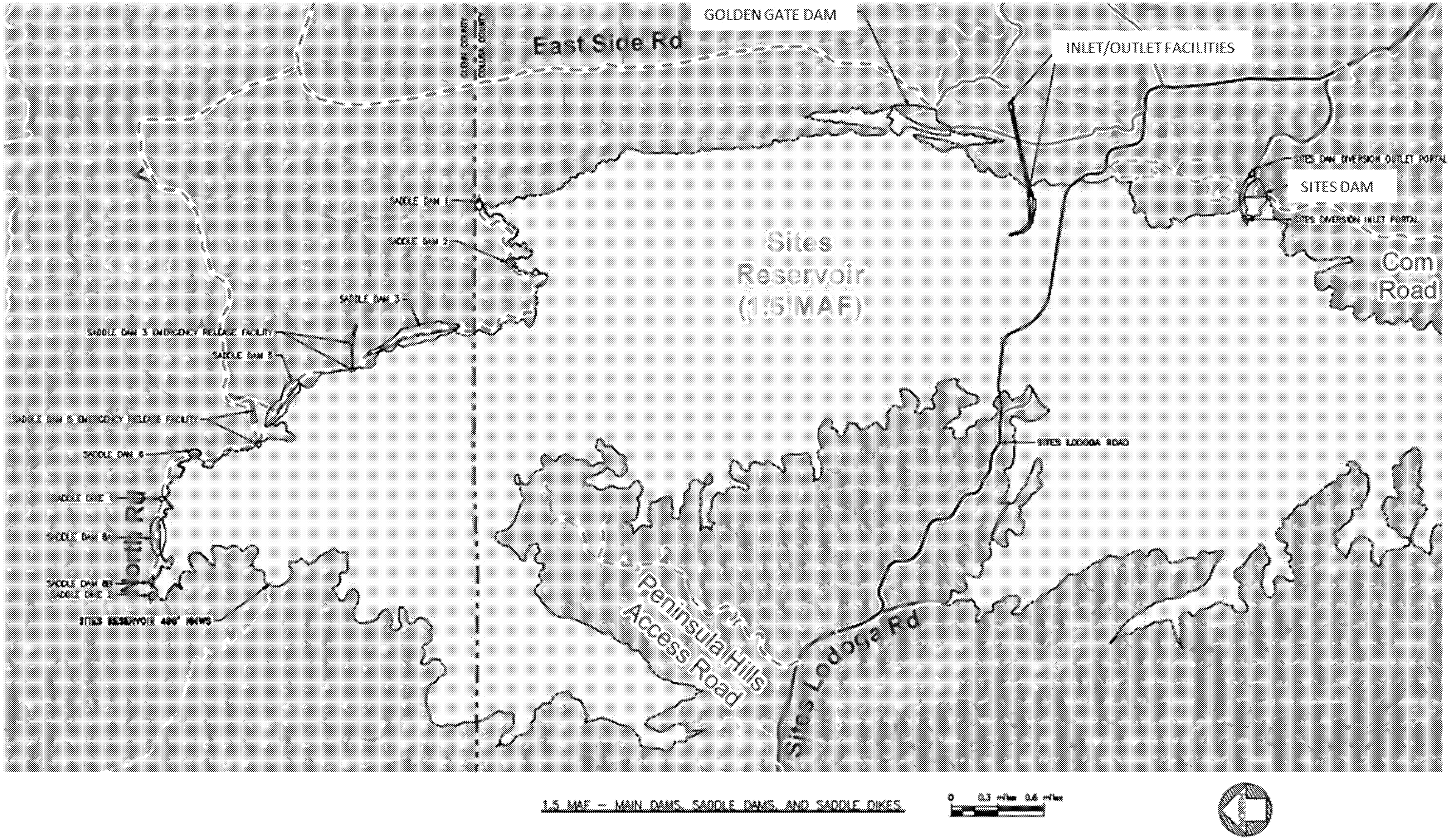

Figure1-1. Alternative 1 Reservoir

[redacted]

The key dimensions of the facilities are included in Table 1-2.

- Main Dams, Saddle Dams and Dikes, and Reservoir Rim: The Sites Reservoir dams include two main dams, Golden Gate Dam on Funks Creek and Sites Dam on Stone Corral Creek, and saddle dams and dikes on the reservoir rim on tributaries to the Hunters Creek drainage.
- Spillway: This structure is a concrete overflow spillway located at Saddle Dam 8B that would discharge into Hunters Creek to the north.
- I/O Works: These facilities include a vertical tower with multiple intake levels connected to two inlet/outlet tunnels. These provide for normal reservoir operation and for making the major portion of emergency reservoir releases that will be required by DSOD as part of dam permitting. The tunnels connect to reservoir conveyance pipelines (HC) at the downstream tunnel portal.
- Sites Dam Outlet Works: This outlet works tunnel would be located in the north abutment of Sites Dam; it would be used initially for construction diversion for both main dams and subsequently for stream maintenance and a portion of the emergency reservoir releases to Stone Corral Creek after construction.
- Emergency Release Structures: These structures provide emergency release capacity to supplement the release capacities at the I/O Works and Sites Dam tunnel. They include intakes and tunnels located at Saddle Dams 3 and 5 for Alternative 1 only; they would discharge to Hunter's Creek tributaries on the north side of the reservoir.
- Roads: Roads include local roads (recreational use and public access), maintenance roads, and construction access roads.
- Bridges: Two bridges crossing the reservoir (lengths of 1,400 feet and 1,633 feet for the west bridge and east bridge, respectively) with fill prisms, providing an east-west connection from rural communities of Maxwell, Lodoga, and Stonyford for Alternative 1 only. For Alternative 2, there will be a southern road alignment around the south end of reservoir, providing an east-west connection from Maxwell to the rural communities of Lodoga and Stonyford.

Table 1-2. Reservoir Facility Descriptions

Reservoir Elevation at full pool (feet)	498.0
Reservoir Area at full pool (acres)	13,200
Dam / Dike Crest Elevation (feet) (without camber)	517.0
Main Dams	2 main dams – see below
Saddle Dams	7 saddle dams and 2 saddle dikes – see below
Dam / Dike:	Max. Ht. Above Streambed / Crest Length (ft)
Golden Gate Dam	287 / 2,221
Sites Dam	267 / 781
Saddle Dam 1	27 / 318
Saddle Dam 2	57 / 250
Saddle Dam 3	107 / 3,422
Saddle Dam 5	77 / 1,894
Saddle Dam 6	47 / 362
Saddle Dam 8A	82 / 1,300
Saddle Dam 8B	37 / 475
Saddle Dike 1	12 / 122
Saddle Dike 2	12 / 198
Saddle Dike 3	Not required
I/O Tower	Top elev. 558 ft. 258 ft high / 7 elevations to draw water from reservoir
I/O Tunnels	Approx. 3,110 ft long/Dual 23 ft Internal diameter tunnels
Sites Diversion/Outlet Tunnels	Approx. 1,590 ft long/12 ft internal diameter tunnel
Emergency Release System (on north rim)	Two emergency release systems located at Saddle Dams 3 and 5
Spillway	Weir crest length = 85.5 feet, crest elevation = 504 feet

ft = feet
I/O = Inlet/outlet works
MAF = million acre feet

1.2 Purpose and Scope

The purpose of this task is to prepare a description of the inspection and O&M activities associated with each of the HR project facilities. This TM also includes a general description of the dam safety monitoring program, including instrumentation, monitoring seismic activity and maintenance. This task supports the Sites Project Feasibility Report, but does not purport to be a detailed inspection and O&M manual that would be used for the constructed facilities.

1.3 Limitations

The scope of work for this TM was restricted to the development of the inspection and O&M activities for the Sites Reservoir under the Reservoir (HR) contract. O&M for the conveyance facilities are separately considered in a companion TM for the HC contract.

AECOM represents that our services were conducted in a manner consistent with the standard of care ordinarily applied as the state of practice in the profession, within the limits prescribed by our client.

2 Inspection and O&M for HR Facilities.

Table 2-1 presents a simplified summary of inspection and O&M for the HR facilities for the dams, spillway, inlet/outlet works (I/O), high-level emergency release structures, roads, and bridges. Table 2-1 shows the estimated frequency and the level of labor and equipment that may be needed for inspection and O&M. This table was also used for estimating the annualized costs for inspection and O&M.

3 Dams, Abutments, Rim and Spillway

3.1 Inspection

3.1.1 <u>Visual Inspections</u>

Visual inspections are an integral part of evaluating the performance of the dams. Systematic visual inspections of the dams will be required once filling has commenced. The visual inspections will be carried out by walking a prescribed route at the dams. Visual observations include, but are not limited to, the following:

- Deformation and Cracking: Cracks, bulges, alignment deviations in the crest, depressions, sinkholes, slides.
- Seepage: Seepage at the downstream face or abutments, turbid or cloudy seepage, evidence of piping (internal erosion of embankment or foundation materials) or transport of materials.
- Surface Conditions: Erosion gullies, excessive vegetation that can obscure observation, rodent burrows, debris, and condition of the riprap on the upstream face of the dams
- Rim observations would include erosion or slumps on the reservoir side and seeps or slumps on the outboard side of the rim.

If unusual conditions are observed, more frequent visual inspections (such as daily) and further investigation of that condition would be undertaken. Also, more frequent visual inspections would be performed after earthquakes that are felt in the site or after major rain storm events. Instrumentation data would also be monitored and recorded more frequently after earthquakes. Monitoring would include more frequent data recording for seepage to check for increased flow, and the piezometers would be read more frequently. Action items, such as needed repairs or follow-up on specific inspections, will be identified and brought to the attention of engineers.

Dams and abutments inspection frequencies are presented in Table 2-1.

[redacted]

Table 2-1. Summary of Inspection and O&M for HR Facilities

Feature	Inspection or O&M Est. Frequency / Duration	No. of Staff & Type	No. of Pick-up Trucks / Equipment as noted
1. Dams and Abutments	**Inspection:** First 5 years, daily / 1 day Years 6-10, weekly / 1 day Years 11 – onward,-monthly / 1 day **O&M:** Annually / 4 days	 6 inspectors 6 inspectors 6 inspectors 2 inspectors 2 laborers 2 operators 2 truck drivers	 6 (pick-up trucks) 6 6 4 pick-up trucks; 2 each dump trucks, backhoes, light walk-behind compactors, with operators
Monument surveys (by subcontractor)	**Inspection (Surveys):** Semi-annually / 2 days	1 crew chief 5 techs	6 pick-up trucks; Survey/GPS instruments
Replace instrumentation (by subcontractor)	**O&M:** 25 years / 25 days each time	2 inspectors 2 drill rig operators 2 drill helpers 2 laborers	4pick-up trucks; 2 rotary drill rigs, 2 flat-bed supply trucks, with operators
[redacted]			
2. Reservoir Rim and Spillway	**Inspection:** First 5 years, weekly / 2 days Years 6-10, quarterly/2 days > 10 years, monthly / 2 days **O&M:** Annually / 4 days	 2 inspectors 2 inspectors 2 inspectors 2 inspectors 2 laborers 2 operators 2 truck drivers	 2 + ATV 2 +ATV 2 +ATV 4 pick-up trucks; 2 each dump trucks, backhoes, light walk-behind compactors, with operators
[redacted]			
3. Inlet/Outlet Works, Sites Dam Outlet and Emergency Release Structures	**Inspection:** First 5 years, weekly / 2 days Years 6-10, monthly/2 days >10 years, quarterly / 2 days **O&M:** Annually / 4 days	 2 inspectors 2 inspectors 2 inspectors 2 inspectors 2 laborers	 2 2 2 2 2
Mechanical equipment/gates/valves (by subcontractor)	**Inspection:** Semi-annually / 1 day >6 years, annually/2 days 5 years for tunnel ROV / 8 days **O&M:** 25 years / 8 days each time	 2 inspectors 2 inspectors 4 inspectors 1 foreman 2 laborers 3 operators	 2 2 4 4 pick-up trucks; crane to lift valves, 1 flat-bed truck to haul valves for refurbishment & return with refurbished valves, with operators

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]
4. Roads – Sites Lodoga Road Causeway Local Roads Main. Roads	**Inspection:** Years 1-5, 3 months/2 days >5 years, 6 months / 2 days **O&M:** Every 3 years / 2 days	 1 inspector 1 inspector 2 inspectors 2 laborers 2 operators 2 drivers	 1 1 4 pick-up trucks; 2 each dump trucks, backhoes, light walk-behind compactors, with operators
[redacted]	[redacted]	[redacted]	[redacted]
5. Bridges	**Inspection:** Monthly / 1 day **O&M:** Annually / 2 days	 2 inspectors 1 inspector 3 laborers 1 operator	 2 4 pick-up trucks, cherry pick crane & operator

1. Routine O&M (Maintenance, Management, Repair, and Operation) for feasibility study O&M cost estimate (AACE Class 5).
2. Engineer inspection report preparation:
   Initial filling, assume first 5 years (can vary greatly): assume 80 hours/month for 5 years
   Long-term: assume 160 hours/year after end of year 5
3. Additional HR O&M staff that would be involved, assume: 1 records admin. assistant (2 hrs/day); 2 O&M maintenance staff (2 hrs/day each).

3.1.2 Instrumentation Data and Monitoring

Instrumentation will be installed in the dam embankment and foundation, downstream of the dam, and in the abutments. The primary objective of the instrumentation is to provide data to evaluate whether the dam is performing as expected and to warn of changes that could impair dam safety.

Instrumentation data will initially be used to evaluate the behavior of the dam during the first filling of the reservoir and whether conditions are consistent with the design assumptions. During long-term operation of the project, instrumentation data will also be used to monitor the performance of the dam. As data are compiled, trends under normal operation will be established, and the significance of variations under unusual events or loads, such as earthquakes, can be evaluated.

Instrumentation will be installed to enable monitoring of the following performance parameters:

- Piezometer Water Levels: Water levels within the downstream shell zone, will be monitored to check for potential saturation of the shell zone. Water levels for foundation piezometers will be monitored to check piezometric pressures in the foundation.
- Seepage (Seepage weirs): Seepage rates will be measured at the dam toe to check for potential internal problems in the dam. In addition, clarity or turbidity of the seepage will be monitored; turbid seepage could indicate piping. Turbidity indicates that material is migrating from the foundation and/or from the dam embankment.
- Embankment Movement (Inclinometer and survey monuments): Horizontal and vertical surface movements of the embankments will be monitored by surveys to check for settlement and deformation. Horizontal movements of the embankment will also be monitored with an inclinometer.
- Earthquake Accelerations (Accelerographs): Accelerations at the dam crest and left abutment will be measured by accelerographs.
- Reservoir Level: Reservoir levels will be monitored to correlate with seepage and piezometric data.

The data recording frequencies are indicated in Table 2-1 and would be increased of any if the of the following is observed:

- Unusual conditions are observed during visual inspections.

- Rapidly changing instrumentation data are recorded.
- Established trends in data change.
- Piezometer readings exceed pre-established levels.
- After earthquakes that trigger at least one of the accelerographs or are felt at the dam site.
- After major rainstorms.

3.2 Maintenance

Maintenance of the dams will include:

- Standard maintenance:
  - Trim vegetative growth on the downstream face of the dam, abutments, and the toe on a regular basis.
  - Clear the spillway channels of trees and shrubs.
  - Clean out and fill rodent holes with hand-tamped sandy gravel materials.
  - Repair erosion rills.
  - Clean out any debris on the downstream face, abutments, access road ditches, approach channel to the Saddle Dam 8B spillway structure.
- Following any major rain storm event:
  - Observe the downstream face of the dam for signs of erosion, and repair any erosional features.
  - Observe culverts for blockage, and clear as necessary.

4 Inlet/Outlet Works and Sites Dam Outlet

4.1 Inspection

Trained operators will conduct periodic inspections of the Inlet/Outlet Works at Golden Gate Dam and the Outlet Works at Sites Dam. Inspections of the intake/outlet works would include the following:

- Checking gates, valves, screens and operators for leaks, corrosion, rust, or unusually large vibrations.
- Actuating gates and valves periodically to confirm functionality without unnecessary discharges.
- Inspecting concrete structures and lining for significant cracks, areas of spalling, voids, and joints.
- Inspecting Stone Corral creek channel for erosion.

Inundated infrastructure, such as the inlets and tunnels, will likely be inspected with remotely operated vehicles (ROVs). Above-ground infrastructure, such as the Sites Dam outlet structure, can be inspected by crews and operators.

4.2 Maintenance

Regular maintenance of the screens at the I/O tower or Sites inlet is not anticipated. However, at the I/O tower they should have any accumulated debris scraped off of them once they are hoisted above the water surface. For all instrumentation and electrical components, routine maintenance such as calibration or testing, should be performed as stated in the manufacturer's O&M manuals. Refurbishment or replacement of gates and valves, both at the I/O tower and Sites inlet and outlet structures, would need to occur periodically as noted in Table 2-1.

If inspections of concrete structure and linings reveals significant defects, maintenance will be required to repair or replace concrete as needed.

4.3 Operation

During typical operations the I/O ports at the tower will be opened based on inflow/outflow demands, port submergence considerations, and desired water quality characteristics (e.g. temperature, dissolved oxygen, etc.). The Sites Dam outlet will typically have a valve open to convey instream beneficial releases to Stone Corral Creek, in accordance with environmental requirements.

In an emergency situation both the I/O works and the Sites Dam Outlet will be operated to drawdown the reservoir according to DSOD emergency drawdown requirements.

5 High Level Emergency Release Structures

5.1 Inspection

Trained operators will conduct periodic inspections of the high-level emergency release structures. Inspections would include the following:

- Checking gates, valves, and operators for leaks, corrosion, rust, or unusually large vibrations.
- Actuating gates and valves periodically to confirm functionality without discharging flows.
- Inspecting concrete structures and lining for significant cracks, areas of spalling, voids, and joints.
- Inspecting Stone Corral creek channel for erosion (following emergency releases).

Inundated infrastructure, such as the inlets and tunnels, will likely be inspected with ROVs. Above-ground infrastructure, such as the outlet structures, can be inspected by crews and operators.

5.2 Maintenance

Trashracks should periodically have any accumulated debris scraped off of them. For all instrumentation and electrical components, routine maintenance such as calibration or testing should be performed as stated in the manufacturer's O&M manuals. Refurbishment or replacement of gates and valves would need to occur periodically as noted in Table 2-1.

If inspections of concrete structure and linings reveals significant defects, maintenance will be required to repair or replace concrete as needed.

5.3 Operation (Emergency)

In an emergency situation the high level emergency release structures will be operated to drawdown the reservoir according to DSOD emergency drawdown requirements.

6 Roads

6.1 Functional Classification

The maintenance level assigned to a road considers the road functional classification, traffic volume, road condition, surface type, travel speed, user comfort and convenience, user safety, budget constraints, and environmental concerns.

Three types of roads have been defined for this Sites Reservoir project to provide for three functions: Local Access, Construction Access, and Maintenance Access. Local Access roads are Colusa County and Glenn County roads used for conveyance of the general traveling public. These roads will be maintained by the agency having jurisdiction of the roadway. Construction Access roads are specific to construction equipment/material transport and utilize Local Access roads in part.

6.2 Operations

6.2.1 <u>Local Access Roads</u>

The Local Access Road classification is assigned to roads that provide a high degree of user comfort and convenience. These roads are two lanes with shoulders, paved facilities and have the following attributes:

- Provides a high degree of user comfort and convenience for drivers in a standard passenger car (daily and during temporary construction operations)
- Provides smooth road surface, free of obstructions and debris
- Inspires confidence in the driver's expectations that hazards will be few and identified well in advance with clear visibility.
- Provides a visually pleasing roadway.
- Provides driver guidance and follows the requirements of the "Manual on Uniform Traffic Control Devices" (MUTCD) for signs and markings.
- Operates with higher traffic volume and speeds.
- Provides drainage via culverts.
- Functions as an arterial or collector.
- Provides a smooth paved road surface with lane striping and defined shoulders
- Operates as an access controlled facility
- Maintained by the local agency having jurisdiction – Glenn or Colusa Counties

6.2.2 Maintenance Access Roads

Maintenance Access Roads The Maintenance Access Road classification is assigned to roads open and maintained for travel by a driver in a standard passenger car. User comfort and convenience are not considered priorities. These roads have restricted access (maintenance personnel and adjacent landowners) are often unpaved gravel roads and have the following attributes:

- Are passable to drivers in passenger cars.
- Usually do not consider user comfort and convenience priorities.
- Are subject to the requirements MUTCD for signs.
- Provides a single lane with turnouts visible from either direction.
- Operates typically at low speeds.
- Functions as a local or collector.
- Operates with low- to moderate-traffic volume.
- Provides drainage via a combination of dips and culverts.
- Typically, may have wash-boarding.

6.3 Inspection and Maintenance

6.3.1 Local Access Roads Maintenance

Maintenance of Local Access roadways will be the responsibility of the local agency having jurisdiction of the roadway – Glenn or Colusa Counties.

Traveled way and shoulders. Maintain to provide for the protection of investment and resource values, and for a high degree of user comfort and convenience for all motor vehicles including standard passenger cars.

Drainage. Drain as necessary to keep drainage facilities functional and prevent unacceptable environmental damage while maintaining a high degree of user comfort and convenience.

Roadway. Control vegetation to provide sight distance. Repair and/or remove slides, slumps and debris to provide passage by the traveling public and to control resource damage. Surface repair includes pothole patching, crack sealing, chip sealing and removal of unsuitable material.

Roadside. Clean up litter in accordance with road management objectives. Remove trees that threaten safety to the general public and maintain vegetation as required. Cut and remove fallen trees for appropriate horizontal clearance. Remove debris and maintain fencing. Remove graffiti from roadside signs and barrier rails.

Structures. Maintain all structures (e.g., culverts) to provide for passage of traffic and to preserve structures for future use. Remove graffiti from columns, barrier rails, etc..

Traffic service. Install and maintain appropriate route markers, warning, regulatory, and guide signs, and other traffic control devices as warranted in a sign plan. Maintain centerlines, edge stripes, and other pavement and curb markings as needed.

Maintenance Cycle. Typically, annually.

6.3.2 <u>Maintenance Access Roads Maintenance</u>

Maintenance Access roads are specific for the use to maintain facilities. Maintenance of Maintenance Access roadways would be the responsibility of the Sites Authority, unless used by the contractor; then maintenance responsibility would be that of the contractor until the Authority takes ownership.

Traveled way and shoulders. Maintain to provide travel by drivers in standard passenger cars. Some surface roughness is acceptable. Maintain a traveled way crown or cross slope to provide adequate drainage. Replace the base course and surfacing as needed to protect the resources.

Drainage. Drain as necessary to keep drainage facilities functional and prevent unacceptable environmental damage while maintaining passage for drivers in standard passenger cars.

Roadway. Control vegetation to provide sight distance. Repair and/or remove slides, slumps and debris to provide passage by the traveling public and to control resource damage. Blade surface to maintain template and drainage. Surface is compact, crowned or sloped to drain without segregation of surface materials – no ruts or rills. Suitable material is recovered and incorporated. Unsuitable material is removed. Surface repair may include pothole patching, crack sealing, chip sealing and removal of unsuitable material.

Roadside. Clean up litter in accordance with road management objectives. Remove trees that threaten safety and maintain vegetation as required. Remove logs and debris when interfering with drainage or operation of maintenance equipment. Remove debris and maintain fencing. Remove debris and maintain fencing. Remove graffiti from roadside signs and barrier rails.

Structures. Maintain all structures (e.g., culverts) to provide for passage of traffic and to preserve structures for future use. Remove graffiti from columns, barrier rails, etc..

Traffic service. Install and maintain appropriate route markers, warning, regulatory, and guide signs and other traffic control devices as warranted in a sign plan.

Maintenance Cycle. Typically, 3 years.

7 Bridges

7.1 Inspection and Maintenance

It is assumed that County would be providing maintenance services generally in response to a problem on a bridge that affects public safety or the structural integrity of the structure. However, for periodic engineering Inspections, County would have arrangements with Caltrans to perform Inspection and Maintenance services. Caltrans "Maintenance Manual, Chapter H" is therefore used primarily in listing the below information. It is anticipated that the County will periodically re-surface and re-stripe the bridge. Signage may also be replaced and guardrails may be painted.

7.2 Inspections by Caltrans Area Bridge Maintenance Engineers

To comply with federal regulations, bridge structures would be periodically inspected by Caltrans Structures and Bridge Maintenance (SM&I) Area Bridge Maintenance Engineers (ABME), and more frequently when the need is determined by the ABME. Work recommendations are made for any corrective actions required.

When work recommendations are made, the recommendations will suggest the work be done either by contract or by maintenance crews. These recommendations are for guidance and the County has the flexibility to accomplish the work by any means available. However, it should be noted that many of the repair recommendations affect structural components and are engineered solutions. Therefore, the repair recommendations, methods, and procedures would need to be followed. Often, the ABME will require assistance from the County crews to perform the bridge Inspections. Each work recommendation is identified by action type, target completion time, and accompanied by an estimated cost to do the work. SM&I staff would be contacted if assistance is needed in marking work complete.

7.3 Inspections by County Maintenance

Periodic walk through inspections would be made by County to detect obvious defects, hazards or potential problems and also to monitor known problems. The purpose of these inspections is to supplement the more detailed, but less frequent inspections by the ABME. Special attention should be given to any condition that affects the safety and/or structural capacity. If there is a question as to the relevance of a structural condition, the ABME would be notified.

When major defects or hazards are found, they would be immediately reported to SM&I. If an emergency condition exists, appropriate action would be taken as soon as possible to provide for public safety and to prevent further structural damage from occurring. This includes, but is not limited to, restricting traffic on the bridge or closing it completely, installing temporary support systems, or making temporary repairs. After a major storm, earthquake, or other natural event that may cause damage to bridges, the County would inspect all bridges in the affected area for signs of damage. Any damage found should be reported to SM&I.

7.4 Post-earthquake Inspections

Post bridge earthquake inspections will be conducted under the direction of SM&I ABME's, and Structure Construction Engineers depending on the level of intensity and extent of damage. SM&I would be notified of any earthquake-related damage.

An earthquake of less than 5.5 magnitude is considered too low to cause bridge damage. Although unexpected, any earthquake related damage found by County Maintenance personnel would be reported to SM&I in Sacramento. For earthquake magnitudes higher than 5.5 magnitude, ABME's team would carry out inspections.

7.5 Minor Defects

Minor defects are those that can be corrected with little or no risk of structure collapse or rendering of damage to adjacent or related members while making repairs or replacements and include the following:

- Damaged or misplaced clearance markers.
- Damaged or missing advisory and warning signs
- Damaged or deteriorated railings
- Uneven or cracked approach and deck surfacing.
- Joint Seals
- Accumulated drift adjacent to bents and piers.
- Minor erosion.
- Accumulated dirt or debris on decks
- Plugged drains.
- Settlement or roughness of approach.
- Fire hazards.
- Faulty electrical contacts

7.6 Major Defects

Some defects are considered major because they involve individual members that affect the structural stability of an entire span, thus requiring underpinning of the span or supplementing of the member before removal and include:

- Bent or damaged girders
- Cracked or spalled concrete members
- Defective bearings
- Joint Seal Assemblies
- Settled bents or piers
- Major erosion or scour
- Extensive fire damage

8 Annualized Cost of Operations and Maintenance

To be done yet

Ref: Appendix A. Estimated O&M Costs

9 Equipment Use Tables for O&M

AQ tables submitted

Ref: Appendix B. Equipment Use Tables for O&M

10 References

From: Jerry Brown [jbrown@sitesproject.org]
Sent: 2/16/2021 9:21:25 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: Discussion of the Lead Negotiator and Team
Attachments: 03-02-Permitting-and-Agreement-List-and-Timing-1.pdf

Flag: Follow up

Do we need to re-evaluate any of the other assignments in this list besides the DWR negotiations? I'm not really having any role in the development of the biological assessment. Should I be?

From: Marcia Kivett <MKivett@sitesproject.org>
Date: Tuesday, February 16, 2021 at 8:40 AM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: Discussion of the Lead Negotiator and Team

Sites

Topic: **Authority Board Agenda Item 3.2** **2020 August 26**

Subject: **Permitting and Agreement List**

Requested Action:

Review and comment on Permitting and Agreement List.

Detailed Description/Background:

In June 2020, the Reservoir Committee and Authority Board approved an Approach to Permit and Agreement Negotiations for Environmental Planning, Permitting and Operations activities. This approach identified a process for managing the negotiations of permit and operating agreement terms and conditions with state and federal agencies.

Staff has developed the attached listing of key permits and agreements for the environmental planning, environmental permitting and reservoir operations activities to: (1) provide a quick reference on staff / member contacts for different agreements and (2) begin to plan and manage workload and efforts for staff and members participating in permitting / agreement negotiations. This listing focuses on those permits and agreements through the end of calendar year 2021. The listing identifies permit / agreement, purpose / key components anticipated to be addressed in the permit / agreement, negotiations timeframe, lead negotiator, negotiations team and the work group involved. Lead negotiators are identified for all activities to plan workload for staff. Negotiations teams are identified for the permitting and agreement efforts that are underway. Additional negotiations teams will be identified as activities are initiated.

The listing will be updated periodically as needed.

Prior Action:

June 2020: Approved an Approach to Permit and Agreement Negotiations, Environmental Planning, Permitting and Operations which identified a process for managing the negotiations of permit and operating agreement terms and conditions with state and federal agencies.

Fiscal Impact/Funding Source:

Sufficient funding exists within the approved work plan (budget) to cover the cost associated with conducting the negotiations planned in the period.

Staff Contact:

Ali Forsythe

Attachments:

Attachment A: Environmental Planning, Environmental Permitting, and Reservoir Operations Permits and Agreements - Lead Negotiator and Negotiations Team, Dated August 12, 2020

Environmental Planning, Environmental Permitting, and Reservoir Operations Permits and Agreements
Lead Negotiator and Negotiations Team
Focused on Activities Thru End of 2021
Draft – August 12, 2020

Permit / Agreement	Agency With	Purpose / Key Components Addressed*	Negotiations Timeframe	Tiered from EIR/EIS	Lead Negotiator*	Negotiations Team	Work Group
Sites / Reclamation Operations Agreement	Bureau of Reclamation	1. Coordination of Sites water deliveries with Reclamation's operation of the Central Valley Project (CVP) 2. Exchanges with Shasta and Folsom reservoirs (Within Year and Real-time) 3. Sites water accounting in the context of the Coordinated Operations Agreement for the CVP and State Water Project (SWP) 4. Conveyance and operational losses 5. Exchanges and transfers from Sites-participants to non-Sites CVP contractors 6. Water rights and point of delivery considerations 7. Note, need to determine if this agreement will also cover Warren Act contract, modifications to Federal Facilities (Funks, turnout for Dunnigan pipeline, etc.), and land license / lease of lands (for any facilities located of Federal lands). Might be best to have these as separate agreements as there are separate standard form of contracts and requirements for these in Reclamation.	Now thru Spring 2022 Term Sheet 6/2021 Final Agreement Spring 2022	Yes	Jerry Brown (lead) and Erin Heydinger	Cinda Kao Rob Kunde Randall Neudeck Dan Ruiz Jeff Sutton	Ops and Engineering

Permit / Agreement	Agency With	Purpose / Key Components Addressed*	Negotiations Timeframe	Tiered from EIR/EIS	Lead Negotiator*	Negotiations Team	Work Group
Sites / State Operations Agreement	Department of Water Resources	1. Coordination of Sites water deliveries with DWR's operation of the SWP 2. Exchanges with Oroville reservoir 3. Sites water accounting in the context of the Coordinated Operations Agreement for the CVP and SWP 4. Conveyance and operational losses 5. Exchanges and transfers from Sites-participants to non-Sites SWP contractors 6. Water rights and point of delivery considerations	Now thru Spring 2022 Term Sheet 6/2021 Final Agreement Spring 2022	Yes	Ali Forsythe (lead) and Erin Heydinger	Same team as Sites / Reclamation Operations Agreement	Ops and Engineering
Plan of Finance (placeholder)	Sites Reservoir Committee	1. Governance and Policy Oversight 2. Delegation of Authority 3. Allocation of capital costs and operating costs (fixed and variable, beneficiary pays) 4. Definition of project vs. non-project costs 5. Storage as a benefit (consistent with the Storage Policy) 6. Definition of water marketplace 7. Conflict resolution	11/2020 thru Spring 2022 Term Sheet 6/2021 Final Agreement Spring 2022	Must be consistent with and cant be signed until CEQA completed	JP Robinette		TBD
Sites / GCID Operations Agreement	Glenn Colusa Irrigation District (GCID)	1. Use of GCID facilities 2. Operations and maintenance responsibilities 3. Roles and responsibilities between the Authority and GCID 4. Costs and payments 5. Modification to GCID facilities (here or separate?)	1/2021 thru Spring 2022 Term Sheet 6/2021 Final Agreement Spring 2022	Must be consistent with and cant be signed until CEQA completed	JP Robinette (lead) and Kevin Spesert		Ops and Engineering and Lands Management
Sites / TCCA Operations Agreement	Tehama-Colusa Canal Authority (TCCA)	1. Use of TCC facilities 2. Operations and maintenance responsibilities 3. Roles and responsibilities between the Authority and TCCA 4. Costs and payments 5. Modification to TCC facilities (here or separate?) Who has authority to grant use and modification permissions (TCCA or Reclamation)? Need to determine how this agreement dovetails with Reclamation Warren Act contract, facility modification agreement, and land license.	1/2021 thru Spring 2022 Term Sheet 6/2021 Final Agreement Spring 2022	Must be consistent with and cant be signed until CEQA completed	JP Robinette (lead) and Kevin Spesert		Ops and Engineering and Lands Management

Permit / Agreement	Agency With	Purpose / Key Components Addressed*	Negotiations Timeframe	Tiered from EIR/EIS	Lead Negotiator*	Negotiations Team	Work Group
Biological Assessment	Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service	1. Compliance with Federal ESA requirements for construction and operations, including incidental take of listed species 2. Compliance with related statue such as the Migratory Bird Treaty Act, Magnuson Stevens Fishery Conservation and Management Act, etc.	9/2020 thru early 2022 Submit BA 6/2021 BO target late 2021	Yes	Jerry Brown		Enviro Planning and Permitting
Eagle Take Permit	Bureau of Reclamation and U.S. Fish and Wildlife Service	Compliance with the Bald and Golden Eagle Act	9/2020 thru early 2022 Submit Application 6/2021 Permit target late 2021	Yes	Jerry Brown		Enviro Planning and Permitting
State Incidental Take Permit – Operations	CA Department of Fish and Wildlife	Compliance with State ESA (Section 2081.1 of Fish and Game Code) for operations, including incidental take of listed species	9/2020 thru late 2022 Submit Application 12/2021 ITP target late 2022	Yes	Jerry Brown		Enviro Planning and Permitting
State Incidental Take Permit – Construction	CA Department of Fish and Wildlife	Compliance with State ESA (Section 2081.1 of Fish and Game Code) for construction, including incidental take of listed species	9/2020 thru late 2022 Submit Application 12/2021 ITP target late 2022	Yes	Jerry Brown		Enviro Planning and Permitting

Permit / Agreement	Agency With	Purpose / Key Components Addressed*	Negotiations Timeframe	Tiered from EIR/EIS	Lead Negotiator*	Negotiations Team	Work Group
Section 106 Programmatic Agreement	Bureau of Reclamation; State Historic Preservation Officer; Tribes	Compliance with Section 106 of the National Historic Preservation Act thru completion of a Programmatic Agreement	9/2020 thru 12/2021	Yes	Kevin Spesert		Enviro Planning and Permitting
AB 52	Tribes	Compliance with AB 52	Now thru end of EIR effort (Spring 2022)	Yes	Kevin Spesert	Same as Section 106	Enviro Planning and Permitting
Water Right Permit	State Water Resources Control Board	Compliance with California Water Code	9/2020 thru end of 2022	Yes	Ali Forsythe		Enviro Planning and Permitting
Clean Water Act Section 404 and River and Harbors Act Section 10	Army Corps of Engineers	Compliance with Clean Water Act Section 404 for construction and operations	9/2020 thru end of 2022	Yes	Ali Forsythe		Enviro Planning and Permitting
Clean Water Act Section 401 and 402 (NPDES Permit) and Porter Cologne Water Quality Control Act	State Water Resources Control Board	Compliance with Clean Water Act Section 401 and 402, and the Porter Cologne Water Quality Control Act	9/2020 thru end of 2022	Yes	Ali Forsythe	Same as 404	Enviro Planning and Permitting
Rivers and Harbor Act, Section 14 (USC Section 408), if needed	Army Corps of Engineers	Compliance with River and Harbors Act Section 408 for actions in and near a Federally-authorized flood control project	9/2020 thru end of 2022	Yes	Ali Forsythe		Enviro Planning and Permitting
Central Valley Flood Protection Board Encroachment Permit	Central Valley Flood Protection Board	Compliance with Title 23 of the California Code of Regulations (CCR Title 23, Div 1 Central Valley Flood Protection Board (July 2014))	9/2020 thru end of 2022	Must be consistent with and cant be signed until CEQA completed	Ali Forsythe	Same as Rivers and Harbor Act Section 14	Enviro Planning and Permitting
Sites/Colusa Basin Drain (CBD) entities and landowners	???	1. Use of CBD for conveyance 2. Operations and maintenance responsibilities 3. Roles and responsibilities between the Authority and CBD entities and landowners	9/2020 thru end of 2022	Must be consistent with and cant be signed until CEQA completed	JP Robinette (lead) and Kevin Spesert		Ops and Engineering / Lands Management

Permit / Agreement	Agency With	Purpose / Key Components Addressed*	Negotiations Timeframe	Tiered from EIR/EIS	Lead Negotiator*	Negotiations Team	Work Group
WSIP Public Benefits – Biological	CA Department of Fish and Wildlife	Comply with Prop 1 requirements for public benefits	1/2021 thru end of 2022	Must be consistent with and cant be signed until CEQA completed	Ali Forsythe		Enviro Planning and Permitting
WSIP Public Benefits – Flood and Recreation	CA Department of Water Resources	Comply with Prop 1 requirements for public benefits	1/2021 thru end of 2022	Must be consistent with and cant be signed until CEQA completed	Ali Forsythe		Enviro Planning and Permitting
2022 and Beyond Permits (Would need to verify the need for some of these depending on final alternative selected)							
Lake and Streambed Alteration Agreement	CDFW	Comply with Section 1600 of Fish and Game Code			Ali Forsythe		Enviro Planning and Permitting
State Land Use Lease (Need TBD)	California State Lands Commission	Work on sovereign land; specifically, below OHWM of Sacramento River			Ali Forsythe		Enviro Planning and Permitting
SMARA mining permit	Glenn and Colusa Counties	Borrow pitting exceeding 1 acre or removal of more than 1,000 cubic yards of material			Ali Forsythe		Enviro Planning and Permitting
Plan Approval	DWR- Div. of Safety of Dams	Water Code, Div. 3, Part 1 & 2			Henry Luu		Ops and Engineering
Permit to Construct/Operate	Air Districts	Warren-Alquist Act and Clean Air Act			Ali Forsythe		Enviro Planning and Permitting
Encroachment Permits	Caltrans	Allow construction and operations of facilities that impact state highways			Henry Luu		Enviro Planning and Permitting

* Per the approved approach the lead negotiator is the Executive Director, except where delegated. In making these assignments, the Executive Director has established expectations for managing the process, coordinating/communicating with the negotiations team and the Boards, and coordinating with other activities. These assignments are subject to change by the Executive Director.

Draft Feasibility Design Basis of Estimate

Sites Reservoir Project

HC Conveyance Facilities

Prepared for

Sites Project Authority

February 3, 2021

JACOBS

Contents

Acronyms and Abbreviations

AACEI	Association for the Advancement of Cost Engineering International
GC	General Conditions or General Contractor
NTP	Notice to Proceed
VE	Value Engineering

1 Executive Summary

1.1 Project Overview

The Sites Reservoir Project consists of a large reservoir, ancillary roads, and conveyance facilities. The Sites Project Authority decided to segregate the design of these facilities into an HR (Segment H Reservoir) segment that is responsible for the design of the reservoir features, including several dams, inlet/outlet tunnels at Golden Gate Dam, as well as relocation of roads displaced by the reservoir. The other segment is known as the HC (Segment H Conveyance) segment and consists of improvements to the two existing diversion canals from the Sacramento River to the Project Area (Tehama-Colusa Canal and Glenn-Colusa Irrigation District Main Canal), regulating reservoirs (existing Funks Reservoir and new Terminal Regulating Reservoir), two pumping/generating plants (PGP), large-diameter pipelines from each PGP to Sites Reservoir, and a large-diameter pipeline to convey water from the Tehama Colusa Canal (TCC) to the Colusa Basin Drain or Sacramento River near Dunnigan, California.

TABLE NUMBER 1.1
Project Overview
Estimate Information

Estimate Classification:	Class 4
Requested By:	Sites Project Authority
Estimated By:	Nick Cavalleri/Robert Wells - Jacobs
Estimate Date	February 3, 2021

1.2 Overall Costs

This executive summary provides an overview of the HC Cost Estimates. The Overall Cost Table 1.2 is the summary of the HC Cost Estimates dated March 2021. Overall Cost Table 1.3 is the summary of the HC Cost Estimates de-escalated to July 2019 using the U.S. Bureau of Reclamation Construction Cost Trends (base 1977 = 100 for indexing field costs only). The composite trend indices for April 2021 and July 2019 were used to adjust the cost to 2019 dollars. The de-escalation was 3% for that time period. Reliance on this information is advised to be in consideration of the full context of this report.

The cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimate presented herein. See Appendix A for Detailed Cost Estimates.

TABLE NUMBER 1.2

Overall Costs

Overall Costs Table Estimate Date March 2021

Bid Package	Description	Date Completed	Firm	Cost ($Millions)	Alt 1 &PGE	Alt1 & WAPA	Alt2 & PGE	Alt 2 & WAPA
1	TRR/Funks Pipelines	1/15/2021	Jacobs	$345.60	x	x	x	x
2	Dunnigan Pipeline Alt 1	1/15/2021	Jacobs	$83.30	x	x		
3	Dunnigan Pipeline Alt 2	1/15/2021	Jacobs	$224.60			x	x
4	Funks Reservoir	12/9/2021	Jacobs	$34.20	x	x	x	x
5	Funks PGP	12/14/2020	Jacobs	$91.80	x	x	x	x
6	TRR East Reservoir	1/15/2021	Jacobs	$79.50	x	x	x	x
7	TRR East PGP	12/14/2020	Jacobs	$93.60	x	x	x	x
8	Transmission Power Lines - WAPA	12/11/2020	Jacobs	$50.20		x		x
9	Transmission Power Lines - PGE	12/11/2020	Jacobs	$52.50	x		x	
10	Substations - WAPA	12/10/2020	Jacobs	$82.90		x		x
11	Substations - PGE	12/10/2020	Jacobs	$82.90	x		x	
12	Red Bluff Improvements	12/15/2020	Jacobs	$4.60	x	x	x	x
13	GCID Improvements	12/16/2020	Jacobs	$12.00	x	x	x	x
14	Interconnection Facilities - WAPA	12/31/2020	Z Global	$16.80		x		x
15	Interconnection Facilities - PGE	12/31/2020	Z Global	$18.70	x		x	
Construction Costs Totals Subtotals ($Millions)					$898.70	$894.50	$1,040.00	$1,035.80
Non-Contract Costs 18.00% of Construction Costs					$161.80	$161.00	$187.20	$186.40
HC Project Costs Totals					$1,060.50	$1,055.50	$1,227.20	$1,222.20

TABLE NUMBER 1.3
Overall Costs
Overall Costs Table Estimate Date July 2019

Bid Package	Description	Date Completed	Firm	Cost ($Millions)	Alt 1 &PGE	Alt1 & WAPA	Alt2 & PGE	Alt 2 & WAPA
1	TRR/Funks Pipelines	1/15/2021	Jacobs	$335.20	x	x	x	x
2	Dunnigan Pipeline Alt 1	1/15/2021	Jacobs	$80.80	x	x		
3	Dunnigan Pipeline Alt 2	1/15/2021	Jacobs	$217.90			x	x
4	Funks Reservoir	12/9/2021	Jacobs	$33.20	x	x	x	x
5	Funks PGP	12/14/2020	Jacobs	$89.00	x	x	x	x
6	TRR East Reservoir	1/15/2021	Jacobs	$77.10	x	x	x	x
7	TRR East PGP	12/14/2020	Jacobs	$90.80	x	x	x	x
8	Transmission Power Lines - WAPA	12/11/2020	Jacobs	$48.70		x		x
9	Transmission Power Lines - PGE	12/11/2020	Jacobs	$50.90	x		x	
10	Substations - WAPA	12/10/2020	Jacobs	$80.40		x		x
11	Substations - PGE	12/10/2020	Jacobs	$80.40	x		x	
12	Red Bluff Improvements	12/15/2020	Jacobs	$4.50	x	x	x	x
13	GCID Improvements	12/16/2020	Jacobs	$11.60	x	x	x	x
14	Interconnection Facilities - WAPA	12/31/2020	Z Global	$16.30		x		x
15	Interconnection Facilities - PGE	12/31/2020	Z Global	$18.10	x		x	
Construction Costs Totals Subtotals ($Millions)					$871.60	$867.60	$1,008.70	$1,004.70
Non-Contract Costs 18.00% of Construction Costs					$156.90	$156.20	$181.60	$180.90
HC Project Costs Totals					$1,028.50	$1,023.80	$1,190.30	$1,185.60

2 Estimate Information

2.1 Purpose of Estimate

The purpose of this Estimate of Construction Costs is to establish an Engineer's opinion of probable construction cost at a feasibility level of design development.

2.2 Scope of Work

The project consists of a large reservoir, ancillary roads, and conveyance facilities. The Authority decided to segregate the design of these facilities into an HR (Segment H Reservoir) segment that is responsible for design of the reservoir features, including several dams, inlet/outlet tunnels at Golden Gate Dam, as well as relocation of roads displaced by the reservoir. The other segment is known as the HC (Segment H Conveyance) segment and includes improvements to the two existing diversion canals from the Sacramento River to the Project Area (Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal), regulating reservoirs (existing Funks Reservoir and new Terminal Regulating Reservoir), two pumping generating plants (PGP), large-diameter pipelines from each PGP to Sites Reservoir, and a large-diameter pipeline to convey water from the Tehama Colusa Canal (TCC) to the Colusa Basin Drain or Sacramento River near Dunnigan, California. Detailed descriptions of each facility are provided in the following subsections.

2.2.1 Improvements to the Red Bluff Pumping Plant

The existing Red Bluff Pumping Plant is located on the Sacramento River at the upstream end of the Tehama Colusa Canal(TCC) near Red Bluff, California. This facility was constructed and put into operation in October 2012. It was designed to accommodate the Sites Project and includes space to add two additional 250 cfs pumping units, bringing the total pumping capacity to 2,500 cfs. The estimate includes furnishing and installation of two new pumps and all appurtenances in the available space within the existing pumping plant.

2.2.2 Glenn Colusa Irrigation District (GCID)Main Canal Improvements

Improvements to the GCID Main Canal will include a 3,000 cfs headworks structure just downstream of the Hamilton City Diversion on the Sacramento River, two siphon structures (Willow Creek and Walker Creek), improvements to the railroad siphon at Willows, canal embankment earthwork, and some canal bank gravel road improvements.

2.2.3 Terminal Regulating Reservoir - East

Construct a new Terminal Regulating Reservoir (TRR) East that will be hydraulically connected to the GCID Main Canal about three miles east of Funks Reservoir. It has about a 130-acre footprint and a capacity of about 600 acre-feet.

2.2.4 TRR PGP

Construction of a new pumping and generating plant will be used to pump water from the TRR to the Sites Reservoir. This facility will also include hydroelectric turbines to generate electricity when flow is released from Sites Reservoir to the TRR and into the GCID Main Canal. As part of this PGP facility, there will also be an energy-dissipation facility that will allow releases back to the TRR as backup to the hydroelectric turbine facilities.

2.2.5 TRR Pipelines

These are two parallel, 12-foot-diameter pipelines used to convey water between the TRR PGP and the Sites Reservoir. These pipelines will connect from the piping manifold at TRR PGP to the downstream side of the two proposed 23-foot-diameter tunnels connected to the Site Reservoir inlet/outlet structure. The approximate length of these pipelines is 5 miles each.

2.2.6 Funks Reservoir

Reclamation constructed the Funks Reservoir in the mid-1970s with the intent of providing operational flexibility for the TCC. There are check structures on the TCC just upstream and downstream of the reservoir. The TCC is located about 1 mile east of the proposed Sites Reservoir on Funks Creek. At the time of construction, the reservoir had a useable capacity of 1,170 acre-feet between operating levels of 199.5- and 205.2-feet elevation, and 1,080 acre-feet of inactive storage below elevation 199.5 feet, for a total capacity of 2,250 acre-feet; however, the addition of sediment from Funks Creek and the TCC have reduced the total storage volume. The project will remove accumulated sediment to recapture the design storage volume. A temporary cofferdam will be constructed within Funks Reservoir to facilitate construction of the TRR pipelines.

2.2.7 Funks PGP

Construction of a new pumping and generating plant will be used to pump water from Funks Reservoir to the Sites Reservoir. This facility will also include hydroelectric turbines to generate electricity when flow is released from Sites Reservoir to Funks Reservoir and, ultimately, the TCC. There will also be an energy-dissipation facility as part of this PGP facility that will allow releases back to Funks Reservoir as backup to the hydroelectric turbine facilities.

2.2.8 Funks Pipelines

These are 2 parallel, 12-foot-diameter pipelines used to convey water between the Funks PGP and the Sites Reservoir. These pipelines will connect from the piping manifold at Funks PGP to the downstream side of the two proposed 23 foot-diameter tunnels connected to the Site Reservoir inlet/outlet structure. The approximate length of these pipelines is 1 mile each.

2.2.9 Dunnigan Pipelines Alternative 1 and 2

The Dunnigan pipeline consists of either a 9-foot-diameter or 10.5-diameter pipeline that will be used to release water from the TCC to the Sacramento River. The concept is to release flow from Sites Reservoir to Funks Reservoir, where the flow will then go south about 40 miles to near the end of the TCC. At this point, flow will be diverted into the Dunnigan pipeline, where flow will go either to the Colusa Basin Drain (CBD), which flows to Sacramento River, or directly to the Sacramento River. If the pipeline discharges directly into the Sacramento River, a portion of the water will also be diverted and discharged in the CBD. The pipeline is 9-feet in diameter and approximately 4 miles long to the CBD, or 10.5-feet in diameter and approximately 10 miles long if it goes directly to the Sacramento River.

2.2.10 WAPA or PG&E Substations

There are 230 kilovolt (kV) electrical transmission lines running near the proposed project area. Specifically, the WAPA transmission lines run very close to Funks Reservoir in a north-south direction, with a parallel 230 kV line owned by PG&E a few miles east of the WAPA transmission lines. It is anticipated that one of these transmission lines will be connected to provide power for the project, as well as receive generated electrical power from the hydroelectric turbines. There will be three substations, an interconnection substation at either the PG&E or WAPA transmission lines, and then a substation at the TRR PGP and a substation at the Funks PGP.

2.2.11 Electrical Transmission Lines

Electrical transmission lines will be required to connect the WAPA or PGE 230 kV transmission lines to the TRR PGP and the Funks PGP.

2.2.12 Administration and Operations Building

Construction of a new Administration and Operations Building with all appurtenances near Funks PGP. This facility is included in the Funks PGP cost estimate.

2.2.13 Maintenance and Storage Building

Construction of a new Maintenance and Storage Building with all appurtenances near Funks PGP. This Facility is included in the Funks PGP cost estimate.

2.2.14 Access Roads

Access to the proposed TRR site would likely be from McDermott Road, which lies adjacent to the proposed reservoir. Access to the Funks complex (PGP and Reservoir) is currently accomplished using the O & M road along the TCC. A new access road will be required that allows larger equipment and year-round access. It is also anticipated that roads will be constructed within the TRR and Funks Pipeline easements, both to provide access to the pipelines and electrical power transmission lines but also as a secondary access road to the project facilities. Access Roads are included in the Funks/TRR Pipelines, Funks PGP and TRR East cost estimates.

2.3 Estimate Classification

This cost estimate prepared is considered a Budget or Class 4 estimate as defined by the Association for the Advancement of Cost Engineering International (AACEI). Refer to Appendix C for more definition.

Project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding. This estimate is based on material, equipment, and labor pricing as of March 2021.

This Cost Estimate is based on the use of conceptual and stochastic costs and detailed items using separate Labor, Materials and Equipment costs. The estimate uses parametric costs where design information or details are insufficient to allow a detailed item method. Quotations, allowances, and other costs are as described in Section 3.

3 Basis of Estimate

3.1 Estimate Methodology

This cost estimate is considered a bottom rolled up type estimate with cost items and breakdown of Labor, Materials and Equipment.

For the development of this cost estimate, there may be systems that have yet to be defined enough on which to base a scope of work for estimating purposes. JACOBS estimating provides parametric costing based on a unit of measurement (i.e. cost per square foot or cost per unit). The cost is assigned per unit and typically is developed by averaging similar projects and analysis of historic costs. Using this approach estimators strive to generate a basic system design fitting the parameters of the structure and its proposed function.

Finally, pricing is geographically adjusted to reflect local labor and material rates and job site conditions and requirements. As the design process progresses and the details have increased the parametric costing can be replaced with a detailed takeoff and estimated accordingly.

3.2 Estimate Major Assumptions

The estimate assumes the work will be done on a competitive bid basis and the contractor will have a reasonable amount of time to complete the work. All contractors are equal, with a reasonable project schedule, no overtime, constructed as under a single contract, no liquidated damages.

This estimate should be evaluated for market changes after 90 days of the issue date. It is assumed that much of the fabricated equipment will be shipped from the mainland USA.

3.3 Estimate Exclusions

The cost estimate excludes the following costs;

- Remediation of hazardous materials.
- Material Adjustment allowances above and beyond what is included at the time of the cost estimate.

3.4 Project Delivery and Methodology

It is assumed that this project will be procured using the traditional Design/Bid/Build method. The general contractor will contract directly with the owner.

The estimate assumes the work will be done on a competitive bid basis and the contractor will have a reasonable amount of time to complete the work. All contractors are equal, with a reasonable project schedule, no overtime, constructed as under a single contract, no liquidated damages.

3.5 Labor, Material, Subcontracts and Other Direct Costs

3.5.1 Labor

The estimate has been adjusted for local area labor rates, based upon Prevailing Wage Rates for Colusa County, General Decision Number CA20200007 Modification 15 Dated 08/14/2020.

Labor unit prices reflect a burdened rate, including: workers compensation, unemployment taxes, Fringe Benefits, and medical insurance.

3.5.2 Material

Materials pricing is national average as determined by RS Means or other data sources. Quotes on certain items may have been obtained and included in this estimate. Many quotes given for engineering estimates are budgetary and may not reflect actual contractor pricing.

3.5.3 Subcontracts

It is assumed that General Contractors will subcontract a portion of the work. Items listed in the cost estimate as subcontractor includes all anticipated markups that a general contractor would receive.

3.5.4 Construction Equipment

Equipment items listed in this cost estimate are for the construction equipment necessary for the installation of the work. Equipment rates in this estimate are assumed to be 100% of 2020 Blue Book value.

3.6 Markups, Taxes, and Other Indirect Costs

It is assumed that this project will be procured using the traditional Design/Bid/Build method. The general contractor will contract directly with the owner.

TABLE NUMBER 3.6
Markups, Taxes, and Other Indirect Costs
Estimate Summary

Item	Unit	Comments
Subcontractor Markups	20.00% to 25.00%	Varies by Trade
Materials Sales Tax	7.25%	Current Sales Tax Rate for Dunnigan Ca.
General Conditions	5.00%	
Mobilization/Demobilization	3.00%	
Prime Contractor Overhead	10.00%	Includes Home office and construction site Overhead
Prime Contractor Profit	6.00%	
Bonds and Insurances	2.17%	
Contractor Contingency	3.00% to 5.00%	Varies based on construction project type. Electrical Transmission Lines and WAPA or PG&E Substations include 5.00% all other HC estimates include 3.00%
Design Contingency	15%	
Escalation		There is no escalation included in this estimate.
Non-Contract Costs	18.00%	

3.7 Design Contingency

A Design Contingency of 15% is included to account for the level of design detail and the potential for additional unforeseen site conditions identified during the design phase.

The contingences are intended to allow for scope that is inherent in the individual projects but is not yet identified in the design documentation. This contingency would be fully consumed or released by the completion of the procurement documents.

3.8 Contractor Contingency

Contractor Contingency is intended to cover unforeseen conditions or changes post contract award. It remains under the control of the owner, separate from the bid award. Contractor contingencies vary from 3% to 5% based on the construction project types. Electrical Transmission Lines and WAPA or PG&E Substations include 5.00% all other HC estimates include 3.00%

3.9 Escalation Costs

There is no escalation included in this estimate.

3.10 Non-Contract Costs

Non-contract costs include geotechnical investigation, engineering, construction management, administration, real estate, legal services, permitting costs, environmental monitoring, and other owner costs attributable to the project. These costs are distinguished from Contract Costs (costs to the construction contractor). An estimate for the non-contract cost has been developed, but it has also been applied as a percentage to each of the project facilities for presentation purposes. The non-contract cost estimate is approximately 18% of the construction cost if real estate is included.

3.11 Market Conditions

During volatile economic conditions, an estimate may have a Market Conditions amount applied. This adjustment is done to account for the current volatility in the construction market and/or the location of a project.

However, based on the current construction market, and the location of the work proposed in this estimate, a Market Conditions adjustment was not applied.

3.12 Cost Resources

The following is a list of the various cost resources used in the development of the cost estimate

- R.S. Means 2015 Data
- CH2M HILL Historical Data
- Vendor Quotes where available
- Estimator Judgment

3.13 Value Engineering

Potential areas of Value Engineering that may bring the construction cost down are provided below. The Value Engineering has not been conducted as of this time pending the results of: 1) geologic mapping and geotechnical exploration being conducted by Fugro and U.S. Bureau of Reclamation during December 2020 through March 2021, 2) condition assessment of existing siphon structures in the GCID Main Canal being conducted by Jacobs in February 2021 and 3) hydraulic modeling of the GCID Main Canal being conducted by Jacobs scheduled for preliminary results in February 2021.

- Decrease the footprint and size of the TRR
- Potentially reducing the effort to replace two GCID siphons and reduce the effort on adding capacity to one GCID siphon

3.14 Disclaimer

The opinions of cost (estimates) shown, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time the opinion was prepared. The final costs of the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. The recent increases or decreases in material pricing may have a significant impact which is not predictable and careful review or consideration must be used in evaluation of material prices. As a result, the final project costs will vary from the opinions of cost presented herein. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

Appendix A:
Detailed Cost Estimate

Red Bluff Pumping Plant Improvements

Jacobs

SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Red Bluff Pumping Plant Improvements
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
12			***Red Bluff Pumping Plant Improvements***									
	12.01		Red Bluff Add Pumps									
		44.40.500	*Red Bluff Pumping Plant, Furnish and Install Pumps*	*4.00 EA*	*24,625.27 /EA*	*5,626.50 /EA*	*668,060.00 /EA*	*2,100.00 /EA*	*700,411.77 /EA*	*2,801,647*	*1,160,580.13 /EA*	*4,642,321*
			12.01 Red Bluff Add Pumps	4.00 EA	24,625.27 /EA	5,626.50 /EA	668,060.00 /EA	2,100.00 /EA	700,411.77 /EA	2,801,647	1,160,580.13 /EA	4,642,321
			12 Red Bluff Pumping Plant Improvements	***1.00 LS***	***98,501.08 /LS***	***22,506.00 /LS***	***2,672,240.00 /LS***	***8,400.00 /LS***	***2,801,647.08 /LS***	***2,801,647***	***4,642,320.54 /LS***	***4,642,321***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	156,405		1,094.400 hrs	
Material	4,436,842			
Allowance	13,338			
Equipment	35,736		360.000 hrs	
Other				
Total Construction Cost	**4,642,321**	**4,642,321**		
Non-Contract Costs	835,618			18.000 %
Total Project Costs	**835,618**	**5,477,939**		

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DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Red Bluff Pumping Plant Improvements
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
12						***Red Bluff Pumping Plant Improvements***									
	12.01					*Red Bluff Add Pumps*									
		44.40.500				*Red Bluff Pumping Plant, Furnish and Install Pumps*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric Power - Install	1.00 ls	9,891.48 /ls	1,000.00 /ls	10,000.00 /ls		20,891.48 /ls	20,891	33,897.45 /ls	33,897
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*20,891*	*/SF*	*33,897*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*20,891*	*/SF*	*33,897*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*20,891*	*/SF*	*33,897*
			40.9			*Instrumentation & Controls*									
				40.90		*Instrumentation & Controls*									
					40.90.99.01	*I&C, Other*									
						I&C Allowance	1.00 ls	6,594.32 /ls	1,000.00 /ls	10,000.00 /ls		17,594.32 /ls	17,594	28,662.05 /ls	28,662
						40.90.99.01 I&C, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*17,594*	*/SF*	*28,662*
						40.90 Instrumentation & Controls	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*17,594*	*/SF*	*28,662*
						40.9 Instrumentation & Controls	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*17,594*	*/SF*	*28,662*
			46.0			*Water and Wastewater Equipment*									
				40.55		*Water Control Gates, Other Gates*									
					40.30.06.01	*Other Gates*									
						Flap gates, hydraulic structures, 84" diameter	2.00 EA	11,093.40 /EA	3,676.20 /EA	16,000.00 /EA	-	30,769.60 /EA	61,539	50,017.39 /EA	100,035
						40.30.06.01 Other Gates	*2.00 EA*	*11,093.40 /EA*	*3,676.20 /EA*	*16,000.00 /EA*	*/EA*	*30,769.60 /EA*	*61,539*	*50,017.39 /EA*	*100,035*
						40.55 Water Control Gates, Other Gates	*2.00 EA*	*11,093.40 /EA*	*3,676.20 /EA*	*16,000.00 /EA*	*/EA*	*30,769.60 /EA*	*61,539*	*50,017.39 /EA*	*100,035*
				44.40		*Process Equipment - Pumps*									
					44.05.42.06	*Vertical Turbine Pump: > 8000 hp*									
						Functional Testing, Pumps, >1000 hp	2.00 ea	3,068.99 /ea	-	100.00 /ea	-	3,168.99 /ea	6,338	5,039.12 /ea	10,078
						Align Pump & Motor, >1000 hp	2.00 ea	3,836.24 /ea	-	-	2,800.00 /ea	6,636.24 /ea	13,272	10,537.32 /ea	21,075
						Vibration Testing, Pumps, >1000 hp	2.00 ea	1,534.50 /ea	-	-	1,400.00 /ea	2,934.50 /ea	5,869	4,659.52 /ea	9,319
						Sleeved anchor bolts - Large	24.00 ea	95.91 /ea	-	28.00 /ea	-	123.91 /ea	2,974	198.77 /ea	4,771
						Anchor bolts for leveling pump cans	8.00 ea	383.62 /ea	-	150.00 /ea	-	533.62 /ea	4,269	858.19 /ea	6,865
						Non-Shrink Machine Grout	32.00 cuft	91.11 /cuft	-	74.00 /cuft	-	165.11 /cuft	5,284	267.54 /cuft	8,561
						Grease, Oil, and Lube Pumps, >1000 hp	2.00 ea	1,534.50 /ea	-	150.00 /ea	-	1,684.50 /ea	3,369	2,685.59 /ea	5,371
						FURNISH Vertical Turbine Pump	2.00 EA	-	-	1,180,000.00 /EA	-	1,180,000.00 /EA	2,360,000	1,959,207.87 /EA	3,918,416
						Remove Existing Blockout Plates to Install Pumps	2.00 ea	1,823.10 /ea	1,300.00 /ea	500.00 /ea	-	3,623.10 /ea	7,246	5,789.17 /ea	11,578
						Remove Existing Blind Flanges	2.00 ea	1,458.48 /ea	520.00 /ea	250.00 /ea	-	2,228.48 /ea	4,457	3,556.62 /ea	7,113
						Remove Roof Pump Access, Replace and Seal after Pumps are Installed	2.00 ea	8,139.87 /ea	1,636.80 /ea	10,000.00 /ea	-	19,776.67 /ea	39,553	32,127.28 /ea	64,255
						Harnessed Sleeve	2.00 ea	2,187.72 /ea	1,560.00 /ea	52,000.00 /ea	-	55,747.72 /ea	111,495	92,288.77 /ea	184,578
						Butterfly Valves	2.00 ea	2,187.72 /ea	1,560.00 /ea	65,000.00 /ea	-	68,747.72 /ea	137,495	113,873.27 /ea	227,747
						44.05.42.06 Vertical Turbine Pump: > 8000 hp	*2.00 EA*	*29,914.24 /EA*	*6,576.80 /EA*	*1,310,120.00 /EA*	*4,200.00 /EA*	*1,350,811.04 /EA*	*2,701,622*	*2,239,863.13 /EA*	*4,479,726*
						44.40 Process Equipment - Pumps	*2.00 EA*	*29,914.24 /EA*	*6,576.80 /EA*	*1,310,120.00 /EA*	*4,200.00 /EA*	*1,350,811.04 /EA*	*2,701,622*	*2,239,863.13 /EA*	*4,479,726*
						46.0 Water and Wastewater Equipment	*4.00 EA*	*20,503.82 /EA*	*5,126.50 /EA*	*663,060.00 /EA*	*2,100.00 /EA*	*690,790.32 /EA*	*2,763,161*	*1,144,940.26 /EA*	*4,579,761*
						44.40.500 Red Bluff Pumping Plant, Furnish and install Pumps	*4.00 EA*	*24,625.27 /EA*	*5,626.50 /EA*	*668,060.00 /EA*	*2,100.00 /EA*	*700,411.77 /EA*	*2,801,647*	*1,160,580.13 /EA*	*4,642,321*
						12.01 Red Bluff Add Pumps	*4.00 EA*	*24,625.27 /EA*	*5,626.50 /EA*	*668,060.00 /EA*	*2,100.00 /EA*	*700,411.77 /EA*	*2,801,647*	*1,160,580.13 /EA*	*4,642,321*
						12 Red Bluff Pumping Plant Improvements	***1.00 LS***	***98,501.08 /LS***	***22,506.00 /LS***	***2,672,240.00 /LS***	***8,400.00 /LS***	***2,801,647.08 /LS***	***2,801,647***	***4,642,320.54 /LS***	***4,642,321***

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	98,501		1,094.400 hrs	
Material	2,672,240			
Allowance	8,400			
Equipment	22,506		360.000 hrs	
Other				
Subtotal Direct Costs	2,801,647	2,801,647		
Material Sales Tax, Dunnigan Ca	193,737			7.250 %
Subtotal W/ Sales Tax	193,737	2,995,384		
General Conditions	149,769			5.000 %
Subtotal W/ General Conditions	149,769	3,145,153		
Mobilization/Demobilization	157,258			5.000 %
Prime Contractor Overhead	330,241			10.000 %
Prime Contractor Profit	217,959			6.000 %
Bonds & Insurance	83,558			2.170 %
Subtotal W/ Prime Markups	789,016	3,934,169		
Contractor Contingency	118,025			3.000 %
Design Contingency	590,125			15.000 %
Subtotal W/ Contingency	708,150	4,642,319		
Total Construction Cost		**4,642,319**		
Non-Contract Costs	835,618			18.000 %
Total Project Costs	**835,618**	**5,477,937**		

GCID Canal Improvements

Jacobs

SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 GCID Canal Improvements Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 2, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
13			***GCID Canal Improvements***									
	13.01		GCID MP 1.52 Headgates Structure									
		01.00.900	*Gate Structure Removal and Control of Water*	6.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
		02.00.900	*Gate Structure Demolish Existing Canal Lining*	17,952.00 SF	1.61 /SF	0.56 /SF	0.82 /SF	/SF	2.99 /SF	53,681	4.66 /SF	83,574
		03.00.500	*Foundation Slab*	697.00 CY	171.45 /CY	6.78 /CY	242.78 /CY	/CY	421.01 /CY	293,442	664.67 /CY	463,276
		03.00.502	*Gate Structure End Walls*	94.00 CY	437.12 /CY	9.12 /CY	389.68 /CY	/CY	835.92 /CY	78,577	1,313.03 /CY	123,425
		03.00.504	*Gate Structure Pier Walls*	271.00 CY	437.74 /CY	9.12 /CY	389.64 /CY	/CY	836.50 /CY	226,692	1,313.91 /CY	356,071
		03.00.506	*Gate Structure Walls*	384.00 CY	446.68 /CY	9.12 /CY	391.07 /CY	/CY	846.87 /CY	325,198	1,329.95 /CY	510,702
		03.00.507	*Gate Structure Elevated Slab*	156.00 CY	396.44 /CY	7.00 /CY	266.25 /CY	/CY	669.69 /CY	104,472	1,048.59 /CY	163,579
		03.00.510	*Gate Structure Concrete Canal Lining*	283.00 CY	208.98 /CY	10.84 /CY	246.47 /CY	/CY	466.29 /CY	131,960	734.54 /CY	207,874
		05.00.900	*Gate Structure Metals*	**1.00** LS	10,190.06 /LS	380.03 /LS	33,932.00 /LS	/LS	44,502.09 /LS	44,502	70,857.71 /LS	70,858
		26.20.GATE	*GATE Actuators*	**1.00** LS	/LS	/LS	/LS	80,000.00 /LS	80,000.00 /LS	80,000	142,956.29 /LS	142,956
		31.25.900	*Gate Structure Earthworks*	2,670.00 CY	7.55 /CY	5.05 /CY	16.11 /CY	/CY	28.72 /CY	76,679	45.31 /CY	120,971
		40.00.900	*Gate Structure Water Control Gates*	8.00 EA	8,217.33 /EA	2,042.33 /EA	20,000.00 /EA	/EA	30,259.67 /EA	242,077	47,957.70 /EA	383,662
		40.90.ALLOW	*Allowance for SCADA at GCID*	**1.00** LS	/LS	/LS	/LS	185,000.00 /LS	185,000.00 /LS	185,000	330,586.40 /LS	330,586
			13.01 GCID MP 1.52 Headgates Structure	**1.00** LS	866,735.17 /LS	58,956.01 /LS	824,594.82 /LS	535,000.00 /LS	2,112,280.60 /LS	2,112,281	3,372,519.11 /LS	3,372,519
	13.02		GCID MP 24.48 Walker Creek Siphon									
		01.00.902	*Siphone Removel and Control of Water*	6.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
		02.00.902	*Siphon Demolish Existing Canal Lining*	5,820.00 SF	1.64 /SF	0.59 /SF	0.82 /SF	/SF	3.05 /SF	17,729	4.74 /SF	27,595
		03.00.512	*Siphon Slab on Grade*	751.00 CY	187.63 /CY	8.73 /CY	244.32 /CY	/CY	440.68 /CY	331,098	695.32 /CY	522,184
		03.00.514	*Siphon Concrete Walls*	500.00 CY	714.81 /CY	9.12 /CY	539.23 /CY	/CY	1,263.17 /CY	631,584	1,980.52 /CY	990,262
		03.00.516	*Siphon Retaining Walls*	558.00 CY	274.20 /CY	14.40 /CY	292.07 /CY	/CY	580.67 /CY	324,016	913.64 /CY	509,814
		03.00.518	*Siphon Elevated Slab*	520.00 CY	547.11 /CY	6.27 /CY	290.36 /CY	/CY	843.73 /CY	438,741	1,317.83 /CY	685,270
		03.00.520	*Siphon Roadway Concrete*	20.00 CY	216.98 /CY	9.55 /CY	248.98 /CY	/CY	475.51 /CY	9,510	748.88 /CY	14,978
		03.00.522	*Siphon Concrete Canal Lining*	128.00 CY	217.11 /CY	10.78 /CY	247.63 /CY	/CY	475.52 /CY	60,866	748.80 /CY	95,847
		31.25.902	*Siphon Earthworks*	26,210.00 CY	6.79 /CY	5.50 /CY	2.71 /CY	/CY	14.99 /CY	392,866	23.23 /CY	608,969
		31.25.904	*Siphon Earthworks, Temporary Bypass Canal*	11,500.00 CY	7.08 /CY	3.65 /CY	3.62 /CY	/CY	14.34 /CY	164,883	22.30 /CY	256,432
			13.02 GCID MP 24.48 Walker Creek Siphon	**1.00** LS	1,236,838.72 /LS	215,483.94 /LS	929,991.35 /LS	270,000.00 /LS	2,641,314.01 /LS	2,641,314	4,126,348.62 /LS	4,126,349
	13.03		GCID MP 24.58 Willow Creek Siphon									
		01.00.902	*Siphone Removal and Control of Water*	6.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	270,000	69,162.91 /MO	414,977
		02.00.902	*Siphon Demolish Existing Canal Lining*	5,820.00 SF	1.64 /SF	0.59 /SF	0.82 /SF	/SF	3.05 /SF	17,729	4.74 /SF	27,595
		03.00.512	*Siphon Slab on Grade*	540.72 CY	197.86 /CY	8.73 /CY	244.32 /CY	/CY	440.86 /CY	238,391	695.32 /CY	375,973
		03.00.514	*Siphon Concrete Walls*	360.00 CY	714.81 /CY	9.12 /CY	539.23 /CY	/CY	1,263.17 /CY	454,740	1,980.52 /CY	712,989
		03.00.516	*Siphon Retaining Walls*	401.76 CY	274.20 /CY	14.40 /CY	292.07 /CY	/CY	580.67 /CY	233,292	913.64 /CY	367,066
		03.00.518	*Siphon Elevated Slab*	374.40 CY	547.11 /CY	6.27 /CY	290.36 /CY	/CY	843.73 /CY	315,893	1,317.83 /CY	493,395
		03.00.520	*Siphon Roadway Concrete*	20.00 CY	216.98 /CY	9.55 /CY	248.98 /CY	/CY	475.51 /CY	9,510	748.88 /CY	14,978
		03.00.522	*Siphon Concrete Canal Lining*	128.00 CY	217.11 /CY	10.78 /CY	247.63 /CY	/CY	475.52 /CY	60,866	748.80 /CY	95,847
		31.25.902	*Siphon Earthworks*	19,094.00 CY	6.94 /CY	5.61 /CY	3.12 /CY	/CY	15.67 /CY	299,036	24.31 /CY	463,926
		31.25.904	*Siphon Earthworks, Temporary Bypass Canal*	12,415.00 CY	7.11 /CY	3.65 /CY	3.73 /CY	/CY	14.49 /CY	179,896	22.54 /CY	279,854
			13.03 GCID MP 24.58 Willow Creek Siphon	**1.00** LS	936,198.96 /LS	173,543.28 /LS	599,627.10 /LS	270,000.00 /LS	2,979,367.34 /LS	2,979,367	3,246,586.44 /LS	3,246,586
	13.04		GCID MP 26.8 BB Siphon									
		01.00.902	*Siphone Removal and Control of Water*	1.00 MO	/MO	/MO	/MO	135,000.00 /MO	135,000.00 /MO	135,000	207,488.73 /MO	207,489
		01.00.906	*Construction Operations*	1.00 MO	/MO	/MO	/MO	75,000.00 /MO	75,000.00 /MO	75,000	115,271.51 /MO	115,272
		03.00.522	*Siphon Concrete Canal Lining*	70.00 CY	214.64 /CY	10.79 /CY	247.66 /CY	/CY	473.09 /CY	33,116	745.08 /CY	52,155
		33.00.504	*Trenchless Pipe Installation, Install Additional Siphon Pipe*	70.00 LF	/LF	/LF	/LF	6,800.00 /LF	6,800.00 /LF	476,000	10,451.29 /LF	731,590
			13.04 GCID MP 26.8 BB Siphon	**1.00** LS	15,024.84 /LS	755.21 /LS	17,336.80 /LS	686,000.00 /LS	719,115.86 /LS	719,116	1,106,505.83 /LS	1,106,506
	13.05		GCID Main Canal Bank Improvements									
		31.00.716	*Construct Embankment*	5,710.00 CY	4.67 /CY	8.05 /CY	/CY	4.38 /CY	17.10 /CY	97,633	26.28 /CY	150,058
			13.05 GCID Main Canal Bank Improvements	**5,710.00** CY	4.67 /CY	8.05 /CY	/CY	4.38 /CY	17.10 /CY	97,633	26.28 /CY	150,058
			13 GCID Canal Improvements	**1.00 LS**	**2,911,441.33 /LS**	**489,711.39 /LS**	**2,462,549.17 /LS**	**1,786,000.00 /LS**	**7,649,701.89 /LS**	**7,649,702**	**12,002,020.73 /LS**	**12,002,021**

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	4,474,750		35,596.623 hrs	
Material	3,963,358			
Allowance	2,811,249			
Equipment	752,664		7,309.217 hrs	
Other				
Total Construction Cost	**12,002,021**	**12,002,021**		
Non-Contract Costs	2,160,364			18.000 %
Total Project Costs	**2,160,364**	**14,162,385**		

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
13						***GCID Canal Improvements***									
	13.02					GCID MP 1.62 Headgates Structure									
		01.00.900				*Gate Structure Removal and Control of Water*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					31.15.02.00	*Dewatering*									
						CBD Discharge Structure, Removal and Control of Water	6.00 MO		-		45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
						31.15.02.00 Dewatering	6.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
						01.01 Construction Operations	6.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
						01.0 General Requirements	6.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
						01.00.900 Gate Structure Removal and Control of Water	6.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
		02.00.900				*Gate Structure Demolish Existing Canal Lining*									
			02.0			*Existing Conditions*									
				02.40		*Demolition*									
					02.01.01.00	*General Site Demolition*									
						Partial Demolition of Existing Canal Lining	17,952.00 SF	1.38 /SF	0.28 /SF	0.82 /SF	-	2.48 /SF	44,585	3.88 /SF	69,594
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	500.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	8,018	24.65 /cy	12,323
						Load excavated spoils	500.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	1,078	3.31 /cy	1,657
						02.01.01.00 General Site Demolition	17,952.00 SF	1.61 /SF	0.56 /SF	0.82 /SF	/SF	2.99 /SF	53,681	4.66 /SF	83,574
						02.40 Demolition	17,952.00 SF	1.61 /SF	0.56 /SF	0.82 /SF	/SF	2.99 /SF	53,681	4.66 /SF	83,574
						02.0 Existing Conditions	17,952.00 SF	1.61 /SF	0.56 /SF	0.82 /SF	/SF	2.99 /SF	53,681	4.66 /SF	83,574
						02.00.900 Gate Structure Demolish Existing Canal Lining	17,952.00 SF	1.61 /SF	0.56 /SF	0.82 /SF	/SF	2.99 /SF	53,681	4.66 /SF	83,574
		03.00.500				*Foundation Slab*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.36	*Cast-In-Place Concrete, Slabs on Grade, 36" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,440.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	12,723	13.65 /sfca	19,656
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	61.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	156,828	4,038.42 /ton	246,344
						Reinforcing in place, unloading & sorting, add to above - slabs	61.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	3,398	85.62 /ton	5,223
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	718.00 cy	-	-	131.00 /cy	-	131.00 /cy	94,058	210.84 /cy	151,382
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	697.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	20,214	44.57 /CY	31,067
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	4,524.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	4,237	1.44 /sf	6,513
						Curing, sprayed membrane curing compound	45.24 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,043	36.33 /csf	1,643
						Fine grading, fine grade for slab on grade, machine	502.67 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	942	2.88 /sy	1,448
						03.10.05.36 Cast-In-Place Concrete, Slabs on Grade, 36" thick	697.00 CY	171.45 /CY	6.78 /CY	242.78 /CY	/CY	421.01 /CY	293,442	664.67 /CY	463,276
						03.18 Cast-In-Place Concrete, Slabs on Grade	697.00 CY	171.45 /CY	6.78 /CY	242.78 /CY	/CY	421.01 /CY	293,442	664.67 /CY	463,276
						03.0 Concrete Work	697.00 CY	171.45 /CY	6.78 /CY	242.78 /CY	/CY	421.01 /CY	293,442	664.67 /CY	463,276
						03.00.500 Foundation Slab	697.00 CY	171.45 /CY	6.78 /CY	242.78 /CY	/CY	421.01 /CY	293,442	664.67 /CY	463,276
		03.00.502				*Gate Structure End Walls*									
			03.0			*Concrete Work*									
				03.20		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.24	*Cast-In-Place Concrete, Straight Walls, 24" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	2,530.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	37,286	23.05 /sfca	58,307
						Form oil, coverage varies greatly, maximum, includes material only	6.75 gal	-	-	23.50 /gal	-	23.50 /gal	159	37.82 /gal	255
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	8.25 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	21,210	4,038.42 /ton	33,317
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	8.25 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	460	85.61 /ton	706
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	97.00 cy	-	-	131.00 /cy	-	131.00 /cy	12,707	210.84 /cy	20,451
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	94.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	4,203	68.72 /CY	6,459
						Finishing: break ties & patch voids (walls, cols or beams)	2,530.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	2,553	1.55 /sf	3,929
						03.10.06.24 Cast-In-Place Concrete, Straight Walls, 24" thick	94.00 CY	437.12 /CY	9.12 /CY	389.68 /CY	/CY	835.92 /CY	78,577	1,313.03 /CY	123,425
						03.20 Cast-In-Place Concrete, Straight Walls	94.00 CY	437.12 /CY	9.12 /CY	389.68 /CY	/CY	835.92 /CY	78,577	1,313.03 /CY	123,425
						03.0 Concrete Work	94.00 CY	437.12 /CY	9.12 /CY	389.68 /CY	/CY	835.92 /CY	78,577	1,313.03 /CY	123,425
						03.00.502 Gate Structure End Walls	94.00 CY	437.12 /CY	9.12 /CY	389.68 /CY	/CY	835.92 /CY	78,577	1,313.03 /CY	123,425
		03.00.504				*Gate Structure Pier Walls*									
			03.0			*Concrete Work*									
				03.20		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.24	*Cast-In-Place Concrete, Straight Walls, 24" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	7,315.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	107,805	23.05 /sfca	168,582
						Form oil, coverage varies greatly, maximum, includes material only	19.50 gal	-	-	23.50 /gal	-	23.50 /gal	458	37.82 /gal	738
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	23.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	61,060	4,038.42 /ton	95,913
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	23.75 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	1,323	85.62 /ton	2,033
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	279.00 cy	-	-	131.00 /cy	-	131.00 /cy	36,549	210.84 /cy	58,824
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	271.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	12,116	68.72 /CY	18,622
						Finishing: break ties & patch voids (walls, cols or beams)	7,315.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	7,381	1.55 /sf	11,360
						03.10.06.24 Cast-In-Place Concrete, Straight Walls, 24" thick	271.00 CY	437.74 /CY	9.12 /CY	389.64 /CY	/CY	836.50 /CY	226,692	1,313.91 /CY	356,071
						03.20 Cast-In-Place Concrete, Straight Walls	271.00 CY	437.74 /CY	9.12 /CY	389.64 /CY	/CY	836.50 /CY	226,692	1,313.91 /CY	356,071
						03.0 Concrete Work	271.00 CY	437.74 /CY	9.12 /CY	389.64 /CY	/CY	836.50 /CY	226,692	1,313.91 /CY	356,071
						03.00.504 Gate Structure Pier Walls	271.00 CY	437.74 /CY	9.12 /CY	389.64 /CY	/CY	836.50 /CY	226,692	1,313.91 /CY	356,071
		03.00.506				*Gate Structure Walls*									
			03.0			*Concrete Work*									
				03.20		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.24	*Cast-In-Place Concrete, Straight Walls, 24" thick*									
						C.I.P. concrete forms, wall, box out for opening, to 16" thick, over 10 S.F. (use perimeter), includes erecting, bracing, stripping and cleaning	240.00 lf	15.09 /lf	-	2.45 /lf	-	17.54 /lf	4,210	27.14 /lf	6,514
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	10,354.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	152,593	23.05 /sfca	238,619
						Form oil, coverage varies greatly, maximum, includes material only	27.60 gal	-	-	23.50 /gal	-	23.50 /gal	649	37.82 /gal	1,044
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	33.60 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	86,384	4,038.42 /ton	135,691
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	33.60 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,872	85.62 /ton	2,877

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.06.24	Cast-In-Place Concrete, Straight Walls, 24" thick									
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	396.00 cy	-	-	131.00 /cy	-	131.00 /cy	51,876	210.84 /cy	83,492
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	384.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	17,168	68.72 /CY	26,387
						Finishing: break ties & patch voids (walls, cols or beams)	10,354.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	10,447	1.55 /sf	16,079
						03.10.06.24 Cast-In-Place Concrete, Straight Walls, 24" thick	384.00 CY	446.68 /CY	9.12 /CY	391.07 /CY	/CY	846.87 /CY	325,198	1,329.95 /CY	510,702
						03.20 Cast-in-Place Concrete, Straight Walls	384.00 CY	446.68 /CY	9.12 /CY	391.07 /CY	/CY	846.87 /CY	325,198	1,329.95 /CY	510,702
						03.0 Concrete Work	384.00 CY	446.68 /CY	9.12 /CY	391.07 /CY	/CY	846.87 /CY	325,198	1,329.95 /CY	510,702
						03.00.506 Gate Structure Walls	384.00 CY	446.68 /CY	9.12 /CY	391.07 /CY	/CY	846.87 /CY	325,198	1,329.95 /CY	510,702
		03.00.507				Gate Structure Elevated Slab									
			03.0			Concrete Work									
				03.24		Cast-In-Place Concrete, Elevated Slabs									
					03.10.10.15	Cast-In-Place Concrete, Elevated Decks, 15" thick									
						Slab shoring	35,640.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	24,404	1.06 /cf	37,636
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	1,296.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	11,504	13.74 /sf	17,806
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	406.00 lf	5.41 /lf	-	0.22 /lf	-	5.63 /lf	2,286	8.67 /lf	3,520
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	13.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	35,350	4,038.42 /ton	55,528
						Reinforcing in place, unloading & sorting, add to above - decks	13.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	766	85.62 /ton	1,177
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	161.00 cy	-	-	131.00 /cy	-	131.00 /cy	21,091	210.84 /cy	33,945
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	156.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	4,650	45.81 /CY	7,147
						Finishing elev slab, bull float, manual float & manual steel trowel	2,804.00 sf	1.23 /sf	-	-	-	1.23 /sf	3,460	1.90 /sf	5,318
						Curing, sprayed membrane curing compound, elevated decks	28.04 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	646	36.33 /csf	1,019
						Fine grading, fine grade for slab on grade, machine	167.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	314	2.88 /sy	483
						03.10.10.15 Cast-In-Place Concrete, Elevated Decks, 15" thick	156.00 CY	396.44 /CY	7.00 /CY	266.25 /CY	/CY	669.69 /CY	104,472	1,048.59 /CY	163,579
						03.24 Cast-in-Place Concrete, Elevated Slabs	156.00 CY	396.44 /CY	7.00 /CY	266.25 /CY	/CY	669.69 /CY	104,472	1,048.59 /CY	163,579
						03.0 Concrete Work	156.00 CY	396.44 /CY	7.00 /CY	266.25 /CY	/CY	669.69 /CY	104,472	1,048.59 /CY	163,579
						03.00.507 Gate Structure Elevated Slab	156.00 CY	396.44 /CY	7.00 /CY	266.25 /CY	/CY	669.69 /CY	104,472	1,048.59 /CY	163,579
		03.00.510				Gate Structure Concrete Canal Lining									
			03.0			Concrete Work									
				03.16		Cast-In-Place Concrete, Slabs on Grade									
					03.10.05.07	Cast-In-Place Concrete, Slabs on Grade, 7" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	514.00 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	2,488	7.46 /lf	3,835
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	24.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	63,631	4,038.42 /ton	99,951
						Reinforcing in place, unloading & sorting, add to above - slabs	24.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,379	85.62 /ton	2,119
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	292.00 cy	-	-	131.00 /cy	-	131.00 /cy	38,252	210.84 /cy	61,565
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	283.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	8,207	44.57 /CY	12,614
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	13,090.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	12,261	1.44 /sf	18,845
						Curing, sprayed membrane curing compound	130.90 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	3,017	36.33 /csf	4,755
						Fine grading, fine grade for slab on grade, machine	1,454.44 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	2,726	2.88 /sy	4,190
						03.10.05.07 Cast-In-Place Concrete, Slabs on Grade, 7" thick	283.00 CY	208.98 /CY	10.84 /CY	246.47 /CY	/CY	466.29 /CY	131,960	734.54 /CY	207,874
						03.16 Cast-In-Place Concrete, Slabs on Grade	283.00 CY	208.98 /CY	10.84 /CY	246.47 /CY	/CY	466.29 /CY	131,960	734.54 /CY	207,874
						03.0 Concrete Work	283.00 CY	208.98 /CY	10.84 /CY	246.47 /CY	/CY	466.29 /CY	131,960	734.54 /CY	207,874
						03.00.510 Gate Structure Concrete Canal Lining	283.00 CY	208.98 /CY	10.84 /CY	246.47 /CY	/CY	466.29 /CY	131,960	734.54 /CY	207,874
		05.00.900				Gate Structure Metals									
			05.0			Metals									
				05.50		Metal Fabrications									
					05.00.99.00	Metals, Other									
						Railing, pipe, aluminum, clear finish, 3 rails, 3'-6" high, posts @ 5' O.C., 1-1/2" dia, shop fabricated	344.00 lf	21.19 /lf	0.79 /lf	90.50 /lf	-	112.48 /lf	38,691	179.43 /lf	61,724
						Checker Plate Deck Cover	8.00 ea	362.80 /ea	13.53 /ea	350.00 /ea	-	726.33 /ea	5,811	1,141.70 /ea	9,134
						05.00.99.00 Metals, Other	**4,524.00** SF	2.25 /SF	0.08 /SF	7.50 /SF	/SF	9.84 /SF	44,502	15.66 /SF	70,858
						05.50 Metal Fabrications	**4,524.00** SF	2.25 /SF	0.08 /SF	7.50 /SF	/SF	9.84 /SF	44,502	15.66 /SF	70,858
						05.0 Metals	**4,524.00** SF	2.25 /SF	0.08 /SF	7.50 /SF	/SF	9.84 /SF	44,502	15.66 /SF	70,858
						05.00.900 Gate Structure Metals	**1.00** LS	10,190.08 /LS	380.03 /LS	33,932.00 /LS	/LS	44,502.09 /LS	44,502	70,857.71 /LS	70,858
		26.20.GATE				GATE Actuators									
			26.0			Electrical Work									
				26.20		Facility Electrical									
					26.00.99.00	Electrical, Other									
						Electrical service and building	1.00 LS				30,000.00 /LS	30,000.00 /LS	30,000	53,608.61 /LS	53,609
						Circuits to 8 Gate Actuators (Power and Controls)	1.00 LS				50,000.00 /LS	50,000.00 /LS	50,000	89,347.68 /LS	89,348
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	80,000	/SF	142,956
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	80,000	/SF	142,956
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	80,000	/SF	142,956
						26.20.GATE GATE Actuators	**1.00** LS	/LS	/LS	/LS	80,000.00 /LS	80,000.00 /LS	80,000	142,956.29 /LS	142,956
		31.25.900				Gate Structure Earthworks									
			31.0			Earthwork									
				31.25		Earthworks, Structural									
					31.25.01.00	Earthworks, Structural, Excavation									
						Structural Excavation, excludes sheeting or dewatering	740.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	4,353	9.04 /CY	6,690
						Stockpile Excavated Spoils	740.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	2,100	4.38 /cy	3,240
						31.25.01.00 Earthworks, Structural, Excavation	740.00 CY	3.89 /CY	4.58 /CY	0.25 /CY	/CY	8.72 /CY	6,452	13.42 /CY	9,930
					31.25.02.00	Earthworks, Structural, Import Aggregates (Slab)									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	200.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	10,100	80.15 /CY	16,031
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	200.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	/CY	50.50 /CY	10,100	80.15 /CY	16,031
					31.25.03.00	Earthworks, Structural, Backfill									
						Backfill, Select Granular material	990.00 CY	6.66 /CY	2.18 /CY	35.00 /CY	-	43.85 /CY	43,406	69.92 /CY	69,225
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	990.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	1,423	2.21 /cy	2,187
						Compaction, water for, 6000 gallon wagon, 6 mile haul	990.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	1,835	2.94 /cy	2,907
						31.25.03.00 Earthworks, Structural, Backfill	990.00 CY	8.31 /CY	2.63 /CY	36.20 /CY	/CY	47.14 /CY	46,664	75.07 /CY	74,319
					31.25.05.00	Earthworks, Structural, Hauling and Disposal									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	740.00 CY	7.24 /CY	8.80 /CY	-	-	16.04 /CY	11,866	24.65 /CY	18,238

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					31.25.05.00	*Earthworks, Structural, Hauling and Disposal*									
						Load excavated spoils	740.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	1,595	3.31 /cy	2,452
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	*740.00 CY*	*9.27 /CY*	*8.92 /CY*	*/CY*	*/CY*	*18.19 /CY*	*13,462*	*27.96 /CY*	*20,690*
						31.25 Earthworks, Structural	*2,670.00 CY*	*7.55 /CY*	*5.05 /CY*	*16.11 /CY*	*/CY*	*28.72 /CY*	*76,679*	*45.31 /CY*	*120,971*
						31.0 Earthwork	*2,670.00 CY*	*7.55 /CY*	*5.05 /CY*	*16.11 /CY*	*/CY*	*28.72 /CY*	*76,679*	*45.31 /CY*	*120,971*
						31.25.900 Gate Structure Earthworks	*2,670.00 CY*	*7.55 /CY*	*5.05 /CY*	*16.11 /CY*	*/CY*	*28.72 /CY*	*76,679*	*45.31 /CY*	*120,971*
		40.00.900				*Gate Structure Water Control Gates*									
			46.0			*Water and Wastewater Equipment*									
				40.51		*Water Control Gates, Slide/Weir Gates*									
					40.30.03.99	*Slide or Weir Gate, Rectangular*									
						Slide gates, hydraulic structures, steel, self contained, 84" x 96", incl. anchor bolts & grout	8.00 EA	8,217.33 /EA	2,042.33 /EA	20,000.00 /EA	-	30,259.67 /EA	242,077	47,957.70 /EA	383,662
						40.30.03.99 Slide or Weir Gate, Rectangular	*8.00 EA*	*8,217.33 /EA*	*2,042.33 /EA*	*20,000.00 /EA*	*/EA*	*30,259.67 /EA*	*242,077*	*47,957.70 /EA*	*383,662*
						40.51 Water Control Gates, Slide/Weir Gates	*8.00 EA*	*8,217.33 /EA*	*2,042.33 /EA*	*20,000.00 /EA*	*/EA*	*30,259.67 /EA*	*242,077*	*47,957.70 /EA*	*383,662*
						46.0 Water and Wastewater Equipment	*8.00 EA*	*8,217.33 /EA*	*2,042.33 /EA*	*20,000.00 /EA*	*/EA*	*30,259.67 /EA*	*242,077*	*47,957.70 /EA*	*383,662*
						40.00.900 Gate Structure Water Control Gates	*8.00 EA*	*8,217.33 /EA*	*2,042.33 /EA*	*20,000.00 /EA*	*/EA*	*30,259.67 /EA*	*242,077*	*47,957.70 /EA*	*383,662*
		40.90.ALLOW				*Allowance for SCADA at GCID*									
			26.0			*Electrical Work*									
				26.20		*Facility Electrical*									
					26.00.99.00	*Electrical, Other*									
						Testing, Startup, Commissioning, Training, Documentation, Warranty	1.00 LS				50,000.00 /LS	50,000.00 /LS	50,000	89,347.67 /LS	89,348
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*50,000*	*/SF*	*89,348*
					40.90.99.01	*I&C, Other*									
						Radio Equipment at Canal - Allowance	1.00 LS				20,000.00 /LS	20,000.00 /LS	20,000	35,739.07 /LS	35,739
						Instrumentation at Canal - Allowance	1.00 LS				40,000.00 /LS	40,000.00 /LS	40,000	71,478.16 /LS	71,478
						Radio Equipment at [Funks] - Allowance	1.00 LS				20,000.00 /LS	20,000.00 /LS	20,000	35,739.05 /LS	35,739
						Software, Licenses	1.00 LS				5,000.00 /LS	5,000.00 /LS	5,000	8,934.77 /LS	8,935
						Programming	1.00 LS				50,000.00 /LS	50,000.00 /LS	50,000	89,347.68 /LS	89,348
						40.90.99.01 I&C, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*135,000*	*/SF*	*241,239*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*185,000*	*/SF*	*330,586*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*185,000*	*/SF*	*330,586*
						40.90.ALLOW Allowance for SCADA at GCID	***1.00*** *LS*	*/LS*	*/LS*	*/LS*	*185,000.00 /LS*	*185,000.00 /LS*	*185,000*	*330,586.40 /LS*	*330,586*
						13.01 GCID MP 1.82 Headgates Structure	**1.00** LS	893,736.17 /LS	56,950.01 /LS	826,594.42 /LS	335,000.00 /LS	2,112,280.60 /LS	2,112,281	3,372,510.11 /LS	3,372,510
	13.02					GCID MP 34.48 Walker Creek Siphon									
		01.00.902				*Siphone Removal and Control of Water*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					31.15.02.00	*Dewatering*									
						CBD Discharge Structure, Removal and Control of Water	6.00 MO		-		45,000.00 /MO	45,000.00 /MO	270,000	69,162.90 /MO	414,977
						31.15.02.00 Dewatering	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.90 /MO*	*414,977*
						01.01 Construction Operations	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.90 /MO*	*414,977*
						01.0 General Requirements	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.90 /MO*	*414,977*
						01.00.902 Siphone Removal and Control of Water	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.90 /MO*	*414,977*
		02.00.902				*Siphon Demolish Existing Canal Lining*									
			02.0			*Existing Conditions*									
				02.40		*Demolition*									
					02.01.01.00	*General Site Demolition*									
						Partial Demolition of Existing Canal Lining	5,820.00 SF	1.38 /SF	0.28 /SF	0.82 /SF	-	2.48 /SF	14,454	3.88 /SF	22,562
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	180.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	2,886	24.65 /cy	4,436
						Load excavated spoils	180.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	388	3.31 /cy	596
						02.01.01.00 General Site Demolition	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
						02.40 Demolition	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
						02.0 Existing Conditions	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
						02.00.902 Siphon Demolish Existing Canal Lining	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
		03.00.512				*Siphon Slab on Grade*									
			03.0			*Concrete Work*									
				03.11		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.06	*Cast-In-Place Concrete, Slabs on Grade, 6" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	496.00 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	2,400	7.46 /lf	3,701
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	10.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	26,995	4,038.42 /ton	42,403
						Reinforcing in place, unloading & sorting, add to above - slabs	10.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	585	85.62 /ton	899
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	123.00 cy	-	-	131.00 /cy	-	131.00 /cy	16,113	210.84 /cy	25,933
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	119.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	3,451	44.57 /CY	5,304
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	5,238.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	4,906	1.44 /sf	7,541
						Curing, sprayed membrane curing compound	52.38 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,207	36.33 /csf	1,903
						Fine grading, fine grade for slab on grade, machine	582.00 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,091	2.88 /sy	1,677
						03.10.05.06 Cast-In-Place Concrete, Slabs on Grade, 6" thick	*119.00 CY*	*218.13 /CY*	*10.61 /CY*	*248.14 /CY*	*/CY*	*476.88 /CY*	*56,749*	*750.93 /CY*	*89,361*
					03.10.05.14	*Cast-In-Place Concrete, Slabs on Grade, 14" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	720.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	6,361	13.65 /sfca	9,828
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	55.30 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	142,173	4,038.42 /ton	223,325
						Reinforcing in place, unloading & sorting, add to above - slabs	55.30 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	3,080	85.62 /ton	4,735
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	650.00 cy	-	-	131.00 /cy	-	131.00 /cy	85,150	210.84 /cy	137,045
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	632.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	18,328	44.57 /CY	28,170
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	14,000.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	13,113	1.44 /sf	20,155
						Curing, sprayed membrane curing compound	140.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	3,227	36.33 /csf	5,086
						Fine grading, fine grade for slab on grade, machine	1,555.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	2,916	2.88 /sy	4,481
						03.10.05.14 Cast-In-Place Concrete, Slabs on Grade, 14" thick	*632.00 CY*	*182.13 /CY*	*8.38 /CY*	*243.59 /CY*	*/CY*	*434.10 /CY*	*274,349*	*684.55 /CY*	*432,824*
						03.11 Cast-In-Place Concrete, Slabs on Grade	*751.00 CY*	*187.83 /CY*	*8.73 /CY*	*244.32 /CY*	*/CY*	*440.88 /CY*	*331,098*	*695.32 /CY*	*522,184*
						03.0 Concrete Work	*751.00 CY*	*187.83 /CY*	*8.73 /CY*	*244.32 /CY*	*/CY*	*440.88 /CY*	*331,098*	*695.32 /CY*	*522,184*
						03.00.512 Siphon Slab on Grade	*751.00 CY*	*187.83 /CY*	*8.73 /CY*	*244.32 /CY*	*/CY*	*440.88 /CY*	*331,098*	*695.32 /CY*	*522,184*
		03.00.514				*Siphon Concrete Walls*									
			03.0			*Concrete Work*									
				03.20		*Cast-In-Place Concrete, Straight Walls*									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.06.12	*Cast-In-Place Concrete, Straight Walls, 12" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	27,000.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	397,914	23.05 /sfca	622,243
						Form oil, coverage varies greatly, maximum, includes material only	72.00 gal	-	-	23.50 /gal	-	23.50 /gal	1,692	37.82 /gal	2,723
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	43.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	112,479	4,038.42 /ton	176,681
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	43.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,437	85.62 /ton	3,746
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	515.00 cy	-	-	131.00 /cy	-	131.00 /cy	67,465	210.84 /cy	108,582
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	500.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	22,355	68.72 /CY	34,358
						Finishing: break ties & patch voids (walls, cols or beams)	27,000.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	27,242	1.55 /sf	41,929
						03.10.06.12 Cast-In-Place Concrete, Straight Walls, 12" thick	*500.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*631,584*	*1,980.52 /CY*	*990,262*
						03.30 Cast-In-Place Concrete, Straight Walls	*500.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*631,584*	*1,980.52 /CY*	*990,262*
						03.0 Concrete Work	*500.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*631,584*	*1,980.52 /CY*	*990,262*
						03.00.514 Siphon Concrete Walls	*500.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*631,584*	*1,980.52 /CY*	*990,262*
		03.00.516				*Siphon Retaining Walls*									
			03.0			*Concrete Work*									
				03.12		*Cast-In-Place Concrete, Continuous Footings*									
					03.10.02.30	*Cast-In-Place Concrete, Continuous Footings, 30" thick*									
						C.I.P. concrete forms, footing, keyway, tapered wood, 2" x 6", 4 use, includes erecting, bracing, stripping and cleaning	194.00 lf	1.47 /lf	-	0.34 /lf	-	1.81 /lf	351	2.80 /lf	544
						Reinforcing Steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	28.50 ton	1,305.66 /ton	-	1,125.00 /ton	-	2,430.66 /ton	69,274	3,817.38 /ton	108,795
						Reinforcing steel, unload and sort, add to base	28.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,588	85.62 /ton	2,440
						Struct concrete,ready mix,normal wt,4000 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	334.00 cy	-	-	127.00 /cy	-	127.00 /cy	42,418	204.40 /cy	68,270
						Structural concrete, placing, continuous footing, deep, pumped, includes strike off & consolidation, excludes material	324.00 CY	27.12 /CY	6.41 /CY	-	-	33.53 /CY	10,864	51.54 /CY	16,698
						Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering	324.00 bcy	6.21 /bcy	2.12 /bcy	-	-	8.32 /bcy	2,697	12.79 /bcy	4,144
						Excavating, trench or continuous footing, common earth, trim sides and bottom for concrete pours, excludes sheeting or dewatering	3,492.00 sf	1.04 /sf	0.03 /sf	-	-	1.07 /sf	3,741	1.65 /sf	5,750
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	324.00 lcy	7.24 /lcy	8.80 /lcy	-	-	16.04 /lcy	5,195	24.65 /lcy	7,985
						03.10.02.30 Cast-In-Place Concrete, Continuous Footings, 30" thick	*324.00 CY*	*171.85 /CY*	*19.22 /CY*	*239.08 /CY*	*/CY*	*420.15 /CY*	*136,128*	*663.43 /CY*	*214,627*
						03.12 Cast-In-Place Concrete, Continuous Footings	*324.00 CY*	*171.85 /CY*	*19.22 /CY*	*239.08 /CY*	*/CY*	*420.15 /CY*	*136,128*	*663.43 /CY*	*214,627*
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.26	*Cast-In-Place Concrete, Straight Walls, 26" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	5,820.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	85,773	23.05 /sfca	134,128
						Form oil, coverage varies greatly, maximum, includes material only	15.50 gal	-	-	23.50 /gal	-	23.50 /gal	364	37.82 /gal	586
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	20.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	52,704	4,038.42 /ton	82,788
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	20.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,142	85.62 /ton	1,755
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	241.00 cy	-	-	131.00 /cy	-	131.00 /cy	31,571	210.84 /cy	50,812
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	234.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	10,462	68.72 /CY	16,080
						Finishing: break ties & patch voids (walls, cols or beams)	5,820.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	5,872	1.55 /sf	9,038
						03.10.06.26 Cast-In-Place Concrete, Straight Walls, 26" thick	*234.00 CY*	*415.92 /CY*	*9.12 /CY*	*377.90 /CY*	*/CY*	*802.94 /CY*	*187,888*	*1,261.48 /CY*	*295,187*
						03.30 Cast-In-Place Concrete, Straight Walls	*234.00 CY*	*415.92 /CY*	*9.12 /CY*	*377.90 /CY*	*/CY*	*802.94 /CY*	*187,888*	*1,261.48 /CY*	*295,187*
						03.0 Concrete Work	*558.00 CY*	*274.20 /CY*	*14.40 /CY*	*292.07 /CY*	*/CY*	*580.67 /CY*	*324,016*	*913.64 /CY*	*509,814*
						03.00.516 Siphon Retaining Walls	*558.00 CY*	*274.20 /CY*	*14.40 /CY*	*292.07 /CY*	*/CY*	*580.67 /CY*	*324,016*	*913.64 /CY*	*509,814*
		03.00.518				*Siphon Elevated Slab*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.12	*Cast-In-Place Concrete, Elevated Decks, 12" thick*									
						Slab shoring	126,000.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	86,275	1.06 /cf	133,058
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	14,000.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	124,270	13.74 /sf	192,348
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	612.00 lf	5.53 /lf	-	0.22 /lf	-	5.75 /lf	3,517	8.85 /lf	5,415
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	45.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	116,978	4,038.42 /ton	183,748
						Reinforcing in place, unloading & sorting, add to above - decks	45.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,535	85.62 /ton	3,896
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	535.00 cy	-	-	131.00 /cy	-	131.00 /cy	70,085	210.84 /cy	112,799
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	520.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	15,499	45.81 /CY	23,822
						Finishing elev slab, bull float, manual float & manual steel trowel	14,000.00 sf	1.23 /sf	-	-	-	1.23 /sf	17,276	1.90 /sf	26,553
						Curing, sprayed membrane curing compound, elevated decks	100.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	2,305	36.33 /csf	3,633
						03.10.10.12 Cast-In-Place Concrete, Elevated Decks, 12" thick	*520.00 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*438,741*	*1,317.83 /CY*	*685,270*
						03.24 Cast-In-Place Concrete, Elevated Slabs	*520.00 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*438,741*	*1,317.83 /CY*	*685,270*
						03.0 Concrete Work	*520.00 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*438,741*	*1,317.83 /CY*	*685,270*
						03.00.518 Siphon Elevated Slab	*520.00 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*438,741*	*1,317.83 /CY*	*685,270*
		03.00.520				*Siphon Roadway Concrete*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.08	*Cast-In-Place Concrete, Slabs on Grade, 8" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	136.00 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	658	7.46 /lf	1,015
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	1.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	4,499	4,038.42 /ton	7,067
						Reinforcing in place, unloading & sorting, add to above - slabs	1.75 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	97	85.61 /ton	150
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	21.00 cy	-	-	131.00 /cy	-	131.00 /cy	2,751	210.84 /cy	4,428
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	20.00 CY	23.46 /CY	5.55 /CY	-	-	29.00 /CY	580	44.57 /CY	891

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.05.06	*Cast-In-Place Concrete, Slabs on Grade, 8" thick*									
						Cfnsh,flrs,for spcf rndm accs flrs acl clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	672.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	629	1.44 /sf	967
						Curing, sprayed membrane curing compound	6.72 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	155	36.33 /csf	244
						Fine grading, fine grade for slab on grade, machine	74.67 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	140	2.88 /sy	215
						03.10.05.06 Cast-In-Place Concrete, Slabs on Grade, 8" thick	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
						03.18 Cast-In-Place Concrete, Slabs on Grade	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
						03.0 Concrete Work	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
						03.00.580 Siphon Roadway Concrete	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
		03.00.522				*Siphon Concrete Canal Lining*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.07	*Cast-In-Place Concrete, Slabs on Grade, 7" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	314.00 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	1,520	7.46 /lf	2,343
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	11.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	30,209	4,038.42 /ton	47,451
						Reinforcing in place, unloading & sorting, add to above - slabs	11.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	655	85.62 /ton	1,006
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	128.00 cy	-	-	131.00 /cy	-	131.00 /cy	16,768	210.84 /cy	26,987
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	128.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	3,712	44.57 /CY	5,705
						Cfnsh,flrs,for spcf rndm accs flrs acl clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	5,820.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	5,451	1.44 /sf	8,379
						Curing, sprayed membrane curing compound	58.20 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,341	36.33 /csf	2,114
						Fine grading, fine grade for slab on grade, machine	646.02 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,211	2.88 /sy	1,861
						03.10.05.07 Cast-In-Place Concrete, Slabs on Grade, 7" thick	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
						03.18 Cast-In-Place Concrete, Slabs on Grade	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
						03.0 Concrete Work	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
						03.00.522 Siphon Concrete Canal Lining	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
		31.25.902				*Siphon Earthworks*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	12,300.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	72,352	9.04 /CY	111,202
						Stockpile Excavated Spoils	12,300.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	34,897	4.38 /cy	53,858
						31.25.01.00 Earthworks, Structural, Excavation	*12,300.00 CY*	*3.89 /CY*	*4.58 /CY*	*0.25 /CY*	*/CY*	*8.72 /CY*	*107,250*	*13.42 /CY*	*165,061*
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	850.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	42,925	80.15 /CY	68,131
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*850.00 CY*	*14.75 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*50.50 /CY*	*42,925*	*80.15 /CY*	*68,131*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, native material	6,400.00 CY	6.66 /CY	2.18 /CY		-	8.85 /CY	56,605	13.59 /CY	87,000
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	6,400.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	9,200	2.21 /cy	14,140
						Compaction, water for, 6000 gallon wagon, 6 mile haul	6,400.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	11,864	2.94 /cy	18,791
						31.25.03.00 Earthworks, Structural, Backfill	*6,400.00 CY*	*8.31 /CY*	*2.63 /CY*	*1.20 /CY*	*/CY*	*12.14 /CY*	*77,669*	*18.74 /CY*	*119,930*
					31.25.05.00	*Earthworks, Structural, Hauling and Disposal*									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	5,900.00 CY	7.24 /CY	8.80 /CY	-	-	16.04 /CY	94,609	24.65 /CY	145,409
						Load excavated spoils	5,900.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	12,720	3.31 /cy	19,551
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	*5,900.00 CY*	*8.27 /CY*	*9.93 /CY*	*/CY*	*/CY*	*18.19 /CY*	*107,329*	*27.96 /CY*	*164,960*
					31.30.09.00	*Site Specialties, Rip Rap*									
						Rip-rap and rock lining, random, broken stone, machine placed for slope protection	760.00 CY	20.51 /CY	15.43 /CY	40.00 /CY	-	75.94 /CY	57,713	119.61 /CY	90,907
						31.30.09.00 Site Specialties, Rip Rap	*760.00 CY*	*20.51 /CY*	*15.43 /CY*	*40.00 /CY*	*/CY*	*75.94 /CY*	*57,713*	*119.61 /CY*	*90,907*
						31.25 Earthworks, Structural	*26,210.00 CY*	*6.79 /CY*	*5.50 /CY*	*2.71 /CY*	*/CY*	*14.99 /CY*	*392,886*	*23.23 /CY*	*608,989*
						31.0 Earthwork	*26,210.00 CY*	*6.79 /CY*	*5.50 /CY*	*2.71 /CY*	*/CY*	*14.99 /CY*	*392,886*	*23.23 /CY*	*608,989*
						31.25.902 Siphon Earthworks	*26,210.00 CY*	*6.79 /CY*	*5.50 /CY*	*2.71 /CY*	*/CY*	*14.99 /CY*	*392,886*	*23.23 /CY*	*608,989*
		31.25.904				*Siphon Earthworks, Temporary Bypass Canal*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	5,100.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	30,000	9.04 /CY	46,108
						Stockpile Excavated Spoils	5,100.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	14,470	4.38 /cy	22,332
						31.25.01.00 Earthworks, Structural, Excavation	*5,100.00 CY*	*3.89 /CY*	*4.58 /CY*	*0.25 /CY*	*/CY*	*8.72 /CY*	*44,469*	*13.42 /CY*	*68,440*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, native material	6,400.00 CY	6.66 /CY	2.18 /CY		-	8.85 /CY	56,605	13.59 /CY	87,000
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	6,400.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	9,200	2.21 /cy	14,140
						Compaction, water for, 6000 gallon wagon, 6 mile haul	6,400.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	11,864	2.94 /cy	18,791
						Surface Restoration	326,200.00 sf	0.03 /sf	0.01 /sf	0.10 /sf	-	0.13 /sf	42,745	0.21 /sf	68,062
						31.25.03.00 Earthworks, Structural, Backfill	*6,400.00 CY*	*9.62 /CY*	*2.90 /CY*	*6.30 /CY*	*/CY*	*18.82 /CY*	*120,414*	*29.37 /CY*	*187,993*
						31.25 Earthworks, Structural	*11,500.00 CY*	*7.08 /CY*	*3.65 /CY*	*3.62 /CY*	*/CY*	*14.34 /CY*	*164,883*	*22.30 /CY*	*256,432*
						31.0 Earthwork	*11,500.00 CY*	*7.08 /CY*	*3.65 /CY*	*3.62 /CY*	*/CY*	*14.34 /CY*	*164,883*	*22.30 /CY*	*256,432*
						31.25.904 Siphon Earthworks, Temporary Bypass Canal	*11,500.00 CY*	*7.08 /CY*	*3.65 /CY*	*3.62 /CY*	*/CY*	*14.34 /CY*	*164,883*	*22.30 /CY*	*256,432*
						15.02 GCID MP 24.38 Walker Creek Siphon	***1.00*** *LS*	*1,236,853.72 /LS*	*215,683.96 /LS*	*920,951.25 /LS*	*270,000.00 /LS*	*2,641,314.01 /LS*	*2,641,314*	*4,126,348.83 /LS*	*4,126,343*
	15.03					*GCID MP 24.88 Willow Creek Siphon*									
		01.00.902				*Siphone Removal and Control of Water*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					31.15.02.00	*Dewatering*									
						CBD Discharge Structure, Removal and Control of Water	6.00 MO		-		45,000.00 /MO	45,000.00 /MO	270,000	69,162.91 /MO	414,977
						31.15.02.00 Dewatering	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.91 /MO*	*414,977*
						01.01 Construction Operations	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.91 /MO*	*414,977*
						01.0 General Requirements	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.91 /MO*	*414,977*
						01.00.902 Siphone Removal and Control of Water	*6.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*270,000*	*69,162.91 /MO*	*414,977*
		02.00.902				*Siphon Demolish Existing Canal Lining*									
			02.0			*Existing Conditions*									
				02.40		*Demolition*									
					02.01.01.00	*General Site Demolition*									
						Partial Demolition of Existing Canal Lining	5,820.00 SF	1.38 /SF	0.28 /SF	0.82 /SF	-	2.48 /SF	14,454	3.88 /SF	22,562
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	180.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	2,886	24.65 /cy	4,436
						Load excavated spoils	180.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	388	3.31 /cy	596
						02.01.01.00 General Site Demolition	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
						02.40 Demolition	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
						02.0 Existing Conditions	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
						02.00.902 Siphon Demolish Existing Canal Lining	*5,820.00 SF*	*1.64 /SF*	*0.59 /SF*	*0.82 /SF*	*/SF*	*3.05 /SF*	*17,729*	*4.74 /SF*	*27,595*
		03.00.512				*Siphon Slab on Grade*									

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
			03.0			Concrete Work									
				03.18		Cast-In-Place Concrete, Slabs on Grade									
					03.10.05.06	Cast-In-Place Concrete, Slabs on Grade, 6" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	357.12 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	1,728	7.46 /lf	2,665
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	7.56 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	19,436	4,038.42 /ton	30,530
						Reinforcing in place, unloading & sorting, add to above - slabs	7.56 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	421	85.62 /ton	647
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	88.56 cy	-	-	131.00 /cy	-	131.00 /cy	11,601	210.84 /cy	18,672
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	85.68 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	2,485	44.57 /CY	3,819
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	3,771.36 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	3,533	1.44 /sf	5,429
						Curing, sprayed membrane curing compound	37.71 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	869	36.33 /csf	1,370
						Fine grading, fine grade for slab on grade, machine	419.04 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	785	2.88 /sy	1,207
						03.10.05.06 Cast-In-Place Concrete, Slabs on Grade, 6" thick	*85.68 CY*	*215.13 /CY*	*10.81 /CY*	*245.14 /CY*	*/CY*	*476.58 /CY*	*40,859*	*750.93 /CY*	*64,340*
					03.10.05.14	Cast-In-Place Concrete, Slabs on Grade, 14" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	518.40 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	4,580	13.65 /sfca	7,076
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	39.82 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	102,365	4,038.42 /ton	160,794
						Reinforcing in place, unloading & sorting, add to above - slabs	39.82 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,218	85.62 /ton	3,409
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	468.00 cy	-	-	131.00 /cy	-	131.00 /cy	61,308	210.84 /cy	98,672
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	455.04 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	13,197	44.57 /CY	20,282
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	10,080.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	9,442	1.44 /sf	14,511
						Curing, sprayed membrane curing compound	100.80 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	2,323	36.33 /csf	3,662
						Fine grading, fine grade for slab on grade, machine	1,120.00 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	2,099	2.88 /sy	3,226
						03.10.05.14 Cast-In-Place Concrete, Slabs on Grade, 14" thick	*455.04 CY*	*182.13 /CY*	*9.36 /CY*	*243.59 /CY*	*/CY*	*434.10 /CY*	*197,531*	*684.85 /CY*	*311,633*
						03.18 Cast-In-Place Concrete, Slabs on Grade	*540.72 CY*	*187.83 /CY*	*8.73 /CY*	*244.32 /CY*	*/CY*	*440.88 /CY*	*238,390*	*695.32 /CY*	*375,973*
						03.0 Concrete Work	*540.72 CY*	*187.83 /CY*	*8.73 /CY*	*244.32 /CY*	*/CY*	*440.88 /CY*	*238,390*	*695.32 /CY*	*375,973*
						03.00.512 Siphon Slab on Grade	*540.72 CY*	*187.83 /CY*	*8.73 /CY*	*244.32 /CY*	*/CY*	*440.88 /CY*	*238,390*	*695.32 /CY*	*375,973*
		03.00.514				Siphon Concrete Walls									
			03.0			Concrete Work									
				03.20		Cast-In-Place Concrete, Straight Walls									
					03.10.06.12	Cast-In-Place Concrete, Straight Walls, 12" thick									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	19,440.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	286,498	23.05 /sfca	448,015
						Form oil, coverage varies greatly, maximum, includes material only	51.84 gal	-	-	23.50 /gal	-	23.50 /gal	1,218	37.82 /gal	1,961
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	31.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	80,985	4,038.42 /ton	127,210
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	31.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,755	85.62 /ton	2,697
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	370.80 cy	-	-	131.00 /cy	-	131.00 /cy	48,575	210.84 /cy	78,179
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	360.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	16,095	68.72 /CY	24,738
						Finishing: break ties & patch voids (walls, cols or beams)	19,440.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	19,614	1.55 /sf	30,189
						03.10.06.12 Cast-In-Place Concrete, Straight Walls, 12" thick	*360.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*454,740*	*1,980.52 /CY*	*712,989*
						03.20 Cast-In-Place Concrete, Straight Walls	*360.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*454,740*	*1,980.52 /CY*	*712,989*
						03.0 Concrete Work	*360.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*454,740*	*1,980.52 /CY*	*712,989*
						03.00.514 Siphon Concrete Walls	*360.00 CY*	*714.81 /CY*	*9.12 /CY*	*539.23 /CY*	*/CY*	*1,263.17 /CY*	*454,740*	*1,980.52 /CY*	*712,989*
		03.00.516				Siphon Retaining Walls									
			03.0			Concrete Work									
				03.13		Cast-In-Place Concrete, Continuous Footings									
					03.10.02.30	Cast-In-Place Concrete, Continuous Footings, 30" thick									
						C.I.P. concrete forms, footing, keyway, tapered wood, 2" x 6", 4 use, includes erecting, bracing, stripping and cleaning	139.68 lf	1.47 /lf	-	0.34 /lf	-	1.81 /lf	253	2.80 /lf	392
						Reinforcing Steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	20.52 ton	1,305.66 /ton	-	1,125.00 /ton	-	2,430.66 /ton	49,877	3,817.37 /ton	78,333
						Reinforcing steel, unload and sort, add to base	20.52 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,143	85.62 /ton	1,757
						Struct concrete,ready mix,normal wt,4000 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	240.48 cy	-	-	127.00 /cy	-	127.00 /cy	30,541	204.40 /cy	49,154
						Structural concrete, placing, continuous footing, deep, pumped, includes strike off & consolidation, excludes material	233.28 CY	27.12 /CY	6.41 /CY	-	-	33.53 /CY	7,822	51.54 /CY	12,023
						Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering	233.28 bcy	6.21 /bcy	2.12 /bcy	-	-	8.32 /bcy	1,942	12.79 /bcy	2,984
						Excavating, trench or continuous footing, common earth, trim sides and bottom for concrete pours, excludes sheeting or dewatering	2,514.24 sf	1.04 /sf	0.03 /sf	-	-	1.07 /sf	2,694	1.65 /sf	4,140
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	233.28 lcy	7.24 /lcy	8.80 /lcy	-	-	16.04 /lcy	3,741	24.65 /lcy	5,749
						03.10.02.30 Cast-In-Place Concrete, Continuous Footings, 30" thick	*233.28 CY*	*171.85 /CY*	*18.22 /CY*	*230.08 /CY*	*/CY*	*420.15 /CY*	*98,012*	*662.43 /CY*	*154,531*
						03.13 Cast-In-Place Concrete, Continuous Footings	*233.28 CY*	*171.85 /CY*	*18.22 /CY*	*230.08 /CY*	*/CY*	*420.15 /CY*	*98,012*	*662.43 /CY*	*154,531*
				03.20		Cast-In-Place Concrete, Straight Walls									
					03.10.06.26	Cast-In-Place Concrete, Straight Walls, 26" thick									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	4,190.40 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	61,756	23.05 /sfca	96,572
						Form oil, coverage varies greatly, maximum, includes material only	11.16 gal	-	-	23.50 /gal	-	23.50 /gal	262	37.82 /gal	422
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	14.76 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	37,947	4,038.42 /ton	59,607
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	14.76 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	822	85.62 /ton	1,264
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	173.52 cy	-	-	131.00 /cy	-	131.00 /cy	22,731	210.84 /cy	36,585
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	168.48 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	7,533	68.72 /CY	11,577
						Finishing: break ties & patch voids (walls, cols or beams)	4,190.40 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	4,228	1.55 /sf	6,507
						03.10.06.26 Cast-In-Place Concrete, Straight Walls, 26" thick	*168.48 CY*	*415.92 /CY*	*9.12 /CY*	*377.90 /CY*	*/CY*	*802.94 /CY*	*135,280*	*1,261.46 /CY*	*212,534*

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						03.20 Cast-In-Place Concrete, Straight Walls	*166.48 CY*	*416.92 /CY*	*[illegible] /CY*	*377.90 /CY*	*/CY*	*802.94 /CY*	*[illegible]*	*[illegible] /CY*	*[illegible]*
						03.0 Concrete Work	*401.76 CY*	*274.20 /CY*	*14.40 /CY*	*292.07 /CY*	*/CY*	*580.67 /CY*	*233,292*	*913.64 /CY*	*367,066*
						03.00.518 Siphon Retaining Walls	*401.76 CY*	*274.20 /CY*	*14.40 /CY*	*292.07 /CY*	*/CY*	*580.67 /CY*	*233,292*	*913.64 /CY*	*367,066*
		03.00.519				*Siphon Elevated Slab*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.12	*Cast-In-Place Concrete, Elevated Decks, 12" thick*									
						Slab shoring	90,720.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	62,118	1.06 /cf	95,802
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	10,080.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	89,475	13.74 /sf	138,490
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	440.64 lf	5.53 /lf	-	0.22 /lf	-	5.75 /lf	2,532	8.85 /lf	3,899
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	32.76 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	84,224	4,038.42 /ton	132,299
						Reinforcing in place, unloading & sorting, add to above - decks	32.76 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,825	85.62 /ton	2,805
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	385.20 cy	-	-	131.00 /cy	-	131.00 /cy	50,461	210.84 /cy	81,215
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	374.40 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	11,160	45.81 /CY	17,152
						Finishing elev slab, bull float, manual float & manual steel trowel	10,080.00 sf	1.23 /sf	-	-	-	1.23 /sf	12,439	1.90 /sf	19,118
						Curing, sprayed membrane curing compound, elevated decks	72.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,660	36.33 /csf	2,616
						03.10.10.12 Cast-In-Place Concrete, Elevated Decks, 12" thick	*374.40 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*315,893*	*1,317.83 /CY*	*493,395*
						03.24 Cast-In-Place Concrete, Elevated Slabs	*374.40 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*315,893*	*1,317.83 /CY*	*493,395*
						03.0 Concrete Work	*374.40 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*315,893*	*1,317.83 /CY*	*493,395*
						03.00.518 Siphon Elevated Slab	*374.40 CY*	*547.11 /CY*	*6.27 /CY*	*290.36 /CY*	*/CY*	*843.73 /CY*	*315,893*	*1,317.83 /CY*	*493,395*
		03.00.520				*Siphon Roadway Concrete*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.08	*Cast-In-Place Concrete, Slabs on Grade, 8" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	136.00 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	658	7.46 /lf	1,015
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	1.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	4,499	4,038.41 /ton	7,067
						Reinforcing in place, unloading & sorting, add to above - slabs	1.75 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	97	85.62 /ton	150
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	21.00 cy	-	-	131.00 /cy	-	131.00 /cy	2,751	210.84 /cy	4,428
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	20.00 CY	23.46 /CY	5.55 /CY	-	-	29.00 /CY	580	44.57 /CY	891
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	672.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	629	1.44 /sf	967
						Curing, sprayed membrane curing compound	6.72 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	155	36.33 /csf	244
						Fine grading, fine grade for slab on grade, machine	74.67 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	140	2.88 /sy	215
						03.10.05.08 Cast-In-Place Concrete, Slabs on Grade, 8" thick	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
						03.18 Cast-In-Place Concrete, Slabs on Grade	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
						03.0 Concrete Work	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
						03.00.520 Siphon Roadway Concrete	*20.00 CY*	*216.98 /CY*	*9.55 /CY*	*248.98 /CY*	*/CY*	*475.51 /CY*	*9,510*	*748.88 /CY*	*14,978*
		03.00.522				*Siphon Concrete Canal Lining*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.07	*Cast-In-Place Concrete, Slabs on Grade, 7" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	314.00 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	1,520	7.46 /lf	2,343
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	11.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	30,209	4,038.42 /ton	47,451
						Reinforcing in place, unloading & sorting, add to above - slabs	11.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	655	85.61 /ton	1,006
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	128.00 cy	-	-	131.00 /cy	-	131.00 /cy	16,768	210.84 /cy	26,987
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	128.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	3,712	44.57 /CY	5,705
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	5,820.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	5,451	1.44 /sf	8,379
						Curing, sprayed membrane curing compound	58.20 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,341	36.33 /csf	2,114
						Fine grading, fine grade for slab on grade, machine	646.02 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,211	2.88 /sy	1,861
						03.10.05.07 Cast-In-Place Concrete, Slabs on Grade, 7" thick	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
						03.18 Cast-In-Place Concrete, Slabs on Grade	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
						03.0 Concrete Work	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
						03.00.522 Siphon Concrete Canal Lining	*128.00 CY*	*217.11 /CY*	*10.78 /CY*	*247.63 /CY*	*/CY*	*475.52 /CY*	*60,866*	*748.80 /CY*	*95,847*
		31.25.302				*Siphon Earthworks*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	8,856.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	52,094	9.04 /CY	80,066
						Stockpile Excavated Spoils	8,856.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	25,126	4.38 /cy	38,778
						31.25.01.00 Earthworks, Structural, Excavation	*8,856.00 CY*	*3.89 /CY*	*4.58 /CY*	*0.25 /CY*	*/CY*	*8.72 /CY*	*77,220*	*13.42 /CY*	*118,844*
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	612.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	30,906	80.15 /CY	49,055
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*612.00 CY*	*14.75 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*50.50 /CY*	*30,906*	*80.15 /CY*	*49,055*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, native material	4,608.00 CY	6.66 /CY	2.18 /CY		-	8.85 /CY	40,756	13.59 /CY	62,640
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	4,608.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	6,624	2.21 /cy	10,181
						Compaction, water for, 6000 gallon wagon, 6 mile haul	4,608.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	8,542	2.94 /cy	13,529
						31.25.03.00 Earthworks, Structural, Backfill	*4,608.00 CY*	*8.31 /CY*	*2.63 /CY*	*1.20 /CY*	*/CY*	*12.14 /CY*	*55,922*	*18.74 /CY*	*86,350*
					31.25.05.00	*Earthworks, Structural, Hauling and Disposal*									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	4,248.00 CY	7.24 /CY	8.80 /CY	-	-	16.04 /CY	68,118	24.65 /CY	104,695
						Load excavated spoils	4,248.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	9,159	3.31 /cy	14,076
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	*4,248.00 CY*	*8.27 /CY*	*9.93 /CY*	*/CY*	*/CY*	*18.19 /CY*	*77,277*	*27.96 /CY*	*118,771*
					31.30.09.00	*Site Specialties, Rip Rap*									
						Rip-rap and rock lining, random, broken stone, machine placed for slope protection	760.00 CY	20.51 /CY	15.43 /CY	40.00 /CY	-	75.94 /CY	57,713	119.61 /CY	90,907
						31.30.09.00 Site Specialties, Rip Rap	*760.00 CY*	*20.51 /CY*	*15.43 /CY*	*40.00 /CY*	*/CY*	*75.94 /CY*	*57,713*	*119.61 /CY*	*90,907*
						31.25 Earthworks, Structural	*[illegible] CY*	*6.94 /CY*	*5.61 /CY*	*[illegible] /CY*	*/CY*	*15.67 /CY*	*[illegible]*	*[illegible] /CY*	*[illegible]*

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DETAIL REPORT

Jacobs

Project type:	Project Name: Sites Reservoir Project Task Order 1 GCID Canal Improvements Rev 2	Estimator: Cavalleri/Wells - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 2, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						31.0 Earthwork	*19,084.00 CY*	*6.94 /CY*	*5.61 /CY*	*3.12 /CY*	*/CY*	*15.67 /CY*	*299,038*	*24.31 /CY*	*463,926*
						31.25.902 Siphon Earthworks	*19,084.00 CY*	*6.94 /CY*	*5.61 /CY*	*3.12 /CY*	*/CY*	*15.67 /CY*	*299,038*	*24.31 /CY*	*463,926*
		31.25.904				*Siphon Earthworks, Temporary Bypass Canal*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	5,505.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	32,382	9.04 /CY	49,770
						Stockpile Excavated Spoils	5,505.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	15,619	4.38 /cy	24,105
						31.25.01.00 Earthworks, Structural, Excavation	*5,505.00 CY*	*3.89 /CY*	*4.58 /CY*	*0.25 /CY*	*/CY*	*8.72 /CY*	*48,001*	*13.42 /CY*	*73,875*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, native material	6,910.00 CY	6.66 /CY	2.18 /CY		-	8.85 /CY	61,116	13.59 /CY	93,932
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	6,910.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	9,933	2.21 /cy	15,267
						Compaction, water for, 6000 gallon wagon, 6 mile haul	6,910.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	12,809	2.94 /cy	20,288
						Surface Restoration	366,600.00 sf	0.03 /sf	0.01 /sf	0.10 /sf	-	0.13 /sf	48,039	0.21 /sf	76,492
						31.25.03.00 Earthworks, Structural, Backfill	*6,910.00 CY*	*9.87 /CY*	*2.91 /CY*	*6.51 /CY*	*/CY*	*19.09 /CY*	*131,897*	*29.81 /CY*	*205,979*
						31.25 Earthworks, Structural	*12,415.00 CY*	*7.11 /CY*	*3.65 /CY*	*3.73 /CY*	*/CY*	*14.49 /CY*	*179,898*	*22.54 /CY*	*279,854*
						31.0 Earthwork	*12,415.00 CY*	*7.11 /CY*	*3.65 /CY*	*3.73 /CY*	*/CY*	*14.49 /CY*	*179,898*	*22.54 /CY*	*279,854*
						31.25.904 Siphon Earthworks, Temporary Bypass Canal	*12,415.00 CY*	*7.11 /CY*	*3.65 /CY*	*3.73 /CY*	*/CY*	*14.49 /CY*	*179,898*	*22.54 /CY*	*279,854*
						13.03 GCID MP 34.59 Willow Creek Siphon	**1.00 LS**	**336,186.96 /LS**	**175,543.38 /LS**	**889,627.10 /LS**	**678,000.00 /LS**	**2,079,357.34 /LS**	**2,079,357**	**3,246,598.44 /LS**	**3,246,598**
	13.04					GCID MP 26.6 RR Siphon									
		01.00.902				*Siphone Removal and Control of Water*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					31.15.02.00	*Dewatering*									
						Removal and Control of Water, Includes Bypass Allowance	1.00 MO		-		135,000.00 /MO	135,000.00 /MO	135,000	207,488.73 /MO	207,489
						31.15.02.00 Dewatering	*1.00 MO*	*/MO*	*/MO*	*/MO*	*135,000.00 /MO*	*135,000.00 /MO*	*135,000*	*207,488.73 /MO*	*207,489*
						01.01 Construction Operations	*1.00 MO*	*/MO*	*/MO*	*/MO*	*135,000.00 /MO*	*135,000.00 /MO*	*135,000*	*207,488.73 /MO*	*207,489*
						01.0 General Requirements	*1.00 MO*	*/MO*	*/MO*	*/MO*	*135,000.00 /MO*	*135,000.00 /MO*	*135,000*	*207,488.73 /MO*	*207,489*
						01.00.902 Siphone Removal and Control of Water	*1.00 MO*	*/MO*	*/MO*	*/MO*	*135,000.00 /MO*	*135,000.00 /MO*	*135,000*	*207,488.73 /MO*	*207,489*
		01.00.906				*Construction Operations*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					01.01.05.00	*General Conditions, Other*									
						Construction Activities Near Active Rail Road Tracks Productivity Adjustment Allowance	1.00 MO		-		75,000.00 /MO	75,000.00 /MO	75,000	115,271.51 /MO	115,272
						01.01.05.00 General Conditions, Other	*1.00 MO*	*/MO*	*/MO*	*/MO*	*75,000.00 /MO*	*75,000.00 /MO*	*75,000*	*115,271.51 /MO*	*115,272*
						01.01 Construction Operations	*1.00 MO*	*/MO*	*/MO*	*/MO*	*75,000.00 /MO*	*75,000.00 /MO*	*75,000*	*115,271.51 /MO*	*115,272*
						01.0 General Requirements	*1.00 MO*	*/MO*	*/MO*	*/MO*	*75,000.00 /MO*	*75,000.00 /MO*	*75,000*	*115,271.51 /MO*	*115,272*
						01.00.906 Construction Operations	*1.00 MO*	*/MO*	*/MO*	*/MO*	*75,000.00 /MO*	*75,000.00 /MO*	*75,000*	*115,271.51 /MO*	*115,272*
		03.00.522				*Siphon Concrete Canal Lining*									
			03.0			*Concrete Work*									
				03.10		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.07	*Cast-In-Place Concrete, Slabs on Grade, 7" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	200.00 lf	4.51 /lf	-	0.33 /lf	-	4.84 /lf	968	7.46 /lf	1,492
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	6.20 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	15,940	4,038.42 /ton	25,038
						Reinforcing in place, unloading & sorting, add to above - slabs	6.20 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	345	85.62 /ton	531
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	72.00 cy	-	-	131.00 /cy	-	131.00 /cy	9,432	210.84 /cy	15,180
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	70.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	2,030	44.57 /CY	3,120
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	3,200.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	2,997	1.44 /sf	4,607
						Curing, sprayed membrane curing compound	32.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	738	36.33 /csf	1,162
						Fine grading, fine grade for slab on grade, machine	355.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	666	2.88 /sy	1,024
						03.10.05.07 Cast-In-Place Concrete, Slabs on Grade, 7" thick	*70.00 CY*	*214.64 /CY*	*10.79 /CY*	*247.66 /CY*	*/CY*	*473.09 /CY*	*33,116*	*745.08 /CY*	*52,155*
						03.10 Cast-In-Place Concrete, Slabs on Grade	*70.00 CY*	*214.64 /CY*	*10.79 /CY*	*247.66 /CY*	*/CY*	*473.09 /CY*	*33,116*	*745.08 /CY*	*52,155*
						03.0 Concrete Work	*70.00 CY*	*214.64 /CY*	*10.79 /CY*	*247.66 /CY*	*/CY*	*473.09 /CY*	*33,116*	*745.08 /CY*	*52,155*
						03.00.522 Siphon Concrete Canal Lining	*70.00 CY*	*214.64 /CY*	*10.79 /CY*	*247.66 /CY*	*/CY*	*473.09 /CY*	*33,116*	*745.08 /CY*	*52,155*
		33.00.504				*Trenchless Pipe Installation, Install Additional Siphon Pipe*									
			33.2			*Pipeline Specialties*									
				33.60		*Trenchless Technology, Tunneling*									
					33.60.01.10	*Pipeline Specials, Tunneling, 84" Piping in 102" Casing*									
						Install Additional Siphon Pipe by Trenchless Pipe Installation	70.00 LF		-		6,800.00 /LF	6,800.00 /LF	476,000	10,451.28 /LF	731,590
						33.60.01.10 Pipeline Specials, Tunneling, 84" Piping in 102" Casing	*70.00 LF*	*/LF*	*/LF*	*/LF*	*6,800.00 /LF*	*6,800.00 /LF*	*476,000*	*10,451.28 /LF*	*731,590*
						33.60 Trenchless Technology, Tunneling	*70.00 LF*	*/LF*	*/LF*	*/LF*	*6,800.00 /LF*	*6,800.00 /LF*	*476,000*	*10,451.28 /LF*	*731,590*
						33.2 Pipeline Specialties	***1.00** LS*	*/LS*	*/LS*	*/LS*	*476,000.00 /LS*	*476,000.00 /LS*	*476,000*	*731,589.86 /LS*	*731,590*
						33.00.504 Trenchless Pipe Installation, Install Additional Siphon Pipe	*70.00 LF*	*/LF*	*/LF*	*/LF*	*6,800.00 /LF*	*6,800.00 /LF*	*476,000*	*10,451.28 /LF*	*731,590*
						13.04 GCID MP 26.6 RR Siphon	**1.00 LS**	**15,024.86 /LS**	**755.21 /LS**	**17,336.40 /LS**	**686,000.00 /LS**	**719,116.45 /LS**	**719,116**	**1,106,505.45 /LS**	**1,106,505**
	13.05					GCID Main Canal Bank Improvements									
		31.00.716				*Construct Embankment*									
			31.0			*Earthwork*									
				31.20		*Earthworks, Site*									
					31.20.09.40	*Earthworks, Sitework, Embankments/Berms*									
						Construct cofferdam embankment w/200 HP dozer	5,710.00 CY	1.35 /CY	1.90 /CY	-	-	3.25 /CY	18,562	5.00 /CY	28,528
						Load excavated spoils	5,710.00 cy	0.62 /cy	0.68 /cy		-	1.29 /cy	7,386	1.99 /cy	11,353
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	5,710.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	25,180	6.78 /cy	38,700
						Compaction, water for, 3000 gallon truck, 3 mile haul	5,710.00 cy	0.65 /cy	0.44 /cy		-	1.09 /cy	6,239	1.68 /cy	9,590
						Compaction, structural, common fill, 8" lifts, sheepsfoot	5,710.00 cy	0.74 /cy	1.09 /cy	-	-	1.83 /cy	10,436	2.81 /cy	16,040
						Cut & finish cofferdam top/sideslopes w/dozer	2,695.12 sy	0.74 /sy	1.05 /sy	-	-	1.79 /sy	4,830	2.75 /sy	7,424
						Mobilizations to 11 Sites	1.00 ls			-	25,000.00 /ls	25,000.00 /ls	25,000	38,423.85 /ls	38,424
						31.20.09.40 Earthworks, Sitework, Embankments/Berms	*5,710.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*4.38 /CY*	*17.10 /CY*	*97,633*	*26.28 /CY*	*150,058*
						31.20 Earthworks, Site	*5,710.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*4.38 /CY*	*17.10 /CY*	*97,633*	*26.28 /CY*	*150,058*
						31.0 Earthwork	*5,710.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*4.38 /CY*	*17.10 /CY*	*97,633*	*26.28 /CY*	*150,058*
						31.00.716 Construct Embankment	*5,710.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*4.38 /CY*	*17.10 /CY*	*97,633*	*26.28 /CY*	*150,058*
						13.05 GCID Main Canal Bank Improvements	**5,710.00 CY**	**4.67 /CY**	**8.05 /CY**	**/CY**	**4.38 /CY**	**17.10 /CY**	**97,633**	**26.28 /CY**	**150,058**
						13 GCID Canal Improvements	***1.00 LS***	***2,911,441.33 /LS***	***489,711.39 /LS***	***2,462,549.17 /LS***	***1,786,000.00 /LS***	***7,649,701.89 /LS***	***7,649,702***	***12,002,020.73 /LS***	***12,002,021***

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	2,911,441		35,596.623 hrs	
Material	2,462,549			
Allowance	1,786,000			
Equipment	489,711		7,309.217 hrs	
Other				
Subtotal Direct Costs	7,649,701	7,649,701		
Material Sales Tax, Dunnigan Ca	178,535			7.250 %
Subtotal W/ Sales Tax	178,535	7,828,236		
Electrical Work I,OH&P	66,250			25.000 %
Subtotal W/ Subcontractor OH&P	66,250	7,894,486		
General Conditions	394,724			5.000 %
Subtotal W/ General Conditions	394,724	8,289,210		
Mobilization/Demobilization	248,676			3.000 %
Prime Contractor Overhead	853,789			10.000 %
Prime Contractor Profit	563,501			6.000 %
Bonds & Insurance	216,027			2.170 %
Subtotal W/ Prime Markups	1,881,993	10,171,203		
Contractor Contingency	305,136			3.000 %
Design Contingency	1,525,681			15.000 %
Subtotal W/ Contingency	1,830,817	12,002,020		
Total Construction Cost		**12,002,020**		
Non-Contract Costs	2,160,364			18.000 %
Total Project Costs	**2,160,364**	**14,162,384**		

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Terminal Regulating Reservoir (TRR) - East

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
07			***TRR East***									
	07.01		TRR East Reservoir									
		01.00.700	TRR East Reservoir, Dewatering/Erosion Controls/Dust Abatement	24.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,440,000	93,621.57 /MO	2,246,918
		31.00.700	Construct Haul Roads	3,767.00 SY	3.80 /SY	4.19 /SY	20.00 /SY	/SY	27.98 /SY	105,408	44.60 /SY	168,028
		31.00.702	Construct Bridge	3,600.00 SF	/SF	/SF	/SF	85.00 /SF	85.00 /SF	306,000	131.09 /SF	471,924
		31.00.704	Set up silos, generator, and batch plant within TRR-E footprint	1.00 LS	/LS	/LS	/LS	554,000.00 /LS	554,000.00 /LS	554,000	854,397.86 /LS	854,398
		31.00.706	Install CDSM using auger rigs	900,000.00 CY	1.29 /CY	1.53 /CY	25.00 /CY	/CY	27.81 /CY	25,031,075	44.71 /CY	40,235,037
		31.00.708	Manage CDSM spoil	100,000.00 CY	2.52 /CY	4.93 /CY	/CY	/CY	7.45 /CY	744,721	11.49 /CY	1,148,535
		31.00.710	Excavate upper 2 ft in reservoir area to remove deleterious materials	450,000.00 CY	3.50 /CY	6.95 /CY	/CY	/CY	10.44 /CY	4,699,974	16.11 /CY	7,248,462
		31.00.712	Base Grades - approach channel (concrete lined)	96,000.00 CY	2.10 /CY	5.46 /CY	/CY	/CY	7.57 /CY	726,476	11.67 /CY	1,120,397
		31.00.714	Base Grades - reservoir bottom grades	210,000.00 CY	6.19 /CY	6.40 /CY	/CY	/CY	12.60 /CY	2,645,048	19.43 /CY	4,079,284
		31.00.716	Construct Embankment	385,000.00 CY	4.67 /CY	8.05 /CY	/CY	/CY	12.72 /CY	4,897,354	19.62 /CY	7,552,868
		31.00.718	Construct Check Structures #2	**6,433.00** SF	41.36 /SF	3.31 /SF	64.59 /SF	4.70 /SF	113.96 /SF	733,075	184.51 /SF	1,186,929
		31.00.720	Construct Check Structures #3	**6,433.00** SF	41.36 /SF	3.31 /SF	64.59 /SF	4.70 /SF	113.96 /SF	733,075	184.51 /SF	1,186,929
		31.00.722	Spillway (concrete lined)	**1.00** LS	823,616.16 /LS	36,801.34 /LS	900,593.42 /LS	/LS	1,761,010.92 /LS	1,761,011	2,781,184.71 /LS	2,781,185
		31.00.724	Prepare TRR Subgrade and Install Reservoir Liner	**5,000,000.00** SF	0.18 /SF	0.09 /SF	0.60 /SF	/SF	0.87 /SF	4,335,965	1.38 /SF	6,904,605
		31.00.726	Construct GCID Canal Plug	57,000.00 CY	4.67 /CY	8.05 /CY	/CY	/CY	12.72 /CY	725,063	19.62 /CY	1,118,217
		31.00.728	Construct Check Structure #1	**6,433.00** SF	41.36 /SF	3.31 /SF	64.59 /SF	4.70 /SF	113.96 /SF	733,075	184.51 /SF	1,186,929
			07.01 TRR East Reservoir	**140.00** AC	67,381.12 /AC	83,607.04 /AC	200,588.55 /AC	6,790.00 /AC	358,366.71 /AC	50,171,340	567,790.30 /AC	79,490,641
			07 TRR East	***1.00 LS***	***9,433,356.84 /LS***	***11,704,985.82 /LS***	***28,082,397.00 /LS***	***950,600.00 /LS***	***50,171,339.66 /LS***	***50,171,340***	***79,490,641.42 /LS***	***79,490,641***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	14,572,188		115,035.771 hrs	
Material	45,398,114			
Allowance	1,466,048			
Equipment	18,054,292		87,057.516 hrs	
Other				
Total Construction Cost	**79,490,642**	**79,490,642**		
Non-Contract Costs	14,308,315			18.000 %
Total Project Costs	**14,308,315**	**93,798,957**		

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR East Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
07						***TRR East***									
	07.01					*TRR East Reservoir*									
		01.00.700				*TRR East Reservoir, Dewatering/Erosion Controls/Dust Abatement*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					01.01.05.00	*General Conditions, Other*									
						Funks Reservoir, Dewatering/Erosion Controls/Dust Abatement Allowance	24.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	-	60,000.00 /MO	1,440,000	93,621.57 /MO	2,246,918
						01.01.05.00 General Conditions, Other	24.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,440,000	93,621.57 /MO	2,246,918
						01.01 Construction Operations	24.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,440,000	93,621.57 /MO	2,246,918
						01.0 General Requirements	24.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,440,000	93,621.57 /MO	2,246,918
						01.00.700 TRR East Reservoir, Dewatering/Erosion Controls/Dust Abatement	24.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,440,000	93,621.57 /MO	2,246,918
		31.00.700				*Construct Haul Roads*									
			32.0			*Exterior Improvements*									
				32.12		*Paving*									
					32.40.04.00	*Site Improvements, Access Roads, Gravel*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	3,767.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	3,671	1.50 /SY	5,662
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	844.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	5,324	9.73 /cy	8,211
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	422.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	6,767	24.73 /cy	10,436
						Load excavated spoils	422.00 cy	0.77 /cy	0.84 /cy		-	1.62 /cy	682	2.49 /cy	1,052
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,18"deep	3,767.00 sy	1.34 /sy	1.31 /sy	20.00 /sy	-	22.64 /sy	85,290	36.37 /sy	137,000
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	3,767.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	3,673	1.50 /sy	5,665
						32.40.04.00 Site Improvements, Access Roads, Gravel	3,767.00 SY	3.60 /SY	4.19 /SY	20.00 /SY	/SY	27.98 /SY	105,408	44.60 /SY	168,026
						32.12 Paving	3,767.00 SY	3.60 /SY	4.19 /SY	20.00 /SY	/SY	27.98 /SY	105,408	44.60 /SY	168,026
						32.0 Exterior Improvements	**1.00** LS	14,295.46 /LS	15,772.25 /LS	75,340.00 /LS	/LS	105,407.73 /LS	105,408	168,025.58 /LS	168,026
						31.00.700 Construct Haul Roads	3,767.00 SY	3.80 /SY	4.19 /SY	20.00 /SY	/SY	27.98 /SY	105,408	44.60 /SY	168,026
		31.00.702				*Construct Bridge*									
			34.0			*Transportation*									
				34.50		*Transportation*									
					32.50.04.00	*Site Improvements, Prefabricated Bridges*									
						Construct GCID Canal Bridge, Complete	3,600.00 SF		-		85.00 /SF	85.00 /SF	306,000	131.09 /SF	471,924
						32.50.04.00 Site Improvements, Prefabricated Bridges	3,600.00 SF	/SF	/SF	/SF	85.00 /SF	85.00 /SF	306,000	131.09 /SF	471,924
						34.50 Transportation	3,600.00 SF	/SF	/SF	/SF	85.00 /SF	85.00 /SF	306,000	131.09 /SF	471,924
						34.0 Transportation	3,600.00 SF	/SF	/SF	/SF	85.00 /SF	85.00 /SF	306,000	131.09 /SF	471,924
						31.00.702 Construct Bridge	3,600.00 SF	/SF	/SF	/SF	85.00 /SF	85.00 /SF	306,000	131.09 /SF	471,924
		31.00.704				*Set up silos, generator, and batch plant within TRR-E footprint*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.10.00	*Earthworks, Sitework, Soil Treatment*									
						Set up silos, generator, and batch plant within TRR-E footprint, Assumes multiple soil mixing rigs	1.00 LS		-		554,000.00 /LS	554,000.00 /LS	554,000	854,397.86 /LS	854,398
						31.20.10.00 Earthworks, Sitework, Soil Treatment	0.00	/CY	/CY	/CY	/CY	/CY	554,000	/CY	854,398
						31.22 Earthworks, Site	0.00	/CY	/CY	/CY	/CY	/CY	554,000	/CY	854,398
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	554,000	/CY	854,398
						31.00.704 Set up silos, generator, and batch plant within TRR-E footprint	1.00 LS	/LS	/LS	/LS	554,000.00 /LS	554,000.00 /LS	554,000	854,397.86 /LS	854,398
		31.00.706				*Install CDSM using auger rigs*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.10.00	*Earthworks, Sitework, Soil Treatment*									
						Install CDSM using auger rigs, Complete	900,000.00 CY	1.29 /CY	1.53 /CY	25.00 /CY	-	27.81 /CY	25,031,075	44.71 /CY	40,235,037
						31.20.10.00 Earthworks, Sitework, Soil Treatment	900,000.00 CY	1.29 /CY	1.53 /CY	25.00 /CY	/CY	27.81 /CY	25,031,075	44.71 /CY	40,235,037
						31.22 Earthworks, Site	900,000.00 CY	1.29 /CY	1.53 /CY	25.00 /CY	/CY	27.81 /CY	25,031,075	44.71 /CY	40,235,037
						31.0 Earthwork	900,000.00 CY	1.29 /CY	1.53 /CY	25.00 /CY	/CY	27.81 /CY	25,031,075	44.71 /CY	40,235,037
						31.00.706 Install CDSM using auger rigs	900,000.00 CY	1.29 /CY	1.53 /CY	25.00 /CY	/CY	27.81 /CY	25,031,075	44.71 /CY	40,235,037
		31.00.708				*Manage CDSM spoil*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.15.00	*Earthworks, Sitework, Hauling and Dump Fees*									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	15,000.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	240,531	24.73 /cy	370,955
						Load excavated spoils	100,000.00 CY	0.62 /CY	0.68 /CY		-	1.29 /CY	129,359	2.00 /CY	199,502
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	85,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	374,832	6.80 /cy	576,078
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	100,000.00 CY	2.52 /CY	4.93 /CY	/CY	/CY	7.45 /CY	744,721	11.49 /CY	1,148,535
						31.22 Earthworks, Site	100,000.00 CY	2.52 /CY	4.93 /CY	/CY	/CY	7.45 /CY	744,721	11.49 /CY	1,148,535
						31.0 Earthwork	100,000.00 CY	2.52 /CY	4.93 /CY	/CY	/CY	7.45 /CY	744,721	11.49 /CY	1,148,535
						31.00.708 Manage CDSM spoil	100,000.00 CY	2.52 /CY	4.93 /CY	/CY	/CY	7.45 /CY	744,721	11.49 /CY	1,148,535
		31.00.710				*Excavate upper 2 ft in reservoir area to remove deleterious materials*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.07.10	*Earthworks, Sitework, Excavating Bulk Measure*									
						Excavate material at deadpool area for levee embankments, 21 C.Y. bucket, self propelled scrapers, 1/4 push dozer	450,000.00 CY	0.65 /CY	1.77 /CY	-	-	2.42 /CY	1,086,884	3.72 /CY	1,676,231
						Grading area w/dozer	333,333.34 sy	0.58 /sy	0.82 /sy	-	-	1.40 /sy	466,594	2.16 /sy	719,597
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	68,000.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	1,090,406	24.73 /cy	1,681,661
						Load excavated spoils	450,000.00 cy	0.62 /cy	0.68 /cy		-	1.29 /cy	582,116	2.00 /cy	897,759
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 2 mile,25 mph,exclds loadng eqpmnt	382,000.00 lcy	0.84 /lcy	3.02 /lcy	-	-	3.86 /lcy	1,473,974	5.95 /lcy	2,273,214
						31.20.07.10 Earthworks, Sitework, Excavating Bulk Measure	450,000.00 CY	3.50 /CY	6.95 /CY	/CY	/CY	10.44 /CY	4,699,974	16.11 /CY	7,248,462
						31.22 Earthworks, Site	450,000.00 CY	3.50 /CY	6.95 /CY	/CY	/CY	10.44 /CY	4,699,974	16.11 /CY	7,248,462
						31.0 Earthwork	450,000.00 CY	3.50 /CY	6.95 /CY	/CY	/CY	10.44 /CY	4,699,974	16.11 /CY	7,248,462
						31.00.710 Excavate upper 2 ft in reservoir area to remove deleterious materials	450,000.00 CY	3.50 /CY	6.95 /CY	/CY	/CY	10.44 /CY	4,699,974	16.11 /CY	7,248,462
		31.00.712				*Base Grades - approach channel (concrete lined)*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.07.10	*Earthworks, Sitework, Excavating Bulk Measure*									
						Excavate material at deadpool area for levee embankments, 21 C.Y. bucket, self propelled scrapers, 1/4 push dozer	96,000.00 CY	0.65 /CY	1.77 /CY	-	-	2.42 /CY	231,889	3.72 /CY	357,596
						Load excavated spoils	96,000.00 cy	0.62 /cy	0.68 /cy		-	1.29 /cy	124,185	2.00 /cy	191,522
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 2 mile,25 mph,exclds loadng eqpmnt	96,000.00 lcy	0.84 /lcy	3.02 /lcy	-	-	3.86 /lcy	370,423	5.95 /lcy	571,279
						31.20.07.10 Earthworks, Sitework, Excavating Bulk Measure	96,000.00 CY	2.10 /CY	5.46 /CY	/CY	/CY	7.57 /CY	726,476	11.67 /CY	1,120,397

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR East Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						31.22 Earthworks, Site	98,000.00 CY	2.10 /CY	5.48 /CY	/CY	/CY	7.57 /CY	726,476	11.67 /CY	1,130,397
						31.0 Earthwork	98,000.00 CY	2.10 /CY	5.48 /CY	/CY	/CY	7.57 /CY	726,476	11.67 /CY	1,130,397
						31.00.712 Base Grades - approach channel (concrete lined)	98,000.00 CY	2.10 /CY	5.48 /CY	/CY	/CY	7.57 /CY	726,476	11.67 /CY	1,130,397
		31.00.714				Base Grades - reservoir bottom grades									
			31.0			Earthwork									
				31.22		Earthworks, Site									
					31.20.09.10	Earthworks, Sitework, Backfill									
						Fill, native fill, compacted, 12" deep	210,000.00 cy	4.08 /cy	2.27 /cy		-	6.35 /cy	1,333,621	9.79 /cy	2,056,756
						Load excavated spoils	210,000.00 cy	0.62 /cy	0.68 /cy		-	1.29 /cy	271,654	2.00 /cy	418,954
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 2 mile,25 mph,exclds loadng eqpmnt	210,000.00 CY	0.84 /CY	3.02 /CY	-	-	3.86 /CY	810,300	5.95 /CY	1,249,673
						Compaction, water for, 3000 gallon truck, 3 mile haul	210,000.00 cy	0.65 /cy	0.44 /cy	0.00 /cy	-	1.09 /cy	229,473	1.69 /cy	353,901
						31.20.09.10 Earthworks, Sitework, Backfill	210,000.00 CY	6.19 /CY	6.40 /CY	/CY	/CY	12.60 /CY	2,645,048	19.43 /CY	4,079,284
						31.22 Earthworks, Site	210,000.00 CY	6.19 /CY	6.40 /CY	/CY	/CY	12.60 /CY	2,645,048	19.43 /CY	4,079,284
						31.0 Earthwork	210,000.00 CY	6.19 /CY	6.40 /CY	/CY	/CY	12.60 /CY	2,645,048	19.43 /CY	4,079,284
						31.00.714 Base Grades - reservoir bottom grades	210,000.00 CY	6.19 /CY	6.40 /CY	/CY	/CY	12.60 /CY	2,645,048	19.43 /CY	4,079,284
		31.00.716				Construct Embankment									
			31.0			Earthwork									
				31.22		Earthworks, Site									
					31.20.09.40	Earthworks, Sitework, Embankments/Berms									
						Construct cofferdam embankment w/200 HP dozer	385,000.00 CY	1.35 /CY	1.90 /CY	-	-	3.25 /CY	1,251,525	5.01 /CY	1,930,144
						Load excavated spoils	385,000.00 cy	0.62 /cy	0.68 /cy		-	1.29 /cy	498,032	2.00 /cy	768,082
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	385,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	1,697,786	6.80 /cy	2,618,353
						Compaction, water for, 3000 gallon truck, 3 mile haul	385,000.00 cy	0.65 /cy	0.44 /cy		-	1.09 /cy	420,700	1.69 /cy	648,818
						Compaction, structural, common fill, 8" lifts, sheepsfoot	385,000.00 cy	0.74 /cy	1.09 /cy	-	-	1.83 /cy	703,649	2.82 /cy	1,085,192
						Cut & finish cofferdam top/sideslopes w/dozer	181,720.00 sy	0.74 /sy	1.05 /sy	-	-	1.79 /sy	325,682	2.76 /sy	502,278
						31.20.09.40 Earthworks, Sitework, Embankments/Berms	385,000.00 CY	4.67 /CY	8.05 /CY	/CY	/CY	12.72 /CY	4,897,354	19.62 /CY	7,552,868
						31.22 Earthworks, Site	385,000.00 CY	4.67 /CY	8.05 /CY	/CY	/CY	12.72 /CY	4,897,354	19.62 /CY	7,552,868
						31.0 Earthwork	385,000.00 CY	4.67 /CY	8.05 /CY	/CY	/CY	12.72 /CY	4,897,354	19.62 /CY	7,552,868
						31.00.716 Construct Embankment	385,000.00 CY	4.67 /CY	8.05 /CY	/CY	/CY	12.72 /CY	4,897,354	19.62 /CY	7,552,868
		31.00.718				Construct Check Structures #2									
			03.0			Concrete Work									
				03.18		Cast-In-Place Concrete, Slabs on Grade									
					03.10.05.07	Cast-In-Place Concrete, Slabs on Grade, 7" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	400.00 lf	5.07 /lf	-	0.33 /lf	-	5.40 /lf	2,161	8.36 /lf	3,343
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	4.00 ton	1,370.95 /ton	-	1,200.00 /ton	-	2,570.95 /ton	10,284	4,052.00 /ton	16,208
						Reinforcing in place, unloading & sorting, add to above - slabs	4.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	223	85.91 /ton	344
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	56.00 cy	-	-	131.00 /cy	-	131.00 /cy	7,336	211.53 /cy	11,846
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	54.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	1,566	44.73 /CY	2,415
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	2,496.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	2,338	1.44 /sf	3,606
						Curing, sprayed membrane curing compound	24.96 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	575	36.45 /csf	910
						Fine grading, fine grade for slab on grade, machine	277.33 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	520	2.89 /sy	802
						03.10.05.07 Cast-In Place Concrete, Slabs on Grade, 7" thick	54.00 CY	218.33 /CY	10.75 /CY	232.94 /CY	/CY	463.02 /CY	25,003	730.97 /CY	39,472
					03.10.05.16	Cast-In-Place Concrete, Slabs on Grade, 16" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	440.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	4,086	14.39 /sfca	6,333
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	27.20 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	69,930	4,052.00 /ton	110,214
						Reinforcing in place, unloading & sorting, add to above - slabs	27.20 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,515	85.91 /ton	2,337
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	27.20 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	1,647	93.38 /ton	2,540
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	373.00 cy	-	-	131.00 /cy	-	131.00 /cy	48,863	211.53 /cy	78,901
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	362.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	10,498	44.73 /CY	16,191
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	6,433.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	6,026	1.44 /sf	9,293
						Curing, sprayed membrane curing compound	64.33 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,483	36.45 /csf	2,345
						Fine grading, fine grade for slab on grade, machine	714.78 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,340	2.89 /sy	2,066
						03.10.05.16 Cast-In-Place Concrete, Slabs on Grade, 16" thick	362.00 CY	164.71 /CY	9.36 /CY	226.54 /CY	/CY	401.62 /CY	145,387	635.96 /CY	230,219
						03.18 Cast-In-Place Concrete, Slabs on Grade	416.00 CY	171.60 /CY	9.69 /CY	229.11 /CY	/CY	409.59 /CY	170,390	648.30 /CY	269,691
				03.20		Cast-In-Place Concrete, Straight Walls									
					03.10.06.18	Cast-In-Place Concrete, Straight Walls, 18" thick									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	6,760.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	99,626	23.12 /sfca	156,317
						Form oil, coverage varies greatly, maximum, includes material only	18.00 gal	-	-	23.50 /gal	-	23.50 /gal	423	37.95 /gal	683
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	16.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	42,421	4,052.00 /ton	66,858
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	16.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	919	85.91 /ton	1,418
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	16.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	999	93.38 /ton	1,541
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	194.00 cy	-	-	131.00 /cy	-	131.00 /cy	25,414	211.53 /cy	41,037
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	188.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	8,405	68.95 /CY	12,963
						Concrete finishing, walls, includes breaking ties and patching voids	6,760.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	6,890	1.57 /sf	10,646
						03.10.06.18 Cast-In Place Concrete, Straight Walls, 18" thick	188.00 CY	534.66 /CY	9.74 /CY	440.16 /CY	/CY	984.56 /CY	185,097	1,550.33 /CY	291,463
						03.20 Cast-In-Place Concrete, Straight Walls	188.00 CY	534.66 /CY	9.74 /CY	440.16 /CY	/CY	984.56 /CY	185,097	1,550.33 /CY	291,463
						03.0 Concrete Work	604.00 CY	284.74 /CY	9.02 /CY	294.80 /CY	/CY	588.56 /CY	355,487	929.06 /CY	561,154
			05.0			Metals									
				05.52		Metal Fabrications									
					05.50.02.50	Metals, Elevated Platforms, Complete									
						Railing, pipe, aluminum, clear finish, 3 rails, 3'-6" high, posts @ 5' O.C., 1-1/2" dia, shop fabricated	88.00 lf	21.19 /lf	0.79 /lf	90.50 /lf	-	112.48 /lf	9,898	180.02 /lf	15,842
						Metal Grating Catwalk	315.00 SF				80.00 /SF	80.00 /SF	25,200	123.38 /SF	38,864
						Miscellaneous Consumables Allowance	1.00 ls		-		5,000.00 /ls	5,000.00 /ls	5,000	7,711.19 /ls	7,711
						05.50.02.50 Metals, Elevated Platforms, Complete	315.00 SF	5.92 /SF	0.22 /SF	25.28 /SF	95.87 /SF	127.30 /SF	40,098	198.15 /SF	62,418

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR East Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						05.50 Metal Fabrications	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.26 /SF*	*95.87 /SF*	*127.30 /SF*	*40,096*	*198.15 /SF*	*62,416*
						05.0 Metals	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.26 /SF*	*95.87 /SF*	*127.30 /SF*	*40,096*	*198.15 /SF*	*62,416*
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electrical Allowance	1.00 LS	26,377.28 /LS	2,800.00 /LS	50,000.00 /LS	-	79,177.28 /LS	79,177	145,529.22 /LS	145,529
						26.00.99.00 Electrical, Other	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
						26.00 Electrical	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
						26.0 Electrical Work	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	275.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	13,888	80.42 /CY	22,116
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*275.00 CY*	*14.75 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*50.50 /CY*	*13,888*	*80.42 /CY*	*22,116*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, Native material	700.00 CY	6.18 /CY	1.69 /CY		-	7.87 /CY	5,510	12.14 /CY	8,497
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	700.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	1,006	2.22 /cy	1,552
						Compaction, water for, 6000 gallon wagon, 6 mile haul	700.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	1,298	2.95 /cy	2,062
						31.25.03.00 Earthworks, Structural, Backfill	*700.00 CY*	*7.83 /CY*	*2.14 /CY*	*1.20 /CY*	*/CY*	*11.16 /CY*	*7,814*	*17.30 /CY*	*12,111*
						31.25 Earthworks, Structural	*975.00 CY*	*9.78 /CY*	*1.75 /CY*	*10.73 /CY*	*/CY*	*22.26 /CY*	*21,701*	*35.10 /CY*	*34,227*
						31.0 Earthwork	*975.00 CY*	*9.78 /CY*	*1.75 /CY*	*10.73 /CY*	*/CY*	*22.26 /CY*	*21,701*	*35.10 /CY*	*34,227*
			40.9			*Instrumentation & Controls*									
				40.90		*Instrumentation & Controls*									
					40.90.99.01	*I&C, Other*									
						I&C Allowance	1.00 LS	6,594.32 /LS	600.00 /LS	25,000.00 /LS	-	32,194.32 /LS	32,194	57,902.54 /LS	57,903
						40.90.99.01 I&C, Other	***6,433.00*** *SF*	*1.03 /SF*	*0.09 /SF*	*3.89 /SF*	*/SF*	*5.01 /SF*	*32,194*	*9.00 /SF*	*57,903*
						40.90 Instrumentation & Controls	***6,433.00*** *SF*	*1.03 /SF*	*0.09 /SF*	*3.89 /SF*	*/SF*	*5.01 /SF*	*32,194*	*9.00 /SF*	*57,903*
						40.9 Instrumentation & Controls	***6,433.00*** *SF*	*1.03 /SF*	*0.09 /SF*	*3.89 /SF*	*/SF*	*5.01 /SF*	*32,194*	*9.00 /SF*	*57,903*
			46.0			*Water and Wastewater Equipment*									
				40.55		*Water Control Gates, Other Gates*									
					40.30.06.01	*Other Gates*									
						Slide gates, hydraulic structures, steel, 72" x 72", incl. anchor bolts & grout	2.00 EA	8,217.34 /EA	2,042.34 /EA	15,000.00 /EA	-	25,259.67 /EA	50,519	40,043.83 /EA	80,088
						Langman gates, hydraulic structures, steel, 14'	3.00 EA	11,093.40 /EA	2,205.72 /EA	38,000.00 /EA	-	51,299.12 /EA	153,897	81,870.27 /EA	245,611
						40.30.06.01 Other Gates	*5.00 EA*	*9,942.97 /EA*	*2,140.37 /EA*	*28,800.00 /EA*	*/EA*	*40,883.34 /EA*	*204,417*	*65,139.70 /EA*	*325,698*
						40.55 Water Control Gates, Other Gates	*5.00 EA*	*9,942.97 /EA*	*2,140.37 /EA*	*28,800.00 /EA*	*/EA*	*40,883.34 /EA*	*204,417*	*65,139.70 /EA*	*325,698*
						46.0 Water and Wastewater Equipment	*5.00 EA*	*9,942.97 /EA*	*2,140.37 /EA*	*28,800.00 /EA*	*/EA*	*40,883.34 /EA*	*204,417*	*65,139.70 /EA*	*325,698*
						31.00.718 Construct Check Structures #2	***6,433.00*** *SF*	*41.36 /SF*	*3.31 /SF*	*64.59 /SF*	*4.70 /SF*	*113.96 /SF*	*733,075*	*184.51 /SF*	*1,186,929*
		31.00.720				*Construct Check Structures #3*									
			03.0			*Concrete Work*									
				03.10		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.07	*Cast-In-Place Concrete, Slabs on Grade, 7" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	400.00 lf	5.07 /lf	-	0.33 /lf	-	5.40 /lf	2,161	8.36 /lf	3,343
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	4.00 ton	1,370.95 /ton	-	1,200.00 /ton	-	2,570.95 /ton	10,284	4,052.00 /ton	16,208
						Reinforcing in place, unloading & sorting, add to above - slabs	4.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	223	85.92 /ton	344
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	56.00 cy	-	-	131.00 /cy	-	131.00 /cy	7,336	211.53 /cy	11,846
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	54.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	1,566	44.73 /CY	2,415
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	2,496.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	2,338	1.44 /sf	3,606
						Curing, sprayed membrane curing compound	24.96 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	575	36.45 /csf	910
						Fine grading, fine grade for slab on grade, machine	277.33 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	520	2.89 /sy	802
						03.10.05.07 Cast-In-Place Concrete, Slabs on Grade, 7" thick	*54.00 CY*	*219.33 /CY*	*10.75 /CY*	*232.94 /CY*	*/CY*	*463.02 /CY*	*25,003*	*730.97 /CY*	*39,472*
					03.10.05.16	*Cast-In-Place Concrete, Slabs on Grade, 16" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	440.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	4,086	14.39 /sfca	6,333
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	27.20 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	69,930	4,052.00 /ton	110,214
						Reinforcing in place, unloading & sorting, add to above - slabs	27.20 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,515	85.91 /ton	2,337
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	27.20 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	1,647	93.38 /ton	2,540
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	373.00 cy	-	-	131.00 /cy	-	131.00 /cy	48,863	211.53 /cy	78,901
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	362.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	10,498	44.73 /CY	16,191
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	6,433.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	6,026	1.44 /sf	9,293
						Curing, sprayed membrane curing compound	64.33 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,483	36.45 /csf	2,345
						Fine grading, fine grade for slab on grade, machine	714.78 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,340	2.89 /sy	2,066
						03.10.05.16 Cast-In-Place Concrete, Slabs on Grade, 16" thick	*362.00 CY*	*164.71 /CY*	*9.36 /CY*	*226.54 /CY*	*/CY*	*401.62 /CY*	*145,387*	*635.96 /CY*	*230,219*
						03.10 Cast-In-Place Concrete, Slabs on Grade	*416.00 CY*	*171.80 /CY*	*8.89 /CY*	*225.11 /CY*	*/CY*	*405.59 /CY*	*170,330*	*648.30 /CY*	*269,691*
				03.20		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.18	*Cast-In-Place Concrete, Straight Walls, 18" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	6,760.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	99,626	23.12 /sfca	156,317
						Form oil, coverage varies greatly, maximum, includes material only	18.00 gal	-	-	23.50 /gal	-	23.50 /gal	423	37.95 /gal	683
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	16.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	42,421	4,052.00 /ton	66,858
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	16.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	919	85.91 /ton	1,418
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	16.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	999	93.38 /ton	1,541
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	194.00 cy	-	-	131.00 /cy	-	131.00 /cy	25,414	211.53 /cy	41,037
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	188.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	8,405	68.95 /CY	12,963
						Concrete finishing, walls, includes breaking ties and patching voids	6,760.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	6,890	1.57 /sf	10,646
						03.10.06.18 Cast-In-Place Concrete, Straight Walls, 18" thick	*188.00 CY*	*534.66 /CY*	*9.74 /CY*	*440.16 /CY*	*/CY*	*984.56 /CY*	*185,097*	*1,550.33 /CY*	*291,463*
						03.20 Cast-In-Place Concrete, Straight Walls	*188.00 CY*	*534.66 /CY*	*9.74 /CY*	*440.16 /CY*	*/CY*	*984.56 /CY*	*185,097*	*1,550.33 /CY*	*291,463*
						03.0 Concrete Work	*604.00 CY*	*284.74 /CY*	*9.02 /CY*	*294.80 /CY*	*/CY*	*588.56 /CY*	*355,487*	*929.06 /CY*	*561,154*
			05.0			*Metals*									
				05.50		*Metal Fabrications*									
					05.50.02.50	*Metals, Elevated Platforms, Complete*									

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DETAIL REPORT

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					05.50.02.50	*Metals, Elevated Platforms, Complete*									
						Railing, pipe, aluminum, clear finish, 3 rails, 3'-6" high, posts @ 5' O.C., 1-1/2" dia, shop fabricated	88.00 lf	21.19 /lf	0.79 /lf	90.50 /lf	-	112.48 /lf	9,898	180.02 /lf	15,842
						Metal Grating Catwalk	315.00 SF				80.00 /SF	80.00 /SF	25,200	123.38 /SF	38,864
						Miscellaneous Consumables Allowance	1.00 ls		-		5,000.00 /ls	5,000.00 /ls	5,000	7,711.15 /ls	7,711
						05.50.02.50 Metals, Elevated Platforms, Complete	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.28 /SF*	*95.87 /SF*	*127.30 /SF*	*40,098*	*198.15 /SF*	*62,418*
						05.50 Metal Fabrications	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.28 /SF*	*95.87 /SF*	*127.30 /SF*	*40,098*	*198.15 /SF*	*62,418*
						05.0 Metals	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.28 /SF*	*95.87 /SF*	*127.30 /SF*	*40,098*	*198.15 /SF*	*62,418*
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electrical Allowance	1.00 LS	26,377.28 /LS	2,800.00 /LS	50,000.00 /LS	-	79,177.28 /LS	79,177	145,529.25 /LS	145,529
						26.00.99.00 Electrical, Other	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
						26.00 Electrical	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
						26.0 Electrical Work	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	275.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	13,888	80.42 /CY	22,116
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*275.00 CY*	*14.75 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*50.50 /CY*	*13,888*	*80.42 /CY*	*22,116*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, Native material	700.00 CY	6.18 /CY	1.69 /CY		-	7.87 /CY	5,510	12.14 /CY	8,498
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	700.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	1,006	2.22 /cy	1,552
						Compaction, water for, 6000 gallon wagon, 6 mile haul	700.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	1,298	2.95 /cy	2,062
						31.25.03.00 Earthworks, Structural, Backfill	*700.00 CY*	*7.83 /CY*	*2.14 /CY*	*1.20 /CY*	*/CY*	*11.16 /CY*	*7,814*	*17.30 /CY*	*12,111*
						31.25 Earthworks, Structural	*975.00 CY*	*9.78 /CY*	*1.75 /CY*	*10.73 /CY*	*/CY*	*22.26 /CY*	*21,701*	*35.10 /CY*	*34,227*
						31.0 Earthwork	*975.00 CY*	*9.78 /CY*	*1.75 /CY*	*10.73 /CY*	*/CY*	*22.26 /CY*	*21,701*	*35.10 /CY*	*34,227*
			40.9			*Instrumentation & Controls*									
				40.90		*Instrumentation & Controls*									
					40.90.99.01	*I&C, Other*									
						I&C Allowance	1.00 LS	6,594.32 /LS	600.00 /LS	25,000.00 /LS	-	32,194.32 /LS	32,194	57,902.57 /LS	57,903
						40.90.99.01 I&C, Other	***6,433.00*** *SF*	*1.03 /SF*	*0.09 /SF*	*3.89 /SF*	*/SF*	*5.01 /SF*	*32,194*	*9.00 /SF*	*57,903*
						40.90 Instrumentation & Controls	***6,433.00*** *SF*	*1.03 /SF*	*0.09 /SF*	*3.89 /SF*	*/SF*	*5.01 /SF*	*32,194*	*9.00 /SF*	*57,903*
						40.9 Instrumentation & Controls	***6,433.00*** *SF*	*1.03 /SF*	*0.09 /SF*	*3.89 /SF*	*/SF*	*5.01 /SF*	*32,194*	*9.00 /SF*	*57,903*
			46.0			*Water and Wastewater Equipment*									
				40.55		*Water Control Gates, Other Gates*									
					40.30.06.01	*Other Gates*									
						Slide gates, hydraulic structures, steel, 72" x 72", incl. anchor bolts & grout	2.00 EA	8,217.34 /EA	2,042.34 /EA	15,000.00 /EA	-	25,259.67 /EA	50,519	40,043.83 /EA	80,088
						Langman gates, hydraulic structures, steel, 14'	3.00 EA	11,093.40 /EA	2,205.72 /EA	38,000.00 /EA	-	51,299.12 /EA	153,897	81,870.27 /EA	245,611
						40.30.06.01 Other Gates	*5.00 EA*	*9,942.97 /EA*	*2,140.37 /EA*	*28,800.00 /EA*	*/EA*	*40,883.34 /EA*	*204,417*	*65,139.70 /EA*	*325,698*
						40.55 Water Control Gates, Other Gates	*5.00 EA*	*9,942.97 /EA*	*2,140.37 /EA*	*28,800.00 /EA*	*/EA*	*40,883.34 /EA*	*204,417*	*65,139.70 /EA*	*325,698*
						46.0 Water and Wastewater Equipment	*5.00 EA*	*9,942.97 /EA*	*2,140.37 /EA*	*28,800.00 /EA*	*/EA*	*40,883.34 /EA*	*204,417*	*65,139.70 /EA*	*325,698*
						31.00.720 Construct Check Structures #3	***6,433.00*** *SF*	*41.36 /SF*	*3.31 /SF*	*64.59 /SF*	*4.70 /SF*	*113.96 /SF*	*733,075*	*184.51 /SF*	*1,186,929*
		31.00.722				*Spillway (concrete lined)*									
			03.0			*Concrete Work*									
				03.12		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.12	*Cast-In-Place Concrete, Slabs on Grade, 12" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,430.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	13,280	14.39 /sfca	20,581
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	165.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	424,206	4,052.00 /ton	668,580
						Reinforcing in place, unloading & sorting, add to above - slabs	165.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	9,191	85.91 /ton	14,175
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	165.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	9,991	93.38 /ton	15,408
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	2,270.00 cy	-	-	131.00 /cy	-	131.00 /cy	297,370	211.53 /cy	480,174
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	2,200.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	63,802	44.73 /CY	98,397
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl pln,strkn	53,960.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	50,542	1.44 /sf	77,948
						Curing, sprayed membrane curing compound	539.60 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	12,437	36.45 /csf	19,668
						Fine grading, fine grade for slab on grade, machine	5,995.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	11,237	2.89 /sy	17,330
						03.10.05.12 Cast-In-Place Concrete, Slabs on Grade, 12" thick	*2,200.00 CY*	*167.56 /CY*	*8.07 /CY*	*229.85 /CY*	*/CY*	*405.48 /CY*	*892,056*	*641.94 /CY*	*1,412,261*
						03.12 Cast-In-Place Concrete, Slabs on Grade	*2,200.00 CY*	*167.56 /CY*	*8.07 /CY*	*229.85 /CY*	*/CY*	*405.48 /CY*	*892,056*	*641.94 /CY*	*1,412,261*
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.99	*Cast-In-Place Concrete, Straight Walls, Other*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	27,120.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	399,682	23.12 /sfca	627,120
						Form oil, coverage varies greatly, maximum, includes material only	73.00 gal	-	-	23.50 /gal	-	23.50 /gal	1,716	37.95 /gal	2,770
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	59.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	151,686	4,052.00 /ton	239,068
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	59.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	3,287	85.91 /ton	5,069
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	59.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	3,572	93.38 /ton	5,509
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	690.00 cy	-	-	131.00 /cy	-	131.00 /cy	90,390	211.53 /cy	145,956
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	670.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	29,955	68.95 /CY	46,198
						Concrete finishing, walls, includes breaking ties and patching voids	27,120.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	27,643	1.57 /sf	42,711
						03.10.06.99 Cast-In-Place Concrete, Straight Walls, Other	*670.00 CY*	*581.50 /CY*	*8.75 /CY*	*465.37 /CY*	*/CY*	*1,056.61 /CY*	*707,931*	*1,663.28 /CY*	*1,114,401*
						03.30 Cast-In-Place Concrete, Straight Walls	*670.00 CY*	*581.50 /CY*	*8.75 /CY*	*465.37 /CY*	*/CY*	*1,056.61 /CY*	*707,931*	*1,663.28 /CY*	*1,114,401*
						03.0 Concrete Work	*2,870.00 CY*	*264.20 /CY*	*9.23 /CY*	*284.07 /CY*	*/CY*	*557.49 /CY*	*1,599,987*	*880.37 /CY*	*2,526,662*
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	2,300.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	116,151	80.42 /CY	184,969
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*2,300.00 CY*	*14.75 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*50.50 /CY*	*116,151*	*80.42 /CY*	*184,969*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, Native material	4,020.00 CY	6.18 /CY	1.69 /CY		-	7.87 /CY	31,642	12.14 /CY	48,800
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	4,020.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	5,779	2.22 /cy	8,912
						Compaction, water for, 6000 gallon wagon, 6 mile haul	4,020.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	7,452	2.95 /cy	11,842
						31.25.03.00 Earthworks, Structural, Backfill	*4,020.00 CY*	*7.83 /CY*	*2.14 /CY*	*1.20 /CY*	*/CY*	*11.16 /CY*	*44,873*	*17.30 /CY*	*69,554*
						31.25 Earthworks, Structural	*6,320.00 CY*	*10.34 /CY*	*1.63 /CY*	*13.50 /CY*	*/CY*	*25.48 /CY*	*161,024*	*40.27 /CY*	*254,523*
						31.0 Earthwork	*6,320.00 CY*	*10.34 /CY*	*1.63 /CY*	*13.50 /CY*	*/CY*	*25.48 /CY*	*161,024*	*40.27 /CY*	*254,523*
						31.00.722 Spillway (concrete lined)	***1.00*** *LS*	*823,616.16 /LS*	*36,801.34 /LS*	*900,593.42 /LS*	*/LS*	*1,761,010.92 /LS*	*1,761,011*	*2,761,184.71 /LS*	*2,761,195*
		31.00.724				*Prepare TRR Subgrade and Install Reservoir Liner*									
			31.0			*Earthwork*									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
				31.22		*Earthworks, Site*									
					31.30.02.00	*Site Specialties, Pond and Reservoir Liners*									
						Fine grading, lagoon bottoms, with grader	5,000.00 msf	77.56 /msf	44.26 /msf	-	-	121.83 /msf	609,130	187.88 /msf	939,421
						Pond and Reservoir Liners, membrane lining systems HDPE	5,000,000.00 sf	0.10 /sf	0.05 /sf	0.60 /sf	-	0.75 /sf	3,726,855	1.19 /sf	5,965,184
						31.30.02.00 Site Specialties, Pond and Reservoir Liners	***555,555.56*** *SY*	*1.60 /SY*	*0.80 /SY*	*5.40 /SY*	*/SY*	*7.81 /SY*	*4,335,985*	*12.43 /SY*	*6,904,605*
						31.22 Earthworks, Site	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*4,335,985*	*/CY*	*6,904,605*
						31.0 Earthwork	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*4,335,985*	*/CY*	*6,904,605*
						31.00.724 Prepare TRR Subgrade and Install Reservoir Liner	***5,000,000.00*** *SF*	*0.16 /SF*	*0.08 /SF*	*0.60 /SF*	*/SF*	*0.87 /SF*	*4,335,985*	*1.38 /SF*	*6,904,605*
		31.00.726				*Construct GCID Canal Plug*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.09.40	*Earthworks, Sitework, Embankments/Berms*									
						Construct cofferdam embankment w/200 HP dozer	57,000.00 CY	1.35 /CY	1.90 /CY		-	3.25 /CY	185,291	5.01 /CY	285,762
						Load excavated spoils	57,000.00 cy	0.62 /cy	0.68 /cy		-	1.29 /cy	73,735	2.00 /cy	113,716
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	57,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	251,358	6.80 /cy	387,652
						Compaction, water for, 3000 gallon truck, 3 mile haul	57,000.00 cy	0.65 /cy	0.44 /cy		-	1.09 /cy	62,285	1.69 /cy	96,059
						Compaction, structural, common fill, 8" lifts, sheepsfoot	57,000.00 cy	0.74 /cy	1.09 /cy	-	-	1.83 /cy	104,177	2.82 /cy	160,665
						Cut & finish cofferdam top/sideslopes w/dozer	26,904.00 sy	0.74 /sy	1.05 /sy	-	-	1.79 /sy	48,218	2.76 /sy	74,363
						31.20.09.40 Earthworks, Sitework, Embankments/Berms	*57,000.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*/CY*	*12.72 /CY*	*725,063*	*19.62 /CY*	*1,118,217*
						31.22 Earthworks, Site	*57,000.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*/CY*	*12.72 /CY*	*725,063*	*19.62 /CY*	*1,118,217*
						31.0 Earthwork	*57,000.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*/CY*	*12.72 /CY*	*725,063*	*19.62 /CY*	*1,118,217*
						31.00.726 Construct GCID Canal Plug	*57,000.00 CY*	*4.67 /CY*	*8.05 /CY*	*/CY*	*/CY*	*12.72 /CY*	*725,063*	*19.62 /CY*	*1,118,217*
		31.00.728				*Construct Check Structure #1*									
			03.0			*Concrete Work*									
				03.13		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.07	*Cast-In-Place Concrete, Slabs on Grade, 7" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	400.00 lf	5.07 /lf	-	0.33 /lf	-	5.40 /lf	2,161	8.36 /lf	3,343
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	4.00 ton	1,370.95 /ton	-	1,200.00 /ton	-	2,570.95 /ton	10,284	4,052.00 /ton	16,208
						Reinforcing in place, unloading & sorting, add to above - slabs	4.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	223	85.91 /ton	344
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	56.00 cy	-	-	131.00 /cy	-	131.00 /cy	7,336	211.53 /cy	11,846
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	54.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	1,566	44.73 /CY	2,415
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	2,496.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	2,338	1.44 /sf	3,606
						Curing, sprayed membrane curing compound	24.96 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	575	36.45 /csf	910
						Fine grading, fine grade for slab on grade, machine	277.33 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	520	2.89 /sy	802
						03.10.05.07 Cast-In-Place Concrete, Slabs on Grade, 7" thick	*54.00 CY*	*218.33 /CY*	*10.75 /CY*	*232.94 /CY*	*/CY*	*463.02 /CY*	*25,003*	*730.97 /CY*	*39,472*
					03.10.05.18	*Cast-In-Place Concrete, Slabs on Grade, 18" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	440.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	4,086	14.39 /sfca	6,333
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	27.20 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	69,930	4,052.00 /ton	110,214
						Reinforcing in place, unloading & sorting, add to above - slabs	27.20 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,515	85.91 /ton	2,337
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	27.20 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	1,647	93.38 /ton	2,540
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	373.00 cy	-	-	131.00 /cy	-	131.00 /cy	48,863	211.53 /cy	78,901
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	362.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	10,498	44.73 /CY	16,191
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	6,433.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	6,026	1.44 /sf	9,293
						Curing, sprayed membrane curing compound	64.33 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,483	36.45 /csf	2,345
						Fine grading, fine grade for slab on grade, machine	714.78 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,340	2.89 /sy	2,066
						03.10.05.18 Cast-In-Place Concrete, Slabs on Grade, 18" thick	*362.00 CY*	*164.71 /CY*	*8.36 /CY*	*226.54 /CY*	*/CY*	*401.62 /CY*	*145,387*	*635.96 /CY*	*230,219*
						03.13 Cast-In-Place Concrete, Slabs on Grade	*416.00 CY*	*171.60 /CY*	*8.69 /CY*	*226.11 /CY*	*/CY*	*409.59 /CY*	*170,390*	*658.30 /CY*	*269,691*
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.18	*Cast-In-Place Concrete, Straight Walls, 18" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	6,760.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	99,626	23.12 /sfca	156,317
						Form oil, coverage varies greatly, maximum, includes material only	18.00 gal	-	-	23.50 /gal	-	23.50 /gal	423	37.95 /gal	683
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	16.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	42,421	4,052.00 /ton	66,858
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	16.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	919	85.91 /ton	1,418
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	16.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	999	93.38 /ton	1,541
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	194.00 cy	-	-	131.00 /cy	-	131.00 /cy	25,414	211.53 /cy	41,037
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	188.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	8,405	68.95 /CY	12,963
						Concrete finishing, walls, includes breaking ties and patching voids	6,760.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	6,890	1.57 /sf	10,646
						03.10.06.18 Cast-In-Place Concrete, Straight Walls, 18" thick	*188.00 CY*	*534.86 /CY*	*9.74 /CY*	*440.16 /CY*	*/CY*	*984.56 /CY*	*185,097*	*1,550.33 /CY*	*291,463*
						03.30 Cast-In-Place Concrete, Straight Walls	*188.00 CY*	*534.86 /CY*	*9.74 /CY*	*440.16 /CY*	*/CY*	*984.56 /CY*	*185,097*	*1,550.33 /CY*	*291,463*
						03.0 Concrete Work	*604.00 CY*	*284.74 /CY*	*9.02 /CY*	*294.80 /CY*	*/CY*	*588.56 /CY*	*355,487*	*929.06 /CY*	*561,154*
			05.0			*Metals*									
				05.50		*Metal Fabrications*									
					05.50.02.50	*Metals, Elevated Platforms, Complete*									
						Railing, pipe, aluminum, clear finish, 3 rails, 3'-6" high, posts @ 5' O.C., 1-1/2" dia, shop fabricated	88.00 lf	21.19 /lf	0.79 /lf	90.50 /lf	-	112.48 /lf	9,898	180.02 /lf	15,842
						Metal Grating Catwalk	315.00 SF				80.00 /SF	80.00 /SF	25,200	123.38 /SF	38,864
						Miscellaneous Consumables Allowance	1.00 ls	0.00 /ls	-	0.00 /ls	5,000.00 /ls	5,000.00 /ls	5,000	7,711.18 /ls	7,711
						05.50.02.50 Metals, Elevated Platforms, Complete	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.28 /SF*	*95.87 /SF*	*127.30 /SF*	*40,098*	*198.15 /SF*	*62,418*
						05.50 Metal Fabrications	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.28 /SF*	*95.87 /SF*	*127.30 /SF*	*40,098*	*198.15 /SF*	*62,418*
						05.0 Metals	*315.00 SF*	*5.92 /SF*	*0.22 /SF*	*25.28 /SF*	*95.87 /SF*	*127.30 /SF*	*40,098*	*198.15 /SF*	*62,418*
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electrical Allowance	1.00 LS	26,377.28 /LS	2,800.00 /LS	50,000.00 /LS	-	79,177.28 /LS	79,177	145,529.24 /LS	145,529
						26.00.99.00 Electrical, Other	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
						26.00 Electrical	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
						26.0 Electrical Work	***6,433.00*** *SF*	*4.10 /SF*	*0.44 /SF*	*7.77 /SF*	*/SF*	*12.31 /SF*	*79,177*	*22.62 /SF*	*145,529*
			31.0			*Earthwork*									

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
				31.25		Earthworks, Structural									
					31.25.02.00	Earthworks, Structural, Import Aggregates (Slab)									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	275.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	13,888	80.42 /CY	22,116
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	275.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	/CY	50.50 /CY	13,888	80.42 /CY	22,116
					31.25.03.00	Earthworks, Structural, Backfill									
						Backfill, Native material	700.00 CY	6.18 /CY	1.69 /CY		-	7.87 /CY	5,510	12.14 /CY	8,498
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	700.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	1,006	2.22 /cy	1,552
						Compaction, water for, 6000 gallon wagon, 6 mile haul	700.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	1,298	2.95 /cy	2,062
						31.25.03.00 Earthworks, Structural, Backfill	700.00 CY	7.83 /CY	2.14 /CY	1.20 /CY	/CY	11.16 /CY	7,814	17.30 /CY	12,111
						31.25 Earthworks, Structural	975.00 CY	9.78 /CY	1.75 /CY	10.73 /CY	/CY	22.26 /CY	21,701	35.10 /CY	34,227
						31.0 Earthwork	975.00 CY	9.78 /CY	1.75 /CY	10.73 /CY	/CY	22.26 /CY	21,701	35.10 /CY	34,227
			40.9			Instrumentation & Controls									
				40.90		Instrumentation & Controls									
					40.90.99.01	I&C, Other									
						I&C Allowance	1.00 LS	6,594.32 /LS	600.00 /LS	25,000.00 /LS	-	32,194.32 /LS	32,194	57,902.54 /LS	57,903
						40.90.99.01 I&C, Other	**6,433.00** SF	1.03 /SF	0.09 /SF	3.89 /SF	/SF	5.01 /SF	32,194	9.00 /SF	57,903
						40.90 Instrumentation & Controls	**6,433.00** SF	1.03 /SF	0.09 /SF	3.89 /SF	/SF	5.01 /SF	32,194	9.00 /SF	57,903
						40.9 Instrumentation & Controls	**6,433.00** SF	1.03 /SF	0.09 /SF	3.89 /SF	/SF	5.01 /SF	32,194	9.00 /SF	57,903
			46.0			Water and Wastewater Equipment									
				40.56		Water Control Gates, Other Gates									
					40.30.06.01	Other Gates									
						Slide gates, hydraulic structures, steel, 72" x 72", incl. anchor bolts & grout	2.00 EA	8,217.34 /EA	2,042.34 /EA	15,000.00 /EA	-	25,259.67 /EA	50,519	40,043.83 /EA	80,088
						Langman gates, hydraulic structures, steel, 14'	3.00 EA	11,093.40 /EA	2,205.72 /EA	38,000.00 /EA	-	51,299.12 /EA	153,897	81,870.27 /EA	245,611
						40.30.06.01 Other Gates	5.00 EA	9,942.97 /EA	2,140.37 /EA	28,800.00 /EA	/EA	40,883.34 /EA	204,417	65,139.70 /EA	325,698
						40.56 Water Control Gates, Other Gates	5.00 EA	9,942.97 /EA	2,140.37 /EA	28,800.00 /EA	/EA	40,883.34 /EA	204,417	65,139.70 /EA	325,698
						46.0 Water and Wastewater Equipment	5.00 EA	9,942.97 /EA	2,140.37 /EA	28,800.00 /EA	/EA	40,883.34 /EA	204,417	65,139.70 /EA	325,698
						31.00.728 Construct Check Structure #1	**6,433.00** SF	41.36 /SF	3.31 /SF	64.59 /SF	4.70 /SF	113.96 /SF	733,075	184.51 /SF	1,186,923
						97.01 TRR East Reservoir	**140.00** AC	67,381.12 /AC	83,607.04 /AC	200,588.55 /AC	6,790.00 /AC	358,366.71 /AC	50,171,340	567,790.30 /AC	79,490,641
						07 TRR East	***1.00 LS***	***9,433,356.84 /LS***	***11,704,985.82 /LS***	***28,082,397.00 /LS***	***950,600.00 /LS***	***50,171,339.66 /LS***	***50,171,340***	***79,490,641.42 /LS***	***79,490,641***

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	9,433,357		115,035.771 hrs	
Material	28,082,397			
Allowance	950,600			
Equipment	11,704,986		87,057.516 hrs	
Other				
Subtotal Direct Costs	50,171,340	50,171,340		
Material Sales Tax, Dunnigan Ca	2,035,974			7.250 %
Subtotal W/ Sales Tax	2,035,974	52,207,314		
Electrical Work I,OH&P	59,383			25.000 %
Instruments & Controls I,OH&P	19,317			20.000 %
Subtotal W/ Subcontractor OH&P	78,700	52,286,014		
General Conditions	2,614,301			5.000 %
Subtotal W/ General Conditions	2,614,301	54,900,315		
Mobilization/Demobilization	1,647,009			3.000 %
Prime Contractor Overhead	5,654,732			10.000 %
Prime Contractor Profit	3,732,123			6.000 %
Bonds & Insurance	1,430,772			2.170 %
Subtotal W/ Prime Markups	12,464,636	67,364,951		
Contractor Contingency	2,020,949			3.000 %
Design Contingency	10,104,743			15.000 %
Subtotal W/ Contingency	12,125,692	79,490,643		
Total Construction Cost		**79,490,643**		
Non-Contract Costs	14,308,315			18.000 %
Total Project Costs	**14,308,315**	**93,798,958**		

Terminal Regulating Reservoir (TRR) Pumping Generating Plant (PGP)

SUMMARY REPORT

Jacobs

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
04			***Terminal Regulating Reservoir (TRR) PGP***									
	04.01		Terminal Regulating Reservoir (TRR) PGP									
		03.00.399	Funk PGP Foundation Slab	5,332.00 CY	155.61 /CY	7.53 /CY	232.33 /CY	/CY	395.47 /CY	2,108,522	640.84 /CY	3,415,915
		03.00.402	TRR PGP Concrete Walls, Perimeter	2,094.00 CY	299.51 /CY	9.70 /CY	309.95 /CY	/CY	618.96 /CY	1,296,110	998.81 /CY	2,091,518
		03.00.404	TRR PGP Concrete Walls, Pier Walls	4,480.00 CY	349.91 /CY	9.74 /CY	338.58 /CY	/CY	698.22 /CY	3,128,034	1,125.91 /CY	5,044,080
		03.00.406	TRR PGP Elevated Slab	3,400.00 CY	243.35 /CY	7.71 /CY	243.54 /CY	/CY	494.60 /CY	1,681,625	797.92 /CY	2,712,600
		03.00.408	TRR PGP Slab on Grade @ El 130.00	471.00 CY	179.80 /CY	8.11 /CY	243.04 /CY	/CY	430.96 /CY	202,980	697.46 /CY	328,477
		05.00.400	TRR PGP, Metals	**35,990.00** SF	3.23 /SF	0.31 /SF	2.78 /SF	18.06 /SF	24.38 /SF	877,294	43.53 /SF	1,566,539
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	33,729.80 /LS	2,600.00 /LS	19,500.00 /LS	/LS	55,829.80 /LS	55,830	103,436.20 /LS	103,436
		40.00.400	TRR PGP, Process Piping	720.00 LF	384.38 /LF	161.00 /LF	2,935.28 /LF	347.22 /LF	3,827.88 /LF	2,756,072	6,250.84 /LF	4,500,604
		44.40.400	TRR PGP, Furnish and Install Pumps	13.00 EA	14,117.37 /EA	/EA	943,172.00 /EA	4,200.00 /EA	961,489.36 /EA	12,499,362	1,585,017.37 /EA	20,605,226
			04.01 Terminal Regulating Reservoir (TRR) PGP	**35,990.00** SF	128.35 /SF	7.30 /SF	523.51 /SF	28.52 /SF	683.69 /SF	24,595,930	1,121.68 /SF	40,388,386
	04.02		Terminal Regulating Reservoir Turbine Buildings									
		03.00.416	TRR PGP Turbine Buildings Foundation Slab	3,248.00 CY	128.62 /CY	6.61 /CY	210.32 /CY	/CY	345.55 /CY	1,122,355	560.32 /CY	1,819,910
		03.00.418	TRR PGP Turbine Buildings Concrete Walls	1,332.00 CY	331.60 /CY	9.57 /CY	323.79 /CY	/CY	664.96 /CY	885,723	1,072.37 /CY	1,428,393
		03.00.420	TRR PGP Turbine Buildings Elevated Slab	394.00 CY	533.20 /CY	7.90 /CY	278.52 /CY	/CY	819.61 /CY	322,925	1,313.03 /CY	517,332
		04.00.400	TRR PGP Turbine Buildings Masonry	2,400.00 SF	21.57 /SF	0.18 /SF	11.45 /SF	/SF	33.20 /SF	79,672	59.83 /SF	143,599
		05.00.402	TRR PGP Turbine Building, Metals	**2.00** LS	14,950.80 /LS	4,072.24 /LS	43,590.00 /LS	30,000.00 /LS	92,613.04 /LS	185,226	167,769.15 /LS	335,538
		08.00.400	TRR PGP Turbine Building, Openings	2.00 EA	340.22 /EA	15.00 /EA	1,500.40 /EA	/EA	1,855.62 /EA	3,711	3,406.93 /EA	6,814
		23.00.400	TRR PGP Turbine Building, HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.21 /SF	330,943
		26.05.GRDG	Facility Grounding	**3,250.00** SF	2.22 /SF	0.10 /SF	1.10 /SF	/SF	3.41 /SF	11,082	6.31 /SF	20,511
		26.12.SEC	Subfeed from Elec Building	**600.00** LF	41.92 /LF	4.18 /LF	24.95 /LF	/LF	71.05 /LF	42,629	128.39 /LF	77,036
		26.20.DIST	Electrical Distribution Equipment	**450.00** AMP	46.44 /AMP	0.79 /AMP	49.26 /AMP	/AMP	96.49 /AMP	43,422	179.90 /AMP	80,955
		26.25.LTG	Interior Lighting and Control	**1.00** LS	15,144.99 /LS	/LS	6,724.85 /LS	/LS	21,869.84 /LS	21,870	40,452.14 /LS	40,452
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	1,713.08 /LS	/LS	143.26 /LS	/LS	1,856.34 /LS	1,856	3,402.64 /LS	3,403
		26.30.DEV	Device Outlets	**1.00** LS	10,060.56 /LS	/LS	6,095.20 /LS	/LS	16,155.76 /LS	16,156	29,964.66 /LS	29,965
		26.40.EQCON	Facility Equipment Connections and Controls	**1.00** ALO	25,946.13 /ALO	3,000.00 /ALO	10,000.00 /ALO	/ALO	38,946.13 /ALO	38,946	71,894.53 /ALO	71,895
		26.40.HYDTURB	13.8kV 15MW Hyd Turbine Pwr Feeders 4-[4" 3#4/0 #4/5G] 800A	**600.00** LF	380.99 /LF	7.83 /LF	154.39 /LF	2.67 /LF	545.89 /LF	327,529	1,002.95 /LF	601,771
		26.41.HYDTURB	Hyd Turbine Controls Circuits	**600.00** LF	164.55 /LF	7.83 /LF	29.81 /LF	/LF	202.19 /LF	121,314	365.86 /LF	219,518
		26.90.LPS	Facility Lightning Protection System	**3,250.00** SF	1.44 /SF	/SF	0.76 /SF	0.46 /SF	2.66 /SF	8,702	4.95 /SF	16,086
		27.30.COMCDT	Comm Conduit to Admin	**1,200.00** LF	28.15 /LF	8.36 /LF	11.74 /LF	/LF	48.25 /LF	57,904	83.75 /LF	100,496
		28.20.AC	Access Control System	**2.00** DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	4,714	3,775.53 /DOOR	7,551
		28.20.CCTV	Closed Circuit TV and Cameras	**2.00** CAM	1,701.66 /CAM	/CAM	1,730.00 /CAM	500.00 /CAM	3,931.66 /CAM	7,863	6,706.89 /CAM	13,414
		28.20.ID	Intrusion Detection System	**2.00** DOOR	2,918.94 /DOOR	/DOOR	2,000.00 /DOOR	250.00 /DOOR	5,168.94 /DOOR	10,338	8,298.41 /DOOR	16,597
		40.00.404	TRR PGP Turbine Building, Process Piping	230.00 LF	160.02 /LF	89.23 /LF	1,133.04 /LF	282.61 /LF	1,664.90 /LF	382,926	2,708.32 /LF	622,915
			04.02 Terminal Regulating Reservoir Turbine Buildings	**2.00** EA	835,461.45 /EA	46,633.15 /EA	901,138.83 /EA	157,998.06 /EA	1,941,531.44 /EA	3,883,063	3,252,549.56 /EA	6,505,099
	04.03		TRR Reservoir Energy Dissipation Valve Structures									
		03.00.410	TRR PGP Energy Dissipation Structures Foundation Slab	740.00 CY	160.90 /CY	6.96 /CY	229.25 /CY	/CY	397.11 /CY	293,857	643.01 /CY	475,825
		03.00.412	TRR PGP Energy Dissipation Structures Concrete Walls	829.00 CY	315.74 /CY	9.57 /CY	316.26 /CY	/CY	641.56 /CY	531,857	1,034.92 /CY	857,950
		03.00.414	TRR PGP Energy Dissipation Structures Elevated Deck	223.00 CY	358.76 /CY	7.58 /CY	248.88 /CY	/CY	615.23 /CY	137,195	988.49 /CY	220,433
		40.00.402	TRR PGP Energy Dissipation Structures Piping	120.00 LF	267.82 /LF	91.35 /LF	1,153.33 /LF	/LF	1,512.50 /LF	181,500	2,469.41 /LF	296,330
			04.03 TRR Reservoir Energy Dissipation Valve Structures	**2.00** EA	246,475.79 /EA	12,886.81 /EA	312,881.30 /EA	/EA	572,204.70 /EA	1,144,409	925,268.98 /EA	1,850,537
	04.04		TRR Reservoir Electrical Building									
		04.00.402	TRR PGP Electrical Building, Masonry	14,600.00 SF	12.79 /SF	0.12 /SF	7.97 /SF	/SF	20.88 /SF	304,790	37.68 /SF	550,160
		05.00.404	TRR PGP Electrical Building, Metal Roof Framing	14,384.00 SF	2.55 /SF	0.29 /SF	4.27 /SF	/SF	7.10 /SF	102,052	12.92 /SF	185,839
		07.00.400	TRR PGP Electrical Building, Roofing	14,384.00 SF	4.48 /SF	0.37 /SF	3.67 /SF	/SF	8.51 /SF	122,419	15.39 /SF	221,409
		08.00.402	TRR PGP Electrical Building, Openings	20.00 EA	616.18 /EA	15.00 /EA	2,006.76 /EA	/EA	2,637.94 /EA	52,759	4,834.12 /EA	96,682
		21.00.400	TRR PGP Electrical Building, Fire Suppression	14,384.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	215,760	26.66 /SF	383,468
		23.00.402	TRR PGP Electrical Building, HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.21 /SF	894,806
		26.02.PRI	Primary Feeds fromSubstation	**2,180.00** LF	376.38 /LF	26.06 /LF	295.94 /LF	2.20 /LF	700.58 /LF	1,527,268	1,281.82 /LF	2,794,367
		26.03.MVSWGR	MV SWGR	**30,800.00** FA	3.59 /FA	0.69 /FA	50.13 /FA	/FA	54.40 /FA	1,675,521	103.04 /FA	3,173,759
		26.03.SWGREQ	Station Aux Xfmr, Btty	**1.00** LS	54,197.72 /LS	5,931.53 /LS	160,200.00 /LS	/LS	220,319.25 /LS	220,319	414,222.22 /LS	414,222
		26.04.MVBUS	Medium Voltage Overhead Bus Duct 2000A	**540.00** LF	429.87 /LF	1.85 /LF	1,642.50 /LF	4.82 /LF	2,079.03 /LF	1,122,677	3,918.27 /LF	2,115,866
		26.04.MVVSD	Medium Voltage Variable Speed Drives	**13.00** EA	12,973.07 /EA	3,250.00 /EA	420,200.00 /EA	5,000.00 /EA	441,423.07 /EA	5,738,500	837,113.76 /EA	10,882,478
		26.05.GRDG	Facility Grounding	**14,550.00** SF	3.49 /SF	/SF	1.30 /SF	/SF	4.79 /SF	69,619	8.84 /SF	128,591
		26.20.DIST	Electrical Distribution Equipment	**550.00** AMP	36.16 /AMP	0.65 /AMP	38.29 /AMP	/AMP	75.10 /AMP	41,306	140.02 /AMP	77,009
		26.25.LTG	Interior Lighting and Control	**1.00** LS	86,265.47 /LS	/LS	38,029.50 /LS	/LS	124,294.97 /LS	124,295	229,891.73 /LS	229,892
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	6,300.47 /LS	/LS	598.58 /LS	/LS	6,899.05 /LS	6,899	12,631.59 /LS	12,632
		26.30.DEV	Device Outlets	**1.00** LS	53,247.76 /LS	/LS	19,053.60 /LS	/LS	72,301.36 /LS	72,301	133,503.72 /LS	133,504
		26.40.EQCON	Facility Equipment Connections and Controls	**1.00** ALO	8,282.95 /ALO	/ALO	4,925.85 /ALO	/ALO	13,208.80 /ALO	13,209	24,494.65 /ALO	24,495
		26.40.PMP	13.8kV 8000HP Pump Power Feeders 4", 3/C VFD Cable 300A	**780.00** LF	145.29 /LF	1.28 /LF	115.46 /LF	3.33 /LF	265.37 /LF	206,985	493.29 /LF	384,770
		26.41.PMP	8000HP Pump Process Control Circuits and Connections	**780.00** LF	43.96 /LF	/LF	12.06 /LF	/LF	56.02 /LF	43,697	103.25 /LF	80,533
		26.90.LPS	Facility Lightning Protection System	**14,550.00** SF	1.27 /SF	0.03 /SF	0.85 /SF	0.34 /SF	2.49 /SF	36,201	4.61 /SF	67,049
		27.10.COMEQ	Communications Room Equipment	**1.00** LS	28,011.60 /LS	/LS	21,023.71 /LS	/LS	49,035.31 /LS	49,035	91,130.54 /LS	91,131
		27.31.COMCDT	Comm Conduit to MH/HH	**200.00** LF	224.65 /LF	28.56 /LF	52.68 /LF	/LF	305.89 /LF	61,178	551.26 /LF	110,252

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Jacobs

SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
		28.10.FA	Fire Alarm System	**14,550.00** SF	3.58 /SF	/SF	1.41 /SF	0.17 /SF	5.16 /SF	75,070	9.06 /SF	131,826
		28.20.AC	Access Control System	**12.00** DOOR	908.12 /DOOR	/DOOR	466.57 /DOOR	/DOOR	1,374.78 /DOOR	16,497	2,202.39 /DOOR	26,429
		28.20.CCTV	Closed Circuit TV and Cameras	**12.00** CAM	3,344.91 /CAM	/CAM	2,063.33 /CAM	833.33 /CAM	6,241.57 /CAM	74,899	10,952.16 /CAM	131,426
		28.20.ID	Intrusion Detection System	**16.00** DOOR	1,256.77 /DOOR	/DOOR	812.50 /DOOR	93.75 /DOOR	2,163.02 /DOOR	34,608	3,470.81 /DOOR	55,533
			04.04 TRR Reservoir Electrical Building	**14,384.00** SF	158.81 /SF	16.15 /SF	635.11 /SF	56.54 /SF	869.81 /SF	12,511,294	1,826.58 /SF	26,398,146
	04.05		TRR Reservoir Site Electrical									
		26.20.DB	Site Ductbanks	**1.00** LS	/LS	/LS	/LS	50,000.00 /LS	50,000.00 /LS	50,000	91,369.20 /LS	91,369
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	/LS	/LS	/LS	125,000.00 /LS	125,000.00 /LS	125,000	228,422.91 /LS	228,423
		28.20.AC	Access Control System	**2.00** DOOR	/DOOR	/DOOR	/DOOR	10,000.00 /DOOR	10,000.00 /DOOR	20,000	18,273.83 /DOOR	36,548
		28.20.CCTV	Closed Circuit TV and Cameras	**10.00** CAM	/CAM	/CAM	/CAM	7,500.00 /CAM	7,500.00 /CAM	75,000	13,705.38 /CAM	137,054
			04.05 TRR Reservoir Site Electrical	**1.00** LS	/LS	/LS	/LS	270,000.00 /LS	270,000.00 /LS	270,000	493,393.55 /LS	493,394
	04.06		Funks Reservoir PGP Sitework									
		31.00.400	TRR PGP Earthworks	272,100.00 CY	7.67 /CY	8.96 /CY	2.76 /CY	4.54 /CY	24.13 /CY	6,565,938	38.26 /CY	10,411,471
		32.00.400	TRR PGP Site Improvements	**1.00** LS	488,194.34 /LS	71,080.21 /LS	833,778.18 /LS	/LS	1,393,052.73 /LS	1,393,053	2,257,827.24 /LS	2,257,827
		33.00.400	TRR PGP Yard Piping	1,850.00 LF	455.79 /LF	364.93 /LF	1,939.98 /LF	/LF	2,760.60 /LF	5,107,102	4,495.17 /LF	8,316,058
			04.06 Funks Reservoir PGP Sitework	**1.00** LS	3,472,349.93 /LS	3,184,362.15 /LS	5,174,040.18 /LS	1,235,250.00 /LS	13,066,093.16 /LS	13,066,093	20,985,358.91 /LS	20,985,357
			04 Terminal Regulating Reservoir (TRR) PGP	***1.00 LS***	***12,458,471.16 /LS***	***3,710,900.47 /LS***	***35,722,567.19 /LS***	***3,588,850.00 /LS***	***55,480,788.82 /LS***	***55,480,789***	***93,600,928.16 /LS***	***93,600,928***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	20,325,590		134,516.944 hrs	
Material	61,319,025			
Allowance	6,075,098			
Equipment	5,881,216		36,110.123 hrs	
Other				
Total Construction Cost	**93,600,929**	**93,600,929**		
Non-Contract Costs	16,848,167			18.000 %
Total Project Costs	**16,848,167**	**110,449,096**		

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DETAIL REPORT

Jacobs

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
04						***Terminal Regulating Reservoir (TRR) PGP***									
	04.01					*Terminal Regulating Reservoir (TRR) PGP*									
		03.00.300				*Funk PGP Foundation Slab*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.48	*Cast-In-Place Concrete, Slabs on Grade, 48" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	3,336.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	30,980	14.72 /sfca	49,102
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	432.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	1,110,648	4,142.36 /ton	1,789,501
						Reinforcing in place, unloading & sorting, add to above - slabs	432.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	24,064	87.87 /ton	37,959
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	432.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	26,157	95.51 /ton	41,260
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	5,440.00 cy	-	-	131.00 /cy	-	131.00 /cy	712,640	216.13 /cy	1,175,773
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	5,332.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	154,632	45.75 /CY	243,914
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	35,990.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	33,711	1.48 /sf	53,174
						Curing, sprayed membrane curing compound	359.90 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	8,295	37.26 /csf	13,410
						Fine grading, fine grade for slab on grade, machine	3,998.89 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	7,495	2.96 /sy	11,822
						03.10.05.48 Cast-In-Place Concrete, Slabs on Grade, 48" thick	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.64 /CY*	*3,415,916*
						03.18 Cast-In-Place Concrete, Slabs on Grade	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.64 /CY*	*3,415,916*
						03.0 Concrete Work	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.64 /CY*	*3,415,916*
						03.00.300 Funk PGP Foundation Slab	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.64 /CY*	*3,415,916*
		03.00.402				*TRR PGP Concrete Walls, Perimeter*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.48	*Cast-In-Place Concrete, Straight Walls, 48" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	28,266.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	416,572	23.64 /sfca	668,262
						Form oil, coverage varies greatly, maximum, includes material only	76.00 gal	-	-	23.50 /gal	-	23.50 /gal	1,786	38.77 /gal	2,947
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	177.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	455,057	4,142.36 /ton	733,199
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	177.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	9,860	87.87 /ton	15,553
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	177.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	10,717	95.51 /ton	16,905
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	2,135.00 cy	-	-	131.00 /cy	-	131.00 /cy	279,685	216.13 /cy	461,448
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	2,094.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	93,622	70.52 /CY	147,677
						Concrete finishing, walls, includes breaking ties and patching voids	28,266.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	28,811	1.61 /sf	45,528
						03.10.06.48 Cast-In-Place Concrete, Straight Walls, 48" thick	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*998.81 /CY*	*2,091,518*
						03.30 Cast-In-Place Concrete, Straight Walls	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*998.81 /CY*	*2,091,518*
						03.0 Concrete Work	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*998.81 /CY*	*2,091,518*
						03.00.402 TRR PGP Concrete Walls, Perimeter	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*998.81 /CY*	*2,091,518*
		03.00.404				*TRR PGP Concrete Walls, Pier Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.36	*Cast-In-Place Concrete, Straight Walls, 36" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	80,640.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	1,188,436	23.64 /sfca	1,906,482
						Form oil, coverage varies greatly, maximum, includes material only	215.00 gal	-	-	23.50 /gal	-	23.50 /gal	5,053	38.77 /gal	8,336
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	392.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	1,007,810	4,142.36 /ton	1,623,807
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	392.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	21,836	87.87 /ton	34,444
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	392.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	23,735	95.51 /ton	37,439
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	4,570.00 cy	-	-	131.00 /cy	-	131.00 /cy	598,670	216.13 /cy	987,736
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	4,480.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	200,299	70.52 /CY	315,948
						Concrete finishing, walls, includes breaking ties and patching voids	80,640.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	82,195	1.61 /sf	129,687
						03.10.06.36 Cast-In-Place Concrete, Straight Walls, 36" thick	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,125.91 /CY*	*5,044,080*
						03.30 Cast-In-Place Concrete, Straight Walls	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,125.91 /CY*	*5,044,080*
						03.0 Concrete Work	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,125.91 /CY*	*5,044,080*
						03.00.404 TRR PGP Concrete Walls, Pier Walls	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,125.91 /CY*	*5,044,080*
		03.00.406				*TRR PGP Elevated Slab*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.36	*Cast-In-Place Concrete, Elevated Decks, 36" thick*									
						Slab shoring	3,250.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	2,225	1.08 /cf	3,522
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	31,212.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	277,052	14.10 /sf	440,027
						C.I.P. concrete forms, elevated slab, edge forms, 36" high, 3 use, includes shoring, erecting, bracing, stripping and cleaning	3,474.00 sfca	12.19 /sfca	-	0.53 /sfca	-	12.72 /sfca	44,182	20.10 /sfca	69,825
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	272.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	699,297	4,142.36 /ton	1,126,723
						Reinforcing in place, unloading & sorting, add to above - decks	272.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	15,152	87.87 /ton	23,900
						Reinforcing steel, crane cost for handling, maximum, add	272.00 ton	140.59 /ton	18.56 /ton	-	-	159.16 /ton	43,291	251.05 /ton	68,286
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	3,468.00 cy	-	-	131.00 /cy	-	131.00 /cy	454,308	216.13 /cy	749,555
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	3,400.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	101,342	47.02 /CY	159,855
						Finishing elev slab, bull float, manual float & manual steel trowel	30,575.00 sf	1.23 /sf	-	-	-	1.23 /sf	37,731	1.95 /sf	59,516
						Curing, sprayed membrane curing compound, elevated decks	305.75 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	7,047	37.26 /csf	11,392
						03.10.10.36 Cast-In-Place Concrete, Elevated Decks, 36" thick	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*797.82 /CY*	*2,712,600*
						03.24 Cast-In-Place Concrete, Elevated Slabs	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*797.82 /CY*	*2,712,600*
						03.0 Concrete Work	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*797.82 /CY*	*2,712,600*
						03.00.406 TRR PGP Elevated Slab	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*797.82 /CY*	*2,712,600*
		03.00.408				*TRR PGP Slab on Grade @ El 130.00*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.24	*Cast-In-Place Concrete, Slabs on Grade, 24" thick*									

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DETAIL REPORT

Jacobs

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.05.24	*Cast-In-Place Concrete, Slabs on Grade, 24" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	667.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	6,194	14.72 /sfca	9,818
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	41.25 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	106,051	4,142.36 /ton	170,873
						Reinforcing in place, unloading & sorting, add to above - slabs	41.25 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,298	87.87 /ton	3,625
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	41.25 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	2,498	95.51 /ton	3,940
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	485.00 cy	-	-	131.00 /cy	-	131.00 /cy	63,535	216.13 /cy	104,825
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	471.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	13,659	45.75 /CY	21,546
						Cfnsh,flrs,for spcl rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	6,358.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	5,955	1.48 /sf	9,394
						Curing, sprayed membrane curing compound	63.58 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,465	37.26 /csf	2,369
						Fine grading, fine grade for slab on grade, machine	706.44 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,324	2.96 /sy	2,089
						03.10.05.24 Cast-In-Place Concrete, Slabs on Grade, 24" thick	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.40 /CY*	*328,477*
						03.10 Cast-In-Place Concrete, Slabs on Grade	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.40 /CY*	*328,477*
						03.0 Concrete Work	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.40 /CY*	*328,477*
						03.00.400 TRR PGP Slab on Grade @ El 130.00	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.40 /CY*	*328,477*
		05.00.400				*TRR PGP, Metals*									
			05.0			*Metals*									
				05.50		*Metal Fabrications*									
					05.50.99.00	*Metals, Other*									
						Trash Rack Allowance	13.00 ea		-		50,000.00 /ea	50,000.00 /ea	650,000	88,869.17 /ea	1,155,299
						Miscellaneous Metals Allowance	1.00 ls	116,094.40 /ls	11,200.00 /ls	100,000.00 /ls	-	227,294.40 /ls	227,294	411,239.31 /ls	411,239
						05.00.99.00 Metals, Other	***35,990.00** SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.53 /SF*	*1,566,539*
						05.50 Metal Fabrications	***35,990.00** SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.53 /SF*	*1,566,539*
						05.0 Metals	***35,990.00** SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.53 /SF*	*1,566,539*
						05.00.400 TRR PGP, Metals	***35,990.00** SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.53 /SF*	*1,566,539*
		26.26.EXTLTG				*Exterior Lighting and Control*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Allowance for lighting?	260.00 hrs	129.73 /hrs	10.00 /hrs	75.00 /hrs		214.73 /hrs	55,830	397.83 /hrs	103,436
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*55,830*	*/SF*	*103,436*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*55,830*	*/SF*	*103,436*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*55,830*	*/SF*	*103,436*
						26.26.EXTLTG Exterior Lighting and Control	***1.00** LS*	*33,729.60 /LS*	*2,600.00 /LS*	*19,500.00 /LS*	*/LS*	*55,829.60 /LS*	*55,830*	*103,436.20 /LS*	*103,436*
		40.00.400				*TRR PGP, Process Piping*									
			40.0			*Process Pipe*									
				40.11		*Process Pipe, Carbon Steel*									
					40.10.02.60	*Process Pipe, Carbon Steel, 60"*									
						Elbow, steel, butt weld, 60' Dia	21.00 ea	3,281.57 /ea	97.68 /ea	9,500.00 /ea	-	12,879.25 /ea	270,464	21,004.26 /ea	441,090
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	720.00 LF	121.97 /LF	62.10 /LF	420.00 /LF	-	604.07 /LF	434,928	983.29 /LF	707,971
						Butterfly Valves	14.00 ea	2,187.72 /ea	1,560.00 /ea	45,000.00 /ea	-	48,747.72 /ea	682,468	80,156.35 /ea	1,122,189
						Check Valves	13.00 ea	2,187.72 /ea	1,560.00 /ea	35,000.00 /ea	-	38,747.72 /ea	503,720	63,657.51 /ea	827,548
						Dismantling Joints	13.00 ea	2,187.72 /ea	1,560.00 /ea	37,000.00 /ea	-	40,747.72 /ea	529,720	66,957.28 /ea	870,445
						ARV, Complete	13.00 ea	2,500.91 /ea	520.00 /ea	3,500.00 /ea		6,520.91 /ea	84,772	10,539.73 /ea	137,016
						Miscellaneous Items Allowance	1.00 ls				250,000.00 /ls	250,000.00 /ls	250,000	394,345.85 /ls	394,346
						40.10.02.60 Process Pipe, Carbon Steel, 60"	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,250.84 /LF*	*4,500,604*
						40.11 Process Pipe, Carbon Steel	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,250.84 /LF*	*4,500,604*
						40.0 Process Pipe	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,250.84 /LF*	*4,500,604*
						40.00.400 TRR PGP, Process Piping	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,250.84 /LF*	*4,500,604*
		44.40.400				*TRR PGP, Furnish and Install Pumps*									
			46.0			*Water and Wastewater Equipment*									
				44.40		*Process Equipment - Pumps*									
					44.05.42.06	*Vertical Turbine Pump: > 8000 hp*									
						Functional Testing, Pumps, >1000 hp	13.00 ea	3,068.99 /ea	-	100.00 /ea	-	3,168.99 /ea	41,197	5,005.97 /ea	65,078
						Align Pump & Motor, >1000 hp	13.00 ea	3,836.24 /ea	-	-	2,800.00 /ea	6,636.24 /ea	86,271	10,467.90 /ea	136,083
						Vibration Testing, Pumps, >1000 hp	13.00 ea	1,534.50 /ea	-		1,400.00 /ea	2,934.50 /ea	38,148	4,628.82 /ea	60,175
						Sleeved anchor bolts - Large	156.00 ea	95.91 /ea	-	28.00 /ea	-	123.91 /ea	19,329	197.48 /ea	30,806
						Anchor bolts for leveling pump cans	52.00 ea	383.62 /ea	-	150.00 /ea	-	533.62 /ea	27,748	852.60 /ea	44,335
						Non-Shrink Machine Grout	208.00 cuft	91.11 /cuft	-	74.00 /cuft	-	165.11 /cuft	34,343	265.81 /cuft	55,288
						Grease, Oil, and Lube Pumps, >1000 hp	13.00 ea	1,534.50 /ea	-	150.00 /ea	-	1,684.50 /ea	21,898	2,667.97 /ea	34,684
						FURNISH Vertical Turbine Pump, SS, 8850 hp	13.00 EA	-	-	940,802.00 /EA	-	940,802.00 /EA	12,230,426	1,552,213.64 /EA	20,176,777
						44.05.42.06 Vertical Turbine Pump: > 8000 hp	*13.00 EA*	*14,117.37 /EA*	*/EA*	*943,172.00 /EA*	*4,200.00 /EA*	*961,489.36 /EA*	*12,499,362*	*1,585,017.37 /EA*	*20,605,226*
						44.40 Process Equipment - Pumps	*13.00 EA*	*14,117.37 /EA*	*/EA*	*943,172.00 /EA*	*4,200.00 /EA*	*961,489.36 /EA*	*12,499,362*	*1,585,017.37 /EA*	*20,605,226*
						46.0 Water and Wastewater Equipment	*13.00 EA*	*14,117.37 /EA*	*/EA*	*943,172.00 /EA*	*4,200.00 /EA*	*961,489.36 /EA*	*12,499,362*	*1,585,017.37 /EA*	*20,605,226*
						44.40.400 TRR PGP, Furnish and Install Pumps	*13.00 EA*	*14,117.37 /EA*	*/EA*	*943,172.00 /EA*	*4,200.00 /EA*	*961,489.36 /EA*	*12,499,362*	*1,585,017.37 /EA*	*20,605,226*
						99.01 Terminal Regulating Reservoir (TRR) PGP	***35,990.00** SF*	*128.38 /SF*	*7.30 /SF*	*525.51 /SF*	*28.32 /SF*	*[illegible] /SF*	*[illegible]*	*[illegible] /SF*	*[illegible]*
	04.03					*Terminal Regulating Reservoir Turbine Buildings*									
		03.00.416				*TRR PGP Turbine Buildings Foundation Slab*									
			03.0			*Concrete Work*									
				03.10		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.99	*Cast-In-Place Concrete, Slabs on Grade, Other*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	4,000.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	37,147	14.72 /sfca	58,876
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	204.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	524,473	4,142.36 /ton	845,042
						Reinforcing in place, unloading & sorting, add to above - slabs	204.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	11,364	87.87 /ton	17,925
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	204.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	12,352	95.51 /ton	19,484
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	3,310.00 cy	-	-	131.00 /cy	-	131.00 /cy	433,610	216.13 /cy	715,406
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	3,248.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	94,195	45.75 /CY	148,581
						Cfnsh,flrs,for spcl rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	6,700.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	6,276	1.48 /sf	9,899
						Curing, sprayed membrane curing compound	67.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,544	37.26 /csf	2,496
						Fine grading, fine grade for slab on grade, machine	744.44 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,395	2.96 /sy	2,201
						03.10.05.99 Cast-In-Place Concrete, Slabs on Grade, Other	*3,248.00 CY*	*128.82 /CY*	*6.61 /CY*	*210.32 /CY*	*/CY*	*345.55 /CY*	*1,122,356*	*560.32 /CY*	*1,819,910*
						03.10 Cast-In-Place Concrete, Slabs on Grade	*3,248.00 CY*	*128.82 /CY*	*6.61 /CY*	*210.32 /CY*	*/CY*	*345.55 /CY*	*1,122,356*	*560.32 /CY*	*1,819,910*

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						03.0 Concrete Work	3,248.00 CY	128.62 /CY	6.61 /CY	210.32 /CY	/CY	345.55 /CY	1,122,355	560.32 /CY	1,819,910
						03.00.415 TRR PGP Turbine Buildings Foundation Slab	3,248.00 CY	128.62 /CY	6.61 /CY	210.32 /CY	/CY	345.55 /CY	1,122,355	560.32 /CY	1,819,910
		03.00.415				*TRR PGP Turbine Buildings Concrete Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.36	*Cast-In-Place Concrete, Straight Walls, 36" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	23,976.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	353,348	23.64 /sfca	566,838
						Form oil, coverage varies greatly, maximum, includes material only	64.00 gal	-	-	23.50 /gal	-	23.50 /gal	1,504	38.77 /gal	2,481
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	100.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	257,094	4,142.36 /ton	414,236
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	100.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	5,570	87.87 /ton	8,787
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	100.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	6,055	95.51 /ton	9,551
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	1,360.00 cy	-	-	131.00 /cy	-	131.00 /cy	178,160	216.13 /cy	293,943
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	1,332.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	59,553	70.52 /CY	93,938
						Concrete finishing, walls, includes breaking ties and patching voids	23,976.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	24,438	1.61 /sf	38,618
						03.10.06.36 Cast-In-Place Concrete, Straight Walls, 36" thick	1,332.00 CY	331.60 /CY	9.57 /CY	323.79 /CY	/CY	664.96 /CY	885,723	1,072.37 /CY	1,428,393
						03.30 Cast-In-Place Concrete, Straight Walls	1,332.00 CY	331.60 /CY	9.57 /CY	323.79 /CY	/CY	664.96 /CY	885,723	1,072.37 /CY	1,428,393
						03.0 Concrete Work	1,332.00 CY	331.60 /CY	9.57 /CY	323.79 /CY	/CY	664.96 /CY	885,723	1,072.37 /CY	1,428,393
						03.00.415 TRR PGP Turbine Buildings Concrete Walls	1,332.00 CY	331.60 /CY	9.57 /CY	323.79 /CY	/CY	664.96 /CY	885,723	1,072.37 /CY	1,428,393
		03.00.420				*TRR PGP Turbine Buildings Elevated Slab*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.24	*Cast-In-Place Concrete, Elevated Decks, 24" thick*									
						Slab shoring	143,640.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	98,354	1.08 /cf	155,663
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	5,320.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	47,223	14.10 /sf	75,001
						C.I.P. concrete forms, elevated slab, edge forms, 24" high, 3 use, includes shoring, erecting, bracing, stripping and cleaning	680.00 sfca	12.19 /sfca	-	0.53 /sfca	-	12.72 /sfca	8,648	20.10 /sfca	13,668
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	34.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	88,698	4,142.36 /ton	142,912
						Reinforcing in place, unloading & sorting, add to above - decks	34.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,922	87.87 /ton	3,031
						Reinforcing steel, crane cost for handling, maximum, add	34.50 ton	140.59 /ton	18.56 /ton	-	-	159.16 /ton	5,491	251.05 /ton	8,661
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	405.00 cy	-	-	131.00 /cy	-	131.00 /cy	53,055	216.13 /cy	87,535
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	394.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	11,744	47.02 /CY	18,524
						Finishing elev slab, bull float, manual float & manual steel trowel	5,320.00 sf	1.23 /sf	-	-	-	1.23 /sf	6,565	1.95 /sf	10,356
						Curing, sprayed membrane curing compound, elevated decks	53.20 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,226	37.26 /csf	1,982
						03.10.10.24 Cast-In-Place Concrete, Elevated Decks, 24" thick	394.00 CY	533.20 /CY	7.90 /CY	278.52 /CY	/CY	819.61 /CY	322,925	1,313.03 /CY	517,332
						03.24 Cast-In-Place Concrete, Elevated Slabs	394.00 CY	533.20 /CY	7.90 /CY	278.52 /CY	/CY	819.61 /CY	322,925	1,313.03 /CY	517,332
						03.0 Concrete Work	394.00 CY	533.20 /CY	7.90 /CY	278.52 /CY	/CY	819.61 /CY	322,925	1,313.03 /CY	517,332
						03.00.420 TRR PGP Turbine Buildings Elevated Slab	394.00 CY	533.20 /CY	7.90 /CY	278.52 /CY	/CY	819.61 /CY	322,925	1,313.03 /CY	517,332
		04.00.400				*TRR PGP Turbine Buildings Masonry*									
			04.0			*Masonry*									
				04.21		*Concrete Unit Masonry - Exterior*									
					04.00.02.12	*Masonry Concrete Masonry Units, 12"*									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	2.00 opng	41.31 /opng	2.13 /opng	13.40 /opng	-	56.84 /opng	114	101.99 /opng	204
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	1,008.00 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	12,898	23.13 /cf	23,316
						Masonry reinforcing bars, #5 and #6 reinforcing steel bars, placed horizontally, ASTM A615	3,600.00 lb	0.79 /lb	-	0.56 /lb	-	1.35 /lb	4,845	2.43 /lb	8,757
						Masonry reinforcing bars, #5 and #6 reinforcing steel bars, placed vertically, ASTM A615	1,872.00 lb	0.97 /lb	-	0.56 /lb	-	1.53 /lb	2,859	2.75 /lb	5,157
						Masonry reinforcing bars, truss type steel joint reinforcing, mill standard galvanized, 12" wide	19.20 clf	31.43 /clf	-	29.50 /clf	-	60.93 /clf	1,170	110.44 /clf	2,120
						Concrt block,high strngt,hollow,3500 psi,12"8"16",inclds mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and verticl rnfrcng	2,400.00 SF	14.60 /SF	-	5.20 /SF	-	19.80 /SF	47,511	35.56 /SF	85,350
						Channel framing, structural steel, field fabricated, C8x11.5, incl cutting & welding	20.00 lf	62.16 /lf	3.01 /lf	9.90 /lf	-	75.07 /lf	1,501	134.15 /lf	2,683
						Silicone water repellants, sprayed on CMU, 2 coat	4,800.00 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	4,777	1.83 /sf	8,766
						Reglet, zinc and copper alloy, 20 ounce	240.00 lf	3.26 /lf	-	2.87 /lf	-	6.13 /lf	1,472	11.11 /lf	2,666
						Reglet, counter flashing for zinc and copper alloy, 20 ounce, 12" wide	240.00 lf	5.27 /lf	-	5.25 /lf	-	10.52 /lf	2,526	19.08 /lf	4,580
						04.00.02.12 Masonry Concrete Masonry Units, 12"	2,400.00 SF	21.57 /SF	0.18 /SF	11.45 /SF	/SF	33.20 /SF	79,672	59.83 /SF	143,599
						04.21 Concrete Unit Masonry - Exterior	2,400.00 SF	21.57 /SF	0.18 /SF	11.45 /SF	/SF	33.20 /SF	79,672	59.83 /SF	143,599
						04.0 Masonry	2,400.00 SF	21.57 /SF	0.18 /SF	11.45 /SF	/SF	33.20 /SF	79,672	59.83 /SF	143,599
						04.00.400 TRR PGP Turbine Buildings Masonry	2,400.00 SF	21.57 /SF	0.18 /SF	11.45 /SF	/SF	33.20 /SF	79,672	59.83 /SF	143,599
		05.00.402				*TRR PGP Turbine Building, Metals*									
			05.0			*Metals*									
				05.50		*Metal Fabrications*									
					05.00.99.00	*Metals, Other*									
						Removable Roof Allowance	1,380.00 SF	10.99 /SF	4.03 /SF	35.00 /SF	-	50.03 /SF	69,037	91.45 /SF	126,208
						Stair Well Roof Allowance	864.00 SF	5.85 /SF	2.15 /SF	25.00 /SF	-	33.00 /SF	28,513	60.47 /SF	52,244
						Stair, 4'-0" wide, w/ guardrail both sides	8.00 flt	1,209.32 /flt	90.20 /flt	2,160.00 /flt	-	3,459.52 /flt	27,676	6,305.49 /flt	50,444
						Tailbay Gate Allowance	2.00 ea				30,000.00 /ea	30,000.00 /ea	60,000	53,321.50 /ea	106,643
						05.00.99.00 Metals, Other	2,244.00 SF	13.33 /SF	3.63 /SF	38.85 /SF	26.74 /SF	82.54 /SF	185,226	149.53 /SF	335,538
						05.50 Metal Fabrications	2,244.00 SF	13.33 /SF	3.63 /SF	38.85 /SF	26.74 /SF	82.54 /SF	185,226	149.53 /SF	335,538
						05.0 Metals	2,244.00 SF	13.33 /SF	3.63 /SF	38.85 /SF	26.74 /SF	82.54 /SF	185,226	149.53 /SF	335,538
						05.00.402 TRR PGP Turbine Building, Metals	**2.00** LS	14,959.50 /LS	4,072.24 /LS	43,590.50 /LS	30,000.00 /LS	92,613.04 /LS	185,226	167,769.15 /LS	335,538
		08.00.400				*TRR PGP Turbine Building, Openings*									
			08.0			*Openings*									
				08.10		*Doors and Frames*									
					08.10.01.00	*Openings, Doors, Frames and Hardware*									
						Steel frms, knock down, 14 ga., to 8-3/4" throat, to 3'-0" x 7'-0", single	2.00 EA	137.64 /EA	-	430.00 /EA	-	567.64 /EA	1,135	1,040.08 /EA	2,080
						Doors, commercial, steel, insulated, full panel, 18 ga., 3'-0" x 7'-0" x 1-3/4" thick	2.00 ea	97.88 /ea	-	520.00 /ea	-	617.88 /ea	1,236	1,135.91 /ea	2,272
						Add for baked enamel finish, average cost per leaf	2.00 leaf	12.94 /leaf	-	50.40 /leaf	-	63.34 /leaf	127	116.24 /leaf	232
						Average Door Hardware	2.00 ea	91.76 /ea	15.00 /ea	500.00 /ea		606.76 /ea	1,214	1,114.70 /ea	2,229
						08.10.01.00 Openings, Doors, Frames and Hardware	2.00 EA	340.22 /EA	15.00 /EA	1,500.40 /EA	/EA	1,855.62 /EA	3,711	3,406.93 /EA	6,814
						08.10 Doors and Frames	2.00 EA	340.22 /EA	15.00 /EA	1,500.40 /EA	/EA	1,855.62 /EA	3,711	3,406.93 /EA	6,814
						08.0 Openings	2.00 EA	340.22 /EA	15.00 /EA	1,500.40 /EA	/EA	1,855.62 /EA	3,711	3,406.93 /EA	6,814
						08.00.400 TRR PGP Turbine Building, Openings	2.00 EA	340.22 /EA	15.00 /EA	1,500.40 /EA	/EA	1,855.62 /EA	3,711	3,406.93 /EA	6,814
		23.00.400				*TRR PGP Turbine Building, HVAC*									
			23.0			*HVAC*									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
				23.00		HVAC									
					23.00.02.00	Mechanical, HVAC									
						HVAC Allowance	5,320.00 SF				35.00 /SF	35.00 /SF	186,200	62.21 /SF	330,949
						23.00.02.00 Mechanical, HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.21 /SF	330,949
						23.00 HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.21 /SF	330,949
						23.0 HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.21 /SF	330,949
						23.00.400 TRR PGP Turbine Building, HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.21 /SF	330,949
		26.05.GRDG				Facility Grounding									
			26.0			Electrical Work									
				26.00		Electrical									
					01.01.06.03	GC Equip, Tools, & Consumables									
						Rent trencher chain boom gas oper walking 12 HP	2.00 day	-	156.95 /day	-	-	156.95 /day	314	286.82 /day	574
						01.01.06.03 GC Equip, Tools, & Consumables	0.00	/LS	/LS	/LS	/LS	/LS	314	/LS	574
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	314	/SF	574
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Copper Bus Bar .25"x 3.0"	2.00 lf	32.44 /lf	-	52.90 /lf	-	85.34 /lf	171	159.76 /lf	320
						Copper Bus Bar Supports	2.00 E	129.73 /E	-	48.30 /E	-	178.03 /E	356	328.84 /E	658
						Grounding rod, copper clad, 15' long, 3/4" diameter	6.00 ea	259.46 /ea	-	55.00 /ea	-	314.46 /ea	1,887	578.63 /ea	3,472
						Ground wire, copper wire, bare stranded, 4/0	4.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	3,137	1,463.41 /clf	5,854
						Water pipe ground clamps, heavy duty, bronze, 2-1/2" to 3" diameter	1.00 ea	172.97 /ea	-	60.50 /ea	-	233.47 /ea	233	431.00 /ea	431
						Exothermic weld, 4/0 wire to 4/0 wire	24.00 ea	148.26 /ea	-	9.45 /ea	-	157.71 /ea	3,785	288.89 /ea	6,933
						Exothermic weld, mold reusable for above	6.00 ea	-	-	141.00 /ea	-	141.00 /ea	846	267.89 /ea	1,607
						Protective boxes at grade level, round, concrete, 12" long, incl breather slots	2.00 ea	64.87 /ea	-	112.00 /ea	-	176.87 /ea	354	331.32 /ea	663
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	10,768	/LF	19,937
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	10,768	/SF	19,937
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	11,082	/SF	20,511
						26.05.GRDG Facility Grounding	**3,250.00** SF	2.22 /SF	0.10 /SF	1.10 /SF	/SF	3.41 /SF	11,082	6.31 /SF	20,511
		26.12.SEC				Subfeed from Elec Building									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	1.00 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,587	4,808.39 /ton	4,808
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	2,587	/LF	4,808
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	600.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	10,016	30.77 /lf	18,465
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	10,016	/EA	18,465
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	12,603	/LS	23,273
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	20.00 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	17,135	1,593.52 /clf	31,870
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	17,135	/LF	31,870
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	6.50 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	5,097	1,463.41 /clf	9,512
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	5,097	/LF	9,512
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	22,232	/SF	41,383
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	34,834	/SF	64,656
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	15.00 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	4,108	437.64 /cy	6,565
						End bulkheads, plywood, concrete envelope/encasement	24.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	341	22.48 /sf	540
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	4,450	/CY	7,104
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	50.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	1,263	39.85 /ecy	1,992
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	1,263	/CY	1,992
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	50.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	1,010	31.85 /lcy	1,593
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	1,010	/CY	1,593
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	37.04 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	1,072	45.66 /bcy	1,691
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	1,072	/CY	1,691
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	7,794	/LS	12,380
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	7,794	/CY	12,380
						26.12.SEC Subfeed from Elec Building	**600.00** LF	41.92 /LF	4.18 /LF	24.95 /LF	/LF	71.05 /LF	42,629	128.39 /LF	77,036
		26.20.DIST				Electrical Distribution Equipment									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 1-1/2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	100.00 lf	23.06 /lf	-	19.05 /lf	-	42.11 /lf	4,211	78.34 /lf	7,834
						Flexible metallic conduit, steel, 1-1/2" diameter	3.00 lf	20.76 /lf	-	2.55 /lf	-	23.31 /lf	70	42.78 /lf	128
						Flexible metallic conduit, steel, 2" diameter	3.00 lf	25.95 /lf	-	3.23 /lf	-	29.18 /lf	88	53.55 /lf	161
						Flexible metallic conduit, steel, connectors, insulated, 1-1/2" diameter	1.00 ea	32.43 /ea	-	24.50 /ea	-	56.93 /ea	57	105.80 /ea	106
						Flexible metallic conduit, steel, connectors, insulated, 2" diameter	1.00 ea	45.12 /ea	-	26.00 /ea	-	71.12 /ea	71	131.85 /ea	132
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 1-1/2" diameter	1.00 ea	45.12 /ea	-	46.00 /ea	-	91.12 /ea	91	169.84 /ea	170
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 2" diameter	1.00 ea	57.66 /ea	-	67.00 /ea	-	124.66 /ea	125	232.66 /ea	233
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	4,125.00 /ea	-	7,831.59 /ea	7,832	14,610.39 /ea	14,610
						Panelboards, 3 phase 4 wire, main circuit breaker, 277/480 V, 225 amp, 42 circuits, NEHB, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	5,175.00 /ea	-	8,881.59 /ea	8,882	16,605.27 /ea	16,605
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	21,438	/SF	39,979
					26.10.03.00	UG Conduit									
						Uninterruptible power supply, charger, inverter, and alarm 1 phase, 120 V, 5 kVA, incl 10 minutes battery	1.00 ea	6,182.64 /ea	356.18 /ea	7,100.00 /ea	-	13,638.82 /ea	13,639	25,438.09 /ea	25,438
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	13,639	/LF	25,438
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #6, type XHHW, in raceway	0.70 clf	159.67 /clf	-	54.50 /clf	-	214.17 /clf	150	395.33 /clf	277
						Wire, copper, stranded, 600 volt, #4, type XHHW, in raceway	0.70 clf	195.81 /clf	-	77.50 /clf	-	273.31 /clf	191	505.04 /clf	354
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	2.00 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	837	776.22 /clf	1,552
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	2.00 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	1,714	1,593.54 /clf	3,187
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	2,892	/LF	5,370

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*32,958*	*/SF*	*70,756*
				26.25		*Facility Electrical*									
					26.25.06.00	*Transformers, Dry Type*									
						Transformer, dry-type, ventilated, 3 phase 480 V primary 120/208 V secondary, 75 kVA	1.00 ea	2,965.27 /ea	-	2,500.00 /ea	-	5,465.27 /ea	5,465	10,168.37 /ea	10,168
						26.25.06.00 Transformers, Dry Type	*0.00*	*/EA*	*/EA*	*/EA*	*/EA*	*/EA*	*5,465*	*/EA*	*10,168*
						26.25 Facility Electrical	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*5,465*	*/LS*	*10,168*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*43,422*	*/SF*	*80,955*
						26.20.DIST Electrical Distribution Equipment	***450.00*** *AMP*	*48.44 /AMP*	*0.79 /AMP*	*49.26 /AMP*	*/AMP*	*96.49 /AMP*	*43,422*	*179.90 /AMP*	*80,955*
		26.25.LTG				*Interior Lighting and Control*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	500.00 lf	12.97 /lf	-	5.15 /lf	-	18.12 /lf	9,062	33.49 /lf	16,746
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	25.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	1,382	101.23 /ea	2,531
						Outlet boxes, pressed steel, covers, blank, 4" square	24.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	408	31.10 /ea	746
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	1.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	18	32.80 /ea	33
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*10,869*	*/SF*	*20,056*
					26.10.03.00	*UG Conduit*									
						Toggle switch, quiet type, single pole, 20 amp	1.00 ea	38.44 /ea	-	3.46 /ea	-	41.90 /ea	42	76.82 /ea	77
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*42*	*/LF*	*77*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	16.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	1,729	198.44 /clf	3,175
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*1,729*	*/LF*	*3,175*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	[illegible]	*/SF*	[illegible]
				26.20		*Facility Electrical*									
					26.20.03.00	*Facility Electrical, Lighting*									
						LED Strip Light, hdwe	24.00 ea	182.08 /ea	-	110.00 /ea	-	292.08 /ea	7,010	541.71 /ea	13,001
						Emergency ballast, material only, interior, factory installed in fixture	6.00 ea	-	-	152.00 /ea	-	152.00 /ea	912	288.79 /ea	1,733
						Exit lighting, L.E.D. standard, single face, ceiling or wall mount	2.00 ea	129.73 /ea	-	70.00 /ea	-	199.73 /ea	399	370.06 /ea	740
						Fixture whips, 3/8" greenfield, 2 connectors, THHN wire, three #14, 6' long	24.00 ea	32.43 /ea	-	5.45 /ea	-	37.88 /ea	909	69.62 /ea	1,671
						26.20.03.00 Facility Electrical, Lighting	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	[illegible]	*/SF*	*17,145*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	[illegible]	*/SF*	*17,145*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*21,870*	*/SF*	*40,452*
						26.25.LTG Interior Lighting and Control	***1.00*** *LS*	*15,144.69 /LS*	*/LS*	*6,724.85 /LS*	*/LS*	*21,869.54 /LS*	*21,870*	*40,452.14 /LS*	*40,452*
		26.26.EXTLTG				*Exterior Lighting and Control*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	80.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	724	16.62 /lf	1,330
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	4.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	221	101.23 /ea	405
						Outlet boxes, pressed steel, covers, blank, 4" square	4.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	68	31.10 /ea	124
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*1,013*	*/SF*	*1,859*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	3.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	324	198.44 /clf	595
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*324*	*/LF*	*595*
					26.15.07.00	*Lighting*									
						LED Area Light	4.00 E	97.30 /E	-		-	97.30 /E	389	177.80 /E	711
						Wallpack Photocell	4.00 E	32.43 /E	-		-	32.43 /E	130	59.27 /E	237
						26.15.07.00 Lighting	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*519*	*/LS*	*948*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*1,856*	*/SF*	*3,403*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*1,856*	*/SF*	*3,403*
						26.26.EXTLTG Exterior Lighting and Control	***1.00*** *LS*	*1,713.08 /LS*	*/LS*	*143.26 /LS*	*/LS*	*1,856.34 /LS*	*1,856*	*3,402.64 /LS*	*3,403*
		26.30.DEV				*Device Outlets*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	500.00 lf	14.83 /lf	-	10.00 /lf	-	24.83 /lf	12,413	46.09 /lf	23,046
						Outlet boxes, cast, 1 gang, FD, 3/4" hub, 2-11/16" deep	8.00 ea	86.49 /ea	-	22.00 /ea	-	108.49 /ea	868	199.84 /ea	1,599
						Duplex receptacle, ground fault interrupting, 20 amp	8.00 ea	38.44 /ea	-	45.00 /ea	-	83.44 /ea	668	155.74 /ea	1,246
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*13,949*	*/SF*	*25,891*
					26.10.03.00	*UG Conduit*									
						WP cover	8.00 ea	17.30 /ea	-	42.50 /ea	-	59.80 /ea	478	112.36 /ea	899
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*478*	*/LF*	*899*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	16.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	1,729	198.44 /clf	3,175
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*1,729*	*/LF*	*3,175*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*16,156*	*/SF*	*29,965*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*16,156*	*/SF*	*29,965*
						26.30.DEV Device Outlets	***1.00*** *LS*	*10,060.56 /LS*	*/LS*	*6,095.20 /LS*	*/LS*	*16,155.76 /LS*	*16,156*	*29,964.68 /LS*	*29,965*
		26.40.EQCON				*Facility Equipment Connections and Controls*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.20.05.00	*Facility Electrical, HVAC*									
						Allowance for HVAC circuit, connection, controls	200.00 HR	129.73 /HR	15.00 /HR	50.00 /HR	-	194.73 /HR	38,946	359.47 /HR	71,895
						26.20.05.00 Facility Electrical, HVAC	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*38,946*	*/SF*	*71,895*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*38,946*	*/SF*	*71,895*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*38,946*	*/SF*	*71,895*
						26.40.EQCON Facility Equipment Connections and Controls	***1.00*** *ALO*	*25,946.13 /ALO*	*3,000.00 /ALO*	*10,000.00 /ALO*	*/ALO*	*38,946.13 /ALO*	*38,946*	*71,894.53 /ALO*	*71,895*
		26.40.HYDTURB				*13.8kV 15MW Hyd Turbine Pwr Feeders 4-[4" 3#4/0 #4/0G] 500A*									
			26.0			*Electrical Work*									
				26.10		*Site Electrical*									
					26.10.02.00	*Site Electrical, Buried Conduit*									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	3.00 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	7,760	4,808.39 /ton	14,425
						26.10.02.00 Site Electrical, Buried Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*7,760*	*/LF*	*14,425*
						26.10 Site Electrical	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*7,760*	*/LS*	*14,425*
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	80.00 lf	64.87 /lf	-	62.50 /lf	-	127.37 /lf	10,189	237.28 /lf	18,982
						Rigid galvanized steel plastic coated conduit elbows, 4" diameter, to 15' high	16.00 ea	389.19 /ea	-	196.00 /ea	-	585.19 /ea	9,363	1,083.58 /ea	17,337
						Rigid galvanized steel plastic coated conduit couplings, 4" diameter, to 15' high	16.00 ea	28.83 /ea	-	57.50 /ea	-	86.33 /ea	1,381	161.93 /ea	2,591

Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.00.99.00	Electrical, Other									
						Flexible metallic conduit, sealtite, 4" diameter	24.00 lf	86.40 /lf	-	20.00 /lf	-	106.40 /lf	2,554	195.88 /lf	4,701
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 4" diameter	8.00 ea	129.73 /ea	-	163.00 /ea	-	292.73 /ea	2,342	546.75 /ea	4,374
						Flexible metallic conduit, coupling sealtite to rigid, 4" diameter	8.00 ea	129.73 /ea	-	198.00 /ea	-	327.73 /ea	2,622	613.25 /ea	4,906
						Electrical Contractor startup assistance per hour	40.00 hr	1,297.31 /hr	25.00 /hr	100.00 /hr	-	1,422.31 /hr	56,892	2,606.35 /hr	104,254
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	85,343	/SF	157,145
					26.10.03.00	UG Conduit									
						PVC conduit, schedule 40, 4" diameter, to 15' H, incl terminations, fittings, & support	2,320.00 lf	32.43 /lf	-	5.75 /lf	-	38.18 /lf	88,584	70.19 /lf	162,844
						PVC conduit elbows, 4" diameter, to 15' H	16.00 ea	116.76 /ea	-	23.00 /ea	-	139.76 /ea	2,236	257.06 /ea	4,113
						PVC conduit, field bends, 45 Deg. to 90 Deg., 4" diameter	16.00 ea	129.73 /ea	-	-	-	129.73 /ea	2,076	237.07 /ea	3,793
						PVC adapters, 4" diameter, to 15' H	16.00 ea	64.87 /ea	-	4.80 /ea	-	69.67 /ea	1,115	127.65 /ea	2,042
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	94,010	/LF	172,792
					26.15.01.00	Process Electrical, Wire/Cable									
						Cable terminations, indoor, insulation diameter range, 15 kV, .525" to 1.025", pad mount	48.00 ea	324.33 /ea	-	109.00 /ea	-	433.33 /ea	20,800	799.76 /ea	38,388
						Medium-cable single cable, copper, XLP shielding, ungrounded neutral, 15 kV, 4/0, in conduit, excl splicing & terminations	78.00 clf	648.65 /clf	-	660.00 /clf	-	1,308.65 /clf	102,075	2,439.26 /clf	190,262
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	122,875	/LF	228,651
					26.25.03.00	Electrical Equipment, Switchgear - General									
						Hi-Pot Test 15 KV	8.00 E	259.46 /E	-	-	200.00 /E	459.46 /E	3,676	839.61 /E	6,717
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	3,676	/EA	6,717
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	305,904	/SF	565,305
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	313,664	/SF	579,730
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	29.63 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	8,115	437.64 /cy	12,967
						End bulkheads, plywood, concrete envelope/encasement	60.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	853	22.48 /sf	1,349
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	8,968	/CY	14,316
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	70.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	1,768	39.85 /ecy	2,789
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	1,768	/CY	2,789
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	70.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	1,414	31.85 /lcy	2,230
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	1,414	/CY	2,230
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	59.26 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	1,715	45.66 /bcy	2,706
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	1,715	/CY	2,706
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	13,866	/LS	22,041
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	13,866	/CY	22,041
						26.40.HYDTURB 13.8kV 15MW Hyd Turbine Pw Feeders 4-[4" 3#4/0 #4/0G] 800A	**600.00 LF**	380.93 /LF	7.83 /LF	154.39 /LF	2.67 /LF	545.88 /LF	327,529	1,002.95 /LF	601,771
		26.41.HYDTURB				Hyd Turbine Controls Circuits									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	3.00 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	7,760	4,808.40 /ton	14,425
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	7,760	/LF	14,425
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	7,760	/LS	14,425
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	40.00 lf	29.65 /lf	-	22.50 /lf	-	52.15 /lf	2,086	96.93 /lf	3,877
						Rigid galvanized steel plastic coated conduit elbows, 2" diameter, to 15' high	8.00 ea	129.73 /ea	-	42.00 /ea	-	171.73 /ea	1,374	316.86 /ea	2,535
						Rigid galvanized steel plastic coated conduit couplings, 2" diameter, to 15' high	8.00 ea	19.58 /ea	-	14.35 /ea	-	33.93 /ea	271	63.05 /ea	504
						Flexible metallic conduit, sealtite, 2" diameter	12.00 lf	34.60 /lf	-	4.30 /lf	-	38.90 /lf	467	71.39 /lf	857
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 2" diameter	4.00 ea	51.89 /ea	-	25.50 /ea	-	77.39 /ea	310	143.27 /ea	573
						Flexible metallic conduit, coupling sealtite to rigid, 2" diameter	4.00 ea	103.79 /ea	-	31.50 /ea	-	135.29 /ea	541	249.50 /ea	998
						Electrical Contractor startup assistance per hour	40.00 hr	1,297.31 /hr	25.00 /hr	100.00 /hr	-	1,422.31 /hr	56,892	2,606.35 /hr	104,254
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	61,941	/SF	113,596
					26.10.03.00	UG Conduit									
						PVC conduit, schedule 40, 2" diameter, to 15' H, incl terminations, fittings, & support	1,160.00 lf	11.53 /lf	-	3.36 /lf	-	14.89 /lf	17,274	27.46 /lf	31,849
						PVC conduit elbows, 2" diameter, to 15' H	8.00 ea	51.32 /ea	-	3.54 /ea	-	54.86 /ea	439	100.51 /ea	804
						PVC conduit, field bends, 45 Deg. to 90 Deg., 2" diameter	8.00 ea	51.89 /ea	-	-	-	51.89 /ea	415	94.83 /ea	759
						PVC adapters, 2" diameter, to 15' H	8.00 ea	38.44 /ea	-	1.39 /ea	-	39.83 /ea	319	72.88 /ea	583
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	18,447	/LF	33,995
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	120.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	10,744	164.32 /clf	19,718
						Cable, copper braided shield, PVC jacket, 300 V, #18 stranded, 2 conductor	48.00 clf	148.26 /clf	-	30.00 /clf	-	178.26 /clf	8,557	327.93 /clf	15,741
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	19,301	/LF	35,459
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	99,689	/SF	183,052
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	107,449	/SF	197,477
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	29.63 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	8,115	437.64 /cy	12,967
						End bulkheads, plywood, concrete envelope/encasement	60.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	853	22.48 /sf	1,349
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	8,968	/CY	14,316
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	70.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	1,768	39.85 /ecy	2,789
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	1,768	/CY	2,789
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	70.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	1,414	31.85 /lcy	2,230
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	1,414	/CY	2,230
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	59.26 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	1,715	45.66 /bcy	2,706
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	1,715	/CY	2,706

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	13,866	/LS	22,041
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	13,866	/CY	22,041
						28.41.HYDTURB Hyd Turbine Controls Circuits	800.00 LF	164.55 /LF	7.83 /LF	29.81 /LF	/LF	202.19 /LF	161,314	365.56 /LF	219,518
		26.90.LPS				Facility Lightning Protection System									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.15.10.00	Process Electrical, Lightning Protection									
						Air terminal and base, copper, 3/8" dia x 10", to 75' h	10.00 ea	129.73 /ea	-	26.00 /ea	-	155.73 /ea	1,557	286.47 /ea	2,865
						Lightning protection cable, copper, 220 lb per thousand feet, to 75' h	400.00 lf	3.24 /lf	-	3.18 /lf	-	6.42 /lf	2,569	11.97 /lf	4,787
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	4,127	/SF	7,652
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	4,127	/SF	7,652
				26.90		Facility Electrical									
					26.15.10.00	Process Electrical, Lightning Protection									
						LPS design and certification, misc mat and labor	1.00 LS	2,075.69 /LS	-	1,000.00 /LS	1,500.00 /LS	4,575.69 /LS	4,576	8,434.05 /LS	8,434
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	4,576	/SF	8,434
						26.90 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	4,576	/SF	8,434
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	8,702	/SF	16,086
						26.90.LPS Facility Lightning Protection System	3,250.00 SF	1.44 /SF	/SF	0.78 /SF	0.46 /SF	2.68 /SF	8,702	4.95 /SF	16,086
		27.30.COMCDT				Comm Conduit to Admin									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.90 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,328	4,808.40 /ton	4,328
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	2,328	/LF	4,328
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	1,200.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	20,032	30.77 /lf	36,929
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	20,032	/EA	36,929
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	22,360	/LS	41,257
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	13.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	10,194	1,463.40 /clf	19,024
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	10,194	/LF	19,024
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	10,194	/SF	19,024
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	32,554	/SF	60,281
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	40.00 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	10,955	437.64 /cy	17,506
						End bulkheads, plywood, concrete envelope/encasement	75.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	1,066	22.48 /sf	1,686
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	12,022	/CY	19,192
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	180.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	4,547	39.85 /ecy	7,173
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	4,547	/CY	7,173
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	180.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	3,635	31.85 /lcy	5,733
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	3,635	/CY	5,733
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	177.78 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	5,146	45.66 /bcy	8,117
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	5,146	/CY	8,117
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	25,350	/LS	40,215
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	25,350	/CY	40,215
						27.30.COMCDT Comm Conduit to Admin	1,200.00 LF	29.15 /LF	8.36 /LF	11.74 /LF	/LF	48.25 /LF	57,904	83.75 /LF	100,496
		28.20.AC				Access Control System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Card reader - all in allowance per each (incl circuit, cards, CX)	2.00 ea	1,556.77 /ea	-	800.00 /ea	-	2,356.77 /ea	4,714	3,775.53 /ea	7,551
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,714	/SF	7,551
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,714	/SF	7,551
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,714	/SF	7,551
						28.20.AC Access Control System	2.00 DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	4,714	3,775.53 /DOOR	7,551
		28.20.CCTV				Closed Circuit TV and Cameras									
			26.0			Electrical Work									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Camera allowance (licenses, circuit, startup, CX)	1.00 LS	1,037.85 /LS	-	1,000.00 /LS	1,000.00 /LS	3,037.85 /LS	3,038	5,623.81 /LS	5,624
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	3,038	/SF	5,624
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	3,038	/SF	5,624
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	3,038	/SF	5,624
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Closed circuit television system (CCTV), industrial quality, for additional camera stations, add	2.00 ea	384.39 /ea	-	690.00 /ea	-	1,074.39 /ea	2,149	1,744.75 /ea	3,490
						Closed circuit television system (CCTV), industrial quality, for weatherproof camera station, add	2.00 ea	798.35 /ea	-	540.00 /ea	-	1,338.35 /ea	2,677	2,150.23 /ea	4,300
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,825	/SF	7,790
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,825	/SF	7,790
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,825	/SF	7,790
						28.20.CCTV Closed Circuit TV and Cameras	2.00 CAM	1,701.66 /CAM	/CAM	1,730.00 /CAM	500.00 /CAM	3,931.66 /CAM	7,863	6,706.59 /CAM	13,414
		28.20.ID				Intrusion Detection System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Securitized door, all-in allowance per each (incl circuit, devices, CX)	2.00 ea	2,594.62 /ea	-	1,000.00 /ea	-	3,594.62 /ea	7,189	5,742.60 /ea	11,485
						Door controller (all-in cost including vendor program and startup)	1.00 ea	648.65 /ea	-	2,000.00 /ea	500.00 /ea	3,148.65 /ea	3,149	5,111.61 /ea	5,112
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	10,338	/SF	16,597
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	10,338	/SF	16,597
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	10,338	/SF	16,597
						28.20.ID Intrusion Detection System	2.00 DOOR	2,918.94 /DOOR	/DOOR	2,000.00 /DOOR	250.00 /DOOR	5,168.94 /DOOR	10,338	8,298.41 /DOOR	16,597
		40.50.404				TRR PGP Turbine Building, Process Piping									
			40.0			Process Pipe									
				40.11		Process Pipe, Carbon Steel									
					40.10.02.60	Process Pipe, Carbon Steel, 60"									
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	230.00 LF	121.97 /LF	62.10 /LF	420.00 /LF	-	604.07 /LF	138,935	983.29 /LF	226,158

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					40.10.02.60	Process Pipe, Carbon Steel, 60"									
						Dismantling Joints	2.00 ea	2,187.72 /ea	1,560.00 /ea	37,000.00 /ea	-	40,747.72 /ea	81,495	66,957.27 /ea	133,915
						Turbine Shutoff Valves	2.00 ea	2,187.72 /ea	1,560.00 /ea	45,000.00 /ea	-	48,747.72 /ea	97,495	80,156.35 /ea	160,313
						Miscellaneous Items Allowance	1.00 ls				65,000.00 /ls	65,000.00 /ls	65,000	102,529.91 /ls	102,530
						40.10.02.60 Process Pipe, Carbon Steel, 60"	230.00 LF	160.02 /LF	89.23 /LF	1,133.04 /LF	282.61 /LF	1,664.90 /LF	382,926	2,708.32 /LF	622,915
						40.11 Process Pipe, Carbon Steel	230.00 LF	160.02 /LF	89.23 /LF	1,133.04 /LF	282.61 /LF	1,664.90 /LF	382,926	2,708.32 /LF	622,915
						40.0 Process Pipe	230.00 LF	160.02 /LF	89.23 /LF	1,133.04 /LF	282.61 /LF	1,664.90 /LF	382,926	2,708.32 /LF	622,915
						40.00.404 TRR PGP Turbine Building, Process Piping	230.00 LF	160.02 /LF	89.23 /LF	1,133.04 /LF	282.61 /LF	1,664.90 /LF	382,926	2,708.32 /LF	622,915
						04.02 Terminal Regulating Reservoir Turbine Buildings	**2.00 EA**	836,881.45 /EA	48,073.15 /EA	901,136.85 /EA	157,500.00 /EA	1,943,591.44 /EA	[illegible]	3,292,549.50 /EA	6,585,099
	04.03					TRR Reservoir Energy Dissipation Valve Structures									
		03.00.410				TRR PGP Energy Dissipation Structures Foundation Slab									
			03.0			Concrete Work									
				03.12		Cast-In-Place Concrete, Slabs on Grade									
					03.10.05.36	Cast-In-Place Concrete, Slabs on Grade, 36" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,848.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	16,328	14.01 /sfca	25,885
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	56.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	143,973	4,142.36 /ton	231,972
						Reinforcing in place, unloading & sorting, add to above - slabs	56.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	3,119	87.87 /ton	4,921
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	762.00 cy	-	-	131.00 /cy	-	131.00 /cy	99,822	216.13 /cy	164,695
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	740.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	21,461	45.75 /CY	33,852
						Cfnsh,flrs,for spcl rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl pcn,strkn	6,656.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	6,234	1.48 /sf	9,834
						Curing, sprayed membrane curing compound	66.56 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,534	37.26 /csf	2,480
						Fine grading, fine grade for slab on grade, machine	739.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,386	2.96 /sy	2,186
						03.10.05.36 Cast-In-Place Concrete, Slabs on Grade, 36" thick	740.00 CY	160.90 /CY	6.96 /CY	229.25 /CY	/CY	397.11 /CY	293,857	643.01 /CY	475,825
						03.12 Cast-In-Place Concrete, Slabs on Grade	740.00 CY	160.90 /CY	6.96 /CY	229.25 /CY	/CY	397.11 /CY	293,857	643.01 /CY	475,825
						03.0 Concrete Work	740.00 CY	160.90 /CY	6.96 /CY	229.25 /CY	/CY	397.11 /CY	293,857	643.01 /CY	475,825
						03.00.410 TRR PGP Energy Dissipation Structures Foundation Slab	740.00 CY	160.90 /CY	6.96 /CY	229.25 /CY	/CY	397.11 /CY	293,857	643.01 /CY	475,825
		03.00.412				TRR PGP Energy Dissipation Structures Concrete Walls									
			03.0			Concrete Work									
				03.30		Cast-In-Place Concrete, Straight Walls									
					03.10.06.36	Cast-In-Place Concrete, Straight Walls, 36" thick									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	12,800.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	188,641	23.64 /sfca	302,616
						Form oil, coverage varies greatly, maximum, includes material only	34.25 gal	-	-	23.50 /gal	-	23.50 /gal	805	38.77 /gal	1,328
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	53.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	137,546	4,142.36 /ton	221,617
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	53.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,980	87.87 /ton	4,701
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	53.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	3,239	95.51 /ton	5,110
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	734.00 cy	-	-	131.00 /cy	-	131.00 /cy	96,154	216.13 /cy	158,643
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	712.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	31,833	70.52 /CY	50,213
						Finishing: break ties & patch voids (walls, cols or beams)	12,800.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	12,915	1.59 /sf	20,399
						03.10.06.36 Cast-In-Place Concrete, Straight Walls, 36" thick	712.00 CY	331.46 /CY	9.57 /CY	324.80 /CY	/CY	665.83 /CY	474,113	1,073.91 /CY	764,657
					03.10.06.30	Cast-In-Place Concrete, Straight Walls, 7.6" thick									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	840.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	12,380	23.64 /sfca	19,859
						Form oil, coverage varies greatly, maximum, includes material only	2.25 gal	-	-	23.50 /gal	-	23.50 /gal	53	38.78 /gal	87
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	8.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	22,496	4,142.36 /ton	36,246
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	8.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	487	87.87 /ton	769
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	8.75 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	530	95.51 /ton	836
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	120.00 cy	-	-	131.00 /cy	-	131.00 /cy	15,720	216.13 /cy	25,936
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	117.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	5,231	70.52 /CY	8,251
						Finishing: break ties & patch voids (walls, cols or beams)	840.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	848	1.59 /sf	1,339
						03.10.06.30 Cast-In-Place Concrete, Straight Walls, 7.6" thick	117.00 CY	220.08 /CY	9.57 /CY	263.90 /CY	/CY	493.54 /CY	57,744	797.63 /CY	93,323
						03.30 Cast-In-Place Concrete, Straight Walls	829.00 CY	315.74 /CY	9.57 /CY	316.26 /CY	/CY	641.56 /CY	531,857	1,034.92 /CY	857,950
						03.0 Concrete Work	829.00 CY	315.74 /CY	9.57 /CY	316.26 /CY	/CY	641.56 /CY	531,857	1,034.92 /CY	857,950
						03.00.412 TRR PGP Energy Dissipation Structures Concrete Walls	829.00 CY	315.74 /CY	9.57 /CY	316.26 /CY	/CY	641.56 /CY	531,857	1,034.92 /CY	857,950
		03.00.414				TRR PGP Energy Dissipation Structures Elevated Deck									
			03.0			Concrete Work									
				03.24		Cast-In-Place Concrete, Elevated Slabs									
					03.10.10.36	Cast-In-Place Concrete, Elevated Decks, 36" thick									
						Slab shoring	46,000.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	31,497	1.08 /cf	49,850
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	2,000.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	17,753	14.10 /sf	28,196
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	280.00 lf	5.41 /lf	-	0.22 /lf	-	5.63 /lf	1,577	8.90 /lf	2,492
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	16.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	43,063	4,142.36 /ton	69,385
						Reinforcing in place, unloading & sorting, add to above - decks	16.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	933	87.87 /ton	1,472
						Reinforcing steel, crane cost for handling, maximum, add	16.75 ton	140.59 /ton	18.56 /ton	-	-	159.16 /ton	2,666	251.05 /ton	4,205
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	230.00 cy	-	-	131.00 /cy	-	131.00 /cy	30,130	216.13 /cy	49,711
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	223.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	6,647	47.02 /CY	10,485
						Finishing elev slab, bull float, manual float & manual steel trowel	2,000.00 sf	1.23 /sf	-	-	-	1.23 /sf	2,468	1.95 /sf	3,893
						Curing, sprayed membrane curing compound, elevated decks	20.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	461	37.26 /csf	745
						03.10.10.36 Cast-In-Place Concrete, Elevated Decks, 36" thick	223.00 CY	358.78 /CY	7.58 /CY	248.88 /CY	/CY	615.23 /CY	137,195	988.49 /CY	220,433
						03.24 Cast-In-Place Concrete, Elevated Slabs	223.00 CY	358.78 /CY	7.58 /CY	248.88 /CY	/CY	615.23 /CY	137,195	988.49 /CY	220,433
						03.0 Concrete Work	223.00 CY	358.76 /CY	7.58 /CY	248.88 /CY	/CY	615.23 /CY	137,195	988.49 /CY	220,433
						03.00.414 TRR PGP Energy Dissipation Structures Elevated Deck	223.00 CY	358.76 /CY	7.58 /CY	248.88 /CY	/CY	615.23 /CY	137,195	988.49 /CY	220,433
		40.00.402				TRR PGP Energy Dissipation Structures Piping									
			40.0			Process Pipe									
				40.11		Process Pipe, Carbon Steel									
					40.10.02.60	Process Pipe, Carbon Steel, 60"									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					40.10.02.60	Process Pipe, Carbon Steel, 60"									
						Fittings, steel, butt weld, 60' Dia	4.00 ea	3,261.57 /ea	97.68 /ea	9,500.00 /ea	-	12,879.25 /ea	51,517	21,004.26 /ea	84,017
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	120.00 LF	121.97 /LF	62.10 /LF	420.00 /LF	-	604.07 /LF	72,488	983.29 /LF	117,995
						Energy Dissipating Valves W/ Hood	2.00 ea	2,187.72 /ea	1,560.00 /ea	25,000.00 /ea	-	28,747.72 /ea	57,495	47,158.67 /ea	94,317
						40.10.02.60 Process Pipe, Carbon Steel, 60"	120.00 LF	267.82 /LF	91.35 /LF	1,153.33 /LF	/LF	1,512.50 /LF	181,500	2,469.41 /LF	296,330
						40.11 Process Pipe, Carbon Steel	120.00 LF	267.82 /LF	91.35 /LF	1,153.33 /LF	/LF	1,512.50 /LF	181,500	2,469.41 /LF	296,330
						40.0 Process Pipe	120.00 LF	267.82 /LF	91.35 /LF	1,153.33 /LF	/LF	1,512.50 /LF	181,500	2,469.41 /LF	296,330
						40.00.402 TRR PGP Energy Dissipation Structures Piping	120.00 LF	267.82 /LF	91.35 /LF	1,153.33 /LF	/LF	1,512.50 /LF	181,500	2,469.41 /LF	296,330
						04.00 TRR Reservoir Energy Dissipation Valve Structures	**2.00** EA	[illegible] /EA	[illegible] /EA	[illegible] /EA	/EA	572,204.70 /EA	1,144,409	925,268.66 /EA	1,850,537
	04.03					TRR Reservoir Electrical Building									
		04.00.402				TRR PGP Electrical Building, Masonry									
			04.0			Masonry									
				04.21		Concrete Unit Masonry - Exterior									
					04.00.02.08	Masonry Concrete Masonry Units, 8"									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	12.00 opng	41.31 /opng	2.12 /opng	13.40 /opng	-	56.83 /opng	682	101.99 /opng	1,224
						Grout, door frames, 6' x 7' opening, 3.5 C.F. per opening	4.00 opng	55.08 /opng	2.83 /opng	18.75 /opng	-	76.66 /opng	307	137.62 /opng	550
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	3,649.99 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	46,704	23.13 /cf	84,427
						Reinforcing, steel bars A615, placed horizontal, average #4 bar	4,963.98 lb	1.40 /lb	-	0.40 /lb	-	1.80 /lb	8,921	3.22 /lb	16,000
						Masonry reinforcing bars, #3 and #4 reinforcing steel bars, placed vertically, ASTM A615	3,649.99 lb	1.80 /lb	-	0.56 /lb	-	2.36 /lb	8,600	4.23 /lb	15,433
						Masonry reinforcing bars, truss type steel joint reinforcing, mill standard galvanized, 12" wide	109.48 clf	31.43 /clf	-	29.50 /clf	-	60.93 /clf	6,671	110.44 /clf	12,091
						Concrt block,high strngt,hollow,3500 psi,8"8"16",includs mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and verticl rnfrcng	14,600.00 SF	8.50 /SF	-	4.07 /SF	-	12.57 /SF	183,576	22.64 /SF	330,592
						Channel framing, structural steel, field fabricated, C6x8.2, incl cutting & welding	180.00 lf	40.69 /lf	1.97 /lf	6.85 /lf	-	49.51 /lf	8,911	88.49 /lf	15,928
						Silicone water repellants, sprayed on CMU, 2 coat	29,199.88 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	29,060	1.83 /sf	53,324
						Reglet, zinc and copper alloy, 20 ounce	682.00 lf	3.26 /lf	-	2.87 /lf	-	6.13 /lf	4,183	11.11 /lf	7,576
						Reglet, counter flashing for zinc and copper alloy, 20 ounce, 12" wide	682.00 lf	5.27 /lf	-	5.25 /lf	-	10.52 /lf	7,177	19.08 /lf	13,016
						04.00.02.08 Masonry Concrete Masonry Units, 8"	14,600.00 SF	12.79 /SF	0.12 /SF	7.97 /SF	/SF	20.88 /SF	304,790	37.68 /SF	550,160
						04.21 Concrete Unit Masonry - Exterior	14,600.00 SF	12.79 /SF	0.12 /SF	7.97 /SF	/SF	20.88 /SF	304,790	37.68 /SF	550,160
						04.0 Masonry	14,600.00 SF	12.79 /SF	0.12 /SF	7.97 /SF	/SF	20.88 /SF	304,790	37.68 /SF	550,160
						04.00.402 TRR PGP Electrical Building, Masonry	14,600.00 SF	12.79 /SF	0.12 /SF	7.97 /SF	/SF	20.88 /SF	304,790	37.68 /SF	550,160
		05.00.404				TRR PGP Electrical Building, Metal Roof Framing									
			05.0			Metals									
				05.50		Metal Fabrications									
					05.00.99.00	Metals, Other									
						Open web bar joist, K Series, 40-ton job lots, 28K8, 12.7 plf, 30' to 50' spans, shop fabricated, incl shop primer, horizontal bridging	2,450.00 lf	7.55 /lf	1.41 /lf	12.45 /lf	-	21.41 /lf	52,445	38.95 /lf	95,427
						Metal roof decking, steel, open type B wide rib, galvanized, over 500 Sq, 1-1/2" D, 20 gauge	14,384.00 SF	1.26 /SF	0.04 /SF	2.15 /SF	-	3.45 /SF	49,607	6.29 /SF	90,412
						05.00.99.00 Metals, Other	14,384.00 SF	2.55 /SF	0.28 /SF	4.27 /SF	/SF	7.10 /SF	102,052	12.92 /SF	185,839
						05.50 Metal Fabrications	14,384.00 SF	2.55 /SF	0.28 /SF	4.27 /SF	/SF	7.10 /SF	102,052	12.92 /SF	185,839
						05.0 Metals	14,384.00 SF	2.55 /SF	0.28 /SF	4.27 /SF	/SF	7.10 /SF	102,052	12.92 /SF	185,839
						05.00.404 TRR PGP Electrical Building, Metal Roof Framing	14,384.00 SF	2.55 /SF	0.28 /SF	4.27 /SF	/SF	7.10 /SF	102,052	12.92 /SF	185,839
		07.00.400				TRR PGP Electrical Building, Roofing									
			07.0			Thermal and Moisture Protection									
				07.50		Thermal & Moisture Protection									
					07.50.02.00	Thermal & Moisture Protection, Membrane Roofing									
						Roof Deck Insulation, foamglass, tapered for drainage	14,384.00 sf	1.03 /sf	-	1.16 /sf	-	2.19 /sf	31,441	3.97 /sf	57,093
						Elastomeric Roofing, vinyl and neoprene membrane traffic deck	14,384.00 SF	2.74 /SF	0.37 /SF	1.77 /SF	-	4.88 /SF	70,161	8.80 /SF	126,549
						Flashing, galvanized steel, .018", 26 ga.	676.00 sf	5.46 /sf	-	0.65 /sf	-	6.11 /sf	4,127	10.90 /sf	7,367
						Reglet, stainless steel, .020" thick	676.00 lf	3.26 /lf	-	4.21 /lf	-	7.47 /lf	5,051	13.59 /lf	9,185
						Reglet, counter flashing for stainless steel, .020" thick, 12 wide	676.00 lf	5.27 /lf	-	6.80 /lf	-	12.07 /lf	8,162	21.95 /lf	14,840
						Roof Hatches, with curb, 1" fiberglass insulation, aluminum curb & cover, 2'-6" x 3'-0"	3.00 ea	258.90 /ea	-	900.00 /ea	-	1,158.90 /ea	3,477	2,125.05 /ea	6,375
						07.50.02.00 Thermal & Moisture Protection, Membrane Roofing	14,384.00 SF	4.48 /SF	0.37 /SF	3.67 /SF	/SF	8.51 /SF	122,419	15.39 /SF	221,409
						07.50 Thermal & Moisture Protection	14,384.00 SF	4.48 /SF	0.37 /SF	3.67 /SF	/SF	8.51 /SF	122,419	15.39 /SF	221,409
						07.0 Thermal and Moisture Protection	14,384.00 SF	4.48 /SF	0.37 /SF	3.67 /SF	/SF	8.51 /SF	122,419	15.39 /SF	221,409
						07.00.400 TRR PGP Electrical Building, Roofing	14,384.00 SF	4.48 /SF	0.37 /SF	3.67 /SF	/SF	8.51 /SF	122,419	15.39 /SF	221,409
		08.00.402				TRR PGP Electrical Building, Openings									
			08.0			Openings									
				08.10		Doors and Frames									
					08.10.01.00	Openings, Doors, Frames and Hardware									
						Steel frms, knock down, 14 ga., to 8-3/4" throat, to 3'-0" x 7'-0", single	12.00 EA	137.64 /EA	-	430.00 /EA	-	567.64 /EA	6,812	1,040.09 /EA	12,481
						Steel frames, knock down, 14 ga., to 8-3/4" throat, to 6070, pair	4.00 EA	183.52 /EA	-	455.00 /EA	-	638.52 /EA	2,554	1,167.89 /EA	4,672
						Doors, commercial, steel, insulated, full panel, 18 ga., 3'-0" x 7'-0" x 1-3/4" thick	20.00 ea	97.88 /ea	-	520.00 /ea	-	617.88 /ea	12,358	1,135.91 /ea	22,718
						Add for baked enamel finish, average cost per leaf	20.00 leaf	12.94 /leaf	-	50.40 /leaf	-	63.34 /leaf	1,267	116.23 /leaf	2,325
						Average Door Hardware	20.00 ea	91.76 /ea	15.00 /ea	500.00 /ea		606.76 /ea	12,135	1,114.70 /ea	22,294
						08.10.01.00 Openings, Doors, Frames and Hardware	16.00 EA	402.33 /EA	18.75 /EA	1,774.25 /EA	/EA	2,195.33 /EA	35,125	4,030.58 /EA	64,489
						08.10 Doors and Frames	16.00 EA	402.33 /EA	18.75 /EA	1,774.25 /EA	/EA	2,195.33 /EA	35,125	4,030.58 /EA	64,489
				08.30		Specialty Doors and Frames - Overhead Door									
					08.30.01.20	Specialty Doors and Frames, Coiling Doors									
						Doors, rolling service, steel, manual, 20 gauge, 12' x 10' high, incl. hardware	4.00 EA	1,186.73 /EA	-	1,250.00 /EA	-	2,436.73 /EA	9,747	4,421.63 /EA	17,687
						Doors, rolling service, steel, manual, for weatherstripping, extruded rubber, jambs, add	80.00 lf	-	-	19.15 /lf	-	19.15 /lf	1,532	35.43 /lf	2,834
						Doors, rolling service, steel, manual, for weatherstripping, hood, extruded rubber, add	48.00 lf	-	-	8.65 /lf	-	8.65 /lf	415	16.00 /lf	768
						Doors, rolling service, steel, manual, motor operators for, to 14' x 14' opening	4.00 ea	284.82 /ea	-	1,200.00 /ea	-	1,484.82 /ea	5,939	2,726.09 /ea	10,904
						08.30.01.20 Specialty Doors and Frames, Coiling Doors	4.00 EA	1,471.55 /EA	/EA	2,936.80 /EA	/EA	4,408.35 /EA	17,633	8,048.24 /EA	32,193
						08.30 Specialty Doors and Frames - Overhead Door	4.00 EA	1,471.55 /EA	/EA	2,936.80 /EA	/EA	4,408.35 /EA	17,633	8,048.24 /EA	32,193
						08.0 Openings	20.00 EA	616.18 /EA	15.00 /EA	2,006.76 /EA	/EA	2,637.94 /EA	52,759	4,834.12 /EA	96,682
						08.00.402 TRR PGP Electrical Building, Openings	20.00 EA	616.18 /EA	15.00 /EA	2,006.76 /EA	/EA	2,637.94 /EA	52,759	4,834.12 /EA	96,682
		21.00.400				TRR PGP Electrical Building, Fire Suppression									
			21.0			Fire Suppression									
				21.00		Fire Suppression									
					21.00.10.10	Fire-Suppression Systems									
						Fire Suppression System Allowance	14,384.00 SF				15.00 /SF	15.00 /SF	215,760	26.66 /SF	383,488
						21.00.10.10 Fire-Suppression Systems	14,384.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	215,760	26.66 /SF	383,488
						21.00 Fire Suppression	14,384.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	215,760	26.66 /SF	383,488
						21.0 Fire Suppression	14,384.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	215,760	26.66 /SF	383,488
						21.00.400 TRR PGP Electrical Building, Fire Suppression	14,384.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	215,760	26.66 /SF	383,488
		23.00.402				TRR PGP Electrical Building, HVAC									
			23.0			HVAC									
				23.00		HVAC									
					23.50.02.00	Mechanical, HVAC									

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DETAIL REPORT

Jacobs

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					23.00.02.00	Mechanical, HVAC									
						HVAC Allowance	14,384.00 SF				35.00 /SF	35.00 /SF	503,440	62.21 /SF	894,806
						23.00.02.00 Mechanical, HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.21 /SF	894,806
						23.00 HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.21 /SF	894,806
						23.0 HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.21 /SF	894,806
						23.00.492 TRR PGP Electrical Building, HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.21 /SF	894,806
		26.02.PRI				Primary Feeds fromSubstation									
			26.0			Electrical Work									
				26.00		Electrical									
					01.01.06.03	GC Equip, Tools, & Consumables									
						Roadway steel plates, 8' x 20' x 1"thick, avg cost per sf, monthly	1,600.00 sf	-	1.00 /sf	-	-	1.00 /sf	1,600	1.83 /sf	2,924
						01.01.06.03 GC Equip, Tools, & Consumables	0.00	/LS	/LS	/LS	/LS	/LS	1,600	/LS	2,924
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	1,600	/SF	2,924
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	45.42 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	117,487	4,808.40 /ton	218,398
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	117,487	/LF	218,398
					26.10.03.00	UG Conduit									
						Electrical Underground Ducts and Manholes, PVC, conduit with coupling, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	17,440.00 lf	6.49 /lf	-	3.16 /lf	-	9.65 /lf	168,236	17.86 /lf	311,426
						Electrical Underground Ducts and Manholes, PVC, elbows, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	128.00 ea	115.32 /ea	-	23.00 /ea	-	138.32 /ea	17,704	254.42 /ea	32,566
						Electrical Underground Ducts and Manholes, PVC, bell end and cap, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	256.00 ea	74.13 /ea	-	9.90 /ea	-	84.03 /ea	21,512	154.28 /ea	39,495
						Electrical Underground Ducts and Manholes, PVC, base spacer, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	3,488.00 ea	25.31 /ea	-	1.78 /ea	-	27.09 /ea	94,501	49.64 /ea	173,141
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	301,954	/LF	556,628
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrc undrgr ducts and manhls,man holes,precast w/iron racks&pulling irons,ci frame and cover,6'10'7',excluds excavtn,backfil and cast place concrete	12.00 ea	3,167.96 /ea	324.85 /ea	3,775.00 /ea	-	7,267.81 /ea	87,214	13,554.76 /ea	162,657
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	87,214	/EA	162,657
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	506,654	/LS	937,683
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Cable terminations, indoor, insulation diameter range, 15 kV, .975" to 1.570", pad mount	144.00 ea	172.97 /ea	-	163.00 /ea	-	335.97 /ea	48,380	625.77 /ea	90,111
						Medium-cable single cable, copper, XLP shielding, ungrounded neutral, 15 kV, 500 kcmil, in conduit, excl splicing & terminations	400.00 clf	864.87 /clf	-	1,050.00 /clf	-	1,914.87 /clf	765,948	3,575.33 /clf	1,430,131
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	814,329	/LF	1,520,243
					26.15.11.00	Process Electrical, Grounding									
						Grounding rod, copper clad, 8' long, 3/4" diameter	12.00 ea	195.82 /ea	-	36.00 /ea	-	231.82 /ea	2,782	426.24 /ea	5,115
						Ground wire, copper wire, bare stranded, 4/0	23.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	18,036	1,463.40 /clf	33,658
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	20,817	/LF	38,773
					26.25.03.00	Electrical Equipment, Switchgear - General									
						Hi-Pot Test 15 KV	24.00 E	242.87 /E	-	-	200.00 /E	442.87 /E	10,629	809.29 /E	19,423
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	10,629	/EA	19,423
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	845,775	/SF	1,578,439
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	1,354,029	/SF	2,519,045
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	363.33 cy	194.63 /cy	0.35 /cy	77.50 /cy	-	272.48 /cy	98,999	435.42 /cy	158,202
						End bulkheads, plywood, concrete envelope/encasement	320.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	4,550	22.48 /sf	7,194
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	103,550	/CY	165,396
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	1,253.50 ecy	1.94 /ecy	11.66 /ecy	-	-	13.60 /ecy	17,051	21.46 /ecy	26,895
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	17,051	/CY	26,895
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 1/4 mile round trip, 5.0 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	1,670.95 lcy	4.46 /lcy	1.86 /lcy	-	-	6.33 /lcy	10,572	9.98 /lcy	16,675
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	10,572	/CY	16,675
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	1,453.33 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	42,067	45.66 /bcy	66,356
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	42,067	/CY	66,356
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	173,239	/LS	275,322
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	173,239	/CY	275,322
						26.02.PRI Primary Feeds fromSubstation	**2,180.00** LF	376.38 /LF	26.06 /LF	395.94 /LF	2.20 /LF	700.58 /LF	1,527,268	1,281.52 /LF	2,794,367
		26.03.MVSWGR				MV SWGR									
			26.0			Electrical Work									
				26.20		Facility Electrical									
					26.00.99.00	Electrical, Other									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	80.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	16,378	377.75 /hr	30,220
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	16,378	/SF	30,220
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	16,378	/SF	30,220
				26.25		Facility Electrical									
					26.25.03.00	Electrical Equipment, Switchgear - General									
						MV SWGR-A	16,000.00 ea	3.24 /ea	0.63 /ea	50.00 /ea	-	53.87 /ea	861,892	102.06 /ea	1,633,008
						MV SWGR-B	14,800.00 ea	3.24 /ea	0.63 /ea	50.00 /ea	-	53.87 /ea	797,250	102.06 /ea	1,510,532
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	1,659,143	/EA	3,143,540
						26.25 Facility Electrical	0.00	/LS	/LS	/LS	/LS	/LS	1,659,143	/LS	3,143,540
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	1,675,521	/SF	3,173,759
						26.03.MVSWGR MV SWGR	**30,800.00** EA	3.58 /EA	0.69 /EA	50.13 /EA	/EA	54.40 /EA	1,675,521	103.04 /EA	3,173,759
		26.03.SWGREQ				Station Aux Xfmr, Btry									
			26.0			Electrical Work									
				26.20		Facility Electrical									
					26.00.99.00	Electrical, Other									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	24.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	4,914	377.75 /hr	9,066
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	4,914	/SF	9,066
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	4,914	/SF	9,066
				26.25		Facility Electrical									
					26.25.01.00	Station Equipment									
						Control batteries	100.00 kah	498.29 /kah	52.02 /kah	540.00 /kah	-	1,090.30 /kah	109,030	2,031.55 /kah	203,155
						Conversion equipment, station service transformers	1.00 ea	1,245.71 /ea	130.04 /ea	105,000.00 /ea	-	106,375.75 /ea	106,376	202,001.77 /ea	202,002

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DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.25.01.00 Station Equipment	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*215,406*	*/LS*	*405,156*
						26.20 Facility Electrical	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*215,406*	*/LS*	*405,156*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*220,319*	*/SF*	*414,222*
						26.03.SWGREQ Station Aux Xfmr, Bldg	***1.00** LS*	*54,127.72 /LS*	*5,931.53 /LS*	*160,260.00 /LS*	*/LS*	*220,319.25 /LS*	*220,319*	*414,222.22 /LS*	*414,222*
		26.04.MVBUS				*Medium Voltage Overhead Bus Duct 2000A*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.39.00	*Electrical, Other*									
						Threaded rod, steel, painted, 1/2" diameter	768.00 lf	7.41 /lf	-	6.75 /lf	-	14.16 /lf	10,877	26.37 /lf	20,253
						Nuts, galvanized steel, 1/2" diameter	16.00 c	-	-	46.50 /c	-	46.50 /c	744	88.35 /c	1,414
						Channels, steel, 1-1/2" x 1-1/2"	896.00 lf	14.83 /lf	-	3.68 /lf	-	18.51 /lf	16,582	34.09 /lf	30,540
						Spring nuts, steel channel, long, 1/2"	1,024.00 ea	12.97 /ea	-	0.83 /ea	-	13.80 /ea	14,134	25.28 /ea	25,890
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*42,337*	*/SF*	*78,097*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Cable terminations, indoor, insulation diameter range, 5 kV, .525" to 1.025", pad mount	26.00 ea	129.73 /ea	-	87.50 /ea	-	217.23 /ea	5,648	403.31 /ea	10,486
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*5,648*	*/LF*	*10,486*
					26.15.04.00	*Process Electrical, Bus Duct*									
						Bus duct, copper, 3 pole 3 wire, 2000 amp	540.00 lf	172.97 /lf	-	1,000.00 /lf	-	1,172.97 /lf	633,406	2,215.97 /lf	1,196,626
						Bus duct, copper, 3 pole 3 wire, elbow, 2000 amp V	11.00 ea	1,037.85 /ea	-	5,000.00 /ea	-	6,037.85 /ea	66,416	11,395.96 /ea	125,356
						Bus duct, copper, 3 pole 3 wire, elbow, 2000 amp H	4.00 ea	1,037.85 /ea	-	5,000.00 /ea	-	6,037.85 /ea	24,151	11,395.96 /ea	45,584
						Bus duct, copper, 3 pole 3 wire, tee fittings, 2000 amp V	5.00 ea	2,075.69 /ea	-	7,500.00 /ea	-	9,575.69 /ea	47,878	18,042.21 /ea	90,211
						Bus duct, copper, 3 pole 3 wire, tee fittings, 2000 amp H	4.00 ea	2,075.69 /ea	-	7,500.00 /ea	-	9,575.69 /ea	38,303	18,042.21 /ea	72,169
						Bus duct, copper, 3 pole 3 wire, expansion fitting, 2000 amp	4.00 ea	798.34 /ea	-	7,500.00 /ea	-	8,298.34 /ea	33,193	15,708.00 /ea	62,832
						Bus duct fittings, flange, wall, with vapor barrier, 2000 amp	4.00 ea	518.92 /ea	-	850.00 /ea	-	1,368.92 /ea	5,476	2,563.17 /ea	10,253
						Bus duct fittings, switchboard stub, 3 pole, 3 wire, 2000 amp	17.00 ea	864.87 /ea	-	5,000.00 /ea	-	5,864.87 /ea	99,703	11,079.87 /ea	188,358
						Bus duct fittings, bellows, 3 pole, 3 wire, 2000 amp	21.00 ea	864.87 /ea	-	2,500.00 /ea	-	3,364.87 /ea	70,662	6,330.16 /ea	132,933
						Bus duct fittings, hanger, spring type, 2000 amp	128.00 ea	172.97 /ea	-	150.00 /ea	-	322.97 /ea	41,341	601.07 /ea	76,937
						26.15.04.00 Process Electrical, Bus Duct	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*1,060,530*	*/LF*	*2,001,258*
					26.25.03.00	*Electrical Equipment, Switchgear - General*									
						Hi-Pot Test 15 KV	13.00 E	259.46 /E	-	-	200.00 /E	459.46 /E	5,973	839.61 /E	10,915
						26.25.03.00 Electrical Equipment, Switchgear - General	*0.00*	*/EA*	*/EA*	*/EA*	*/EA*	*/EA*	*5,973*	*/EA*	*10,915*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*1,114,488*	*/SF*	*2,100,756*
				26.20		*Facility Electrical*									
					26.00.39.00	*Electrical, Other*									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	40.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	8,189	377.75 /hr	15,110
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*8,189*	*/SF*	*15,110*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*8,189*	*/SF*	*15,110*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*1,122,677*	*/SF*	*2,115,866*
						26.04.MVBUS Medium Voltage Overhead Bus Duct 2000A	***540.00** LF*	*429.67 /LF*	*1.85 /LF*	*1,642.50 /LF*	*4.82 /LF*	*2,079.03 /LF*	*1,122,677*	*3,919.27 /LF*	*2,115,866*
		26.04.MVVSD				*Medium Voltage Variable Speed Drives*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.39.00	*Electrical, Other*									
						Electrical Contractor startup assistance per hour	26.00 hr	1,297.31 /hr	25.00 /hr	100.00 /hr	-	1,422.31 /hr	36,980	2,606.35 /hr	67,765
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*36,980*	*/SF*	*67,765*
					26.25.03.00	*Electrical Equipment, Switchgear - General*									
						MV VSP 8000A 13.8kV, includes allowance for Vendor startup, CX, train, doc	13.00 ea	10,378.45 /ea	3,200.00 /ea	420,000.00 /ea	5,000.00 /ea	438,578.45 /ea	5,701,520	831,901.00 /ea	10,814,713
						26.25.03.00 Electrical Equipment, Switchgear - General	*0.00*	*/EA*	*/EA*	*/EA*	*/EA*	*/EA*	*5,701,520*	*/EA*	*10,814,713*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*5,738,500*	*/SF*	*10,882,478*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*5,738,500*	*/SF*	*10,882,478*
						26.04.MVVSD Medium Voltage Variable Speed Drives	***13.00** EA*	*12,973.07 /EA*	*3,250.00 /EA*	*420,200.00 /EA*	*5,000.00 /EA*	*441,423.07 /EA*	*5,738,500*	*837,113.70 /EA*	*10,882,478*
		26.05.GRDG				*Facility Grounding*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.15.11.00	*Process Electrical, Grounding*									
						Copper Bus Bar .25"x 3.0"	20.00 lf	32.43 /lf	-	52.90 /lf	-	85.33 /lf	1,707	159.77 /lf	3,195
						Copper Bus Bar Supports	20.00 E	129.73 /E	-	48.30 /E	-	178.03 /E	3,561	328.83 /E	6,577
						Ground wire, copper wire, bare stranded, 4/0	35.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	27,445	1,463.40 /clf	51,219
						Exothermic weld, 4/0 wire to 4/0 wire	234.00 ea	148.26 /ea	-	9.45 /ea	-	157.71 /ea	36,905	288.89 /ea	67,600
						26.15.11.00 Process Electrical, Grounding	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*69,618*	*/LF*	*128,591*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*69,618*	*/SF*	*128,591*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*69,618*	*/SF*	*128,591*
						26.05.GRDG Facility Grounding	***14,550.00** SF*	*3.48 /SF*	*/SF*	*1.30 /SF*	*/SF*	*4.79 /SF*	*69,618*	*8.84 /SF*	*128,591*
		26.20.DIST				*Electrical Distribution Equipment*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.39.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 1-1/2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	40.00 lf	11.53 /lf	-	3.46 /lf	-	14.99 /lf	600	27.65 /lf	1,106
						Flexible metallic conduit, steel, 1-1/2" diameter	3.00 lf	20.76 /lf	-	2.55 /lf	-	23.31 /lf	70	42.78 /lf	128
						Flexible metallic conduit, steel, 2" diameter	3.00 lf	25.95 /lf	-	3.23 /lf	-	29.18 /lf	88	53.55 /lf	161
						Flexible metallic conduit, steel, connectors, insulated, 1-1/2" diameter	1.00 ea	32.43 /ea	-	24.50 /ea	-	56.93 /ea	57	105.80 /ea	106
						Flexible metallic conduit, steel, connectors, insulated, 2" diameter	1.00 ea	45.12 /ea	-	26.00 /ea	-	71.12 /ea	71	131.85 /ea	132
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 1-1/2" diameter	1.00 ea	45.12 /ea	-	46.00 /ea	-	91.12 /ea	91	169.85 /ea	170
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 2" diameter	1.00 ea	57.66 /ea	-	67.00 /ea	-	124.66 /ea	125	232.66 /ea	233
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 100 amp, 30 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,594.61 /ea	-	2,125.00 /ea	-	4,719.61 /ea	4,720	8,778.58 /ea	8,779
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	4,125.00 /ea	-	7,831.59 /ea	7,832	14,610.42 /ea	14,610
						Panelboards, 3 phase 4 wire, main circuit breaker, 277/480 V, 225 amp, 42 circuits, NEHB, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	5,175.00 /ea	-	8,881.59 /ea	8,882	16,605.23 /ea	16,605
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*22,534*	*/SF*	*42,039*
					26.10.03.00	*UG Conduit*									
						Uninterruptible power supply, charger, inverter, and alarm 1 phase, 120 V, 5 kVA, incl 10 minutes battery	1.00 ea	6,182.64 /ea	356.18 /ea	7,100.00 /ea	-	13,638.82 /ea	13,639	25,438.11 /ea	25,438
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*13,639*	*/LF*	*25,438*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #6, type XHHW, in raceway	0.25 clf	159.68 /clf	-	54.50 /clf	-	214.20 /clf	54	395.36 /clf	99
						Wire, copper, stranded, 600 volt, #4, type XHHW, in raceway	0.15 clf	195.80 /clf	-	77.50 /clf	-	273.30 /clf	41	505.27 /clf	76
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	1.00 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	418	776.20 /clf	776
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	0.60 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	514	1,593.52 /clf	956
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*1,027*	*/LF*	*1,907*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*37,209*	*/SF*	*69,374*
				26.20		*Facility Electrical*									
					26.25.06.00	*Transformers, Dry Type*									

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DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2
Project Number: D3380602
Design Stage: Feasibilty

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.25.06.00	Transformers, Dry Type									
						Transformer, dry-type, ventilated, 3 phase 480 V primary 120/208 V secondary, 30 kVA	1.00 ea	2,306.32 /ea	-	1,800.00 /ea	-	4,106.32 /ea	4,106	7,634.31 /ea	7,634
						26.25.06.00 Transformers, Dry Type	0.00	/EA	/EA	/EA	/EA	/EA	4,106	/EA	7,634
						26.25 Facility Electrical	0.00	/LS	/LS	/LS	/LS	/LS	4,106	/LS	7,634
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	41,306	/SF	77,009
						26.20.DIST Electrical Distribution Equipment	**550.00** AMP	36.18 /AMP	0.65 /AMP	38.28 /AMP	/AMP	75.10 /AMP	41,306	140.02 /AMP	77,009
		26.25.LTG				Interior Lighting and Control									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	2,600.00 lf	12.97 /lf	-	5.15 /lf	-	18.12 /lf	47,120	33.49 /lf	87,077
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	150.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	8,289	101.23 /ea	15,184
						Outlet boxes, pressed steel, covers, blank, 4" square	150.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	2,548	31.10 /ea	4,664
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	57,957	/SF	106,926
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	80.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	8,644	198.44 /clf	15,875
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	10.00 clf	103.79 /clf	-	20.50 /clf	-	124.29 /clf	1,243	228.60 /clf	2,286
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	9,887	/LF	18,161
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	67,844	/SF	125,087
				26.20		Facility Electrical									
					26.20.03.00	Facility Electrical, Lighting									
						LED Strip Light, hdwe	150.00 ea	182.08 /ea	-	110.00 /ea	-	292.08 /ea	43,812	541.71 /ea	81,257
						Emergency ballast, material only, interior, factory installed in fixture	30.00 ea	-	-	152.00 /ea	-	152.00 /ea	4,560	288.78 /ea	8,663
						Exit lighting, L.E.D. standard, single face, ceiling or wall mount	12.00 ea	129.73 /ea	-	70.00 /ea	-	199.73 /ea	2,397	370.06 /ea	4,441
						Fixture whips, 3/8" greenfield, 2 connectors, THHN wire, three #14, 6' long	150.00 ea	32.43 /ea	-	5.45 /ea	-	37.88 /ea	5,682	69.62 /ea	10,443
						26.20.03.00 Facility Electrical, Lighting	0.00	/SF	/SF	/SF	/SF	/SF	56,451	/SF	104,804
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	56,451	/SF	104,804
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	124,295	/SF	229,892
						26.25.LTG Interior Lighting and Control	**1.00** LS	56,265.47 /LS	/LS	68,029.50 /LS	/LS	124,294.97 /LS	124,295	229,891.73 /LS	229,892
		26.26.EXTLTG				Exterior Lighting and Control									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	350.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	3,169	16.62 /lf	5,818
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	12.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	663	101.23 /ea	1,215
						Outlet boxes, pressed steel, covers, blank, 4" square	12.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	204	31.10 /ea	373
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	4,036	/SF	7,408
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	12.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	1,297	198.44 /clf	2,381
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	1,297	/LF	2,381
					26.15.07.00	Lighting									
						LED Area Light	12.00 E	97.30 /E	-		-	97.30 /E	1,168	177.80 /E	2,134
						Wallpack Photocell	12.00 E	32.43 /E	-		-	32.43 /E	389	59.27 /E	711
						26.15.07.00 Lighting	0.00	/LS	/LS	/LS	/LS	/LS	1,557	/LS	2,845
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	6,889	/SF	12,632
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	6,889	/SF	12,632
						26.26.EXTLTG Exterior Lighting and Control	**1.00** LS	6,303.47 /LS	/LS	585.58 /LS	/LS	6,889.05 /LS	6,889	12,631.59 /LS	12,632
		26.30.DEV				Device Outlets									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	3,000.00 lf	12.97 /lf	-	5.15 /lf	-	18.12 /lf	54,369	33.49 /lf	100,474
						Outlet boxes, cast, 1 gang, FD, 3/4" hub, 2-11/16" deep	36.00 ea	86.49 /ea	-	22.00 /ea	-	108.49 /ea	3,906	199.84 /ea	7,194
						Duplex receptacle, grounded, 120 volt, 20 amp	24.00 ea	38.44 /ea	-	10.65 /ea	-	49.09 /ea	1,178	90.48 /ea	2,171
						Duplex receptacle, ground fault interrupting, 20 amp	12.00 ea	38.44 /ea	-	45.00 /ea	-	83.44 /ea	1,001	155.74 /ea	1,869
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	60,454	/SF	111,708
					26.10.03.00	UG Conduit									
						WP cover	12.00 ea	17.30 /ea	-	42.50 /ea	-	59.80 /ea	718	112.35 /ea	1,348
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	718	/LF	1,348
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	80.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	8,644	198.44 /clf	15,875
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	20.00 clf	103.79 /clf	-	20.50 /clf	-	124.29 /clf	2,486	228.60 /clf	4,572
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	11,130	/LF	20,447
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	72,301	/SF	133,504
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	72,301	/SF	133,504
						26.30.DEV Device Outlets	**1.00** LS	53,247.76 /LS	/LS	19,053.60 /LS	/LS	72,301.38 /LS	72,301	133,503.72 /LS	133,504
		26.40.EQCON				Facility Equipment Connections and Controls									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.00.99.00	Electrical, Other									
						Motor connections, flexible conduit and fittings, 3 phase, 460 volt, 5 HP motor	4.00 ea	129.73 /ea	-	6.35 /ea	-	136.08 /ea	544	249.13 /ea	997
						Motor connections, flexible conduit and fittings, 3 phase, 460 volt, 10 HP motor	2.00 ea	129.73 /ea	-	6.35 /ea	-	136.08 /ea	272	249.13 /ea	498
						Motor connections, flexible conduit and fittings, 3 phase, sealtite, 460 volt, 10 HP motor	2.00 ea	129.73 /ea	-	9.30 /ea	-	139.03 /ea	278	254.73 /ea	509
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	1,095	/SF	2,004
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	1,095	/LS	2,004
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	300.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	2,716	16.62 /lf	4,987
						Electric metallic tubing (EMT), 1" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	9.03 /lf	-	1.80 /lf	-	10.83 /lf	2,165	19.91 /lf	3,982
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	4,881	/SF	8,969
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	4.50 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	486	198.44 /clf	893
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	9.00 clf	103.78 /clf	-	20.50 /clf	-	124.28 /clf	1,119	228.60 /clf	2,057
						Wire, copper, stranded, 600 volt, #8, type XHHW, in raceway	13.00 clf	129.73 /clf	-	34.00 /clf	-	163.73 /clf	2,129	301.66 /clf	3,922
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	3,733	/LF	6,872
					26.20.05.00	Facility Electrical, HVAC									
						HVAC controls - electrical contractor scope	1.00 LS		-	3,500.00 /LS	-	3,500.00 /LS	3,500	6,649.58 /LS	6,650
						26.20.05.00 Facility Electrical, HVAC	0.00	/SF	/SF	/SF	/SF	/SF	3,500	/SF	6,650

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Jacobs

Project type:	Project Name: Sites Reservoir Project Task Order 1 TRR PGP Rev 2	Estimator: Cavalleri/Wells - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibilty	Estimate Class: 4

DETAIL REPORT

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	12,174	/SF	22,490
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	13,209	/SF	24,495
						26.40.EQCON Facility Equipment Connections and Controls	1.00 ALO	8,282.85 /ALO	/ALO	4,925.85 /ALO	/ALO	13,208.50 /ALO	13,209	24,494.65 /ALO	24,495
		26.40.PMP				13.8kV 8000HP Pump Power Feeders 4", 3/C VFD Cable 300A									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	130.00 lf	64.87 /lf	-	62.50 /lf	-	127.37 /lf	16,557	237.28 /lf	30,846
						Rigid galvanized steel plastic coated conduit elbows, 4" diameter, to 15' high	13.00 ea	389.19 /ea	-	196.00 /ea	-	585.19 /ea	7,608	1,083.58 /ea	14,087
						Rigid galvanized steel plastic coated conduit couplings, 4" diameter, to 15' high	13.00 ea	28.83 /ea	-	57.50 /ea	-	86.33 /ea	1,122	161.92 /ea	2,105
						Flexible metallic conduit, sealtite, 4" diameter	39.00 lf	86.40 /lf	-	20.00 /lf	-	106.40 /lf	4,150	195.88 /lf	7,640
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 4" diameter	13.00 ea	129.73 /ea	-	163.00 /ea	-	292.73 /ea	3,806	546.75 /ea	7,108
						Flexible metallic conduit, coupling sealtite to rigid, 4" diameter	13.00 ea	129.73 /ea	-	198.00 /ea	-	327.73 /ea	4,261	613.25 /ea	7,972
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	37,503	/SF	69,757
					26.10.03.00	UG Conduit									
						PVC conduit, schedule 40, 4" diameter, to 15' H, incl terminations, fittings, & support	650.00 lf	32.43 /lf	-	5.75 /lf	-	38.18 /lf	24,819	70.19 /lf	45,624
						PVC conduit elbows, 4" diameter, to 15' H	13.00 ea	116.76 /ea	-	23.00 /ea	-	139.76 /ea	1,817	257.06 /ea	3,342
						PVC conduit, field bends, 45 Deg. to 90 Deg., 4" diameter	13.00 ea	129.73 /ea	-	-	-	129.73 /ea	1,687	237.07 /ea	3,082
						PVC adapters, 4" diameter, to 15' H	26.00 ea	64.87 /ea	-	4.80 /ea	-	69.67 /ea	1,811	127.65 /ea	3,319
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	30,133	/LF	55,367
					26.15.01.00	Process Electrical, Wire/Cable									
						Cable terminations, indoor, insulation diameter range, 15 kV, .525" to 1.025", pad mount	78.00 ea	324.33 /ea	-	109.00 /ea	-	433.33 /ea	33,799	799.76 /ea	62,381
						MV VFD Cable 3/C	9.75 clf	3,373.00 /clf	-	6,000.00 /clf	-	9,373.00 /clf	91,387	17,563.06 /clf	171,240
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	125,186	/LF	233,621
					26.25.03.00	Electrical Equipment, Switchgear - General									
						Hi-Pot Test 15 KV	13.00 E	259.46 /E	-	-	200.00 /E	459.46 /E	5,973	839.61 /E	10,915
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	5,973	/EA	10,915
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	198,795	/SF	369,660
				26.20		Facility Electrical									
					26.00.99.00	Electrical, Other									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	40.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	8,189	377.75 /hr	15,110
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	8,189	/SF	15,110
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	8,189	/SF	15,110
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	206,985	/SF	384,770
						26.40.PMP 13.8kV 8000HP Pump Power Feeders 4", 3/C VFD Cable 300A	780.00 LF	145.22 /LF	1.26 /LF	115.46 /LF	3.33 /LF	265.37 /LF	206,985	493.29 /LF	384,770
		26.41.PMP				8000HP Pump Process Control Circuits and Connections									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	130.00 lf	29.65 /lf	-	22.50 /lf	-	52.15 /lf	6,780	96.93 /lf	12,601
						Rigid galvanized steel plastic coated conduit elbows, 2" diameter, to 15' high	13.00 ea	129.73 /ea	-	42.00 /ea	-	171.73 /ea	2,233	316.86 /ea	4,119
						Rigid galvanized steel plastic coated conduit couplings, 2" diameter, to 15' high	13.00 ea	19.58 /ea	-	14.35 /ea	-	33.93 /ea	441	63.05 /ea	820
						Flexible metallic conduit, sealtite, 2" diameter	39.00 lf	34.60 /lf	-	4.30 /lf	-	38.90 /lf	1,517	71.39 /lf	2,784
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 2" diameter	13.00 ea	51.89 /ea	-	25.50 /ea	-	77.39 /ea	1,006	143.27 /ea	1,863
						Flexible metallic conduit, coupling sealtite to rigid, 2" diameter	13.00 ea	103.79 /ea	-	31.50 /ea	-	135.29 /ea	1,759	249.50 /ea	3,244
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	13,735	/SF	25,430
					26.10.03.00	UG Conduit									
						PVC conduit, schedule 40, 2" diameter, to 15' H, incl terminations, fittings, & support	650.00 lf	11.53 /lf	-	3.36 /lf	-	14.89 /lf	9,680	27.46 /lf	17,847
						PVC conduit elbows, 2" diameter, to 15' H	13.00 ea	51.32 /ea	-	3.54 /ea	-	54.86 /ea	713	100.51 /ea	1,307
						PVC conduit, field bends, 45 Deg. to 90 Deg., 2" diameter	13.00 ea	51.89 /ea	-	-	-	51.89 /ea	675	94.83 /ea	1,233
						PVC adapters, 2" diameter, to 15' H	26.00 ea	38.44 /ea	-	1.39 /ea	-	39.83 /ea	1,036	72.88 /ea	1,895
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	12,103	/LF	22,281
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	80.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	7,163	164.32 /clf	13,145
						Cable, copper braided shield, PVC jacket, 300 V, #18 stranded, 2 conductor	60.00 clf	148.26 /clf	-	30.00 /clf	-	178.26 /clf	10,696	327.93 /clf	19,676
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	17,859	/LF	32,821
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	43,697	/SF	80,533
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	43,697	/SF	80,533
						26.41.PMP 8000HP Pump Process Control Circuits and Connections	780.00 LF	43.96 /LF	/LF	12.06 /LF	/LF	56.02 /LF	43,697	103.25 /LF	80,533
		26.90.LPS				Facility Lightning Protection System									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.15.10.00	Process Electrical, Lightning Protection									
						Air terminal and base, copper, 3/8" dia x 10", to 75' h	50.00 ea	129.73 /ea	-	26.00 /ea	-	155.73 /ea	7,787	286.46 /ea	14,323
						Lightning protection cable, copper, 220 lb per thousand feet, to 75' h	1,650.00 lf	3.24 /lf	-	3.18 /lf	-	6.42 /lf	10,598	11.97 /lf	19,748
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	18,385	/SF	34,071
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	18,385	/SF	34,071
				26.20		Facility Electrical									
					26.00.99.00	Electrical, Other									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	16.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	3,276	377.75 /hr	6,044
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	3,276	/SF	6,044
					26.15.10.00	Process Electrical, Lightning Protection									
						LPS design and certification, misc mat and labor	1.00 LS	4,540.57 /LS	-	5,000.00 /LS	5,000.00 /LS	14,540.57 /LS	14,541	26,933.70 /LS	26,934
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	14,541	/SF	26,934
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	17,816	/SF	32,978
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	36,201	/SF	67,049
						26.90.LPS Facility Lightning Protection System	14,550.00 SF	1.27 /SF	0.03 /SF	0.95 /SF	0.34 /SF	2.49 /SF	36,201	4.61 /SF	67,049
		27.10.COMEQ				Communications Room Equipment									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	1,811	16.62 /lf	3,324
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	4.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	221	101.24 /ea	405
						Outlet boxes, pressed steel, covers, blank, 4" square	4.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	68	31.09 /ea	124
						Duplex receptacle, grounded, 120 volt, 20 amp	4.00 ea	38.44 /ea	-	10.65 /ea	-	49.09 /ea	196	90.48 /ea	362
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	2,296	/SF	4,216
					26.15.01.00	Process Electrical, Wire/Cable									
						Closet Distribution Frame (CDF), 7 feet tall, 19 inches wide	1.00 E	364.31 /E	-	123.00 /E	-	487.31 /E	487	899.42 /E	899
						Network Equipment Allowance	1.00 LS	24,287.06 /LS	-	20,000.00 /LS	-	44,287.06 /LS	44,287	82,379.46 /LS	82,379
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	6.50 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	702	198.44 /clf	1,290

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	45,477	/LF	84,569
					26.15.03.00	Process Electrical, Cable Tray									
						Cable tray, ladder type, galvanized steel, 4" deep, 4" rung spacing, 12" wide, to 15' elevation, incl fittings & supports	30.00 lf	24.14 /lf	-	17.95 /lf	-	42.09 /lf	1,263	78.21 /lf	2,346
						26.15.03.00 Process Electrical, Cable Tray	0.00	/LF	/LF	/LF	/LF	/LF	1,263	/LF	2,346
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	49,035	/SF	91,131
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	49,035	/SF	91,131
						27.10.COMEQ Communications Room Equipment	**1.00** LS	28,011.60 /LS	/LS	21,023.71 /LS	/LS	49,035.31 /LS	49,035	91,130.54 /LS	91,131
		27.31.COMCDT				Comm Conduit to MH/HH									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.90 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,328	4,808.39 /ton	4,328
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	2,328	/LF	4,328
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	800.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	13,354	30.77 /lf	24,619
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	13,354	/EA	24,619
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	15,682	/LS	28,947
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	130.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	11,639	164.32 /clf	21,361
						Cable, copper braided shield, PVC jacket, 300 V, #18 stranded, 2 conductor	130.00 clf	148.26 /clf	-	30.00 /clf	-	178.26 /clf	23,174	327.93 /clf	42,631
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	34,814	/LF	63,992
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	1.55 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	1,212	1,463.40 /clf	2,261
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	1.50 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	241	295.97 /ea	444
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	1,453	/LF	2,705
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	36,267	/SF	66,687
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	51,949	/SF	95,644
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	8.90 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	2,438	437.64 /cy	3,896
						End bulkheads, plywood, concrete envelope/encasement	1.07 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	15	22.47 /sf	24
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	2,454	/CY	3,920
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	116.05 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	2,932	39.85 /ecy	4,624
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	2,932	/CY	4,624
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	9.87 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	199	31.85 /lcy	314
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	199	/CY	314
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	125.92 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	3,645	45.66 /bcy	5,749
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	3,645	/CY	5,749
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	9,228	/LS	14,608
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	9,228	/CY	14,608
						27.31.COMCDT Comm Conduit to MH/HH	**200.00** LF	224.65 /LF	26.56 /LF	52.98 /LF	/LF	305.89 /LF	61,178	551.26 /LF	110,252
		28.10.FA				Fire Alarm System									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	1,820.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	16,477	16.62 /lf	30,251
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	60.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	3,316	101.23 /ea	6,074
						Outlet boxes, pressed steel, covers, blank, 4" square	8.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	136	31.09 /ea	249
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	52.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	930	32.79 /ea	1,705
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	20,858	/SF	38,279
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	300.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	26,860	164.32 /clf	49,295
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	26,860	/LF	49,295
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	47,719	/SF	87,574
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	47,719	/SF	87,574
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Detection Systems, fire alarm control panel, alarm device, excluding wires & conduits	24.00 ea	129.73 /ea	-	230.00 /ea	-	359.73 /ea	8,634	584.11 /ea	14,019
						Detection Systems, fire alarm control panel, actuating device, excluding wires & conduits	4.00 ea	129.73 /ea	-	340.00 /ea	-	469.73 /ea	1,879	765.60 /ea	3,062
						Detection Systems, fire alarm control panel, addressable without voice, up to 200 points, excluding wires & conduits, inluding vendor design, startup	1.00 ea	1,816.00 /ea	-	4,575.00 /ea	2,500.00 /ea	8,891.00 /ea	8,891	14,356.18 /ea	14,356
						Detection Systems, fire alarm control panel, battery & rack, excluding wires & conduits	1.00 ea	259.46 /ea	-	460.00 /ea	-	719.46 /ea	719	1,168.22 /ea	1,168
						Detection Systems, fire alarm control panel, battery & rack, automatic charger, excluding wires & conduits	1.00 ea	129.73 /ea	-	525.00 /ea	-	654.73 /ea	655	1,070.84 /ea	1,071
						Detection Systems, visual alarm, ADA type, excluding wires & conduits	24.00 ea	154.90 /ea	-	119.00 /ea	-	273.90 /ea	6,574	440.68 /ea	10,576
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	27,351	/SF	44,252
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	27,351	/SF	44,252
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	27,351	/SF	44,252
						28.10.FA Fire Alarm System	**14,550.00** SF	3.58 /SF	/SF	1.41 /SF	0.17 /SF	5.16 /SF	75,070	9.06 /SF	131,826
		28.20.AC				Access Control System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Card reader - all in allowance per each (incl circuit, cards, CX)	7.00 ea	1,556.77 /ea	-	800.00 /ea	-	2,356.77 /ea	16,497	3,775.53 /ea	26,429
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	16,497	/SF	26,429
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	16,497	/SF	26,429
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	16,497	/SF	26,429
						28.20.AC Access Control System	**12.00** DOOR	908.12 /DOOR	/DOOR	466.67 /DOOR	/DOOR	1,374.78 /DOOR	16,497	2,202.39 /DOOR	26,429
		28.20.CCTV				Closed Circuit TV and Cameras									
			26.0			Electrical Work									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					28.35.01.00	*Electronic Safety and Security*									
						Camera allowance (licenses, circuit, startup, CX)	1.00 LS	25,946.13 /LS	-	10,000.00 /LS	10,000.00 /LS	45,946.13 /LS	45,946	84,686.20 /LS	84,686
						28.35.01.00 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*45,946*	/SF	*84,686*
						28.00 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*45,946*	/SF	*84,686*
						26.0 Electrical Work	*0.00*	/SF	/SF	/SF	/SF	/SF	*45,946*	/SF	*84,686*
			28.0			*Electronic Safety and Security*									
				28.00		*Electronic Safety and Security*									
					28.35.01.00	*Electronic Safety and Security*									
						Closed circuit television system (CCTV), industrial quality, for additional camera stations, add	12.00 ea	384.39 /ea	-	690.00 /ea	-	1,074.39 /ea	12,893	1,744.75 /ea	20,937
						Closed circuit television system (CCTV), industrial quality, for weatherproof camera station, add	12.00 ea	798.34 /ea	-	540.00 /ea	-	1,338.34 /ea	16,060	2,150.23 /ea	25,803
						28.35.01.00 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*28,953*	/SF	*46,740*
						28.00 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*28,953*	/SF	*46,740*
						28.0 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*28,953*	/SF	*46,740*
						28.20.CCTV Closed Circuit TV and Cameras	***12.00*** *CAM*	*3,344.91 /CAM*	*/CAM*	*2,063.33 /CAM*	*833.33 /CAM*	*6,241.57 /CAM*	*74,899*	*10,952.16 /CAM*	*131,426*
		28.20.ID				*Intrusion Detection System*									
			28.0			*Electronic Safety and Security*									
				28.00		*Electronic Safety and Security*									
					28.35.01.00	*Electronic Safety and Security*									
						Securitized door, all-in allowance per each (incl circuit, devices, CX)	7.00 ea	2,594.61 /ea	-	1,000.00 /ea	-	3,594.61 /ea	25,162	5,742.58 /ea	40,198
						Door controller (all-in cost including vendor program and startup)	3.00 ea	648.65 /ea	-	2,000.00 /ea	500.00 /ea	3,148.65 /ea	9,446	5,111.63 /ea	15,335
						28.35.01.00 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*34,608*	/SF	*55,533*
						28.00 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*34,608*	/SF	*55,533*
						28.0 Electronic Safety and Security	*0.00*	/SF	/SF	/SF	/SF	/SF	*34,608*	/SF	*55,533*
						28.20.ID Intrusion Detection System	***16.00*** *DOOR*	*1,256.77 /DOOR*	*/DOOR*	*812.50 /DOOR*	*93.75 /DOOR*	*2,163.02 /DOOR*	*34,608*	*3,470.81 /DOOR*	*55,533*
						04.04 TRR Reservoir Electrical Building	***14,384.00*** *SF*	*158.91 /SF*	*19.15 /SF*	*645.11 /SF*	*56.54 /SF*	*869.81 /SF*	*12,511,294*	*1,626.66 /SF*	*23,398,146*
	04.05					TRR Reservoir Site Electrical									
		26.20.DB				*Site Ductbanks*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						In addition to those itemized, lump sum allowance	1.00 ls	-	-	-	50,000.00 /ls	50,000.00 /ls	50,000	91,369.20 /ls	91,369
						26.00.99.00 Electrical, Other	*0.00*	/SF	/SF	/SF	/SF	/SF	*50,000*	/SF	*91,369*
						26.00 Electrical	*0.00*	/SF	/SF	/SF	/SF	/SF	*50,000*	/SF	*91,369*
						26.0 Electrical Work	*0.00*	/SF	/SF	/SF	/SF	/SF	*50,000*	/SF	*91,369*
						26.20.DB Site Ductbanks	***1.00*** *LS*	/LS	/LS	/LS	*50,000.00 /LS*	*50,000.00 /LS*	*50,000*	*91,369.20 /LS*	*91,369*
		26.26.EXTLTG				*Exterior Lighting and Control*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Site lighting, pole, base, circuit, controls, per each (qty assumed)	25.00 ea	-	-	-	5,000.00 /ea	5,000.00 /ea	125,000	9,136.92 /ea	228,423
						26.00.99.00 Electrical, Other	*0.00*	/SF	/SF	/SF	/SF	/SF	*125,000*	/SF	*228,423*
						26.00 Electrical	*0.00*	/SF	/SF	/SF	/SF	/SF	*125,000*	/SF	*228,423*
						26.0 Electrical Work	*0.00*	/SF	/SF	/SF	/SF	/SF	*125,000*	/SF	*228,423*
						26.26.EXTLTG Exterior Lighting and Control	***1.00*** *LS*	/LS	/LS	/LS	*125,000.00 /LS*	*125,000.00 /LS*	*125,000*	*228,422.91 /LS*	*228,423*
		28.20.AC				*Access Control System*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Gate Operator, with card reader, power and control circuit, per each	2.00 ea	-	-	-	10,000.00 /ea	10,000.00 /ea	20,000	18,273.83 /ea	36,548
						26.00.99.00 Electrical, Other	*0.00*	/SF	/SF	/SF	/SF	/SF	*20,000*	/SF	*36,548*
						26.00 Electrical	*0.00*	/SF	/SF	/SF	/SF	/SF	*20,000*	/SF	*36,548*
						26.0 Electrical Work	*0.00*	/SF	/SF	/SF	/SF	/SF	*20,000*	/SF	*36,548*
						28.20.AC Access Control System	***2.00*** *DOOR*	/DOOR	/DOOR	/DOOR	*10,000.00 /DOOR*	*10,000.00 /DOOR*	*20,000*	*18,273.83 /DOOR*	*36,548*
		28.20.CCTV				*Closed Circuit TV and Cameras*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Cameras, installed on site ltg poles, assumed qty, per each	10.00 ea	-	-	-	7,500.00 /ea	7,500.00 /ea	75,000	13,705.38 /ea	137,054
						26.00.99.00 Electrical, Other	*0.00*	/SF	/SF	/SF	/SF	/SF	*75,000*	/SF	*137,054*
						26.00 Electrical	*0.00*	/SF	/SF	/SF	/SF	/SF	*75,000*	/SF	*137,054*
						26.0 Electrical Work	*0.00*	/SF	/SF	/SF	/SF	/SF	*75,000*	/SF	*137,054*
						28.20.CCTV Closed Circuit TV and Cameras	***10.00*** *CAM*	/CAM	/CAM	/CAM	*7,500.00 /CAM*	*7,500.00 /CAM*	*75,000*	*13,705.38 /CAM*	*137,054*
						04.05 TRR Reservoir Site Electrical	***1.00*** *LS*	/LS	/LS	/LS	*270,000.00 /LS*	*270,000.00 /LS*	*270,000*	*493,393.55 /LS*	*493,394*
	04.06					Funks Reservoir PGP Sitework									
		31.00.400				*TRR PGP Earthworks*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					01.01.05.00	*General Conditions, Other*									
						Funks Reservoir, Dewatering/Erosion Controls/Dust Abatement Allowance	36.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	-	60,000.00 /MO	2,160,000	95,730.51 /MO	3,446,298
						01.01.05.00 General Conditions, Other	*36.00 MO*	*15,000.00 /MO*	*30,000.00 /MO*	*15,000.00 /MO*	*/MO*	*60,000.00 /MO*	*2,160,000*	*95,730.51 /MO*	*3,446,298*
						01.01 Construction Operations	*36.00 MO*	*15,000.00 /MO*	*30,000.00 /MO*	*15,000.00 /MO*	*/MO*	*60,000.00 /MO*	*2,160,000*	*95,730.51 /MO*	*3,446,298*
						01.0 General Requirements	*36.00 MO*	*15,000.00 /MO*	*30,000.00 /MO*	*15,000.00 /MO*	*/MO*	*60,000.00 /MO*	*2,160,000*	*95,730.51 /MO*	*3,446,298*
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.16.01.00	*Earthworks, Sheeting and Shoring*									
						Sheet Pile Wall	27,450.00 SF				45.00 /SF	45.00 /SF	1,235,250	70.98 /SF	1,948,463
						31.16.01.00 Earthworks, Sheeting and Shoring	*27,450.00 SF*	/SF	/SF	/SF	*45.00 /SF*	*45.00 /SF*	*1,235,250*	*70.98 /SF*	*1,948,463*
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	135,000.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	794,111	9.28 /CY	1,252,617
						Stockpile Excavated Spoils	135,000.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	383,019	4.49 /cy	606,615
						31.25.01.00 Earthworks, Structural, Excavation	*135,000.00 CY*	*3.89 /CY*	*4.58 /CY*	*0.25 /CY*	*/CY*	*8.72 /CY*	*1,177,130*	*13.77 /CY*	*1,859,232*
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	2,100.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	106,051	82.20 /CY	172,612
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*2,100.00 CY*	*14.75 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*50.50 /CY*	*106,051*	*82.20 /CY*	*172,612*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, Native material	86,710.00 CY	6.18 /CY	1.69 /CY		-	7.87 /CY	682,514	12.42 /CY	1,076,586
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	69,370.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	140,872	3.20 /cy	222,209
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	17,340.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	24,927	2.27 /cy	39,319
						Compaction, water for, 6000 gallon wagon, 6 mile haul	86,710.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	160,734	3.01 /cy	261,083
						31.25.03.00 Earthworks, Structural, Backfill	*86,710.00 CY*	*7.45 /CY*	*2.98 /CY*	*1.20 /CY*	*/CY*	*11.64 /CY*	*1,009,046*	*18.44 /CY*	*1,599,197*
					31.25.05.00	*Earthworks, Structural, Hauling and Disposal*									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	48,290.00 CY	7.24 /CY	8.80 /CY	-	-	16.04 /CY	774,348	25.29 /CY	1,221,444
						Load excavated spoils	48,290.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	104,112	3.40 /cy	164,225
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	*48,290.00 CY*	*8.27 /CY*	*9.92 /CY*	*/CY*	*/CY*	*18.19 /CY*	*878,461*	*28.69 /CY*	*1,385,670*

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						31.25 Earthwork, Structural	*272,100.00 CY*	*5.88 /CY*	*4.99 /CY*	*0.76 /CY*	*4.54 /CY*	*16.19 /CY*	*4,405,938*	*25.60 /CY*	*6,965,173*
						31.0 Earthwork	*272,100.00 CY*	*5.88 /CY*	*4.99 /CY*	*0.76 /CY*	*4.54 /CY*	*16.19 /CY*	*4,405,938*	*25.60 /CY*	*6,965,173*
						31.00.400 TRR PGP Earthworks	*272,100.00 CY*	*7.87 /CY*	*8.96 /CY*	*2.76 /CY*	*4.54 /CY*	*24.13 /CY*	*6,565,938*	*38.26 /CY*	*10,411,471*
		32.00.400				*TRR PGP Site Improvements*									
			32.0			*Exterior Improvements*									
				32.12		*Paving*									
					32.40.03.00	*Site Improvements, Paving, Concrete*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	2,086.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	19,372	14.72 /sfca	30,704
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	167.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	430,633	4,142.36 /ton	693,846
						Reinforcing in place, unloading & sorting, add to above - slabs	167.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	9,331	87.87 /ton	14,718
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	2,284.70 cy	-	-	131.00 /cy	-	131.00 /cy	299,296	216.13 /cy	493,803
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	2,240.48 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	64,976	45.75 /CY	102,492
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	90,284.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	84,566	1.48 /sf	133,393
						Curing, sprayed membrane curing compound	902.84 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	20,809	37.26 /csf	33,639
						Fine grading, fine grade for slab on grade, machine	10,031.56 SY	1.19 /SY	0.68 /SY	-	-	1.87 /SY	18,802	2.96 /SY	29,657
						32.40.03.00 Site Improvements, Paving, Concrete	*10,031.56 SY*	*41.02 /SY*	*2.27 /SY*	*51.19 /SY*	*/SY*	*94.48 /SY*	*947,763*	*152.74 /SY*	*1,532,251*
					32.40.04.00	*Site Improvements, Access Roads, Gravel*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	18,893.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	18,413	1.54 /SY	29,045
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	18,893.00 sy	0.94 /sy	0.92 /sy	7.30 /sy	-	9.16 /sy	173,037	14.98 /sy	282,944
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	18,893.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	18,421	1.54 /sy	29,057
						32.40.04.00 Site Improvements, Access Roads, Gravel	*18,893.00 SY*	*2.13 /SY*	*1.68 /SY*	*7.30 /SY*	*/SY*	*11.11 /SY*	*209,871*	*18.05 /SY*	*341,046*
					32.40.04.90	*Site Improvements, Access Roads, Asphalt*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	4,692.00 sy	0.62 /sy	0.35 /sy	-	-	0.98 /sy	4,573	1.54 /sy	7,213
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,12"deep	4,692.00 sy	1.34 /sy	1.31 /sy	15.00 /sy	-	17.64 /sy	82,773	28.91 /sy	135,668
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	4,692.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	4,575	1.54 /sy	7,216
						Plant-mix asphalt paving, for highways and large paved areas, binder course, 2" thick, no hauling included	4,692.00 SY	0.99 /SY	0.39 /SY	7.40 /SY	-	8.78 /SY	41,209	14.39 /SY	67,519
						Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	4,692.00 sy	1.11 /sy	0.43 /sy	8.25 /sy	-	9.79 /sy	45,930	16.04 /sy	75,256
						32.40.04.90 Site Improvements, Access Roads, Asphalt	*4,692.00 SY*	*4.62 /SY*	*2.99 /SY*	*30.65 /SY*	*/SY*	*38.16 /SY*	*179,060*	*62.42 /SY*	*292,873*
						32.12 Paving	*33,616.56 SY*	*14.08 /SY*	*2.03 /SY*	*23.66 /SY*	*/SY*	*39.76 /SY*	*1,336,715*	*64.94 /SY*	*2,166,170*
				32.31		*Fencing*									
					32.45.01.00	*Fencing, Chain Link*									
						Fence,chain link industrial,galvanized steel,3 strands barb wire,2"posts @ 10'oc,9ga wire,6'high,schedule 40,includes excavation,& concrete	1,400.00 LF	6.52 /LF	0.94 /LF	19.95 /LF	-	27.41 /LF	38,369	44.68 /LF	62,547
						Fence, chain link industrial, gate, chain link, 8' high, to 18' wide, includes excavation, in concrete	60.00 LF	95.45 /LF	28.04 /LF	176.00 /LF	-	299.49 /LF	17,970	485.17 /LF	29,110
						32.45.01.00 Fencing, Chain Link	*1,460.00 LF*	*10.17 /LF*	*2.05 /LF*	*26.36 /LF*	*/LF*	*38.59 /LF*	*56,338*	*62.78 /LF*	*91,657*
						32.31 Fencing	*1,460.00 LF*	*10.17 /LF*	*2.05 /LF*	*26.36 /LF*	*/LF*	*38.59 /LF*	*56,338*	*62.78 /LF*	*91,657*
						32.0 Exterior Improvements	***1.00*** *LS*	*488,194.34 /LS*	*71,080.21 /LS*	*833,778.18 /LS*	*/LS*	*1,393,052.73 /LS*	*1,393,053*	*2,257,827.24 /LS*	*2,257,827*
						32.00.400 TRR PGP Site Improvements	***1.00*** *LS*	*488,194.34 /LS*	*71,080.21 /LS*	*833,778.18 /LS*	*/LS*	*1,393,052.73 /LS*	*1,393,053*	*2,257,827.24 /LS*	*2,257,827*
		33.00.400				*TRR PGP Yard Piping*									
			33.2			*Pipeline Specialties*									
				33.01		*Pipeline Specialties*									
					33.10.99.01	*Buried Pipe Specials, Other*									
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	36,710.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	161,954	6.96 /cy	255,464
						Pipe bedding and zone, CLSM	20,832.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	1,567,242	123.75 /cy	2,577,864
						Backfill native material	9,350.00 cy	6.18 /cy	1.69 /cy		-	7.87 /cy	73,596	12.42 /cy	116,089
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	27,360.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	438,728	25.29 /cy	692,042
						Load excavated spoils	27,360.00 cy	0.77 /cy	0.84 /cy		-	1.62 /cy	44,241	2.55 /cy	69,785
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	9,350.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	18,987	3.20 /cy	29,950
						Compaction, water for, 6000 gallon wagon, 6 mile haul	9,350.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	17,332	3.01 /cy	28,153
						Piping, pipe, WSP, plain end, welded, 144" diameter, excludes excavation or backfill	1,850.00 LF	121.97 /LF	62.10 /LF	970.00 /LF	-	1,154.07 /LF	2,135,022	1,890.73 /LF	3,497,850
						Pipe Fittings and Connections Allowance	1.00 ls	162,500.00 /ls	162,500.00 /ls	325,000.00 /ls	-	650,000.00 /ls	650,000	1,048,861.72 /ls	1,048,862
						33.10.99.01 Buried Pipe Specials, Other	*1,850.00 LF*	*455.79 /LF*	*364.83 /LF*	*1,939.98 /LF*	*/LF*	*2,760.60 /LF*	*5,107,102*	*4,495.17 /LF*	*8,316,058*
						33.01 Pipeline Specialties	***1.00*** *LS*	*843,212.34 /LS*	*674,929.96 /LS*	*3,588,960.00 /LS*	*/LS*	*5,107,102.30 /LS*	*5,107,102*	*8,316,058.20 /LS*	*8,316,058*
						33.2 Pipeline Specialties	***1.00*** *LS*	*843,212.34 /LS*	*674,929.96 /LS*	*3,588,960.00 /LS*	*/LS*	*5,107,102.30 /LS*	*5,107,102*	*8,316,058.20 /LS*	*8,316,058*
						33.00.400 TRR PGP Yard Piping	*1,850.00 LF*	*455.79 /LF*	*364.83 /LF*	*1,939.98 /LF*	*/LF*	*2,760.60 /LF*	*5,107,102*	*4,495.17 /LF*	*8,316,058*
						04.06 Funks Reservoir PGP Sitework	***1.00*** *LS*	*3,472,840.95 /LS*	*3,184,363.15 /LS*	*5,174,649.15 /LS*	*1,235,250.00 /LS*	*13,068,093.26 /LS*	*13,068,093*	*20,985,356.31 /LS*	*20,985,357*
						04 Terminal Regulating Reservoir (TRR) PGP	***1.00 LS***	***12,458,471.16 /LS***	***3,710,900.47 /LS***	***35,722,567.19 /LS***	***3,588,850.00 /LS***	***55,480,788.82 /LS***	***55,480,789***	***93,600,928.16 /LS***	***93,600,928***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	12,458,471		134,516.944 hrs	
Material	35,722,567			
Allowance	3,588,850			
Equipment	3,710,900		36,110.123 hrs	
Other				
Subtotal Direct Costs	55,480,788	55,480,788		
Material Sales Tax, Dunnigan Ca	2,589,886			7.250 %
Subtotal W/ Sales Tax	2,589,886	58,070,674		
Masonry Work I,OH&P	76,892			20.000 %
Metals Work I,OH&P	232,914			20.000 %
Architectural (Div 6-12)I,OH&P	35,778			20.000 %
Mechanical Work I,OH&P	181,080			20.000 %
Electrical Work I,OH&P	2,969,900			25.000 %
Instruments & Controls I,OH&P				20.000 %
Subtotal W/ Subcontractor OH&P	3,496,564	61,567,238		
General Conditions	3,078,362			5.000 %
Subtotal W/ General Conditions	3,078,362	64,645,600		
Mobilization/Demobilization	1,939,368			3.000 %
Prime Contractor Overhead	6,658,497			10.000 %
Prime Contractor Profit	4,394,608			6.000 %
Bonds & Insurance	1,684,746			2.170 %
Subtotal W/ Prime Markups	14,677,219	79,322,819		
Contractor Contingency	2,379,685			3.000 %
Design Contingency	11,898,423			15.000 %
Subtotal W/ Contingency	14,278,108	93,600,927		
Total Construction Cost		**93,600,927**		
Non-Contract Costs	16,848,167			18.000 %
Total Project Costs	**16,848,167**	**110,449,094**		

Funks/TRR Pipelines

Jacobs

SUMMARY REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Funks/TRR Pipelines Rev 2	Estimator: Cavalleri/Wells Jacobs
Job Size:	Project Number: D3880600	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility Study	Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
05			***Funks/TRR Pipelines***									
	05.01		Funks TRR Connection Manifold									
		33.00.510	*Funks TRR Connection Manifold*	***475.00*** *LF*	*1,061.93 /LF*	*545.15 /LF*	*4,527.46 /LF*	*342.11 /LF*	*6,476.65 /LF*	*3,076,407*	*10,337.56 /LF*	*4,910,341*
			05.01 Funks TRR Connection Manifold	**1.00** LS	504,415.01 /LS	358,948.01 /LS	2,150,544.00 /LS	162,500.00 /LS	3,076,407.02 /LS	3,076,407	4,910,341.42 /LS	4,910,341
	05.02		Funks Pipeline									
		33.00.502	*Funks Pipeline, Open Cut, Dual Bore*	*10,590.00 LF*	*666.88 /LF*	*284.32 /LF*	*2,202.78 /LF*	*101.92 /LF*	*3,255.90 /LF*	*34,479,975*	*5,191.52 /LF*	*54,978,245*
			05.02 Funks Pipeline	10,590.00 LF	666.88 /LF	284.32 /LF	2,202.78 /LF	101.92 /LF	3,255.90 /LF	34,479,975	5,191.52 /LF	54,978,245
	05.03		Terminal Regulating Reservoir Pipeline									
		32.00.000	*TRR Access Roads*	***31,455.00*** *LF*	*13.35 /LF*	*14.13 /LF*	*69.83 /LF*	*/LF*	*97.32 /LF*	*3,061,151*	*155.46 /LF*	*4,890,106*
		33.00.500	*TRR Pipeline, Open Cut, Dual Bore*	*44,944.00 LF*	*704.78 /LF*	*298.45 /LF*	*2,479.49 /LF*	*201.89 /LF*	*3,684.61 /LF*	*165,600,945*	*5,874.13 /LF*	*264,006,919*
		33.00.504	*Funks Pipeline, Trenchless Pipe Installation, Dual Bore at TC Canal*	*702.00 LF*	*1,995.71 /LF*	*271.70 /LF*	*3,485.21 /LF*	*1,062.68 /LF*	*6,815.30 /LF*	*4,784,338*	*10,785.36 /LF*	*7,571,326*
		33.00.506	*Funks Pipeline, Trenchless Pipe Installation, Dual Bore at GCID Canal*	*642.00 LF*	*1,999.48 /LF*	*273.59 /LF*	*3,497.05 /LF*	*1,161.99 /LF*	*6,932.11 /LF*	*4,450,417*	*10,966.76 /LF*	*7,040,657*
		33.00.508	*Funks Pipeline, Enviornmental Water Pipeline*	*2,500.00 LF*	*142.39 /LF*	*39.10 /LF*	*289.15 /LF*	*79.00 /LF*	*549.64 /LF*	*1,374,103*	*870.41 /LF*	*2,176,014*
			05.03 Terminal Regulating Reservoir Pipeline	48,788.00 LF	720.18 /LF	293.56 /LF	2,440.14 /LF	220.61 /LF	3,674.49 /LF	179,270,954	5,855.64 /LF	285,685,022
			05 Funks/TRR Pipelines	***59,853.00 LF***	***713.47 /LF***	***293.92 /LF***	***2,414.71 /LF***	***200.57 /LF***	***3,622.66 /LF***	***216,827,336***	***5,773.71 /LF***	***345,573,608***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	65,995,283		538,779.443 hrs	
Material	233,837,923			
Allowance	18,553,014			
Equipment	27,187,389		200,080.654 hrs	
Other				
Total Construction Cost	**345,573,609**	**345,573,609**		
Non-Contract Costs	62,203,250			18.000 %
Total Project Costs	**62,203,250**	**407,776,859**		

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
05						***Funks/TRR Pipelines***									
	05.01					Funks TRR Connection Manifold									
		33.00.510				*Funks TRR Connection Manifold*									
			33.2			*Pipeline Specialties*									
				33.01		*Pipeline Specialties*									
					33.10.99.01	*Buried Pipe Specials, Other*									
						Butterfly valve, iron body, Flgd, MTR OPER, 150#, 144"	5.00 ea	5,001.82 /ea	600.00 /ea	170,000.00 /ea	-	175,601.82 /ea	878,009	283,708.48 /ea	1,418,542
						Gasket and bolt set, for flanges, 150 lb., 144" pipe size	10.00 ea	1,491.57 /ea	-	5,250.00 /ea	-	6,741.57 /ea	67,416	10,799.37 /ea	107,994
						Reducer, steel, butt weld, 23' x 17'	2.00 ea	4,375.43 /ea	1,200.00 /ea	54,400.00 /ea	-	59,975.43 /ea	119,951	96,632.90 /ea	193,266
						Reducer, steel, butt weld, 17' x 12'	4.00 ea	4,375.43 /ea	1,200.00 /ea	33,200.00 /ea	-	38,775.43 /ea	155,102	62,332.40 /ea	249,330
						Wye, steel, butt weld, 17' Dia	2.00 ea	4,375.43 /ea	1,200.00 /ea	58,000.00 /ea	-	63,575.43 /ea	127,151	102,457.51 /ea	204,915
						Elbow, 45 deg, steel, butt weld, 17' Dia	2.00 ea	4,375.43 /ea	1,200.00 /ea	32,000.00 /ea	-	37,575.43 /ea	75,151	60,390.86 /ea	120,782
						Flange, steel, forged steel, weld neck, 150 lb., 144" pipe size, includes 1 weld per joint and weld machine	10.00 ea	6,563.16 /ea	195.36 /ea	11,250.00 /ea	-	18,008.52 /ea	180,085	28,646.85 /ea	286,469
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	31,810.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	140,337	6.82 /cy	216,884
						Pipe bedding and zone, CLSM	7,760.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	583,804	121.34 /cy	941,620
						Backfill native material	24,270.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	191,035	12.16 /cy	295,234
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	7,540.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	120,907	24.78 /cy	186,855
						Load excavated spoils	7,540.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	12,192	2.50 /cy	18,842
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	24,270.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	49,286	3.14 /cy	76,169
						Compaction, water for, 6000 gallon wagon, 6 mile haul	24,270.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	44,989	2.95 /cy	71,640
						Piping, pipe, WSP, plain end, welded, 144" diameter, excludes excavation or backfill	146.00 lf	121.97 /lf	62.10 /lf	970.00 /lf	-	1,154.07 /lf	168,494	1,853.87 /lf	270,666
						Erosion Controls Allowance	500.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	27,500	85.00 /lf	42,500
						Dewatering Allowance	15.00 msf	0.00 /msf	0.00 /msf	0.00 /msf	9,000.00 /msf	9,000.00 /msf	135,000	13,909.03 /msf	208,635
						33.10.99.01 Buried Pipe Specials, Other	**475.00** LF	1,061.93 /LF	545.15 /LF	4,527.46 /LF	342.11 /LF	6,476.65 /LF	3,076,407	10,337.56 /LF	4,910,341
						33.01 Pipeline Specialties	**1.00** LS	504,415.01 /LS	258,948.01 /LS	2,150,544.00 /LS	162,500.00 /LS	3,076,407.02 /LS	3,076,407	4,910,341.42 /LS	4,910,341
						33.2 Pipeline Specialties	**1.00** LS	504,415.01 /LS	258,948.01 /LS	2,150,544.00 /LS	162,500.00 /LS	3,076,407.02 /LS	3,076,407	4,910,341.42 /LS	4,910,341
						33.00.510 Funks TRR Connection Manifold	**475.00** LF	1,061.93 /LF	545.15 /LF	4,527.46 /LF	342.11 /LF	6,476.65 /LF	3,076,407	10,337.56 /LF	4,910,341
						05.01 Funks TRR Connection Manifold	**1.00** LS	504,415.01 /LS	258,948.01 /LS	2,150,544.00 /LS	162,500.00 /LS	3,076,407.02 /LS	3,076,407	4,910,341.42 /LS	4,910,341
	05.02					Funks Pipeline									
		33.00.502				*Funks Pipeline, Open Cut, Dual Bore*									
			33.0			*Pipelines*									
				33.03		*Buried Process Pipe, Carbon Steel*									
					33.00.10.144	*Buried Pipe, RCP, 144"*									
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	271,261.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	1,196,729	6.82 /cy	1,849,482
						Trench Stabilization, Geotextile Wrapped	4,530.00 cy	5.50 /cy	2.25 /cy	40.00 /cy	-	47.75 /cy	216,294	76.69 /cy	347,408
						Pipe bedding and zone, CLSM	95,090.00 cy	4.52 /cy	0.71 /cy	35.00 /cy	-	40.23 /cy	3,825,701	64.71 /cy	6,153,712
						Backfill native material	188,805.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	1,486,127	12.16 /cy	2,296,732
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	82,456.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	1,322,213	24.78 /cy	2,043,411
						Load excavated spoils	82,456.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	133,330	2.50 /cy	206,055
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	188,805.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	383,413	3.14 /cy	592,544
						Compaction, water for, 6000 gallon wagon, 6 mile haul	188,805.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	349,987	2.95 /cy	557,313
						Piping, WSP 0.6" Wt Polyurethand Coating Insitu Morter Lining, 144" diameter	10,590.00 LF	379.47 /LF	82.79 /LF	1,850.00 /LF	-	2,312.26 /LF	24,486,820	3,707.60 /LF	39,263,489
						Dewatering Allowance	223.00 msf	0.00 /msf	0.00 /msf	0.00 /msf	3,000.00 /msf	3,000.00 /msf	669,000	4,636.34 /msf	1,033,905
						Erosion Controls Allowance	5,295.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	291,225	85.00 /lf	450,073
						Surface Restorations Allowance	794.25 msf	0.00 /msf	0.00 /msf	0.00 /msf	150.00 /msf	150.00 /msf	119,138	231.82 /msf	184,121
						33.00.10.144 Buried Pipe, RCP, 144"	10,590.00 LF	666.68 /LF	284.32 /LF	2,202.78 /LF	101.92 /LF	3,255.90 /LF	34,479,975	5,191.52 /LF	54,978,245
						33.03 Buried Process Pipe, Carbon Steel	10,590.00 LF	666.68 /LF	284.32 /LF	2,202.78 /LF	101.92 /LF	3,255.90 /LF	34,479,975	5,191.52 /LF	54,978,245
						33.0 Pipelines	10,590.00 LF	666.68 /LF	284.32 /LF	2,202.78 /LF	101.92 /LF	3,255.90 /LF	34,479,975	5,191.52 /LF	54,978,245
						33.00.502 Funks Pipeline, Open Cut, Dual Bore	10,590.00 LF	666.68 /LF	284.32 /LF	2,202.78 /LF	101.92 /LF	3,255.90 /LF	34,479,975	5,191.52 /LF	54,978,245
						05.02 Funks Pipeline	10,590.00 LF	666.68 /LF	284.32 /LF	2,202.78 /LF	101.92 /LF	3,255.90 /LF	34,479,975	5,191.52 /LF	54,978,245
	05.03					Terminal Regulating Reservoir Pipeline									
		32.00.600				*TRR Access Roads*									
			32.0			*Exterior Improvements*									
				32.12		*Paving*									
					32.40.04.00	*Site Improvements, Access Roads, Gravel*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	92,996.67 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	90,635	1.51 /SY	140,072
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	20,800.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	131,208	9.75 /cy	202,775
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	10,400.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	166,768	24.78 /cy	257,731
						Load excavated spoils	10,400.00 cy	0.77 /cy	0.84 /cy		-	1.62 /cy	16,817	2.50 /cy	25,989
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,18"deep	92,996.67 sy	1.34 /sy	1.31 /sy	20.00 /sy	-	22.64 /sy	2,105,575	36.44 /sy	3,388,901
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	92,996.67 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	90,674	1.51 /sy	140,132
						32.40.04.00 Site improvements, Access Roads, Gravel	92,996.67 SY	3.79 /SY	4.18 /SY	20.00 /SY	/SY	27.98 /SY	2,601,677	44.69 /SY	4,155,601
					32.40.04.90	*Site Improvements, Access Roads, Asphalt*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	11,853.33 sy	0.62 /sy	0.35 /sy	-	-	0.98 /sy	11,552	1.51 /sy	17,854
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	2,000.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	12,616	9.75 /cy	19,498
						Fill by borrow and utility bedding, borrow, select fill for shoulders and embankments, spread fill, with front-end loader	300.00 cy	20.18 /cy	14.41 /cy	35.00 /cy	-	69.59 /cy	20,877	110.08 /cy	33,025
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	1,000.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	16,035	24.78 /cy	24,782
						Load excavated spoils	1,000.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	1,617	2.50 /cy	2,499
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,12"deep	11,853.33 sy	1.34 /sy	1.31 /sy	15.00 /sy	-	17.64 /sy	209,109	28.35 /sy	336,058
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	11,853.33 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	11,557	1.51 /sy	17,861
						Plant-mix asphalt paving, for highways and large paved areas, binder course, 2" thick, no hauling included	9,482.67 SY	0.99 /SY	0.39 /SY	7.40 /SY	-	8.78 /SY	83,284	14.11 /SY	133,798
						Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	9,482.67 sy	1.11 /sy	0.43 /sy	8.25 /sy	-	9.79 /sy	92,827	15.73 /sy	149,131
						32.40.04.90 Site improvements, Access Roads, Asphalt	9,482.67 SY	7.09 /SY	5.86 /SY	35.51 /SY	/SY	48.45 /SY	459,475	77.46 /SY	734,505
						32.12 Paving	102,479.34 SY	4.10 /SY	4.34 /SY	21.43 /SY	/SY	29.87 /SY	3,061,153	47.73 /SY	4,890,106

Area	Facility	WorkActv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						32.0 Exterior Improvements	1.00 LS	419,930.02 /LS	444,584.27 /LS	2,196,637.08 /LS	/LS	3,061,151.37 /LS	3,061,151	4,890,106.36 /LS	4,890,106
						32.00.050 TRR Access Roads	31,455.00 LF	13.35 /LF	14.13 /LF	69.83 /LF	/LF	97.32 /LF	3,061,151	155.46 /LF	4,890,106
		33.00.500				TRR Pipeline, Open Cut, Dual Bore									
			33.0			Pipelines									
				33.03		Buried Process Pipe, Carbon Steel									
					33.00.10.144	Buried Pipe, RCP, 144"									
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	1,338,768.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	5,906,276	6.82 /cy	9,127,843
						Trench Stabilization, Geotextile Wrapped	19,230.00 cy	5.50 /cy	2.25 /cy	40.00 /cy	-	47.75 /cy	918,174	76.69 /cy	1,474,757
						Pipe bedding and zone, CLSM	403,570.00 cy	4.52 /cy	0.71 /cy	35.00 /cy	-	40.23 /cy	16,236,596	64.71 /cy	26,116,874
						Backfill native material	1,052,364.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	8,283,395	12.16 /cy	12,801,557
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	285,404.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	4,576,561	24.78 /cy	7,072,837
						Load excavated spoils	285,404.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	461,495	2.50 /cy	713,216
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	1,052,364.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	2,137,071	3.14 /cy	3,302,732
						Compaction, water for, 6000 gallon wagon, 6 mile haul	1,052,364.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	1,950,762	2.95 /cy	3,106,357
						Piping, WSP 0.6875" Wt Polyurethand Coating Insitu Morter Lining, 144" diameter	44,944.00 LF	379.47 /LF	82.79 /LF	2,120.00 /LF	-	2,582.26 /LF	116,057,035	4,144.45 /LF	186,268,001
						Dewatering Allowance	944.00 msf	0.00 /msf	0.00 /msf	0.00 /msf	3,000.00 /msf	3,000.00 /msf	2,832,000	4,636.34 /msf	4,376,709
						Erosion Controls Allowance	22,472.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	1,235,960	85.00 /lf	1,910,112
						Surface Restorations Allowance	33,370.80 msf	0.00 /msf	0.00 /msf	0.00 /msf	150.00 /msf	150.00 /msf	5,005,620	231.82 /msf	7,735,925
						33.00.10.144 Buried Pipe, RCP, 144"	44,944.00 LF	704.78 /LF	298.45 /LF	2,479.49 /LF	201.89 /LF	3,684.61 /LF	165,600,945	5,874.13 /LF	264,006,919
						33.03 Buried Process Pipe, Carbon Steel	44,944.00 LF	704.78 /LF	298.45 /LF	2,479.49 /LF	201.89 /LF	3,684.61 /LF	165,600,945	5,874.13 /LF	264,006,919
						33.0 Pipelines	44,944.00 LF	704.78 /LF	298.45 /LF	2,479.49 /LF	201.89 /LF	3,684.61 /LF	165,600,945	5,874.13 /LF	264,006,919
						33.00.500 TRR Pipeline, Open Cut, Dual Bore	44,944.00 LF	704.78 /LF	298.45 /LF	2,479.49 /LF	201.89 /LF	3,684.61 /LF	165,600,945	5,874.13 /LF	264,006,919
		33.00.504				Funks Pipeline, Trenchless Pipe installation, Dual Bore at TC Canal									
			33.0			Pipelines									
				33.60		Trenchless Technology, Tunneling									
					33.60.01.08	Pipeline Specials, Tunneling, 144" Piping in 186" Casing									
						Grout Annular Space Between Carrier Pipe and Casing	53,072.00 cf	9.30 /cf	0.43 /cf	0.95 /cf	-	10.68 /cf	566,756	16.57 /cf	879,547
						Final Surface Restoration Allowance	222.22 sy	0.00 /sy	0.00 /sy	0.00 /sy	13.50 /sy	13.50 /sy	3,000	20.86 /sy	4,636
						Excavating jacking and Receiving Pits, excludes sheeting or dewatering	2,300.00 cy	2.65 /cy	2.21 /cy	-	-	4.85 /cy	11,163	7.50 /cy	17,252
						Jacking and Receiving Pits Shoring, SF of Pit Walls	5,400.00 sf	0.00 /sf	0.00 /sf	0.00 /sf	45.00 /sf	45.00 /sf	243,000	69.55 /sf	375,544
						Backfill Pits, Native material	1,590.00 cy	6.18 /cy	1.15 /cy	0.00 /cy	-	7.33 /cy	11,661	11.33 /cy	18,022
						Pipe bedding and zone in pits, CLSM	855.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	64,324	121.34 /cy	103,748
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	5,620.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	74,387	20.46 /cy	114,962
						Load excavated spoils	5,620.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	10,104	2.78 /cy	15,615
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	1,590.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	2,619	2.55 /cy	4,047
						Compaction, water for, 6000 gallon wagon, 6 mile haul	1,590.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	2,795	2.80 /cy	4,458
						Horizontal boring, roadwork, 186" diameter casing, includes casing only, 100' minimum, excludes jacking pits or dewatering	702.00 lf	596.42 /lf	142.23 /lf	1,100.00 /lf	-	1,838.65 /lf	1,290,729	2,921.28 /lf	2,050,740
						Carrier Pipe Spacers	148.00 ea	14.91 /ea	4.74 /ea	500.00 /ea	0.00 /ea	519.65 /ea	76,908	839.34 /ea	124,223
						Piping, WSP 0.6875" Wt Polyurethand Coating Insitu Morter Lining, 144" diameter	702.00 LF	596.41 /LF	28.45 /LF	2,120.00 /LF	-	2,744.86 /LF	1,926,892	4,395.74 /LF	3,085,808
						Dewatering Allowance	1.00 ls	0.00 /ls	0.00 /ls	0.00 /ls	500,000.00 /ls	500,000.00 /ls	500,000	772,723.99 /ls	772,724
						33.60.01.08 Pipeline Specials, Tunneling, 144" Piping in 186" Casing	702.00 LF	1,995.71 /LF	271.70 /LF	3,485.21 /LF	1,062.68 /LF	6,815.30 /LF	4,784,338	10,785.36 /LF	7,571,326
						33.60 Trenchless Technology, Tunneling	702.00 LF	1,995.71 /LF	271.70 /LF	3,485.21 /LF	1,062.68 /LF	6,815.30 /LF	4,784,338	10,785.36 /LF	7,571,326
						33.0 Pipelines	702.00 LF	1,995.71 /LF	271.70 /LF	3,485.21 /LF	1,062.68 /LF	6,815.30 /LF	4,784,338	10,785.36 /LF	7,571,326
						33.00.504 Funks Pipeline, Trenchless Pipe Installation, Dual Bore at TC Canal	702.00 LF	1,995.71 /LF	271.70 /LF	3,485.21 /LF	1,062.68 /LF	6,815.30 /LF	4,784,338	10,785.36 /LF	7,571,326
		33.00.506				Funks Pipeline, Trenchless Pipe installation, Dual Bore at GCID Canal									
			33.0			Pipelines									
				33.60		Trenchless Technology, Tunneling									
					33.60.01.08	Pipeline Specials, Tunneling, 144" Piping in 186" Casing									
						Grout Annular Space Between Carrier Pipe and Casing	48,536.00 cf	9.30 /cf	0.43 /cf	0.95 /cf	-	10.68 /cf	518,316	16.57 /cf	804,373
						Final Surface Restoration Allowance	222.22 sy				13.50 /sy	13.50 /sy	3,000	20.86 /sy	4,636
						Excavating jacking and Receiving Pits, excludes sheeting or dewatering	2,300.00 cy	2.65 /cy	2.21 /cy	-	-	4.85 /cy	11,163	7.50 /cy	17,252
						Jacking and Receiving Pits Shoring, SF of Pit Walls	5,400.00 sf				45.00 /sf	45.00 /sf	243,000	69.55 /sf	375,544
						Backfill Pits, Native material	1,590.00 cy	6.18 /cy	1.15 /cy		-	7.33 /cy	11,661	11.33 /cy	18,022
						Pipe bedding and zone in pits, CLSM	855.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	64,324	121.34 /cy	103,748
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	5,200.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	68,828	20.46 /cy	106,370
						Load excavated spoils	5,200.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	9,349	2.78 /cy	14,448
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	1,590.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	2,619	2.55 /cy	4,047
						Compaction, water for, 6000 gallon wagon, 6 mile haul	1,590.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	2,795	2.80 /cy	4,458
						Horizontal boring, roadwork, 186" diameter casing, includes casing only, 100' minimum, excludes jacking pits or dewatering	642.00 lf	596.42 /lf	142.23 /lf	1,100.00 /lf	-	1,838.65 /lf	1,180,411	2,921.28 /lf	1,875,463
						Carrier Pipe Spacers	140.00 ea	14.91 /ea	4.74 /ea	500.00 /ea	0.00 /ea	519.65 /ea	72,751	839.34 /ea	117,508
						Piping, WSP 0.6875" Wt Polyurethand Coating Insitu Morter Lining, 144" diameter	642.00 LF	596.41 /LF	28.45 /LF	2,120.00 /LF	-	2,744.86 /LF	1,762,200	4,395.74 /LF	2,822,064
						Dewatering Allowance	1.00 ls				500,000.00 /ls	500,000.00 /ls	500,000	772,724.00 /ls	772,724
						33.60.01.08 Pipeline Specials, Tunneling, 144" Piping in 186" Casing	642.00 LF	1,999.48 /LF	273.59 /LF	3,497.05 /LF	1,161.99 /LF	6,932.11 /LF	4,450,417	10,966.76 /LF	7,040,657
						33.60 Trenchless Technology, Tunneling	642.00 LF	1,999.48 /LF	273.59 /LF	3,497.05 /LF	1,161.99 /LF	6,932.11 /LF	4,450,417	10,966.76 /LF	7,040,657
						33.0 Pipelines	642.00 LF	1,999.48 /LF	273.59 /LF	3,497.05 /LF	1,161.99 /LF	6,932.11 /LF	4,450,417	10,966.76 /LF	7,040,657
						33.00.506 Funks Pipeline, Trenchless Pipe Installation, Dual Bore at GCID Canal	642.00 LF	1,999.48 /LF	273.59 /LF	3,497.05 /LF	1,161.99 /LF	6,932.11 /LF	4,450,417	10,966.76 /LF	7,040,657
		33.00.508				Funks Pipeline, Enviornmental Water Pipeline									
			33.0			Pipelines									
				33.02		Buried Process Pipe, Ductile Iron									
					33.00.04.24	Buried Pipe, Ductile Iron, 24"									
						Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	11,800.00 cy	2.27 /cy	1.76 /cy	-	-	4.03 /cy	47,502	6.22 /cy	73,411
						Trench Stabilization, Geotextile Wrapped	408.00 cy	5.50 /cy	2.25 /cy	40.00 /cy	-	47.75 /cy	19,481	76.69 /cy	31,290
						Pipe bedding and zone, CLSM	2,710.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	203,880	121.34 /cy	328,839
						Backfill native material	9,550.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	75,170	12.16 /cy	116,172
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	2,250.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	36,080	24.78 /cy	55,759
						Load excavated spoils	2,250.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	3,638	2.50 /cy	5,623
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	9,550.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	19,394	3.14 /cy	29,972
						Compaction, water for, 6000 gallon wagon, 6 mile haul	9,550.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	17,703	2.95 /cy	28,190
						Piping,ductile iron pipe,cement lined,mechanical joint,fittings,18'lengths,24"diameter, excludes excavation backfill	2,500.00 LF	69.46 /LF	8.50 /LF	168.00 /LF	-	245.96 /LF	614,900	392.30 /LF	980,746
						Piping, joint restraint, ductile iron mechanical joints, 24" diameter	142.00 ea	332.13 /ea	-	450.00 /ea	-	782.13 /ea	111,062	1,241.36 /ea	176,274
						Butterfly valves with boxes,cast iron,mechncl joint,24"dm,includs valve box and mechncl joints,excluds excavtn and backfill	1.00 ea	560.46 /ea	171.82 /ea	15,000.00 /ea	-	15,732.28 /ea	15,732	25,400.93 /ea	25,401
						Dewatering Allowance	20.00 msf	0.00 /msf	0.00 /msf	0.00 /msf	3,000.00 /msf	3,000.00 /msf	60,000	4,636.34 /msf	92,727
						Erosion Controls Allowance	2,500.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	137,500	85.00 /lf	212,499

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Jacobs

DETAIL REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Funks/TRR Pipelines Rev 2	Estimator: Cavalleri/Wells Jacobs
Job Size:	Project Number: D3880600	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility Study	Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					33.00.04.24	*Buried Pipe, Ductile Iron, 24"*									
						Connection to TRR Pipeline	1.00 ls	5,001.82 /ls	560.00 /ls	6,500.00 /ls		12,061.82 /ls	12,062	19,112.17 /ls	19,112
						33.00.04.24 Buried Pipe, Ductile Iron, 24"	*2,500.00 LF*	*142.39 /LF*	*39.10 /LF*	*289.15 /LF*	*79.00 /LF*	*549.64 /LF*	*1,374,103*	*870.41 /LF*	*2,176,014*
						33.02 Buried Process Pipe, Ductile Iron	*2,500.00 LF*	*142.39 /LF*	*39.10 /LF*	*289.15 /LF*	*79.00 /LF*	*549.64 /LF*	*1,374,103*	*870.41 /LF*	*2,176,014*
						33.0 Pipelines	*2,500.00 LF*	*142.39 /LF*	*39.10 /LF*	*289.15 /LF*	*79.00 /LF*	*549.64 /LF*	*1,374,103*	*870.41 /LF*	*2,176,014*
						33.00.508 Funks Pipeline, Enviornmental Water Pipeline	*2,500.00 LF*	*142.39 /LF*	*39.10 /LF*	*289.15 /LF*	*79.00 /LF*	*549.64 /LF*	*1,374,103*	*870.41 /LF*	*2,176,014*
						05.05 Terminal Regulating Reservoir Pipeline	48,753.00 LF	728.18 /LF	298.56 /LF	2,440.54 /LF	220.81 /LF	3,678.39 /LF	179,270,856	5,555.64 /LF	295,805,022
						05 Funks/TRR Pipelines	***59,853.00 LF***	***713.47 /LF***	***293.92 /LF***	***2,414.71 /LF***	***200.57 /LF***	***3,622.66 /LF***	***216,827,336***	***5,773.71 /LF***	***345,573,608***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	42,703,012		538,779.443 hrs	
Material	144,527,467			
Allowance	12,004,942			
Equipment	17,591,915		200,080.654 hrs	
Other				
Subtotal Direct Costs	216,827,336	216,827,336		
Material Sales Tax, Dunnigan Ca	10,478,241			7.250 %
Subtotal W/ Sales Tax	10,478,241	227,305,577		
General Conditions	11,365,279			5.000 %
Subtotal W/ General Conditions	11,365,279	238,670,856		
Mobilization/Demobilization	7,160,126			3.000 %
Prime Contractor Overhead	24,583,098			10.000 %
Prime Contractor Profit	16,224,845			6.000 %
Bonds & Insurance	6,220,065			2.170 %
Subtotal W/ Prime Markups	54,188,134	292,858,990		
Contractor Contingency	8,785,770			3.000 %
Design Contingency	43,928,849			15.000 %
Subtotal W/ Contingency	52,714,619	345,573,609		
Total Construction Cost		**345,573,609**		
Non-Contract Costs	62,203,250			18.000 %
Total Project Costs	**62,203,250**	**407,776,859**		

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Funks Reservoir

Jacobs

SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
06			**Funks Reservoir**									
	06.01		Funks Reservoir Admin and Operations BLDG									
		03.00.002	Funks Reservoir Admin and Operations BLDG, Concrete	220.00 CY	180.34 /CY	8.07 /CY	243.42 /CY	/CY	431.82 /CY	95,000	679.23 /CY	149,431
		04.00.002	Funks Reservoir Admin and Operations BLDG, Masonry	4,100.00 SF	12.87 /SF	0.11 /SF	8.10 /SF	/SF	21.08 /SF	86,445	37.11 /SF	152,137
		05.00.002	Funks Reservoir Admin and Operations BLDG, Metals	3,517.00 SF	5.52 /SF	0.24 /SF	4.43 /SF	/SF	10.19 /SF	35,846	17.98 /SF	63,219
		07.00.002	Funks Reservoir Admin and Operations BLDG, Metal Roofing	3,517.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.82 /SF	31,003	15.64 /SF	54,999
		08.00.002	Funks Reservoir Admin and Operations BLDG, Openings	19.00 EA	475.99 /EA	15.79 /EA	1,940.68 /EA	/EA	2,432.47 /EA	46,217	4,353.94 /EA	82,725
		09.00.002	Funks Reservoir Admin and Operations BLDG, Metal Stud Walls	3,939.00 SF	6.69 /SF	/SF	1.52 /SF	/SF	8.22 /SF	32,358	14.34 /SF	56,482
		09.00.004	Funks Reservoir Admin and Operations BLDG, Finishes	6,605.00 SF	3.01 /SF	0.09 /SF	2.72 /SF	/SF	5.82 /SF	38,463	10.28 /SF	67,926
		21.00.002	Funks Reservoir Admin and Operations BLDG, Fire Suppression System	3,414.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	51,210	25.98 /SF	88,700
		22.00.002	Funks Reservoir Admin and Operations BLDG, Plumbing	3,414.00 SF	3.63 /SF	0.29 /SF	5.23 /SF	/SF	9.15 /SF	31,241	16.23 /SF	55,406
		23.00.002	Funks Reservoir Admin and Operations BLDG, HVAC	3,414.00 SF	/SF	/SF	/SF	30.00 /SF	30.00 /SF	102,420	51.95 /SF	177,400
		26.01.PRI	Primary Feed 100A	1,000.00 LF	47.49 /LF	20.23 /LF	28.17 /LF	/LF	95.89 /LF	95,868	165.23 /LF	165,232
		26.03.XFMR	Pad Mounted Transformer, Meter, and Grounding	225.00 kVA	39.03 /kVA	1.31 /kVA	90.86 /kVA	/kVA	131.19 /kVA	29,519	240.39 /kVA	54,087
		26.05.GRDG	Facility Grounding	3,414.00 SF	3.27 /SF	0.14 /SF	1.52 /SF	/SF	4.92 /SF	16,798	8.88 /SF	30,311
		26.10.SEC	Secondary Power Feed 225A	500.00 LF	16.96 /LF	7.62 /LF	8.69 /LF	/LF	33.26 /LF	16,629	56.82 /LF	28,412
		26.20.DIST	Electrical Distribution Equipment	325.00 AMP	55.12 /AMP	1.10 /AMP	55.65 /AMP	/AMP	111.86 /AMP	36,354	203.38 /AMP	66,097
		26.25.LTG	Interior Lighting and Control	1.00 LS	27,739.43 /LS	/LS	13,527.42 /LS	/LS	41,266.85 /LS	41,267	74,521.83 /LS	74,522
		26.26.EXTLTG	Exterior Lighting and Control	1.00 LS	1,162.52 /LS	/LS	90.58 /LS	/LS	1,253.10 /LS	1,253	2,239.69 /LS	2,240
		26.30.DEV	Device Outlets	1.00 LS	28,723.16 /LS	/LS	4,467.90 /LS	/LS	33,191.06 /LS	33,191	59,473.26 /LS	59,473
		26.40.EQCON	Facility Equipment Connections and Controls	8.00 ALO	1,035.37 /ALO	/ALO	615.73 /ALO	/ALO	1,651.10 /ALO	13,209	2,987.05 /ALO	23,896
		26.90.LPS	Facility Lightning Protection System	3,414.00 SF	3.04 /SF	/SF	1.67 /SF	1.47 /SF	6.17 /SF	21,078	11.12 /SF	37,977
		27.10.COMEQ	Communications Room Equipment	1.00 LS	28,011.60 /LS	/LS	21,023.71 /LS	/LS	49,035.31 /LS	49,035	88,909.37 /LS	88,909
		27.20.COMOUT	Comm Outlets	24.00 EA	827.91 /EA	/EA	151.71 /EA	/EA	979.61 /EA	23,511	1,710.54 /EA	41,053
		27.31.COMCDT	Comm Conduit to MH/HH	0.00	/LF	/LF	/LF	/LF	/LF	18,234	/LF	30,475
		28.10.FA	Fire Alarm System	3,414.00 SF	15.27 /SF	/SF	5.99 /SF	0.73 /SF	21.99 /SF	75,070	37.62 /SF	128,426
		28.20.AC	Access Control System	7.00 DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	16,497	3,668.77 /DOOR	25,681
		28.20.CCTV	Closed Circuit TV and Cameras	6.00 CAM	1,179.28 /CAM	/CAM	1,108.33 /CAM	333.33 /CAM	2,620.95 /CAM	15,726	4,392.27 /CAM	26,354
		28.20.ID	Intrusion Detection System	10.00 DOOR	2,010.83 /DOOR	/DOOR	1,300.00 /DOOR	150.00 /DOOR	3,460.83 /DOOR	34,608	5,396.53 /DOOR	53,965
			06.01 Funks Reservoir Admin and Operations BLDG	3,414.00 SF	149.20 /SF	10.50 /SF	110.78 /SF	48.22 /SF	318.71 /SF	1,088,072	552.36 /SF	1,886,337
	06.02		Funks Reservoir Maintenance and Storage BLDG									
		03.00.000	Funks Reservoir Maintenance and Storage BLDG, Concrete	180.00 CY	182.68 /CY	8.04 /CY	244.05 /CY	/CY	434.77 /CY	78,259	683.81 /CY	123,085
		04.00.000	Funks Reservoir Maintenance and Storage BLDG, Masonry	4,098.00 SF	18.86 /SF	0.19 /SF	10.08 /SF	/SF	29.13 /SF	119,389	51.19 /SF	209,787
		05.00.000	Funks Reservoir Maintenance and Storage BLDG, Metals	1.00 LS	15,636.95 /LS	682.03 /LS	12,526.00 /LS	/LS	28,844.98 /LS	28,845	50,870.15 /LS	50,870
		07.00.000	Funks Reservoir Maintenance and Storage BLDG, Roofing	2,813.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.81 /SF	24,775	15.62 /SF	43,950
		08.00.000	Funks Reservoir Maintenance and Storage BLDG, Openings	9.00 EA	619.23 /EA	13.33 /EA	2,097.85 /EA	/EA	2,730.42 /EA	24,574	4,881.42 /EA	43,933
		09.00.000	Funks Reservoir Maintenance and Storage BLDG, Finishes	2,731.00 SF	1.12 /SF	0.13 /SF	1.10 /SF	/SF	2.35 /SF	6,412	4.15 /SF	11,324
		21.00.000	Funks Reservoir Maintenance and Storage BLDG, Fire Suppression System	2,731.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	40,965	25.98 /SF	70,955
		22.00.000	Funks Reservoir Maintenance and Storage BLDG, Plumbing	2,731.00 SF	2.53 /SF	0.37 /SF	3.63 /SF	/SF	6.53 /SF	17,842	11.58 /SF	31,623
		23.00.000	Funks Reservoir Maintenance and Storage BLDG, HVAC	2,731.00 SF	/SF	/SF	/SF	20.00 /SF	20.00 /SF	54,620	34.64 /SF	94,607
		26.05.GRDG	Facility Grounding	2,731.00 SF	2.44 /SF	0.12 /SF	1.27 /SF	/SF	3.82 /SF	10,433	6.90 /SF	18,843
		26.11.SEC	Subfeed UG from Admin 100A	150.00 LF	56.88 /LF	38.08 /LF	26.60 /LF	/LF	121.56 /LF	18,234	203.17 /LF	30,476
		26.20.DIST	Electrical Distribution Equipment	200.00 AMP	36.05 /AMP	/AMP	32.27 /AMP	/AMP	68.32 /AMP	13,664	124.09 /AMP	24,818
		26.25.LTG	Interior Lighting and Control	1.00 LS	11,979.39 /LS	/LS	3,893.85 /LS	/LS	15,873.24 /LS	15,873	28,569.78 /LS	28,570
		26.26.EXTLTG	Exterior Lighting and Control	1.00 LS	1,162.52 /LS	/LS	90.58 /LS	/LS	1,253.10 /LS	1,253	2,239.69 /LS	2,240
		26.30.DEV	Device Outlets	1.00 LS	8,723.44 /LS	/LS	1,559.54 /LS	/LS	10,282.98 /LS	10,283	18,438.24 /LS	18,438
		26.40.EQCON	Facility Equipment Connections and Controls	2.00 ALO	1,894.07 /ALO	/ALO	863.60 /ALO	/ALO	2,757.67 /ALO	5,515	4,977.01 /ALO	9,954
		26.90.LPS	Facility Lightning Protection System	2,731.00 SF	2.15 /SF	/SF	1.30 /SF	0.92 /SF	4.37 /SF	11,941	7.89 /SF	21,535
		27.30.COMCDT	Comm Conduit to Admin	0.00	/LF	/LF	/LF	/LF	/LF	22,890	/LF	38,920
		28.10.FA	Fire Alarm System	2,731.00 SF	5.14 /SF	/SF	3.89 /SF	0.37 /SF	9.40 /SF	25,660	15.64 /SF	42,707
		28.20.AC	Access Control System	4.00 DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	9,427	3,668.78 /DOOR	14,675
		28.20.CCTV	Closed Circuit TV and Cameras	0.00	/CAM	/CAM	/CAM	/CAM	/CAM	7,863	/CAM	13,058
		28.20.ID	Intrusion Detection System	6.00 DOOR	1,945.96 /DOOR	/DOOR	1,333.33 /DOOR	166.67 /DOOR	3,445.96 /DOOR	20,676	5,376.18 /DOOR	32,257
			06.02 Funks Reservoir Maintenance and Storage BLDG	2,731.00 SF	92.38 /SF	5.86 /SF	73.19 /SF	37.01 /SF	208.43 /SF	569,292	357.61 /SF	976,624
	06.03		Funks Reservoir Flow Meter Vault									
		01.00.102	Funks Reservoir Flow Meter Vault, Removal and Control of Water	3.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	135,000	68,943.90 /MO	206,832
		03.00.004	Funks Reservoir Flow Meter Vault, Concrete	903.00 CY	365.11 /CY	8.77 /CY	312.72 /CY	/CY	686.59 /CY	619,993	1,074.59 /CY	970,355
		05.00.004	Funks Reservoir Flow Meter Vault, Catwalk	260.00 SF	46.87 /SF	8.49 /SF	83.63 /SF	26.92 /SF	165.91 /SF	43,135	293.43 /SF	76,291
		08.00.003	Funks Reservoir Flow Meter Vault, Access Hatches	4.00 EA	623.04 /EA	/EA	2,400.00 /EA	/EA	3,023.04 /EA	12,092	5,410.16 /EA	21,641
		23.00.004	Funks Reservoir Flow Meter Vault, HVAC	3,096.00 SF	1.50 /SF	0.09 /SF	3.47 /SF	/SF	5.06 /SF	15,679	9.02 /SF	27,937
		27.30.COMCDT	Comm Conduit to Admin	300.00 LF	48.11 /LF	38.08 /LF	19.85 /LF	/LF	106.04 /LF	31,812	175.03 /LF	52,508

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Jacobs

SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
		31.00.106	*Funks Reservoir Flow Meter Vault, Excavation and Backfill*	16,933.00 CY	5.82 /CY	4.39 /CY	0.89 /CY	/CY	11.09 /CY	186,700	17.06 /CY	287,123
		40.00.000	*Funks Reservoir Flow Meter Vault, Piping*	144.00 LF	162.28 /LF	65.10 /LF	1,011.67 /LF	/LF	1,239.05 /LF	178,423	1,971.68 /LF	283,922
		40.90.102	*Funks Reservoir Flow Meter Vault, I&C*	**3,096.00** SF	3.41 /SF	1.34 /SF	51.68 /SF	/SF	56.43 /SF	174,711	101.49 /SF	314,214
			06.03 Funks Reservoir Flow Meter Vault	**3,096.00** SF	159.97 /SF	35.28 /SF	210.28 /SF	45.87 /SF	451.40 /SF	1,397,545	723.78 /SF	2,346,822
	06.04		Funks Reservoir									
		01.00.204	*Funks Reservoir, Dewatering/Erosion Controls/Dust Abatement*	**18.00** MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,080,000	93,012.69 /MO	1,674,228
		31.00.107	*Funks Reservoir, Prepare Access/Haul Roads and Stockpile Areas*	184,000.00 CY	2.90 /CY	5.94 /CY	/CY	/CY	8.84 /CY	1,626,378	13.54 /CY	2,491,753
		31.00.108	*Funks Reservoir, Sediment Removal*	286,000.00 CY	11.47 /CY	7.19 /CY	1.00 /CY	/CY	19.66 /CY	5,622,092	30.19 /CY	8,634,266
		31.00.110	*Funks Reservoir, Reservoir Excavation*	358,000.00 CY	11.30 /CY	7.06 /CY	1.00 /CY	/CY	19.35 /CY	6,930,562	29.73 /CY	10,644,176
		31.00.112	*Funks Reservoir, Construct Pipeline Cofferdam*	145,000.00 CY	4.83 /CY	7.70 /CY	0.62 /CY	/CY	13.16 /CY	1,908,218	20.21 /CY	2,930,109
		31.00.114	*Funks Reservoir, Construct PGP Cofferdam*	59,000.00 CY	4.93 /CY	7.80 /CY	0.51 /CY	/CY	13.24 /CY	781,010	20.32 /CY	1,198,744
		31.00.116	*Funks Reservoir, Remove Pipeline Cofferdam*	68,000.00 CY	2.61 /CY	6.45 /CY	/CY	/CY	9.06 /CY	616,292	13.89 /CY	944,212
		31.00.118	*Funks Reservoir, Remove PGP Cofferdam*	40,000.00 CY	2.45 /CY	6.22 /CY	/CY	/CY	8.67 /CY	346,751	13.28 /CY	531,253
			06.04 Funks Reservoir	**132.73** AC	76,794.43 /AC	63,899.35 /AC	7,789.72 /AC	/AC	142,479.49 /AC	18,911,303	218,855.89 /AC	29,046,742
			06 Funks Reservoir	***1.00 LS***	***10,653,475.12 /LS***	***8,641,641.11 /LS***	***2,263,480.97 /LS***	***407,715.00 /LS***	***21,966,312.20 /LS***	***21,966,312***	***34,151,725.21 /LS***	***34,151,725***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	16,465,630		131,956.228 hrs	
Material	3,764,617			
Allowance	678,523			
Equipment	13,242,956		348,060.160 hrs	
Other				
Total Construction Cost	**34,151,726**	**34,151,726**		
Non-Contract Costs	6,147,311			18.000 %
Total Project Costs	**6,147,311**	**40,299,037**		

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DETAIL REPORT

Jacobs

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
06						***Funks Reservoir***									
	06.01					Funks Reservoir Admin and Operations BLDG									
		03.00.002				*Funks Reservoir Admin and Operations BLDG, Concrete*									
			03.0			*Concrete Work*									
				03.12		*Cast-In-Place Concrete, Continuous Footings*									
					03.10.02.24	*Cast-In-Place Concrete, Continuous Footings, 24" thick*									
						C.I.P. concrete forms, footing, keyway, tapered wood, 2" x 4", 4 use, includes erecting, bracing, stripping and cleaning	275.00 lf	3.16 /lf	-	0.25 /lf	-	3.41 /lf	939	5.25 /lf	1,443
						Reinforcing Steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	8.14 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	20,927	4,025.91 /ton	32,771
						Reinforcing steel, unload and sort, add to base	8.14 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	453	85.35 /ton	695
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	96.00 cy	-	-	131.00 /cy	-	131.00 /cy	12,576	210.20 /cy	20,179
						Structural concrete, placing, continuous footing, deep, pumped, includes strike off & consolidation, excludes material	93.00 CY	27.12 /CY	6.41 /CY	-	-	33.53 /CY	3,118	51.37 /CY	4,778
						03.10.02.24 Cast-In-Place Concrete, Continuous Footings, 24" thick	*93.00 CY*	*160.78 /CY*	*6.98 /CY*	*241.00 /CY*	*/CY*	*408.76 /CY*	*38,014*	*643.72 /CY*	*59,866*
						03.12 Cast-In-Place Concrete, Continuous Footings	*93.00 CY*	*160.78 /CY*	*6.98 /CY*	*241.00 /CY*	*/CY*	*408.76 /CY*	*38,014*	*643.72 /CY*	*59,866*
				03.16		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.12	*Cast-In-Place Concrete, Slabs on Grade, 12" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, 7" to 12" high, 4 use, includes erecting, bracing, stripping and cleaning	278.00 sfca	7.30 /sfca	-	0.75 /sfca	-	8.05 /sfca	2,238	12.39 /sfca	3,444
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	11.12 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	28,589	4,025.91 /ton	44,768
						Reinforcing in place, unloading & sorting, add to above - slabs	11.12 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	619	85.35 /ton	949
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	131.00 cy	-	-	131.00 /cy	-	131.00 /cy	17,161	210.20 /cy	27,536
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	127.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	3,683	44.43 /CY	5,643
						Cfnsh,flrs,for spcf rndm accs flrs acl clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	3,414.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	3,198	1.44 /sf	4,899
						Curing, sprayed membrane curing compound	34.14 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	787	36.21 /csf	1,236
						Fine grading, fine grade for slab on grade, machine	379.33 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	711	2.87 /sy	1,089
						03.10.05.12 Cast-In-Place Concrete, Slabs on Grade, 12" thick	*127.00 CY*	*194.68 /CY*	*8.86 /CY*	*245.18 /CY*	*/CY*	*448.71 /CY*	*56,986*	*705.23 /CY*	*89,565*
						03.16 Cast-In-Place Concrete, Slabs on Grade	*127.00 CY*	*194.68 /CY*	*8.86 /CY*	*245.18 /CY*	*/CY*	*448.71 /CY*	*56,986*	*705.23 /CY*	*89,565*
						03.0 Concrete Work	*220.00 CY*	*180.34 /CY*	*8.07 /CY*	*243.42 /CY*	*/CY*	*431.82 /CY*	*95,000*	*679.23 /CY*	*149,431*
						03.00.002 Funks Reservoir Admin and Operations BLDG, Concrete	*220.00 CY*	*180.34 /CY*	*8.07 /CY*	*243.42 /CY*	*/CY*	*431.82 /CY*	*95,000*	*679.23 /CY*	*149,431*
		04.00.002				*Funks Reservoir Admin and Operations BLDG, Masonry*									
			04.0			*Masonry*									
				04.21		*Concrete Unit Masonry - Exterior*									
					04.00.02.08	*Masonry Concrete Masonry Units, 8"*									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	2.00 opng	41.31 /opng	2.13 /opng	13.40 /opng	-	56.84 /opng	114	99.41 /opng	199
						Grout, door frames, 6' x 7' opening, 3.5 C.F. per opening	1.00 opng	55.08 /opng	2.83 /opng	18.75 /opng	-	76.66 /opng	77	134.15 /opng	134
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	800.25 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	10,240	22.55 /cf	18,047
						Reinforcing, steel bars A615, placed horizontal, average #4 bar	1,088.34 lb	1.40 /lb	-	0.40 /lb	-	1.80 /lb	1,956	3.14 /lb	3,419
						Masonry reinforcing bars, #3 and #4 reinforcing steel bars, placed vertically, ASTM A615	800.25 lb	1.80 /lb	-	0.56 /lb	-	2.36 /lb	1,885	4.12 /lb	3,298
						Masonry reinforcing bars, truss type steel joint reinforcing, mill standard galvanized, 12" wide	27.50 clf	31.43 /clf	-	29.50 /clf	-	60.93 /clf	1,676	107.68 /clf	2,961
						Concrt block,high strngt,hollow,3500 psi,8"8"16",includs mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and verticl rnfrcng	3,201.00 SF	8.50 /SF	-	4.07 /SF	-	12.57 /SF	40,248	22.07 /SF	70,658
						Channel framing, structural steel, field fabricated, C6x8.2, incl cutting & welding	22.00 lf	40.69 /lf	1.97 /lf	6.85 /lf	-	49.51 /lf	1,089	86.25 /lf	1,897
						Silicone water repellants, sprayed on CMU, 2 coat	6,402.00 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	6,371	1.78 /sf	11,403
						Reglet, zinc and copper alloy, 20 ounce	275.00 lf	3.26 /lf	-	2.87 /lf	-	6.13 /lf	1,687	10.83 /lf	2,979
						Reglet, counter flashing for zinc and copper alloy, 20 ounce, 12" wide	275.00 lf	5.27 /lf	-	5.25 /lf	-	10.52 /lf	2,894	18.61 /lf	5,117
						04.00.02.08 Masonry Concrete Masonry Units, 8"	*3,201.00 SF*	*12.94 /SF*	*0.11 /SF*	*8.26 /SF*	*/SF*	*21.32 /SF*	*68,236*	*37.52 /SF*	*120,113*
						04.21 Concrete Unit Masonry - Exterior	*3,201.00 SF*	*12.94 /SF*	*0.11 /SF*	*8.26 /SF*	*/SF*	*21.32 /SF*	*68,236*	*37.52 /SF*	*120,113*
				04.22		*Concrete Unit Masonry - Interior*									
					04.00.02.08	*Masonry Concrete Masonry Units, 8"*									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	3.00 opng	41.31 /opng	2.12 /opng	13.40 /opng	-	56.83 /opng	171	99.41 /opng	298
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	224.75 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	2,876	22.55 /cf	5,068
						Reinforcing, steel bars A615, placed horizontal, average #4 bar	305.66 lb	1.40 /lb	-	0.40 /lb	-	1.80 /lb	549	3.14 /lb	960
						Masonry reinforcing bars, #3 and #4 reinforcing steel bars, placed vertically, ASTM A615	224.75 lb	1.80 /lb	-	0.56 /lb	-	2.36 /lb	530	4.12 /lb	926
						Concrt block,high strngt,hollow,3500 psi,8"8"16",includs mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and verticl rnfrcng	899.00 SF	8.50 /SF	-	4.07 /SF	-	12.57 /SF	11,304	22.07 /SF	19,844
						Channel framing, structural steel, field fabricated, C6x8.2, incl cutting & welding	20.00 lf	40.69 /lf	1.97 /lf	6.85 /lf	-	49.51 /lf	990	86.25 /lf	1,725
						Silicone water repellants, sprayed on CMU, 2 coat	1,798.00 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	1,789	1.78 /sf	3,202
						04.00.02.08 Masonry Concrete Masonry Units, 8"	*899.00 SF*	*12.65 /SF*	*0.14 /SF*	*7.46 /SF*	*/SF*	*20.25 /SF*	*18,205*	*35.62 /SF*	*32,026*
						04.22 Concrete Unit Masonry - Interior	*899.00 SF*	*12.65 /SF*	*0.14 /SF*	*7.46 /SF*	*/SF*	*20.25 /SF*	*18,205*	*35.62 /SF*	*32,026*
						04.0 Masonry	*4,100.00 SF*	*12.87 /SF*	*0.11 /SF*	*8.10 /SF*	*/SF*	*21.08 /SF*	*86,445*	*37.11 /SF*	*152,137*
						04.00.002 Funks Reservoir Admin and Operations BLDG, Masonry	*4,100.00 SF*	*12.87 /SF*	*0.11 /SF*	*8.10 /SF*	*/SF*	*21.08 /SF*	*86,445*	*37.11 /SF*	*152,137*
		05.00.002				*Funks Reservoir Admin and Operations BLDG, Metals*									
			05.0			*Metals*									
				05.40		*Cold-formed Metal Framing*									
					05.10.01.10	*Metals, Steel Trusses*									
						Roof truss,using galv metal studs,fink (w) king post type,3:12 pitch,18 x 6"chrds,32'span,excl erectn,bridgng&bracing,fabrication only trusses on-site	57.00 ea	175.54 /ea	-	150.00 /ea	-	325.54 /ea	18,556	574.74 /ea	32,760
						Roof truss, using galv LB metal studs, to 3:12 pitch, 32' span, excl truss materials, bridging & bracing, erection only	57.00 ea	84.60 /ea	14.83 /ea	-	-	99.43 /ea	5,667	172.21 /ea	9,816
						Underlayment, plywood, underlayment grade, 1/2" thick	3,517.00 SF	1.31 /SF	-	2.00 /SF	-	3.31 /SF	11,623	5.87 /SF	20,642
						05.10.01.10 Metals, Steel Trusses	*3,517.00 SF*	*5.52 /SF*	*0.24 /SF*	*4.43 /SF*	*/SF*	*10.19 /SF*	*35,846*	*17.98 /SF*	*63,219*
						05.40 Cold-formed Metal Framing	*3,517.00 SF*	*5.52 /SF*	*0.24 /SF*	*4.43 /SF*	*/SF*	*10.19 /SF*	*35,846*	*17.98 /SF*	*63,219*
						05.0 Metals	*3,517.00 SF*	*5.52 /SF*	*0.24 /SF*	*4.43 /SF*	*/SF*	*10.19 /SF*	*35,846*	*17.98 /SF*	*63,219*
						05.00.002 Funks Reservoir Admin and Operations BLDG, Metals	*3,517.00 SF*	*5.52 /SF*	*0.24 /SF*	*4.43 /SF*	*/SF*	*10.19 /SF*	*35,846*	*17.98 /SF*	*63,219*
		07.00.002				*Funks Reservoir Admin and Operations BLDG, Metal Roofing*									
			07.0			*Thermal and Moisture Protection*									
				07.60		*Thermal & Moisture Protection*									
					07.60.02.06	*Thermal & Moisture Protection, Metal Roofing*									
						Steel roofing panels, on steel frame, flat profile, zinc aluminum alloy finish, 1-3/4" standing seams, 10" wide, 22 gauge	3,517.00 SF	2.88 /SF	-	4.47 /SF	-	7.35 /SF	25,838	13.05 /SF	45,894

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					07.80.02.00	*Thermal & Moisture Protection, Metal Roofing*									
						Aluminum downspouts, enameled, 3" x 4", .024" thick	56.00 lf	5.65 /lf	-	2.29 /lf	-	7.94 /lf	445	13.92 /lf	779
						Aluminum gutters, stock units, enameled, 5" box, .032" thick	214.00 lf	6.33 /lf	-	3.58 /lf	-	9.91 /lf	2,120	17.42 /lf	3,728
						Miscellaneous Items Allowance	1.00 ls	1,300.00 /ls	0.00 /ls	1,300.00 /ls	0.00 /ls	2,600.00 /ls	2,600	4,597.66 /ls	4,598
						07.80.02.00 Thermal & Moisture Protection, Metal Roofing	3,517.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.82 /SF	31,003	15.64 /SF	54,999
						07.00 Thermal & Moisture Protection	3,517.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.82 /SF	31,003	15.64 /SF	54,999
						07.0 Thermal and Moisture Protection	3,517.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.82 /SF	31,003	15.64 /SF	54,999
						07.00.002 Funks Reservoir Admin and Operations BLDG, Metal Roofing	3,517.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.82 /SF	31,003	15.64 /SF	54,999
		08.00.002				*Funks Reservoir Admin and Operations BLDG, Openings*									
			08.0			*Openings*									
				08.10		*Doors and Frames*									
					08.10.01.00	*Openings, Doors, Frames and Hardware*									
						Steel frames, knock down, 14 ga., to 6-3/4" throat, to 3070, single	13.00 EA	97.88 /EA	-	320.00 /EA	-	417.88 /EA	5,432	747.00 /EA	9,711
						Steel frms, knock down, 14 ga., to 8-3/4" throat, to 3'-0" x 7'-0", single	5.00 EA	137.64 /EA	-	430.00 /EA	-	567.64 /EA	2,838	1,014.38 /EA	5,072
						Steel frames, knock down, 14 ga., to 8-3/4" throat, to 6070, pair	1.00 EA	183.52 /EA	-	455.00 /EA	-	638.52 /EA	639	1,138.95 /EA	1,139
						Doors, commercial, steel, insulated, full panel, 18 ga., 3'-0" x 7'-0" x 1-3/4" thick	20.00 ea	97.88 /ea	-	520.00 /ea	-	617.88 /ea	12,358	1,107.92 /ea	22,158
						Add for baked enamel finish, average cost per leaf	20.00 leaf	12.94 /leaf	-	50.40 /leaf	-	63.34 /leaf	1,267	113.36 /leaf	2,267
						Average Door Hardware	20.00 ea	91.76 /ea	15.00 /ea	500.00 /ea		606.76 /ea	12,135	1,087.21 /ea	21,744
						08.10.01.00 Openings, Doors, Frames and Hardware	19.00 EA	326.09 /EA	15.79 /EA	1,482.79 /EA	/EA	1,824.67 /EA	34,669	3,267.99 /EA	62,092
						08.10 Doors and Frames	19.00 EA	326.09 /EA	15.79 /EA	1,482.79 /EA	/EA	1,824.67 /EA	34,669	3,267.99 /EA	62,092
				08.50		*Windows*									
					08.50.01.00	*Windows*									
						Aluminum punched window, 1" insulating glass, fixed, standard colors	290.00 sf	9.82 /sf	-	30.00 /sf	-	39.82 /sf	11,548	71.15 /sf	20,633
						08.50.01.00 Windows	0.00	/EA	/EA	/EA	/EA	/EA	11,548	/EA	20,633
						08.50 Windows	0.00	/EA	/EA	/EA	/EA	/EA	11,548	/EA	20,633
						08.0 Openings	19.00 EA	475.99 /EA	15.79 /EA	1,940.68 /EA	/EA	2,432.47 /EA	46,217	4,353.94 /EA	82,725
						08.00.002 Funks Reservoir Admin and Operations BLDG, Openings	19.00 EA	475.99 /EA	15.79 /EA	1,940.68 /EA	/EA	2,432.47 /EA	46,217	4,353.94 /EA	82,725
		09.00.002				*Funks Reservoir Admin and Operations BLDG, Metal Stud Walls*									
			09.0			*Finishes*									
				09.20		*Plaster and Gypsum Board*									
					09.20.01.00	*Finishes, Plaster & Gypsum Board*									
						Blanket insulation, for walls or ceilings, unfaced fiberglass, 3-1/2" thick, R13, 15" wide	3,939.00 sf	0.54 /sf	-	0.33 /sf	-	0.87 /sf	3,442	1.54 /sf	6,056
						3-5/8" Metal studs, galv, 20 ga., 16" oc, non load bearing, >10' ht.	3,939.00 SF	2.80 /SF	-	0.29 /SF	-	3.09 /SF	12,154	5.37 /SF	21,134
						18 to 16 ga x 1-1/2" channel bridging, studs 16"oc	3.03 clf	242.28 /clf	-	51.50 /clf	-	293.78 /clf	890	512.58 /clf	1,553
						Studs, drive pins & studs, 1/4" & 3/8" diameter	1.30 c	-	-	4.48 /c	-	4.48 /c	6	8.09 /c	11
						Gypsum wallboard, on walls, fire resistant, taped & finished (level 4 finish), 5/8" thick	7,878.00 sf	1.58 /sf	-	0.43 /sf	-	2.01 /sf	15,867	3.52 /sf	27,729
						09.20.01.00 Finishes, Plaster & Gypsum Board	3,939.00 SF	6.69 /SF	/SF	1.52 /SF	/SF	8.22 /SF	32,358	14.34 /SF	56,482
						09.20 Plaster and Gypsum Board	3,939.00 SF	6.69 /SF	/SF	1.52 /SF	/SF	8.22 /SF	32,358	14.34 /SF	56,482
						09.0 Finishes	3,939.00 SF	6.69 /SF	/SF	1.52 /SF	/SF	8.22 /SF	32,358	14.34 /SF	56,482
						09.00.002 Funks Reservoir Admin and Operations BLDG, Metal Stud Walls	3,939.00 SF	6.69 /SF	/SF	1.52 /SF	/SF	8.22 /SF	32,358	14.34 /SF	56,482
		09.00.004				*Funks Reservoir Admin and Operations BLDG, Finishes*									
			09.0			*Finishes*									
				09.00		*Finishes*									
					09.00.99.00	*Finishes, Other*									
						Finishes Allowance	3,414.00 SF	2.24 /SF	0.18 /SF	2.34 /SF		4.75 /SF	16,230	8.40 /SF	28,692
						09.00.99.00 Finishes, Other	3,414.00 SF	2.24 /SF	0.18 /SF	2.34 /SF	/SF	4.75 /SF	16,230	8.40 /SF	28,692
					09.50.01.00	*Finishes, Suspended Ceilings*									
						Blanket insulation, for walls or ceilings, kraft faced mineral fiber, 6" thick, R19	2,765.00 sf	0.46 /sf	-	1.29 /sf	-	1.75 /sf	4,835	3.12 /sf	8,634
						Suspended Acoustic Ceiling Tiles, mineral Fiber Tile, lay-in, fine texture, 2' x 2' or 2' x 4', 5/8" thick	2,765.00 SF	1.18 /SF	-	0.85 /SF	-	2.03 /SF	5,598	3.57 /SF	9,866
						Ceiling Suspension System, class A, 15/16" T bar, 2' x 4' grid	2,765.00 sf	0.92 /sf	-	0.93 /sf	-	1.85 /sf	5,109	3.27 /sf	9,035
						Hanging wire, 8' long, 12 gauge	27.65 csf	11.29 /csf	-	6.20 /csf	-	17.49 /csf	484	30.75 /csf	850
						Seismic bracing, 2-1/2" compression post with 4 bracing wires	19.00 ea	14.68 /ea	-	2.88 /ea	-	17.56 /ea	334	30.63 /ea	582
						09.50.01.00 Finishes, Suspended Ceilings	2,765.00 SF	2.77 /SF	/SF	3.15 /SF	/SF	5.92 /SF	16,359	10.48 /SF	28,968
					09.50.01.02	*Finishes, Gypsum Board Ceilings*									
						Blanket insulation, for walls or ceilings, kraft faced mineral fiber, 6" thick, R19	426.00 sf	0.46 /sf	-	1.29 /sf	-	1.75 /sf	745	3.12 /sf	1,330
						Ceilings, gypsum board, fire rated, finished, screwed to grid, channel or joists, over 8' high, 5/8" thick	426.00 SF	3.45 /SF	-	0.36 /SF	-	3.81 /SF	1,622	6.62 /SF	2,820
						Ceiling/soffit framing to 6" 18 ga. stud, 24" oc., flat	426.00 sf	6.89 /sf	-	1.34 /sf	-	8.23 /sf	3,507	14.36 /sf	6,116
						09.50.01.02 Finishes, Gypsum Board Ceilings	426.00 SF	10.80 /SF	/SF	2.99 /SF	/SF	13.79 /SF	5,874	24.10 /SF	10,266
						09.00 Finishes	6,605.00 SF	3.01 /SF	0.09 /SF	2.72 /SF	/SF	5.82 /SF	38,463	10.28 /SF	67,926
						09.0 Finishes	6,605.00 SF	3.01 /SF	0.09 /SF	2.72 /SF	/SF	5.82 /SF	38,463	10.28 /SF	67,926
						09.00.004 Funks Reservoir Admin and Operations BLDG, Finishes	6,605.00 SF	3.01 /SF	0.09 /SF	2.72 /SF	/SF	5.82 /SF	38,463	10.28 /SF	67,926
		21.00.002				*Funks Reservoir Admin and Operations BLDG, Fire Suppression System*									
			21.0			*Fire Suppression*									
				21.00		*Fire Suppression*									
					21.00.10.10	*Water-Based Fire-Suppression Systems*									
						Fire Suppression System Allowance	3,414.00 SF				15.00 /SF	15.00 /SF	51,210	25.98 /SF	88,700
						21.00.10.10 Water-Based Fire-Suppression Systems	3,414.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	51,210	25.98 /SF	88,700
						21.00 Fire Suppression	3,414.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	51,210	25.98 /SF	88,700
						21.0 Fire Suppression	3,414.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	51,210	25.98 /SF	88,700
						21.00.002 Funks Reservoir Admin and Operations BLDG, Fire Suppression System	3,414.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	51,210	25.98 /SF	88,700
		22.00.002				*Funks Reservoir Admin and Operations BLDG, Plumbing*									
			22.0			*Plumbing*									
				22.00		*Plumbing*									
					22.00.01.00	*Mechanical, Plumbing*									
						Lavatory, vanity top, rough-in, supply, waste and vent	2.00 ea	720.97 /ea	-	278.00 /ea	-	998.97 /ea	1,998	1,750.46 /ea	3,501
						Lavatory, wall hung, porcelain enamel on cast iron, white, single bowl, includes trim	2.00 ea	180.24 /ea	-	246.00 /ea	-	426.24 /ea	852	756.12 /ea	1,512
						Water closet, bowl only, wall hung, includes flush valve and seat	2.00 ea	248.61 /ea	-	1,100.00 /ea	-	1,348.61 /ea	2,697	2,415.67 /ea	4,831
						Water closet, bowl only, wall hung, rough-in, supply, waste and vent	2.00 ea	720.97 /ea	-	1,300.00 /ea	-	2,020.97 /ea	4,042	3,594.74 /ea	7,189
						Kitchenette Equipment and Rough-in	1.00 ls	1,441.94 /ls		2,000.00 /ls		3,441.94 /ls	3,442	6,106.75 /ls	6,107
						Supply, Waste and Vent Allowance	1.00 ls	7,209.64 /ls	1,000.00 /ls	10,000.00 /ls	0.00 /ls	18,209.64 /ls	18,210	32,265.67 /ls	32,266
						22.00.01.00 Mechanical, Plumbing	**3,414.00** SF	3.63 /SF	0.29 /SF	5.23 /SF	/SF	9.15 /SF	31,241	16.23 /SF	55,406
						22.00 Plumbing	**3,414.00** SF	3.63 /SF	0.29 /SF	5.23 /SF	/SF	9.15 /SF	31,241	16.23 /SF	55,406
						22.0 Plumbing	**3,414.00** SF	3.63 /SF	0.29 /SF	5.23 /SF	/SF	9.15 /SF	31,241	16.23 /SF	55,406
						22.00.002 Funks Reservoir Admin and Operations BLDG, Plumbing	**3,414.00** SF	3.63 /SF	0.29 /SF	5.23 /SF	/SF	9.15 /SF	31,241	16.23 /SF	55,406
		23.00.002				*Funks Reservoir Admin and Operations BLDG, HVAC*									
			23.0			*HVAC*									
				23.00		*HVAC*									
					23.00.02.00	*Mechanical, HVAC*									
						HVAC Allowance	3,414.00 SF				30.00 /SF	30.00 /SF	102,420	51.96 /SF	177,400
						23.00.02.00 Mechanical, HVAC	3,414.00 SF	/SF	/SF	/SF	30.00 /SF	30.00 /SF	102,420	51.96 /SF	177,400
						23.00 HVAC	3,414.00 SF	/SF	/SF	/SF	30.00 /SF	30.00 /SF	102,420	51.96 /SF	177,400
						23.0 HVAC	3,414.00 SF	/SF	/SF	/SF	30.00 /SF	30.00 /SF	102,420	51.96 /SF	177,400

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						23.00.002 Funks Reservoir Admin and Operations BLDG, HVAC	3,414.00 SF	/SF	/SF	/SF	30.00 /SF	30.00 /SF	102,420	51.96 /SF	177,400
		26.01.PRI				Primary Feed 100A									
			26.0			Electrical Work									
				26.00		Electrical									
					01.01.06.03	GC Equip, Tools, & Consumables									
						Roadway steel plates, 8' x 20' x 1"thick, avg cost per sf, monthly	160.00 sf	-	1.00 /sf	-	-	1.00 /sf	160	1.78 /sf	285
						01.01.06.03 GC Equip, Tools, & Consumables	1.00 LS	/LS	160.00 /LS	/LS	/LS	160.00 /LS	160	285.13 /LS	285
						26.00 Electrical	3,414.00 SF	/SF	0.05 /SF	/SF	/SF	0.05 /SF	160	0.08 /SF	285
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	3.00 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	7,760	4,691.23 /ton	14,074
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	1,000.00 LF	12.97 /LF	-	3.72 /LF	-	16.69 /LF	16,693	30.02 /LF	30,018
						26.10.02.00 Site Electrical, Buried Conduit	1,000.00 LF	17.36 /LF	/LF	7.10 /LF	/LF	24.45 /LF	24,453	44.09 /LF	44,092
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrc undrgr ducts and manhls,man holes,precast w/iron racks&pulling irons,ci frame and cover,6'x8'7',excluds excavtn,backfil and cast place concrete	3.00 EA	3,001.22 /EA	341.95 /EA	3,375.00 /EA	-	6,718.17 /EA	20,155	12,217.04 /EA	36,651
						26.10.04.00 Site Electrical, Manholes/Handholes	3.00 EA	3,001.22 /EA	341.95 /EA	3,375.00 /EA	/EA	6,718.17 /EA	20,155	12,217.04 /EA	36,651
						26.10 Site Electrical	1.00 LS	26,358.67 /LS	1,025.85 /LS	17,220.00 /LS	/LS	44,607.59 /LS	44,608	80,743.03 /LS	80,743
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Cable terminations, indoor, insulation diameter range, 15 kV, .525" to 1.025", pad mount	6.00 ea	162.16 /ea	-	109.00 /ea	-	271.16 /ea	1,627	491.14 /ea	2,947
						Medium-cable single cable, copper, XLP shielding, ungrounded neutral, 15 kV, #1, in conduit, excl splicing & terminations	15.45 clf	518.92 /clf	-	365.00 /clf	-	883.92 /clf	13,657	1,601.69 /clf	24,746
						26.15.01.00 Process Electrical, Wire/Cable	1,545.00 LF	5.82 /LF	/LF	4.07 /LF	/LF	9.89 /LF	15,284	17.92 /LF	27,693
					26.15.11.00	Process Electrical, Grounding									
						Grounding rod, copper clad, 8' long, 3/4" diameter	1.00 ea	195.82 /ea	-	36.00 /ea	-	231.82 /ea	232	415.74 /ea	416
						Ground wire, copper wire, bare stranded, 4/0	5.15 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	4,038	1,427.88 /clf	7,354
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	5.00 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	804	288.68 /ea	1,443
						26.15.11.00 Process Electrical, Grounding	515.00 LF	5.28 /LF	/LF	4.57 /LF	/LF	9.85 /LF	5,074	17.89 /LF	9,213
						26.15 Process Electrical	3,414.00 SF	3.43 /SF	/SF	2.53 /SF	/SF	5.96 /SF	20,358	10.81 /SF	36,906
						26.0 Electrical Work	3,414.00 SF	11.15 /SF	0.35 /SF	7.58 /SF	/SF	19.08 /SF	65,125	34.54 /SF	117,934
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	29.67 CY	194.63 /CY	1.76 /CY	77.50 /CY	-	273.89 /CY	8,127	425.24 /CY	12,618
						End bulkheads, plywood, concrete envelope/encasement	3.55 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	51	21.83 /sf	78
						31.20.07.15 Earthworks, Sitework, Borrow	29.67 CY	196.24 /CY	1.76 /CY	77.59 /CY	/CY	275.59 /CY	8,178	427.85 /CY	12,696
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	386.82 CY	1.94 /CY	23.32 /CY	-	-	25.26 /CY	9,772	38.71 /CY	14,972
						31.20.09.10 Earthworks, Sitework, Backfill	386.82 CY	1.94 /CY	23.32 /CY	/CY	/CY	25.26 /CY	9,772	38.71 /CY	14,972
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	32.91 CY	10.88 /CY	9.31 /CY	-	-	20.19 /CY	664	30.94 /CY	1,018
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	32.91 CY	10.88 /CY	9.31 /CY	/CY	/CY	20.19 /CY	664	30.94 /CY	1,018
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	419.72 CY	5.93 /CY	23.02 /CY	-	-	28.95 /CY	12,149	44.35 /CY	18,613
						31.25.01.00 Earthworks, Structural, Excavation	419.72 CY	5.93 /CY	23.02 /CY	/CY	/CY	28.95 /CY	12,149	44.35 /CY	18,613
						26.10 Site Electrical	1.00 LS	9,420.17 /LS	19,040.64 /LS	2,302.25 /LS	/LS	30,763.06 /LS	30,763	47,298.59 /LS	47,299
						31.0 Earthwork	869.12 CY	10.84 /CY	21.91 /CY	2.65 /CY	/CY	35.40 /CY	30,763	54.42 /CY	47,299
						26.01.PRI Primary Feed 100A	1,000.00 LF	47.49 /LF	20.23 /LF	28.17 /LF	/LF	95.89 /LF	95,888	165.23 /LF	165,232
		26.03.XFMR				Pad Mounted Transformer, Meter, and Grounding									
			26.0			Electrical Work									
				26.10		Site Electrical									
					03.05.00.00	Concrete Pad									
						Concrete in place, curbs and pads, including formwork & resteel	36.00 sf	22.91 /sf	1.00 /sf	2.00 /sf	-	25.91 /sf	933	46.31 /sf	1,667
						03.05.00.00 Concrete Pad	0.00	/CY	/CY	/CY	/CY	/CY	933	/CY	1,667
						26.10 Site Electrical	1.00 LS	824.76 /LS	36.00 /LS	72.00 /LS	/LS	932.76 /LS	933	1,667.16 /LS	1,667
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Grounding rod, copper clad, 10' long, 3/4" diameter	4.00 ea	235.88 /ea	-	53.00 /ea	-	288.88 /ea	1,156	518.64 /ea	2,075
						Ground wire, copper wire, bare stranded, 4/0	1.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	784	1,427.89 /clf	1,428
						Exothermic weld, 4/0 wire to 4/0 wire	6.00 ea	148.26 /ea	-	9.45 /ea	-	157.71 /ea	946	281.74 /ea	1,690
						Exothermic weld, mold reusable for above	2.00 ea	-	-	141.00 /ea	-	141.00 /ea	282	261.51 /ea	523
						26.15.11.00 Process Electrical, Grounding	100.00 LF	21.97 /LF	/LF	9.71 /LF	/LF	31.68 /LF	3,168	57.16 /LF	5,716
					26.25.03.00	Electrical Equipment, Switchgear - General									
						Allowance for metering at transformer	1.00 EA	1,037.85 /EA	-	2,500.00 /EA	-	3,537.85 /EA	3,538	6,485.99 /EA	6,486
						26.25.03.00 Electrical Equipment, Switchgear - General	1.00 EA	1,037.85 /EA	/EA	2,500.00 /EA	/EA	3,537.85 /EA	3,538	6,485.99 /EA	6,486
						26.15 Process Electrical	3,414.00 SF	0.95 /SF	/SF	1.02 /SF	/SF	1.96 /SF	6,706	3.57 /SF	12,202
				26.25		Facility Electrical									
					26.25.06.00	Transformers, Dry Type									
						Transformer, oil-filled, 15 kV with taps, 480 V secondary 3 phase, 225 kVA, pad mounted	1.00 EA	4,721.29 /EA	259.04 /EA	16,900.00 /EA	-	21,880.33 /EA	21,880	40,217.90 /EA	40,218
						26.25.06.00 Transformers, Dry Type	1.00 EA	4,721.29 /EA	259.04 /EA	16,900.00 /EA	/EA	21,880.33 /EA	21,880	40,217.90 /EA	40,218
						26.25 Facility Electrical	1.00 LS	4,721.29 /LS	259.04 /LS	16,900.00 /LS	/LS	21,880.33 /LS	21,880	40,217.90 /LS	40,218
						26.0 Electrical Work	3,414.00 SF	2.57 /SF	0.09 /SF	5.99 /SF	/SF	8.65 /SF	29,519	15.84 /SF	54,087
						26.03.XFMR Pad Mounted Transformer, Meter, and Grounding	225.00 kVA	39.03 /kVA	1.31 /kVA	90.86 /kVA	/kVA	131.19 /kVA	29,519	240.39 /kVA	54,087
		26.05.GRDG				Facility Grounding									
			26.0			Electrical Work									
				26.00		Electrical									
					01.01.06.03	GC Equip, Tools, & Consumables									
						Rent trencher chain boom gas oper walking 12 HP	3.00 day	-	156.95 /day	-	-	156.95 /day	471	279.70 /day	839
						01.01.06.03 GC Equip, Tools, & Consumables	1.00 LS	/LS	470.85 /LS	/LS	/LS	470.85 /LS	471	839.10 /LS	839
						26.00 Electrical	3,414.00 SF	/SF	0.14 /SF	/SF	/SF	0.14 /SF	471	0.25 /SF	839
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Copper Bus Bar .25"x 3.0"	4.00 lf	30.36 /lf	-	52.90 /lf	-	83.26 /lf	333	152.21 /lf	609
						Copper Bus Bar Supports	6.00 E	121.44 /E	-	48.30 /E	-	169.74 /E	1,018	305.98 /E	1,836
						Grounding rod, copper clad, 15' long, 3/4" diameter	8.00 ea	259.46 /ea	-	55.00 /ea	-	314.46 /ea	2,516	564.38 /ea	4,515
						Ground wire, copper wire, bare stranded, 4/0	5.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	3,921	1,427.89 /clf	7,139
						Water pipe ground clamps, heavy duty, bronze, 2-1/2" to 3" diameter	2.00 ea	172.98 /ea	-	60.50 /ea	-	233.48 /ea	467	420.46 /ea	841
						Exothermic weld, 4/0 wire to 4/0 wire	40.00 ea	148.26 /ea	-	9.45 /ea	-	157.71 /ea	6,309	281.74 /ea	11,270
						Exothermic weld, mold reusable for above	10.00 ea	-	-	141.00 /ea	-	141.00 /ea	1,410	261.50 /ea	2,615
						Protective boxes at grade level, round, concrete, 12" long, incl breather slots	2.00 ea	64.87 /ea	-	112.00 /ea	-	176.87 /ea	354	323.31 /ea	647

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.15.11.00 Process Electrical, Grounding	**500.00** LF	22.31 /LF	/LF	10.35 /LF	/LF	32.65 /LF	16,327	58.94 /LF	29,472
						26.15 Process Electrical	**3,414.00** SF	3.27 /SF	/SF	1.52 /SF	/SF	4.78 /SF	16,327	8.63 /SF	29,472
						26.0 Electrical Work	**3,414.00** SF	3.27 /SF	0.14 /SF	1.52 /SF	/SF	4.92 /SF	16,799	8.88 /SF	30,311
						26.05.GRDG Facility Grounding	**3,414.00** SF	3.27 /SF	0.14 /SF	1.52 /SF	/SF	4.92 /SF	16,799	8.88 /SF	30,311
		26.10.SEC				*Secondary Power Feed 225A*									
			26.0			*Electrical Work*									
				26.10		*Site Electrical*									
					26.10.02.00	*Site Electrical, Buried Conduit*									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.60 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	1,552	4,691.23 /ton	2,815
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	220.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	3,672	30.02 /lf	6,604
						26.10.02.00 Site Electrical, Buried Conduit	**220.00** LF	16.96 /LF	/LF	6.79 /LF	/LF	23.75 /LF	5,224	42.81 /LF	9,419
						26.10 Site Electrical	**1.00** LS	3,731.07 /LS	/LS	1,493.40 /LS	/LS	5,224.47 /LS	5,224	9,418.74 /LS	9,419
				26.15		*Process Electrical*									
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	5.00 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	4,284	1,554.71 /clf	7,774
						26.15.01.00 Process Electrical, Wire/Cable	**500.00** LF	4.72 /LF	/LF	3.85 /LF	/LF	8.57 /LF	4,284	15.55 /LF	7,774
					26.15.11.00	*Process Electrical, Grounding*									
						Ground wire, copper wire, bare stranded, 4/0	1.03 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	808	1,427.86 /clf	1,471
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	1.00 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	161	288.69 /ea	289
						26.15.11.00 Process Electrical, Grounding	**103.00** LF	4.90 /LF	/LF	4.50 /LF	/LF	9.40 /LF	968	17.09 /LF	1,759
						26.15 Process Electrical	**3,414.00** SF	0.84 /SF	/SF	0.70 /SF	/SF	1.54 /SF	5,252	2.79 /SF	9,533
						26.0 Electrical Work	**3,414.00** SF	1.93 /SF	/SF	1.14 /SF	/SF	3.07 /SF	10,477	5.55 /SF	18,952
			31.0			*Earthwork*									
				26.10		*Site Electrical*									
					31.20.07.15	*Earthworks, Sitework, Borrow*									
						Concrete (red) envelope/encasement, poured neat	5.94 CY	194.63 /CY	1.76 /CY	77.50 /CY	-	273.89 /CY	1,626	425.24 /CY	2,524
						End bulkheads, plywood, concrete envelope/encasement	0.71 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	10	21.83 /sf	16
						31.20.07.15 Earthworks, Sitework, Borrow	5.94 CY	196.24 /CY	1.76 /CY	77.59 /CY	/CY	275.59 /CY	1,636	427.85 /CY	2,539
					31.20.09.10	*Earthworks, Sitework, Backfill*									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	77.36 CY	1.94 /CY	23.32 /CY	-	-	25.26 /CY	1,954	38.70 /CY	2,994
						31.20.09.10 Earthworks, Sitework, Backfill	77.36 CY	1.94 /CY	23.32 /CY	/CY	/CY	25.26 /CY	1,954	38.70 /CY	2,994
					31.20.15.00	*Earthworks, Sitework, Hauling and Dump Fees*									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	6.58 CY	10.88 /CY	9.31 /CY	-	-	20.19 /CY	133	30.94 /CY	204
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	6.58 CY	10.88 /CY	9.31 /CY	/CY	/CY	20.19 /CY	133	30.94 /CY	204
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	83.94 CY	5.93 /CY	23.02 /CY	-	-	28.95 /CY	2,430	44.35 /CY	3,723
						31.25.01.00 Earthworks, Structural, Excavation	83.94 CY	5.93 /CY	23.02 /CY	/CY	/CY	28.95 /CY	2,430	44.35 /CY	3,723
						26.10 Site Electrical	**1.00** LS	1,884.11 /LS	3,808.12 /LS	460.68 /LS	/LS	6,152.71 /LS	6,153	9,459.85 /LS	9,460
						31.0 Earthwork	173.82 CY	10.84 /CY	21.91 /CY	2.65 /CY	/CY	35.40 /CY	6,153	54.42 /CY	9,460
						26.10.SEC Secondary Power Feed 225A	**500.00** LF	16.96 /LF	7.62 /LF	8.69 /LF	/LF	33.26 /LF	16,629	56.82 /LF	28,412
		26.20.DIST				*Electrical Distribution Equipment*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 1-1/2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	40.00 lf	11.53 /lf	-	3.46 /lf	-	14.99 /lf	600	26.97 /lf	1,079
						Flexible metallic conduit, steel, 1-1/2" diameter	3.00 lf	20.76 /lf	-	2.55 /lf	-	23.31 /lf	70	41.72 /lf	125
						Flexible metallic conduit, steel, 2" diameter	3.00 lf	25.95 /lf	-	3.23 /lf	-	29.18 /lf	88	52.23 /lf	157
						Flexible metallic conduit, steel, connectors, insulated, 1-1/2" diameter	1.00 ea	32.43 /ea	-	24.50 /ea	-	56.93 /ea	57	103.23 /ea	103
						Flexible metallic conduit, steel, connectors, insulated, 2" diameter	1.00 ea	45.12 /ea	-	26.00 /ea	-	71.12 /ea	71	128.62 /ea	129
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 1-1/2" diameter	1.00 ea	45.12 /ea	-	46.00 /ea	-	91.12 /ea	91	165.72 /ea	166
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 2" diameter	1.00 ea	57.66 /ea	-	67.00 /ea	-	124.66 /ea	125	227.01 /ea	227
						Panelboards, 3 phase 4 wire, main lugs, 277/480 V, 100 amp, 20 circuits, NEHB, incl 20 A 1 pole plug-in breakers	1.00 ea	1,729.74 /ea	-	2,200.00 /ea	-	3,929.74 /ea	3,930	7,162.64 /ea	7,163
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 100 amp, 30 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,594.61 /ea	-	2,125.00 /ea	-	4,719.61 /ea	4,720	8,564.84 /ea	8,565
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	4,125.00 /ea	-	7,831.59 /ea	7,832	14,255.64 /ea	14,256
						26.00.99.00 Electrical, Other	**3,414.00** SF	2.58 /SF	/SF	2.57 /SF	/SF	5.15 /SF	17,582	9.36 /SF	31,969
					26.10.03.00	*UG Conduit*									
						Uninterruptible power supply, charger, inverter, and alarm 1 phase, 120 V, 5 kVA, incl 10 minutes battery	1.00 ea	6,182.64 /ea	356.18 /ea	7,100.00 /ea	-	13,638.82 /ea	13,639	24,820.28 /ea	24,820
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	13,639	/LF	24,820
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #6, type XHHW, in raceway	0.25 clf	159.68 /clf	-	54.50 /clf	-	214.20 /clf	54	385.68 /clf	96
						Wire, copper, stranded, 600 volt, #4, type XHHW, in raceway	0.15 clf	195.80 /clf	-	77.50 /clf	-	273.30 /clf	41	492.73 /clf	74
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	1.00 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	418	757.26 /clf	757
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	0.60 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	514	1,554.72 /clf	933
						26.15.01.00 Process Electrical, Wire/Cable	**200.00** LF	3.08 /LF	/LF	2.06 /LF	/LF	5.14 /LF	1,027	9.30 /LF	1,860
						26.15 Process Electrical	**3,414.00** SF	4.57 /SF	0.10 /SF	4.77 /SF	/SF	9.45 /SF	32,248	17.18 /SF	58,649
				26.25		*Facility Electrical*									
					26.25.06.00	*Transformers, Dry Type*									
						Transformer, dry-type, ventilated, 3 phase 480 V primary 120/208 V secondary, 30 kVA	1.00 ea	2,306.32 /ea	-	1,800.00 /ea	-	4,106.32 /ea	4,106	7,448.33 /ea	7,448
						26.25.06.00 Transformers, Dry Type	**1.00** EA	2,306.32 /EA	/EA	1,800.00 /EA	/EA	4,106.32 /EA	4,106	7,448.33 /EA	7,448
						26.25 Facility Electrical	**1.00** LS	2,306.32 /LS	/LS	1,800.00 /LS	/LS	4,106.32 /LS	4,106	7,448.33 /LS	7,448
						26.0 Electrical Work	**3,414.00** SF	5.25 /SF	0.10 /SF	5.30 /SF	/SF	10.65 /SF	36,354	19.36 /SF	66,097
						26.20.DIST Electrical Distribution Equipment	**325.00** AMP	55.12 /AMP	1.10 /AMP	55.65 /AMP	/AMP	111.86 /AMP	36,354	203.38 /AMP	66,097
		26.25.LTG				*Interior Lighting and Control*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	870.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	7,876	16.21 /lf	14,104
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	58.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	3,205	98.73 /ea	5,726
						Outlet boxes, pressed steel, covers, blank, 4" square	36.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	612	30.33 /ea	1,092
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	22.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	393	31.98 /ea	704
						26.00.99.00 Electrical, Other	**3,414.00** SF	3.18 /SF	/SF	0.35 /SF	/SF	3.54 /SF	12,086	6.33 /SF	21,625
					26.10.03.00	*UG Conduit*									
						Toggle switch, quiet type, single pole, 20 amp	2.00 ea	38.44 /ea	-	3.46 /ea	-	41.90 /ea	84	74.92 /ea	150
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	84	/LF	150
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	34.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	3,674	193.55 /clf	6,581

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	3.50 clf	103.79 /clf	-	20.50 /clf	-	124.29 /clf	435	222.98 /clf	780
						26.15.01.00 Process Electrical, Wire/Cable	3,750.00 LF	0.95 /LF	/LF	0.14 /LF	/LF	1.10 /LF	4,109	1.96 /LF	7,361
						26.15 Process Electrical	3,414.00 SF	3.26 /SF	/SF	0.51 /SF	/SF	4.77 /SF	16,273	8.53 /SF	29,128
				26.20		Facility Electrical									
					26.20.03.00	Facility Electrical, Lighting									
						LED Strip Light, hdwe	9.00 ea	182.08 /ea	-	110.00 /ea	-	292.08 /ea	2,629	528.48 /ea	4,756
						LED Lay-in, hdwe	38.00 ea	207.57 /ea	-	150.00 /ea	-	357.57 /ea	13,588	648.09 /ea	24,628
						LED Downlight, hdwe	5.00 ea	129.73 /ea	-	80.00 /ea	-	209.73 /ea	1,049	379.56 /ea	1,898
						LED Foyer Indirect, hdwe	2.00 ea	207.57 /ea	-	250.00 /ea	-	457.57 /ea	915	833.55 /ea	1,667
						Emergency ballast, material only, interior, factory installed in fixture	19.00 ea	-	-	152.00 /ea	-	152.00 /ea	2,888	281.90 /ea	5,356
						Exit lighting, L.E.D. standard, single face, ceiling or wall mount	4.00 ea	129.73 /ea	-	70.00 /ea	-	199.73 /ea	799	361.01 /ea	1,444
						Automatic wall switches	16.00 ea	43.24 /ea	-	50.00 /ea	-	93.24 /ea	1,492	169.79 /ea	2,717
						Fixture whips, 3/8" greenfield, 2 connectors, THHN wire, three #14, 6' long	43.00 ea	32.43 /ea	-	5.45 /ea	-	37.88 /ea	1,629	67.91 /ea	2,920
						26.20.03.00 Facility Electrical, Lighting	3,414.00 SF	3.87 /SF	/SF	3.45 /SF	/SF	7.32 /SF	24,989	13.29 /SF	45,386
						26.20 Facility Electrical	3,414.00 SF	3.87 /SF	/SF	3.45 /SF	/SF	7.32 /SF	24,989	13.29 /SF	45,386
						26.0 Electrical Work	3,414.00 SF	8.13 /SF	/SF	3.96 /SF	/SF	12.09 /SF	41,267	21.83 /SF	74,522
						26.25.LTG Interior Lighting and Control	1.00 LS	27,739.43 /LS	/LS	13,527.42 /LS	/LS	41,266.85 /LS	41,267	74,521.83 /LS	74,522
		26.26.EXTLTG				Exterior Lighting and Control									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	50.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	453	16.21 /lf	811
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	3.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	166	98.73 /ea	296
						Outlet boxes, pressed steel, covers, blank, 4" square	3.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	51	30.33 /ea	91
						26.00.99.00 Electrical, Other	3,414.00 SF	0.18 /SF	/SF	0.02 /SF	/SF	0.20 /SF	669	0.35 /SF	1,198
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	1.80 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	194	193.53 /clf	348
						26.15.01.00 Process Electrical, Wire/Cable	180.00 LF	0.94 /LF	/LF	0.14 /LF	/LF	1.08 /LF	194	1.94 /LF	348
					26.15.07.00	Lighting									
						LED Area Light	3.00 E	97.30 /E	-		-	97.30 /E	292	173.39 /E	520
						Wallpack Photocell	3.00 E	32.43 /E	-		-	32.43 /E	97	57.80 /E	173
						26.15.07.00 Lighting	1.00 LS	389.19 /LS	/LS	/LS	/LS	389.19 /LS	389	693.58 /LS	694
						26.15 Process Electrical	3,414.00 SF	0.34 /SF	/SF	0.03 /SF	/SF	0.37 /SF	1,253	0.66 /SF	2,240
						26.0 Electrical Work	3,414.00 SF	0.34 /SF	/SF	0.03 /SF	/SF	0.37 /SF	1,253	0.66 /SF	2,240
						26.26.EXTLTG Exterior Lighting and Control	1.00 LS	1,162.52 /LS	/LS	90.58 /LS	/LS	1,253.10 /LS	1,253	2,239.69 /LS	2,240
		26.30.DEV				Device Outlets									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	1,820.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	16,477	16.21 /lf	29,505
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	91.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	5,029	98.73 /ea	8,984
						Outlet boxes, pressed steel, covers, blank, 4" square	20.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	340	30.33 /ea	607
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	71.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	1,269	31.98 /ea	2,270
						Duplex receptacle, grounded, 120 volt, 20 amp	61.00 ea	38.44 /ea	-	10.65 /ea	-	49.09 /ea	2,994	88.25 /ea	5,383
						Duplex receptacle, ground fault interrupting, 20 amp	10.00 ea	38.44 /ea	-	45.00 /ea	-	83.44 /ea	834	151.96 /ea	1,520
						26.00.99.00 Electrical, Other	3,414.00 SF	6.87 /SF	/SF	1.02 /SF	/SF	7.89 /SF	26,944	14.14 /SF	48,269
					26.10.03.00	UG Conduit									
						WP cover	5.00 ea	17.30 /ea	-	42.50 /ea	-	59.80 /ea	299	109.65 /ea	548
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	299	/LF	548
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	51.60 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	5,575	193.55 /clf	9,987
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	3.00 clf	103.78 /clf	-	20.50 /clf	-	124.28 /clf	373	222.97 /clf	669
						26.15.01.00 Process Electrical, Wire/Cable	5,460.00 LF	0.95 /LF	/LF	0.14 /LF	/LF	1.09 /LF	5,948	1.95 /LF	10,656
						26.15 Process Electrical	3,414.00 SF	8.41 /SF	/SF	1.31 /SF	/SF	9.72 /SF	33,191	17.42 /SF	59,473
						26.0 Electrical Work	3,414.00 SF	8.41 /SF	/SF	1.31 /SF	/SF	9.72 /SF	33,191	17.42 /SF	59,473
						26.30.DEV Device Outlets	1.00 LS	28,723.16 /LS	/LS	4,467.90 /LS	/LS	33,191.06 /LS	33,191	59,473.26 /LS	59,473
		26.40.EQCON				Facility Equipment Connections and Controls									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.00.99.00	Electrical, Other									
						Motor connections, flexible conduit and fittings, 3 phase, 460 volt, 5 HP motor	4.00 ea	129.73 /ea	-	6.35 /ea	-	136.08 /ea	544	242.97 /ea	972
						Motor connections, flexible conduit and fittings, 3 phase, 460 volt, 10 HP motor	2.00 ea	129.73 /ea	-	6.35 /ea	-	136.08 /ea	272	242.96 /ea	486
						Motor connections, flexible conduit and fittings, 3 phase, sealtite, 460 volt, 10 HP motor	2.00 ea	129.73 /ea	-	9.30 /ea	-	139.03 /ea	278	248.44 /ea	497
						26.00.99.00 Electrical, Other	3,414.00 SF	0.30 /SF	/SF	0.02 /SF	/SF	0.32 /SF	1,095	0.57 /SF	1,955
						26.10 Site Electrical	1.00 LS	1,037.84 /LS	/LS	56.70 /LS	/LS	1,094.54 /LS	1,095	1,954.66 /LS	1,955
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	300.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	2,716	16.21 /lf	4,863
						Electric metallic tubing (EMT), 1" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	9.03 /lf	-	1.80 /lf	-	10.83 /lf	2,165	19.42 /lf	3,884
						26.00.99.00 Electrical, Other	3,414.00 SF	1.23 /SF	/SF	0.20 /SF	/SF	1.43 /SF	4,881	2.56 /SF	8,748
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	4.50 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	486	193.55 /clf	871
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	9.00 clf	103.78 /clf	-	20.50 /clf	-	124.28 /clf	1,119	222.97 /clf	2,007
						Wire, copper, stranded, 600 volt, #8, type XHHW, in raceway	13.00 clf	129.73 /clf	-	34.00 /clf	-	163.73 /clf	2,129	294.25 /clf	3,825
						26.15.01.00 Process Electrical, Wire/Cable	2,650.00 LF	1.15 /LF	/LF	0.26 /LF	/LF	1.41 /LF	3,733	2.53 /LF	6,703
					26.20.05.00	Facility Electrical, HVAC									
						HVAC controls - electrical contractor scope	1.00 LS		-	3,500.00 /LS	-	3,500.00 /LS	3,500	6,491.06 /LS	6,491
						26.20.05.00 Facility Electrical, HVAC	3,414.00 SF	/SF	/SF	1.03 /SF	/SF	1.03 /SF	3,500	1.90 /SF	6,491
						26.15 Process Electrical	3,414.00 SF	2.13 /SF	/SF	1.43 /SF	/SF	3.55 /SF	12,114	6.42 /SF	21,942
						26.0 Electrical Work	3,414.00 SF	2.43 /SF	/SF	1.44 /SF	/SF	3.87 /SF	13,209	7.00 /SF	23,896
						26.40.EQCON Facility Equipment Connections and Controls	8.00 ALO	1,036.37 /ALO	/ALO	615.73 /ALO	/ALO	1,651.10 /ALO	13,209	2,987.05 /ALO	23,896
		26.80.LPS				Facility Lightning Protection System									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.15.10.00	Process Electrical, Lightning Protection									
						Air terminal and base, copper, 3/8" dia x 10", to 75' h	20.00 ea	129.73 /ea	-	26.00 /ea	-	155.73 /ea	3,115	279.41 /ea	5,588
						Lightning protection cable, copper, 220 lb per thousand feet, to 75' h	1,000.00 lf	3.24 /lf	-	3.18 /lf	-	6.42 /lf	6,423	11.68 /lf	11,677
						26.15.10.00 Process Electrical, Lightning Protection	3,414.00 SF	1.71 /SF	/SF	1.08 /SF	/SF	2.79 /SF	9,538	5.06 /SF	17,266
						26.15 Process Electrical	3,414.00 SF	1.71 /SF	/SF	1.08 /SF	/SF	2.79 /SF	9,538	5.06 /SF	17,266
				26.20		Facility Electrical									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.15.10.00	Process Electrical, Lightning Protection									
						LPS design and certification, misc mat and labor	1.00 LS	4,540.57 /LS	-	2,000.00 /LS	5,000.00 /LS	11,540.57 /LS	11,541	20,711.30 /LS	20,711
						26.15.10.00 Process Electrical, Lightning Protection	3,414.00 SF	1.33 /SF	/SF	0.59 /SF	1.47 /SF	3.38 /SF	11,541	6.07 /SF	20,711
						26.20 Facility Electrical	3,414.00 SF	1.33 /SF	/SF	0.59 /SF	1.47 /SF	3.38 /SF	11,541	6.07 /SF	20,711
						26.0 Electrical Work	3,414.00 SF	3.04 /SF	/SF	1.67 /SF	1.47 /SF	6.17 /SF	21,078	11.12 /SF	37,977
						26.90.LPS Facility Lightning Protection System	3,414.00 SF	3.04 /SF	/SF	1.67 /SF	1.47 /SF	6.17 /SF	21,078	11.12 /SF	37,977
		27.10.COMEQ				Communications Room Equipment									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	1,811	16.21 /lf	3,242
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	4.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	221	98.72 /ea	395
						Outlet boxes, pressed steel, covers, blank, 4" square	4.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	68	30.33 /ea	121
						Duplex receptacle, grounded, 120 volt, 20 amp	4.00 ea	38.44 /ea	-	10.65 /ea	-	49.09 /ea	196	88.25 /ea	353
						26.00.99.00 Electrical, Other	3,414.00 SF	0.59 /SF	/SF	0.08 /SF	/SF	0.67 /SF	2,296	1.20 /SF	4,112
					26.15.01.00	Process Electrical, Wire/Cable									
						Closet Distribution Frame (CDF), 7 feet tall, 19 inches wide	1.00 E	364.31 /E	-	123.00 /E	-	487.31 /E	487	877.34 /E	877
						Network Equipment Allowance	1.00 LS	24,287.06 /LS	-	20,000.00 /LS	-	44,287.06 /LS	44,287	80,373.38 /LS	80,373
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	6.50 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	702	193.54 /clf	1,258
						26.15.01.00 Process Electrical, Wire/Cable	350.00 LF	72.19 /LF	/LF	57.75 /LF	/LF	129.93 /LF	45,477	235.74 /LF	82,509
					26.15.03.00	Process Electrical, Cable Tray									
						Cable tray, ladder type, galvanized steel, 4" deep, 4" rung spacing, 12" wide, to 15' elevation, incl fittings & supports	30.00 lf	24.14 /lf	-	17.95 /lf	-	42.09 /lf	1,263	76.30 /lf	2,289
						26.15.03.00 Process Electrical, Cable Tray	30.00 LF	24.14 /LF	/LF	17.95 /LF	/LF	42.09 /LF	1,263	76.30 /LF	2,289
						26.15 Process Electrical	3,414.00 SF	8.21 /SF	/SF	6.16 /SF	/SF	14.36 /SF	49,035	26.04 /SF	88,909
						26.0 Electrical Work	3,414.00 SF	8.21 /SF	/SF	6.16 /SF	/SF	14.36 /SF	49,035	26.04 /SF	88,909
						27.10.COMEQ Communications Room Equipment	1.00 LS	28,011.60 /LS	/LS	21,023.71 /LS	/LS	49,035.31 /LS	49,035	88,909.37 /LS	88,909
		27.20.COMOUT				Comm Outlets									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 1" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	1,600.00 lf	9.03 /lf	-	1.80 /lf	-	10.83 /lf	17,320	19.42 /lf	31,074
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	24.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	1,326	98.73 /ea	2,369
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	24.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	429	31.98 /ea	767
						26.00.99.00 Electrical, Other	3,414.00 SF	4.71 /SF	/SF	0.88 /SF	/SF	5.59 /SF	19,075	10.02 /SF	34,211
						26.15 Process Electrical	3,414.00 SF	4.71 /SF	/SF	0.88 /SF	/SF	5.59 /SF	19,075	10.02 /SF	34,211
						26.0 Electrical Work	3,414.00 SF	4.71 /SF	/SF	0.88 /SF	/SF	5.59 /SF	19,075	10.02 /SF	34,211
			27.0			Communications									
				27.00		Communications									
					27.30.01.00	Comm Cable									
						Unshielded twisted pair (UTP) cable, stranded, PVC jacket, #24, 4 pair, category 6	20.00 clf	148.26 /clf	-	15.45 /clf	-	163.71 /clf	3,274	251.94 /clf	5,039
						Shielded twisted pair (UTP) jack, RJ-45, category 6	48.00 ea	17.30 /ea	-	6.90 /ea	-	24.20 /ea	1,161	37.57 /ea	1,804
						27.30.01.00 Comm Cable	1.00 LS	3,795.55 /LS	/LS	640.20 /LS	/LS	4,435.75 /LS	4,436	6,842.37 /LS	6,842
						27.00 Communications	1.00 LS	3,795.55 /LS	/LS	640.20 /LS	/LS	4,435.75 /LS	4,436	6,842.37 /LS	6,842
						27.0 Communications	3,414.00 SF	1.11 /SF	/SF	0.19 /SF	/SF	1.30 /SF	4,436	2.00 /SF	6,842
						27.20.COMOUT Comm Outlets	24.00 EA	827.91 /EA	/EA	151.71 /EA	/EA	979.61 /EA	23,511	1,710.54 /EA	41,053
		27.31.COMCDT				Comm Conduit to MH/HH									
			26.0			Electrical Work									
				28.10		Site Electrical									
					28.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.90 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,328	4,691.22 /ton	4,222
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	150.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	2,504	30.02 /lf	4,503
						28.10.02.00 Site Electrical, Buried Conduit	150.00 LF	21.74 /LF	/LF	10.47 /LF	/LF	32.21 /LF	4,832	58.17 /LF	8,725
						28.10 Site Electrical	1.00 LS	3,261.45 /LS	/LS	1,570.50 /LS	/LS	4,831.95 /LS	4,832	[illegible] /LS	8,725
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	6.50 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	2,720	757.26 /clf	4,922
						26.15.01.00 Process Electrical, Wire/Cable	650.00 LF	2.60 /LF	/LF	1.58 /LF	/LF	4.19 /LF	2,720	7.57 /LF	4,922
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	1.55 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	1,212	1,427.88 /clf	2,206
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	1.50 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	241	288.69 /ea	433
						26.15.11.00 Process Electrical, Grounding	155.00 LF	4.89 /LF	/LF	4.49 /LF	/LF	9.37 /LF	1,453	17.03 /LF	2,639
						26.15 Process Electrical	3,414.00 SF	[illegible] /SF	/SF	[illegible] /SF	/SF	1.22 /SF	4,173	2.21 /SF	7,561
						26.0 Electrical Work	3,414.00 SF	1.67 /SF	/SF	0.97 /SF	/SF	2.64 /SF	9,005	4.77 /SF	16,286
			31.0			Earthwork									
				28.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	8.90 CY	194.63 /CY	1.76 /CY	77.50 /CY	-	273.89 /CY	2,438	425.24 /CY	3,786
						End bulkheads, plywood, concrete envelope/encasement	1.07 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	15	21.82 /sf	23
						31.20.07.15 Earthworks, Sitework, Borrow	8.90 CY	196.24 /CY	1.76 /CY	77.58 /CY	/CY	275.59 /CY	2,454	427.85 /CY	3,809
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	116.05 CY	1.94 /CY	23.32 /CY	-	-	25.26 /CY	2,932	38.70 /CY	4,492
						31.20.09.10 Earthworks, Sitework, Backfill	116.05 CY	1.94 /CY	23.32 /CY	/CY	/CY	25.26 /CY	2,932	38.70 /CY	4,492
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	9.87 CY	10.88 /CY	9.31 /CY	-	-	20.19 /CY	199	30.94 /CY	305
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	9.87 CY	10.88 /CY	9.31 /CY	/CY	/CY	20.19 /CY	199	30.94 /CY	305
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	125.92 CY	5.93 /CY	23.02 /CY	-	-	28.95 /CY	3,645	44.35 /CY	5,584
						31.25.01.00 Earthworks, Structural, Excavation	125.92 CY	5.93 /CY	23.02 /CY	/CY	/CY	28.95 /CY	3,645	44.35 /CY	5,584
						28.10 Site Electrical	1.00 LS	[illegible] /LS	5,712.18 /LS	690.76 /LS	/LS	[illegible] /LS	9,229	14,190.05 /LS	14,190
						31.0 Earthwork	260.74 CY	10.84 /CY	21.91 /CY	2.65 /CY	/CY	35.40 /CY	9,229	54.42 /CY	14,190
						27.31.COMCDT Comm Conduit to MH/HH	0.00	/LF	/LF	/LF	/LF	/LF	18,234	/LF	30,476
		28.10.FA				Fire Alarm System									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	1,820.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	16,477	16.21 /lf	29,505
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	60.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	3,316	98.73 /ea	5,924

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.00.99.00	Electrical, Other									
						Outlet boxes, pressed steel, covers, blank, 4" square	8.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	136	30.33 /ea	243
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	52.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	930	31.98 /ea	1,663
						26.00.99.00 Electrical, Other	3,414.00 SF	5.45 /SF	/SF	0.66 /SF	/SF	6.11 /SF	20,858	10.94 /SF	37,334
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	300.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	26,860	160.26 /clf	48,078
						26.15.01.00 Process Electrical, Wire/Cable	30,000.00 LF	0.80 /LF	/LF	0.10 /LF	/LF	0.90 /LF	26,860	1.60 /LF	48,078
						26.15 Process Electrical	3,414.00 SF	12.47 /SF	/SF	1.51 /SF	/SF	13.98 /SF	47,718	25.02 /SF	85,412
						26.0 Electrical Work	3,414.00 SF	12.47 /SF	/SF	1.51 /SF	/SF	13.98 /SF	47,719	25.02 /SF	85,412
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Detection Systems, fire alarm control panel, alarm device, excluding wires & conduits	24.00 ea	129.73 /ea	-	230.00 /ea	-	359.73 /ea	8,634	567.81 /ea	13,628
						Detection Systems, fire alarm control panel, actuating device, excluding wires & conduits	4.00 ea	129.73 /ea	-	340.00 /ea	-	469.73 /ea	1,879	744.32 /ea	2,977
						Detection Systems, fire alarm control panel, addressable without voice, up to 200 points, excluding wires & conduits, inluding vendor design, startup	1.00 ea	1,816.00 /ea	-	4,575.00 /ea	2,500.00 /ea	8,891.00 /ea	8,891	13,953.45 /ea	13,953
						Detection Systems, fire alarm control panel, battery & rack, excluding wires & conduits	1.00 ea	259.46 /ea	-	460.00 /ea	-	719.46 /ea	719	1,135.63 /ea	1,136
						Detection Systems, fire alarm control panel, battery & rack, automatic charger, excluding wires & conduits	1.00 ea	129.73 /ea	-	525.00 /ea	-	654.73 /ea	655	1,041.17 /ea	1,041
						Detection Systems, visual alarm, ADA type, excluding wires & conduits	24.00 ea	154.90 /ea	-	119.00 /ea	-	273.90 /ea	6,574	426.27 /ea	10,278
						28.35.01.00 Electronic Safety and Security	3,414.00 SF	2.80 /SF	/SF	4.48 /SF	0.73 /SF	8.01 /SF	27,351	12.60 /SF	43,014
						28.00 Electronic Safety and Security	3,414.00 SF	2.80 /SF	/SF	4.48 /SF	0.73 /SF	8.01 /SF	27,351	12.60 /SF	43,014
						28.0 Electronic Safety and Security	3,414.00 SF	2.80 /SF	/SF	4.48 /SF	0.73 /SF	8.01 /SF	27,351	12.60 /SF	43,014
						28.10.FA Fire Alarm System	3,414.00 SF	15.27 /SF	/SF	5.99 /SF	0.73 /SF	21.99 /SF	75,070	37.62 /SF	128,426
		28.20.AC				Access Control System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Card reader - all in allowance per each (incl circuit, cards, CX)	7.00 ea	1,556.77 /ea	-	800.00 /ea	-	2,356.77 /ea	16,497	3,668.77 /ea	25,681
						28.35.01.00 Electronic Safety and Security	3,414.00 SF	3.19 /SF	/SF	1.64 /SF	/SF	4.83 /SF	16,497	7.52 /SF	25,681
						28.00 Electronic Safety and Security	3,414.00 SF	3.19 /SF	/SF	1.64 /SF	/SF	4.83 /SF	16,497	7.52 /SF	25,681
						28.0 Electronic Safety and Security	3,414.00 SF	3.19 /SF	/SF	1.64 /SF	/SF	4.83 /SF	16,497	7.52 /SF	25,681
						28.20.AC Access Control System	7.00 DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	16,497	3,668.77 /DOOR	25,681
		28.20.CCTV				Closed Circuit TV and Cameras									
			26.0			Electrical Work									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Camera allowance (licenses, circuit, startup, CX)	1.00 LS	3,113.54 /LS	-	2,000.00 /LS	2,000.00 /LS	7,113.54 /LS	7,114	12,821.97 /LS	12,822
						28.35.01.00 Electronic Safety and Security	3,414.00 SF	0.91 /SF	/SF	0.59 /SF	0.59 /SF	2.08 /SF	7,114	3.76 /SF	12,822
						28.00 Electronic Safety and Security	3,414.00 SF	0.91 /SF	/SF	0.59 /SF	0.59 /SF	2.08 /SF	7,114	3.76 /SF	12,822
						26.0 Electrical Work	3,414.00 SF	0.91 /SF	/SF	0.59 /SF	0.59 /SF	2.08 /SF	7,114	3.76 /SF	12,822
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Closed circuit television system (CCTV), industrial quality, one station (camera & monitor)	1.00 totl	798.34 /totl	-	1,650.00 /totl	-	2,448.34 /totl	2,448	3,870.67 /totl	3,871
						Closed circuit television system (CCTV), industrial quality, for additional camera stations, add	2.00 ea	384.39 /ea	-	690.00 /ea	-	1,074.39 /ea	2,149	1,696.08 /ea	3,392
						Closed circuit television system (CCTV), industrial quality, for weatherproof camera station, add	3.00 ea	798.34 /ea	-	540.00 /ea	-	1,338.34 /ea	4,015	2,089.61 /ea	6,269
						28.35.01.00 Electronic Safety and Security	3,414.00 SF	1.16 /SF	/SF	1.36 /SF	/SF	2.52 /SF	8,612	3.96 /SF	13,532
						28.00 Electronic Safety and Security	3,414.00 SF	1.16 /SF	/SF	1.36 /SF	/SF	2.52 /SF	8,612	3.96 /SF	13,532
						28.0 Electronic Safety and Security	3,414.00 SF	1.16 /SF	/SF	1.36 /SF	/SF	2.52 /SF	8,612	3.96 /SF	13,532
						28.20.CCTV Closed Circuit TV and Cameras	6.00 CAM	1,179.25 /CAM	/CAM	1,108.33 /CAM	333.33 /CAM	2,620.95 /CAM	15,726	4,392.27 /CAM	26,354
		28.20.ID				Intrusion Detection System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Securitized door, all-in allowance per each (incl circuit, devices, CX)	7.00 ea	2,594.61 /ea	-	1,000.00 /ea	-	3,594.61 /ea	25,162	5,579.76 /ea	39,058
						Door controller (all-in cost including vendor program and startup)	3.00 ea	648.65 /ea	-	2,000.00 /ea	500.00 /ea	3,148.65 /ea	9,446	4,969.01 /ea	14,907
						28.35.01.00 Electronic Safety and Security	3,414.00 SF	5.89 /SF	/SF	3.81 /SF	0.44 /SF	10.14 /SF	34,608	15.81 /SF	53,965
						28.00 Electronic Safety and Security	3,414.00 SF	5.89 /SF	/SF	3.81 /SF	0.44 /SF	10.14 /SF	34,608	15.81 /SF	53,965
						28.0 Electronic Safety and Security	3,414.00 SF	5.89 /SF	/SF	3.81 /SF	0.44 /SF	10.14 /SF	34,608	15.81 /SF	53,965
						28.20.ID Intrusion Detection System	10.00 DOOR	2,010.83 /DOOR	/DOOR	1,300.00 /DOOR	150.00 /DOOR	3,460.83 /DOOR	34,608	5,396.53 /DOOR	53,965
						06.01 Funks Reservoir Admin and Operations BLDG	3,414.00 SF	158.99 /SF	10.59 /SF	118.79 /SF	68.22 /SF	315.73 /SF	1,096,072	552.30 /SF	1,885,537
	06.02					Funks Reservoir Maintenance and Storage BLDG									
		03.00.000				Funks Reservoir Maintenance and Storage BLDG, Concrete									
			03.0			Concrete Work									
				03.13		Cast-In-Place Concrete, Continuous Footings									
					03.10.02.24	Cast-In-Place Concrete, Continuous Footings, 24" thick									
						C.I.P. concrete forms, footing, keyway, tapered wood, 2" x 4", 4 use, includes erecting, bracing, stripping and cleaning	232.00 lf	3.16 /lf	-	0.25 /lf	-	3.41 /lf	792	5.25 /lf	1,218
						Reinforcing Steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	6.83 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	17,547	4,025.91 /ton	27,477
						Reinforcing steel, unload and sort, add to base	6.83 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	380	85.34 /ton	582
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	81.00 cy	-	-	131.00 /cy	-	131.00 /cy	10,611	210.20 /cy	17,026
						Structural concrete, placing, continuous footing, deep, pumped, includes strike off & consolidation, excludes material	78.00 CY	27.12 /CY	6.41 /CY	-	-	33.53 /CY	2,616	51.37 /CY	4,007
						03.10.02.24 Cast-In-Place Concrete, Continuous Footings, 24" thick	78.00 CY	160.79 /CY	6.98 /CY	241.78 /CY	/CY	409.56 /CY	31,945	645.01 /CY	50,311
						03.13 Cast-In-Place Concrete, Continuous Footings	78.00 CY	160.79 /CY	6.98 /CY	241.78 /CY	/CY	409.56 /CY	31,945	645.01 /CY	50,311
				03.15		Cast-In-Place Concrete, Slabs on Grade									
					03.10.05.12	Cast-In-Place Concrete, Slabs on Grade, 12" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, 7" to 12" high, 4 use, includes erecting, bracing, stripping and cleaning	234.00 sfca	8.67 /sfca	-	0.75 /sfca	-	9.42 /sfca	2,205	14.49 /sfca	3,391
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	9.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	23,139	4,025.91 /ton	36,233
						Reinforcing in place, unloading & sorting, add to above - slabs	9.00 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	501	85.34 /ton	768
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	105.00 cy	-	-	131.00 /cy	-	131.00 /cy	13,755	210.20 /cy	22,071

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.05.12	*Cast-In-Place Concrete, Slabs on Grade, 12" thick*									
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	102.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	2,958	44.43 /CY	4,532
						Cfnsh,flrs,for spcl rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	2,731.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	2,558	1.44 /sf	3,919
						Curing, sprayed membrane curing compound	27.31 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	629	36.21 /csf	989
						Fine grading, fine grade for slab on grade, machine	303.44 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	569	2.87 /sy	871
						03.10.05.12 Cast-In Place Concrete, Slabs on Grade, 12" thick	102.00 CY	139.42 /CY	8.85 /CY	245.79 /CY	/CY	454.06 /CY	46,314	713.48 /CY	72,775
						03.10 Cast-in-Place Concrete, Slabs on Grade	102.00 CY	139.42 /CY	8.85 /CY	245.79 /CY	/CY	454.06 /CY	46,314	713.48 /CY	72,775
						03.0 Concrete Work	180.00 CY	182.68 /CY	8.04 /CY	244.05 /CY	/CY	434.77 /CY	78,259	683.81 /CY	123,085
						03.00.000 Funks Reservoir Maintenance and Storage BLDG, Concrete	180.00 CY	182.68 /CY	8.04 /CY	244.05 /CY	/CY	434.77 /CY	78,259	683.81 /CY	123,085
		04.00.000				*Funks Reservoir Maintenance and Storage BLDG, Masonry*									
			04.0			*Masonry*									
				04.21		*Concrete Unit Masonry - Exterior*									
					04.00.02.12	*Masonry Concrete Masonry Units, 12"*									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	2.00 opng	41.31 /opng	2.13 /opng	13.40 /opng	-	56.84 /opng	114	99.42 /opng	199
						Grout, door frames, 6' x 7' opening, 3.5 C.F. per opening	1.00 opng	55.08 /opng	2.83 /opng	18.75 /opng	-	76.66 /opng	77	134.13 /opng	134
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	1,127.05 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	14,421	22.55 /cf	25,416
						Masonry reinforcing bars, #5 and #6 reinforcing steel bars, placed horizontally, ASTM A615	4,025.16 lb	0.79 /lb	-	0.56 /lb	-	1.35 /lb	5,417	2.37 /lb	9,546
						Masonry reinforcing bars, #5 and #6 reinforcing steel bars, placed vertically, ASTM A615	2,093.08 lb	0.97 /lb	-	0.56 /lb	-	1.53 /lb	3,196	2.69 /lb	5,621
						Masonry reinforcing bars, truss type steel joint reinforcing, mill standard galvanized, 12" wide	23.20 clf	31.43 /clf	-	29.50 /clf	-	60.93 /clf	1,414	107.68 /clf	2,498
						Concrt block,high strngt,hollow,3500 psi,12"8"16",inclds mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and verticl rnfrcng	2,684.00 SF	14.60 /SF	-	5.20 /SF	-	19.80 /SF	53,133	34.67 /SF	93,043
						Channel framing, structural steel, field fabricated, C8x11.5, incl cutting & welding	51.00 lf	62.16 /lf	3.01 /lf	9.90 /lf	-	75.07 /lf	3,829	130.75 /lf	6,668
						Silicone water repellants, sprayed on CMU, 2 coat	5,368.00 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	5,342	1.78 /sf	9,561
						Reglet, zinc and copper alloy, 20 ounce	232.00 lf	3.26 /lf	-	2.87 /lf	-	6.13 /lf	1,423	10.83 /lf	2,513
						Reglet, counter flashing for zinc and copper alloy, 20 ounce, 12" wide	232.00 lf	5.27 /lf	-	5.25 /lf	-	10.52 /lf	2,441	18.61 /lf	4,317
						04.00.02.12 Masonry Concrete Masonry Units, 12"	2,684.00 SF	22.16 /SF	0.21 /SF	11.47 /SF	/SF	33.83 /SF	90,807	59.43 /SF	159,516
						04.21 Concrete Unit Masonry - Exterior	2,684.00 SF	22.16 /SF	0.21 /SF	11.47 /SF	/SF	33.83 /SF	90,807	59.43 /SF	159,516
				04.22		*Concrete Unit Masonry - Interior*									
					04.00.02.08	*Masonry Concrete Masonry Units, 8"*									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	5.00 opng	41.31 /opng	2.12 /opng	13.40 /opng	-	56.83 /opng	284	99.41 /opng	497
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	353.43 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	4,522	22.55 /cf	7,970
						Reinforcing, steel bars A615, placed horizontal, average #4 bar	480.67 lb	1.40 /lb	-	0.40 /lb	-	1.80 /lb	864	3.14 /lb	1,510
						Masonry reinforcing bars, #3 and #4 reinforcing steel bars, placed vertically, ASTM A615	353.43 lb	1.80 /lb	-	0.56 /lb	-	2.36 /lb	833	4.12 /lb	1,457
						Concrt block,high strngt,hollow,3500 psi,8"8"16",includs mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and verticl rnfrcng	1,414.00 SF	8.50 /SF	-	4.07 /SF	-	12.57 /SF	17,779	22.07 /SF	31,212
						Channel framing, structural steel, field fabricated, C6x8.2, incl cutting & welding	30.00 lf	40.69 /lf	1.97 /lf	6.85 /lf	-	49.51 /lf	1,485	86.25 /lf	2,587
						Silicone water repellants, sprayed on CMU, 2 coat	2,828.00 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	2,814	1.78 /sf	5,037
						04.00.02.08 Masonry Concrete Masonry Units, 8"	1,414.00 SF	12.62 /SF	0.14 /SF	7.46 /SF	/SF	20.21 /SF	28,582	35.55 /SF	50,271
						04.22 Concrete Unit Masonry - Interior	1,414.00 SF	12.62 /SF	0.14 /SF	7.46 /SF	/SF	20.21 /SF	28,582	35.55 /SF	50,271
						04.0 Masonry	4,098.00 SF	18.86 /SF	0.19 /SF	10.08 /SF	/SF	29.13 /SF	119,389	51.19 /SF	209,787
						04.00.000 Funks Reservoir Maintenance and Storage BLDG, Masonry	4,098.00 SF	18.86 /SF	0.19 /SF	10.08 /SF	/SF	29.13 /SF	119,389	51.19 /SF	209,787
		05.00.000				*Funks Reservoir Maintenance and Storage BLDG, Metals*									
			05.0			*Metals*									
				05.40		*Cold-formed Metal Framing*									
					05.10.01.10	*Metals, Steel Trusses*									
						Roof truss,using galv metal studs,fink (w) king post type,3:12 pitch,18 x 6"chrds,32'span,excl erectn,bridgng&bracing,fabrication only trusses on-site	46.00 ea	175.54 /ea	-	150.00 /ea	-	325.54 /ea	14,975	574.74 /ea	26,438
						Roof truss, using galv LB metal studs, to 3:12 pitch, 32' span, excl truss materials, bridging & bracing, erection only	46.00 ea	84.60 /ea	14.83 /ea	-	-	99.43 /ea	4,574	172.21 /ea	7,922
						Underlayment, plywood, underlayment grade, 1/2" thick	2,813.00 SF	1.31 /SF	-	2.00 /SF	-	3.31 /SF	9,296	5.87 /SF	16,510
						05.10.01.10 Metals, Steel Trusses	2,813.00 SF	5.56 /SF	0.24 /SF	4.45 /SF	/SF	10.25 /SF	28,845	18.08 /SF	50,870
						05.40 Cold-formed Metal Framing	2,813.00 SF	5.56 /SF	0.24 /SF	4.45 /SF	/SF	10.25 /SF	28,845	18.08 /SF	50,870
						05.0 Metals	2,813.00 SF	5.56 /SF	0.24 /SF	4.45 /SF	/SF	10.25 /SF	28,845	18.08 /SF	50,870
						05.00.000 Funks Reservoir Maintenance and Storage BLDG, Metals	**1.00** LS	15,636.95 /LS	682.03 /LS	12,526.00 /LS	/LS	28,844.98 /LS	28,845	50,870.15 /LS	50,870
		07.00.000				*Funks Reservoir Maintenance and Storage BLDG, Roofing*									
			07.0			*Thermal and Moisture Protection*									
				07.60		*Thermal & Moisture Protection*									
					07.60.02.00	*Thermal & Moisture Protection, Metal Roofing*									
						Steel roofing panels, on steel frame, flat profile, zinc aluminum alloy finish, 1-3/4" standing seams, 10" wide, 22 gauge	2,813.00 SF	2.88 /SF	-	4.47 /SF	-	7.35 /SF	20,666	13.05 /SF	36,707
						Aluminum downspouts, enameled, 3" x 4", .024" thick	56.00 lf	5.65 /lf	-	2.29 /lf	-	7.94 /lf	445	13.92 /lf	779
						Aluminum gutters, stock units, enameled, 5" box, .032" thick	168.00 lf	6.33 /lf	-	3.58 /lf	-	9.91 /lf	1,665	17.42 /lf	2,927
						Miscellaneous Items Allowance	1.00 ls	1,000.00 /ls		1,000.00 /ls		2,000.00 /ls	2,000	3,536.67 /ls	3,537
						07.60.02.00 Thermal & Moisture Protection, Metal Roofing	2,813.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.81 /SF	24,775	15.62 /SF	43,950
						07.60 Thermal & Moisture Protection	2,813.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.81 /SF	24,775	15.62 /SF	43,950
						07.0 Thermal and Moisture Protection	2,813.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.81 /SF	24,775	15.62 /SF	43,950
						07.00.000 Funks Reservoir Maintenance and Storage BLDG, Roofing	2,813.00 SF	3.72 /SF	/SF	5.09 /SF	/SF	8.81 /SF	24,775	15.62 /SF	43,950
		08.00.000				*Funks Reservoir Maintenance and Storage BLDG, Openings*									
			08.0			*Openings*									
				08.10		*Doors and Frames*									
					08.10.01.00	*Openings, Doors, Frames and Hardware*									
						Steel frms, knock down, 14 ga., to 8-3/4" throat, to 3'-0" x 7'-0", single	6.00 EA	137.64 /EA	-	430.00 /EA	-	567.64 /EA	3,406	1,014.38 /EA	6,086
						Steel frames, knock down, 14 ga., to 8-3/4" throat, to 6070, pair	1.00 EA	183.52 /EA	-	455.00 /EA	-	638.52 /EA	639	1,138.96 /EA	1,139
						Doors, commercial, steel, insulated, full panel, 18 ga., 3'-0" x 7'-0" x 1-3/4" thick	8.00 ea	97.88 /ea	-	520.00 /ea	-	617.88 /ea	4,943	1,107.92 /ea	8,863
						Add for baked enamel finish, average cost per leaf	8.00 leaf	12.94 /leaf	-	50.40 /leaf	-	63.34 /leaf	507	113.36 /leaf	907
						Average Door Hardware	8.00 ea	91.76 /ea	15.00 /ea	500.00 /ea	-	606.76 /ea	4,854	1,087.22 /ea	8,698
						08.10.01.00 Openings, Doors, Frames and Hardware	7.00 EA	375.71 /EA	17.14 /EA	1,656.89 /EA	/EA	2,049.74 /EA	14,349	3,670.43 /EA	25,693
					08.30.01.20	*Specialty Doors and Frames, Coiling Doors*									
						Doors, rolling service, steel, manual, 20 gauge, 12' x 12' high, incl. hardware	2.00 EA	1,186.74 /EA	-	1,250.00 /EA	-	2,436.74 /EA	4,873	4,311.26 /EA	8,623
						Doors, rolling service, steel, manual, for 18 gauge doors, add	288.00 sf	-	-	1.52 /sf	-	1.52 /sf	438	2.74 /sf	790
						Doors, rolling service, steel, manual, for enamel finish, add	288.00 sf	-	-	2.84 /sf	-	2.84 /sf	818	5.13 /sf	1,476
						Doors, rolling service, steel, manual, for weatherstripping, extruded rubber, jambs, add	48.00 lf	-	-	19.15 /lf	-	19.15 /lf	919	34.56 /lf	1,659
						Doors, rolling service, steel, manual, for weatherstripping, hood, extruded rubber, add	24.00 lf	-	-	8.65 /lf	-	8.65 /lf	208	15.61 /lf	375
						Doors, rolling service, steel, manual, motor operators for, to 14' x 14' opening	2.00 ea	284.82 /ea	-	1,200.00 /ea	-	1,484.82 /ea	2,970	2,658.83 /ea	5,318

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						08.30.01.20 Specialty Doors and Frames, Coiling Doors	2.00 EA	1,471.55 /EA	/EA	3,641.24 /EA	/EA	5,112.79 /EA	10,226	9,119.79 /EA	18,240
						08.10 Doors and Frames	9.00 EA	619.23 /EA	13.33 /EA	2,097.85 /EA	/EA	2,730.42 /EA	24,574	4,881.42 /EA	43,933
						08.0 Openings	9.00 EA	619.23 /EA	13.33 /EA	2,097.85 /EA	/EA	2,730.42 /EA	24,574	4,881.42 /EA	43,933
						08.00.000 Funks Reservoir Maintenance and Storage BLDG, Openings	9.00 EA	619.23 /EA	13.33 /EA	2,097.85 /EA	/EA	2,730.42 /EA	24,574	4,881.42 /EA	43,933
		09.00.000				Funks Reservoir Maintenance and Storage BLDG, Finishes									
			09.0			Finishes									
				09.00		Finishes									
					09.00.99.00	Finishes, Other									
						Finishes Allowance	2,731.00 SF	1.12 /SF	0.13 /SF	1.10 /SF		2.35 /SF	6,412	4.15 /SF	11,324
						09.00.99.00 Finishes, Other	2,731.00 SF	1.12 /SF	0.13 /SF	1.10 /SF	/SF	2.35 /SF	6,412	4.15 /SF	11,324
						09.00 Finishes	2,731.00 SF	1.12 /SF	0.13 /SF	1.10 /SF	/SF	2.35 /SF	6,412	4.15 /SF	11,324
						09.0 Finishes	2,731.00 SF	1.12 /SF	0.13 /SF	1.10 /SF	/SF	2.35 /SF	6,412	4.15 /SF	11,324
						09.00.000 Funks Reservoir Maintenance and Storage BLDG, Finishes	2,731.00 SF	1.12 /SF	0.13 /SF	1.10 /SF	/SF	2.35 /SF	6,412	4.15 /SF	11,324
		21.00.000				Funks Reservoir Maintenance and Storage BLDG, Fire Suppression System									
			21.0			Fire Suppression									
				21.00		Fire Suppression									
					21.00.10.10	Water-Based Fire Suppression Systems									
						Fire Suppression System Allowance	2,731.00 SF				15.00 /SF	15.00 /SF	40,965	25.98 /SF	70,955
						21.00.10.10 Water-Based Fire-Suppression Systems	2,731.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	40,965	25.98 /SF	70,955
						21.00 Fire Suppression	2,731.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	40,965	25.98 /SF	70,955
						21.0 Fire Suppression	2,731.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	40,965	25.98 /SF	70,955
						21.00.000 Funks Reservoir Maintenance and Storage BLDG, Fire Suppression System	2,731.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	40,965	25.98 /SF	70,955
		22.00.000				Funks Reservoir Maintenance and Storage BLDG, Plumbing									
			22.0			Plumbing									
				22.00		Plumbing									
					22.00.01.00	Mechanical, Plumbing									
						Lavatory, vanity top, rough-in, supply, waste and vent	1.00 ea	720.97 /ea	-	278.00 /ea	-	998.97 /ea	999	1,750.45 /ea	1,750
						Lavatory, wall hung, porcelain enamel on cast iron, white, single bowl, includes trim	1.00 ea	180.24 /ea	-	246.00 /ea	-	426.24 /ea	426	756.11 /ea	756
						Water closet, bowl only, wall hung, includes flush valve and seat	1.00 ea	248.61 /ea	-	1,100.00 /ea	-	1,348.61 /ea	1,349	2,415.66 /ea	2,416
						Water closet, bowl only, wall hung, rough-in, supply, waste and vent	1.00 ea	720.97 /ea	-	1,300.00 /ea	-	2,020.97 /ea	2,021	3,594.75 /ea	3,595
						Kitchenette Equipment and Rough-in	1.00 ls	1,441.94 /ls		2,000.00 /ls		3,441.94 /ls	3,442	6,106.75 /ls	6,107
						Supply, Waste and Vent Allowance	1.00 ls	3,604.84 /ls	1,000.00 /ls	5,000.00 /ls		9,604.84 /ls	9,605	16,996.89 /ls	16,999
						22.00.01.00 Mechanical, Plumbing	**2,731.00** SF	2.53 /SF	0.37 /SF	3.63 /SF	/SF	6.53 /SF	17,842	11.58 /SF	31,623
						22.00 Plumbing	**2,731.00** SF	2.53 /SF	0.37 /SF	3.63 /SF	/SF	6.53 /SF	17,842	11.58 /SF	31,623
						22.0 Plumbing	**2,731.00** SF	2.53 /SF	0.37 /SF	3.63 /SF	/SF	6.53 /SF	17,842	11.58 /SF	31,623
						22.00.000 Funks Reservoir Maintenance and Storage BLDG, Plumbing	**2,731.00** SF	2.53 /SF	0.37 /SF	3.63 /SF	/SF	6.53 /SF	17,842	11.58 /SF	31,623
		23.00.000				Funks Reservoir Maintenance and Storage BLDG, HVAC									
			23.0			HVAC									
				23.00		HVAC									
					23.00.02.00	Mechanical, HVAC									
						HVAC Allowance	2,731.00 SF				20.00 /SF	20.00 /SF	54,620	34.64 /SF	94,607
						23.00.02.00 Mechanical, HVAC	2,731.00 SF	/SF	/SF	/SF	20.00 /SF	20.00 /SF	54,620	34.64 /SF	94,607
						23.00 HVAC	2,731.00 SF	/SF	/SF	/SF	20.00 /SF	20.00 /SF	54,620	34.64 /SF	94,607
						23.0 HVAC	2,731.00 SF	/SF	/SF	/SF	20.00 /SF	20.00 /SF	54,620	34.64 /SF	94,607
						23.00.000 Funks Reservoir Maintenance and Storage BLDG, HVAC	2,731.00 SF	/SF	/SF	/SF	20.00 /SF	20.00 /SF	54,620	34.64 /SF	94,607
		26.05.GRDG				Facility Grounding									
			26.0			Electrical Work									
				26.00		Electrical									
					01.01.06.03	GC Equip, Tools, & Consumables									
						Rent trencher chain boom gas oper walking 12 HP	2.00 day	-	156.95 /day	-	-	156.95 /day	314	279.70 /day	559
						01.01.06.03 GC Equip, Tools, & Consumables	**1.00** LS	/LS	313.90 /LS	/LS	/LS	313.90 /LS	314	559.40 /LS	559
						26.00 Electrical	**2,731.00** SF	/SF	0.12 /SF	/SF	/SF	0.12 /SF	314	0.20 /SF	559
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Copper Bus Bar .25"x 3.0"	2.00 lf	30.36 /lf	-	52.90 /lf	-	83.26 /lf	167	152.22 /lf	304
						Copper Bus Bar Supports	2.00 E	121.44 /E	-	48.30 /E	-	169.74 /E	339	305.98 /E	612
						Grounding rod, copper clad, 15' long, 3/4" diameter	4.00 ea	259.46 /ea	-	55.00 /ea	-	314.46 /ea	1,258	564.39 /ea	2,258
						Ground wire, copper wire, bare stranded, 4/0	4.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	3,137	1,427.89 /clf	5,712
						Water pipe ground clamps, heavy duty, bronze, 2-1/2" to 3" diameter	1.00 ea	172.97 /ea	-	60.50 /ea	-	233.47 /ea	233	420.44 /ea	420
						Exothermic weld, 4/0 wire to 4/0 wire	24.00 ea	148.26 /ea	-	9.45 /ea	-	157.71 /ea	3,785	281.75 /ea	6,762
						Exothermic weld, mold reusable for above	6.00 ea	-	-	141.00 /ea	-	141.00 /ea	846	261.50 /ea	1,569
						Protective boxes at grade level, round, concrete, 12" long, incl breather slots	2.00 ea	64.87 /ea	-	112.00 /ea	-	176.87 /ea	354	323.31 /ea	647
						26.15.11.00 Process Electrical, Grounding	**400.00** LF	16.65 /LF	/LF	8.65 /LF	/LF	25.30 /LF	10,119	45.71 /LF	18,283
						26.15 Process Electrical	**2,731.00** SF	2.44 /SF	/SF	1.27 /SF	/SF	3.71 /SF	10,119	6.69 /SF	18,283
						26.0 Electrical Work	**2,731.00** SF	2.44 /SF	0.12 /SF	1.27 /SF	/SF	3.82 /SF	10,433	6.90 /SF	18,843
						26.05.GRDG Facility Grounding	**2,731.00** SF	2.44 /SF	0.12 /SF	1.27 /SF	/SF	3.82 /SF	10,433	6.90 /SF	18,843
		26.11.SEC				Subfeed UG from Admin 100A									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.90 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,328	4,691.21 /ton	4,222
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	150.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	2,504	30.02 /lf	4,503
						26.10.02.00 Site Electrical, Buried Conduit	**150.00** LF	21.74 /LF	/LF	10.47 /LF	/LF	32.21 /LF	4,832	58.17 /LF	8,725
						26.10 Site Electrical	**1.00** LS	3,261.48 /LS	/LS	1,570.50 /LS	/LS	4,831.98 /LS	4,832	8,724.64 /LS	8,725
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	6.50 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	2,720	757.26 /clf	4,922
						26.15.01.00 Process Electrical, Wire/Cable	**650.00** LF	2.60 /LF	/LF	1.59 /LF	/LF	4.19 /LF	2,720	7.57 /LF	4,922
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	1.55 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	1,212	1,427.88 /clf	2,206
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	1.50 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	241	288.69 /ea	433
						26.15.11.00 Process Electrical, Grounding	**155.00** LF	4.89 /LF	/LF	4.49 /LF	/LF	9.37 /LF	1,453	17.03 /LF	2,639
						26.15 Process Electrical	**2,731.00** SF	0.90 /SF	/SF	0.63 /SF	/SF	1.53 /SF	4,173	2.77 /SF	7,561
						26.0 Electrical Work	**2,731.00** SF	2.09 /SF	/SF	1.21 /SF	/SF	3.30 /SF	9,005	5.96 /SF	16,286
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	8.90 CY	194.63 /CY	1.76 /CY	77.50 /CY	-	273.89 /CY	2,438	425.24 /CY	3,786
						End bulkheads, plywood, concrete envelope/encasement	1.07 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	15	21.85 /sf	23
						31.20.07.15 Earthworks, Sitework, Borrow	8.90 CY	196.24 /CY	1.76 /CY	77.59 /CY	/CY	275.59 /CY	2,454	427.85 /CY	3,809
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	116.05 CY	1.94 /CY	23.32 /CY	-	-	25.26 /CY	2,932	38.71 /CY	4,492
						31.20.09.10 Earthworks, Sitework, Backfill	116.05 CY	1.94 /CY	23.32 /CY	/CY	/CY	25.26 /CY	2,932	38.71 /CY	4,492
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	9.87 CY	10.88 /CY	9.31 /CY	-	-	20.19 /CY	199	30.94 /CY	305

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	*9.87 CY*	*10.28 /CY*	*9.91 /CY*	*/CY*	*/CY*	*20.19 /CY*	*199*	*30.94 /CY*	*305*
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	125.92 CY	5.93 /CY	23.02 /CY	-	-	28.95 /CY	3,645	44.35 /CY	5,584
						31.25.01.00 Earthworks, Structural, Excavation	*125.92 CY*	*5.93 /CY*	*23.02 /CY*	*/CY*	*/CY*	*28.95 /CY*	*3,645*	*44.35 /CY*	*5,584*
						26.10 Site Electrical	***1.00** LS*	*2,836.28 /LS*	*5,712.18 /LS*	*880.76 /LS*	*/LS*	*9,429.22 /LS*	*9,429*	*14,190.05 /LS*	*14,190*
						31.0 Earthwork	*260.74 CY*	*10.84 /CY*	*21.91 /CY*	*2.65 /CY*	*/CY*	*35.40 /CY*	*9,229*	*54.42 /CY*	*14,190*
						26.11.SEC Subfeed UG from Admin 100A	***150.00** LF*	*56.88 /LF*	*38.08 /LF*	*26.60 /LF*	*/LF*	*121.56 /LF*	*18,234*	*203.17 /LF*	*30,476*
		26.20.DIST				*Electrical Distribution Equipment*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Flexible metallic conduit, steel, 1-1/2" diameter	6.00 lf	20.76 /lf	-	2.55 /lf	-	23.31 /lf	140	41.72 /lf	250
						Flexible metallic conduit, steel, connectors, insulated, 1-1/2" diameter	2.00 ea	32.44 /ea	-	24.50 /ea	-	56.94 /ea	114	103.24 /ea	206
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 1-1/2" diameter	2.00 ea	45.13 /ea	-	46.00 /ea	-	91.13 /ea	182	165.73 /ea	331
						Panelboards, 3 phase 4 wire, main lugs, 277/480 V, 100 amp, 20 circuits, NEHB, incl 20 A 1 pole plug-in breakers	1.00 ea	1,729.74 /ea	-	2,200.00 /ea	-	3,929.74 /ea	3,930	7,162.64 /ea	7,163
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 100 amp, 30 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,594.61 /ea	-	2,125.00 /ea	-	4,719.61 /ea	4,720	8,564.82 /ea	8,565
						26.00.99.00 Electrical, Other	***2,731.00** SF*	*1.69 /SF*	*/SF*	*1.64 /SF*	*/SF*	*3.33 /SF*	*9,085*	*6.05 /SF*	*16,516*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #6, type XHHW, in raceway	0.25 clf	159.68 /clf	-	54.50 /clf	-	214.20 /clf	54	385.68 /clf	96
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	1.00 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	418	757.27 /clf	757
						26.15.01.00 Process Electrical, Wire/Cable	***125.00** LF*	*2.40 /LF*	*/LF*	*1.38 /LF*	*/LF*	*3.78 /LF*	*472*	*6.83 /LF*	*854*
						26.15 Process Electrical	***2,731.00** SF*	*1.80 /SF*	*/SF*	*1.70 /SF*	*/SF*	*3.50 /SF*	*9,557*	*6.36 /SF*	*17,370*
				26.25		*Facility Electrical*									
					26.25.06.00	*Transformers, Dry Type*									
						Transformer, dry-type, ventilated, 3 phase 480 V primary 120/208 V secondary, 30 kVA	1.00 EA	2,306.32 /EA	-	1,800.00 /EA	-	4,106.32 /EA	4,106	7,448.32 /EA	7,448
						26.25.06.00 Transformers, Dry Type	*1.00 EA*	*2,306.32 /EA*	*/EA*	*1,800.00 /EA*	*/EA*	*4,106.32 /EA*	*4,106*	*7,448.32 /EA*	*7,448*
						26.25 Facility Electrical	***1.00** LS*	*2,306.32 /LS*	*/LS*	*1,800.00 /LS*	*/LS*	*4,106.32 /LS*	*4,106*	*7,448.32 /LS*	*7,448*
						26.0 Electrical Work	***2,731.00** SF*	*2.64 /SF*	*/SF*	*2.36 /SF*	*/SF*	*5.00 /SF*	*13,664*	*9.09 /SF*	*24,818*
						26.20.DIST Electrical Distribution Equipment	***200.00** AMP*	*36.05 /AMP*	*/AMP*	*32.27 /AMP*	*/AMP*	*68.32 /AMP*	*13,664*	*124.09 /AMP*	*24,818*
		26.25.LTG				*Interior Lighting and Control*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	500.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	4,527	16.21 /lf	8,106
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	21.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	1,161	98.73 /ea	2,073
						Outlet boxes, pressed steel, covers, blank, 4" square	9.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	153	30.33 /ea	273
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	12.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	215	31.98 /ea	384
						26.00.99.00 Electrical, Other	***2,731.00** SF*	*1.99 /SF*	*/SF*	*0.23 /SF*	*/SF*	*2.22 /SF*	*6,056*	*3.97 /SF*	*10,836*
					26.10.03.00	*UG Conduit*									
						Toggle switch, quiet type, single pole, 20 amp	8.00 ea	38.44 /ea	-	3.46 /ea	-	41.90 /ea	335	74.92 /ea	599
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*335*	*/LF*	*599*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	16.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	1,729	193.55 /clf	3,097
						26.15.01.00 Process Electrical, Wire/Cable	***1,600.00** LF*	*0.94 /LF*	*/LF*	*0.14 /LF*	*/LF*	*1.08 /LF*	*1,729*	*1.94 /LF*	*3,097*
						26.15 Process Electrical	***2,731.00** SF*	*2.65 /SF*	*/SF*	*0.32 /SF*	*/SF*	*2.97 /SF*	*8,119*	*5.32 /SF*	*14,532*
				26.20		*Facility Electrical*									
					26.20.03.00	*Facility Electrical, Lighting*									
						LED Strip Light, hdwe	16.00 ea	182.08 /ea	-	110.00 /ea	-	292.08 /ea	4,673	528.48 /ea	8,456
						Emergency ballast, material only, interior, factory installed in fixture	5.00 ea	-	-	152.00 /ea	-	152.00 /ea	760	281.90 /ea	1,409
						Exit lighting, L.E.D. standard, single face, ceiling or wall mount	3.00 ea	129.73 /ea	-	70.00 /ea	-	199.73 /ea	599	361.01 /ea	1,083
						Automatic wall switches	1.00 ea	43.24 /ea	-	50.00 /ea	-	93.24 /ea	93	169.78 /ea	170
						Fixture whips, 3/8" greenfield, 2 connectors, THHN wire, three #14, 6' long	43.00 ea	32.43 /ea	-	5.45 /ea	-	37.88 /ea	1,629	67.91 /ea	2,920
						26.20.03.00 Facility Electrical, Lighting	***2,731.00** SF*	*1.74 /SF*	*/SF*	*1.10 /SF*	*/SF*	*2.84 /SF*	*7,755*	*5.14 /SF*	*14,038*
						26.20 Facility Electrical	***2,731.00** SF*	*1.74 /SF*	*/SF*	*1.10 /SF*	*/SF*	*2.84 /SF*	*7,755*	*5.14 /SF*	*14,038*
						26.0 Electrical Work	***2,731.00** SF*	*4.39 /SF*	*/SF*	*1.42 /SF*	*/SF*	*5.81 /SF*	*15,873*	*10.46 /SF*	*28,570*
						26.25.LTG Interior Lighting and Control	***1.00** LS*	*11,879.39 /LS*	*/LS*	*3,993.85 /LS*	*/LS*	*15,873.24 /LS*	*15,873*	*28,569.76 /LS*	*28,570*
		26.26.EXTLTG				*Exterior Lighting and Control*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	50.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	453	16.21 /lf	811
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	3.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	166	98.73 /ea	296
						Outlet boxes, pressed steel, covers, blank, 4" square	3.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	51	30.33 /ea	91
						26.00.99.00 Electrical, Other	***2,731.00** SF*	*0.22 /SF*	*/SF*	*0.02 /SF*	*/SF*	*0.25 /SF*	*669*	*0.44 /SF*	*1,198*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	1.80 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	194	193.54 /clf	348
						26.15.01.00 Process Electrical, Wire/Cable	***180.00** LF*	*0.94 /LF*	*/LF*	*0.14 /LF*	*/LF*	*1.08 /LF*	*194*	*1.94 /LF*	*348*
					26.15.07.00	*Lighting*									
						LED Area Light	3.00 E	97.30 /E	-		-	97.30 /E	292	173.39 /E	520
						Wallpack Photocell	3.00 E	32.43 /E	-		-	32.43 /E	97	57.80 /E	173
						26.15.07.00 Lighting	***1.00** LS*	*389.19 /LS*	*/LS*	*/LS*	*/LS*	*389.19 /LS*	*389*	*693.57 /LS*	*694*
						26.15 Process Electrical	***2,731.00** SF*	*0.43 /SF*	*/SF*	*0.03 /SF*	*/SF*	*0.46 /SF*	*1,253*	*0.82 /SF*	*2,240*
						26.0 Electrical Work	***2,731.00** SF*	*0.43 /SF*	*/SF*	*0.03 /SF*	*/SF*	*0.46 /SF*	*1,253*	*0.82 /SF*	*2,240*
						26.26.EXTLTG Exterior Lighting and Control	***1.00** LS*	*1,162.52 /LS*	*/LS*	*90.58 /LS*	*/LS*	*1,253.10 /LS*	*1,253*	*2,239.69 /LS*	*2,240*
		26.30.DEV				*Device Outlets*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	600.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	5,432	16.21 /lf	9,727
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	20.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	1,105	98.73 /ea	1,975
						Outlet boxes, pressed steel, covers, blank, 4" square	4.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	68	30.33 /ea	121
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	16.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	286	31.98 /ea	512
						Duplex receptacle, grounded, 120 volt, 20 amp	10.00 ea	38.44 /ea	-	10.65 /ea	-	49.09 /ea	491	88.25 /ea	883
						Duplex receptacle, ground fault interrupting, 20 amp	6.00 ea	38.44 /ea	-	45.00 /ea	-	83.44 /ea	501	151.96 /ea	912
						26.00.99.00 Electrical, Other	***2,731.00** SF*	*2.48 /SF*	*/SF*	*0.41 /SF*	*/SF*	*2.89 /SF*	*7,883*	*5.17 /SF*	*14,130*
					26.10.03.00	*UG Conduit*									
						WP cover	4.00 ea	17.30 /ea	-	42.50 /ea	-	59.80 /ea	239	109.65 /ea	439
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*239*	*/LF*	*439*
					26.15.01.00	*Process Electrical, Wire/Cable*									

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	20.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	2,161	193.55 /clf	3,871
						26.15.01.00 Process Electrical, Wire/Cable	**2,000.00** LF	0.94 /LF	/LF	0.14 /LF	/LF	1.08 /LF	2,161	1.94 /LF	3,871
						26.15 Process Electrical	**2,731.00** SF	3.19 /SF	/SF	0.57 /SF	/SF	3.77 /SF	10,283	6.75 /SF	18,438
						26.0 Electrical Work	**2,731.00** SF	3.19 /SF	/SF	0.57 /SF	/SF	3.77 /SF	10,283	6.75 /SF	18,438
						26.30.DEV Device Outlets	**1.00** LS	8,723.44 /LS	/LS	1,559.54 /LS	/LS	10,282.98 /LS	10,283	18,438.24 /LS	18,438
		26.40.EQCON				*Facility Equipment Connections and Controls*									
			26.0			*Electrical Work*									
				26.10		*Site Electrical*									
					26.00.99.00	*Electrical, Other*									
						Motor connections, flexible conduit and fittings, 3 phase, 460 volt, 5 HP motor	2.00 ea	129.73 /ea	-	6.35 /ea	-	136.08 /ea	272	242.97 /ea	486
						26.00.99.00 Electrical, Other	**2,731.00** SF	0.10 /SF	/SF	0.01 /SF	/SF	0.10 /SF	272	0.18 /SF	486
						26.10 Site Electrical	**1.00** LS	259.46 /LS	/LS	12.70 /LS	/LS	272.16 /LS	272	485.93 /LS	486
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	12.97 /lf	-	5.15 /lf	-	18.12 /lf	3,625	32.67 /lf	6,534
						26.00.99.00 Electrical, Other	**2,731.00** SF	0.95 /SF	/SF	0.38 /SF	/SF	1.33 /SF	3,625	2.39 /SF	6,534
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	9.00 clf	103.78 /clf	-	20.50 /clf	-	124.28 /clf	1,119	222.97 /clf	2,007
						26.15.01.00 Process Electrical, Wire/Cable	**900.00** LF	1.04 /LF	/LF	0.21 /LF	/LF	1.24 /LF	1,119	2.23 /LF	2,007
					26.20.05.00	*Facility Electrical, HVAC*									
						HVAC controls - electrical contractor scope	1.00 LS		-	500.00 /LS	-	500.00 /LS	500	927.30 /LS	927
						26.20.05.00 Facility Electrical, HVAC	**2,731.00** SF	/SF	/SF	0.18 /SF	/SF	0.18 /SF	500	0.34 /SF	927
						26.15 Process Electrical	**2,731.00** SF	1.29 /SF	/SF	0.63 /SF	/SF	1.92 /SF	5,243	3.47 /SF	9,468
						26.0 Electrical Work	**2,731.00** SF	1.39 /SF	/SF	0.63 /SF	/SF	2.02 /SF	5,515	3.64 /SF	9,954
						26.40.EQCON Facility Equipment Connections and Controls	**2.00** ALO	1,594.07 /ALO	/ALO	563.60 /ALO	/ALO	2,757.67 /ALO	5,515	4,977.01 /ALO	9,954
		26.90.LPS				*Facility Lightning Protection System*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.15.10.00	*Process Electrical, Lightning Protection*									
						Air terminal and base, copper, 3/8" dia x 10", to 75' h	12.00 ea	129.73 /ea	-	26.00 /ea	-	155.73 /ea	1,869	279.41 /ea	3,353
						Lightning protection cable, copper, 220 lb per thousand feet, to 75' h	700.00 lf	3.24 /lf	-	3.18 /lf	-	6.42 /lf	4,496	11.68 /lf	8,174
						26.15.10.00 Process Electrical, Lightning Protection	**2,731.00** SF	1.40 /SF	/SF	0.93 /SF	/SF	2.33 /SF	6,365	4.22 /SF	11,527
						26.15 Process Electrical	**2,731.00** SF	1.40 /SF	/SF	0.93 /SF	/SF	2.33 /SF	6,365	4.22 /SF	11,527
				26.90		*Facility Electrical*									
					26.15.10.00	*Process Electrical, Lightning Protection*									
						LPS design and certification, misc mat and labor	1.00 LS	2,075.69 /LS	-	1,000.00 /LS	2,500.00 /LS	5,575.69 /LS	5,576	10,008.67 /LS	10,009
						26.15.10.00 Process Electrical, Lightning Protection	**2,731.00** SF	0.76 /SF	/SF	0.37 /SF	0.92 /SF	2.04 /SF	5,576	3.66 /SF	10,009
						26.90 Facility Electrical	**2,731.00** SF	0.76 /SF	/SF	0.37 /SF	0.92 /SF	2.04 /SF	5,576	3.66 /SF	10,009
						26.0 Electrical Work	**2,731.00** SF	2.16 /SF	/SF	1.30 /SF	0.92 /SF	4.37 /SF	11,941	7.89 /SF	21,536
						26.90.LPS Facility Lightning Protection System	**2,731.00** SF	2.16 /SF	/SF	1.30 /SF	0.92 /SF	4.37 /SF	11,941	7.89 /SF	21,536
		27.30.COMCDT				*Comm Conduit to Admin*									
			26.0			*Electrical Work*									
				26.10		*Site Electrical*									
					26.10.02.00	*Site Electrical, Buried Conduit*									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	1.80 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	4,656	4,691.24 /ton	8,444
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.90 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,328	4,691.21 /ton	4,222
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	150.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	2,504	30.02 /lf	4,503
						26.10.02.00 Site Electrical, Buried Conduit	**150.00** LF	39.29 /LF	/LF	23.97 /LF	/LF	63.25 /LF	9,488	114.46 /LF	17,169
						26.10 Site Electrical	**1.00** LS	[illegible] /LS	/LS	3,595.50 /LS	/LS	[illegible] /LS	9,488	17,169.08 /LS	17,169
				26.15		*Process Electrical*									
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	6.50 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	2,720	757.26 /clf	4,922
						26.15.01.00 Process Electrical, Wire/Cable	**650.00** LF	2.60 /LF	/LF	1.59 /LF	/LF	4.19 /LF	2,720	7.57 /LF	4,922
					26.15.11.00	*Process Electrical, Grounding*									
						Ground wire, copper wire, bare stranded, 4/0	1.55 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	1,212	1,427.88 /clf	2,206
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	1.50 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	241	288.69 /ea	433
						26.15.11.00 Process Electrical, Grounding	**155.00** LF	4.89 /LF	/LF	4.49 /LF	/LF	9.37 /LF	1,453	17.03 /LF	2,639
						26.15 Process Electrical	**2,731.00** SF	0.95 /SF	/SF	0.62 /SF	/SF	1.53 /SF	4,173	2.77 /SF	7,561
						26.0 Electrical Work	**2,731.00** SF	3.05 /SF	/SF	1.95 /SF	/SF	5.00 /SF	13,661	9.06 /SF	24,730
			31.0			*Earthwork*									
				26.10		*Site Electrical*									
					31.20.07.15	*Earthworks, Sitework, Borrow*									
						Concrete (red) envelope/encasement, poured neat	8.90 CY	194.63 /CY	1.76 /CY	77.50 /CY	-	273.89 /CY	2,438	425.24 /CY	3,786
						End bulkheads, plywood, concrete envelope/encasement	1.07 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	15	21.84 /sf	23
						31.20.07.15 Earthworks, Sitework, Borrow	*8.90* CY	196.24 /CY	1.76 /CY	77.58 /CY	/CY	275.59 /CY	2,454	427.85 /CY	3,809
					31.20.09.10	*Earthworks, Sitework, Backfill*									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	116.05 CY	1.94 /CY	23.32 /CY	-	-	25.26 /CY	2,932	38.71 /CY	4,492
						31.20.09.10 Earthworks, Sitework, Backfill	*116.05* CY	1.94 /CY	23.32 /CY	/CY	/CY	25.26 /CY	2,932	38.71 /CY	4,492
					31.20.15.00	*Earthworks, Sitework, Hauling and Dump Fees*									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	9.87 CY	10.88 /CY	9.31 /CY	-	-	20.19 /CY	199	30.94 /CY	305
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	*9.87* CY	10.88 /CY	9.31 /CY	/CY	/CY	20.19 /CY	199	30.94 /CY	305
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	125.92 CY	5.93 /CY	23.02 /CY	-	-	28.95 /CY	3,645	44.35 /CY	5,584
						31.25.01.00 Earthworks, Structural, Excavation	*125.92* CY	5.93 /CY	23.02 /CY	/CY	/CY	28.95 /CY	3,645	44.35 /CY	5,584
						26.10 Site Electrical	**1.00** LS	2,826.35 /LS	5,712.15 /LS	690.78 /LS	/LS	9,229.28 /LS	9,229	14,190.04 /LS	14,190
						31.0 Earthwork	*260.74* CY	10.84 /CY	21.91 /CY	2.65 /CY	/CY	35.40 /CY	9,229	54.42 /CY	14,190
						27.30.COMCDT Comm Conduit to Admin	*0.00*	/LF	/LF	/LF	/LF	/LF	22,890	/LF	38,920
		28.10.FA				*Fire Alarm System*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	800.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	7,243	16.21 /lf	12,969
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	20.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	1,105	98.73 /ea	1,975
						Outlet boxes, pressed steel, covers, blank, 4" square	2.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	34	30.32 /ea	61
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	18.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	322	31.98 /ea	576
						26.00.99.00 Electrical, Other	**2,731.00** SF	2.84 /SF	/SF	0.35 /SF	/SF	3.19 /SF	8,704	5.70 /SF	15,580
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	20.00 clf	79.84 /clf	-	9.70 /clf	-	89.54 /clf	1,791	160.26 /clf	3,205

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						28.15.01.00 Process Electrical, Wire/Cable	2,000.00 LF	0.80 /LF	/LF	0.10 /LF	/LF	0.90 /LF	1,791	1.60 /LF	3,205
						28.15 Process Electrical	2,731.00 SF	3.42 /SF	/SF	0.42 /SF	/SF	3.84 /SF	10,494	6.88 /SF	18,785
						28.0 Electrical Work	2,731.00 SF	3.42 /SF	/SF	0.42 /SF	/SF	3.84 /SF	10,494	6.88 /SF	18,785
			28.0			*Electronic Safety and Security*									
				28.00		*Electronic Safety and Security*									
					28.35.01.00	*Electronic Safety and Security*									
						Detection Systems, fire alarm control panel, alarm device, excluding wires & conduits	8.00 ea	129.73 /ea	-	230.00 /ea	-	359.73 /ea	2,878	567.81 /ea	4,542
						Detection Systems, fire alarm control panel, actuating device, excluding wires & conduits	4.00 ea	129.73 /ea	-	340.00 /ea	-	469.73 /ea	1,879	744.32 /ea	2,977
						Detection Systems, fire alarm control panel, addressable without voice, up to 200 points, excluding wires & conduits, inluding vendor design, startup	1.00 ea	1,816.00 /ea	-	4,575.00 /ea	1,000.00 /ea	7,391.00 /ea	7,391	11,655.34 /ea	11,655
						Detection Systems, fire alarm control panel, battery & rack, excluding wires & conduits	1.00 ea	259.46 /ea	-	460.00 /ea	-	719.46 /ea	719	1,135.61 /ea	1,136
						Detection Systems, fire alarm control panel, battery & rack, automatic charger, excluding wires & conduits	1.00 ea	129.73 /ea	-	525.00 /ea	-	654.73 /ea	655	1,041.17 /ea	1,041
						Detection Systems, visual alarm, ADA type, excluding wires & conduits	6.00 ea	154.90 /ea	-	119.00 /ea	-	273.90 /ea	1,643	428.27 /ea	2,570
						28.35.01.00 Electronic Safety and Security	2,731.00 SF	1.72 /SF	/SF	3.47 /SF	0.37 /SF	5.55 /SF	15,165	8.76 /SF	23,922
						28.00 Electronic Safety and Security	2,731.00 SF	1.72 /SF	/SF	3.47 /SF	0.37 /SF	5.55 /SF	15,165	8.76 /SF	23,922
						28.0 Electronic Safety and Security	2,731.00 SF	1.72 /SF	/SF	3.47 /SF	0.37 /SF	5.55 /SF	15,165	8.76 /SF	23,922
						28.10.FA Fire Alarm System	2,731.00 SF	5.14 /SF	/SF	3.89 /SF	0.37 /SF	9.40 /SF	25,660	15.64 /SF	42,707
		28.20.AC				*Access Control System*									
			28.0			*Electronic Safety and Security*									
				28.00		*Electronic Safety and Security*									
					28.35.01.00	*Electronic Safety and Security*									
						Card reader - all in allowance per each (incl circuit, cards, CX)	4.00 ea	1,556.77 /ea	-	800.00 /ea	-	2,356.77 /ea	9,427	3,668.78 /ea	14,675
						28.35.01.00 Electronic Safety and Security	2,731.00 SF	2.28 /SF	/SF	1.17 /SF	/SF	3.45 /SF	9,427	5.37 /SF	14,675
						28.00 Electronic Safety and Security	2,731.00 SF	2.28 /SF	/SF	1.17 /SF	/SF	3.45 /SF	9,427	5.37 /SF	14,675
						28.0 Electronic Safety and Security	2,731.00 SF	2.28 /SF	/SF	1.17 /SF	/SF	3.45 /SF	9,427	5.37 /SF	14,675
						28.20.AC Access Control System	4.00 DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	9,427	3,668.78 /DOOR	14,675
		28.20.CCTV				*Closed Circuit TV and Cameras*									
			28.0			*Electrical Work*									
				28.00		*Electronic Safety and Security*									
					28.35.01.00	*Electronic Safety and Security*									
						Camera allowance (licenses, circuit, startup, CX)	1.00 LS	1,037.85 /LS	-	1,000.00 /LS	1,000.00 /LS	3,037.85 /LS	3,038	5,486.20 /LS	5,486
						28.35.01.00 Electronic Safety and Security	2,731.00 SF	0.38 /SF	/SF	0.37 /SF	0.37 /SF	1.11 /SF	3,038	2.01 /SF	5,486
						28.00 Electronic Safety and Security	2,731.00 SF	0.38 /SF	/SF	0.37 /SF	0.37 /SF	1.11 /SF	3,038	2.01 /SF	5,486
						28.0 Electrical Work	2,731.00 SF	0.38 /SF	/SF	0.37 /SF	0.37 /SF	1.11 /SF	3,038	2.01 /SF	5,486
			28.0			*Electronic Safety and Security*									
				28.00		*Electronic Safety and Security*									
					28.35.01.00	*Electronic Safety and Security*									
						Closed circuit television system (CCTV), industrial quality, for additional camera stations, add	2.00 ea	384.39 /ea	-	690.00 /ea	-	1,074.39 /ea	2,149	1,696.08 /ea	3,392
						Closed circuit television system (CCTV), industrial quality, for weatherproof camera station, add	2.00 ea	798.35 /ea	-	540.00 /ea	-	1,338.35 /ea	2,677	2,089.61 /ea	4,179
						28.35.01.00 Electronic Safety and Security	2,731.00 SF	0.87 /SF	/SF	0.90 /SF	/SF	1.77 /SF	4,825	2.77 /SF	7,571
						28.00 Electronic Safety and Security	2,731.00 SF	0.87 /SF	/SF	0.90 /SF	/SF	1.77 /SF	4,825	2.77 /SF	7,571
						28.0 Electronic Safety and Security	2,731.00 SF	0.87 /SF	/SF	0.90 /SF	/SF	1.77 /SF	4,825	2.77 /SF	7,571
						28.20.CCTV Closed Circuit TV and Cameras	0.00	/CAM	/CAM	/CAM	/CAM	/CAM	7,863	/CAM	13,058
		28.20.ID				*Intrusion Detection System*									
			28.0			*Electronic Safety and Security*									
				28.00		*Electronic Safety and Security*									
					28.35.01.00	*Electronic Safety and Security*									
						Securitized door, all-in allowance per each (incl circuit, devices, CX)	4.00 ea	2,594.61 /ea	-	1,000.00 /ea	-	3,594.61 /ea	14,378	5,579.76 /ea	22,319
						Door controller (all-in cost including vendor program and startup)	2.00 ea	648.66 /ea	-	2,000.00 /ea	500.00 /ea	3,148.66 /ea	6,297	4,969.01 /ea	9,938
						28.35.01.00 Electronic Safety and Security	2,731.00 SF	4.28 /SF	/SF	2.93 /SF	0.37 /SF	7.57 /SF	20,676	11.81 /SF	32,257
						28.00 Electronic Safety and Security	2,731.00 SF	4.28 /SF	/SF	2.93 /SF	0.37 /SF	7.57 /SF	20,676	11.81 /SF	32,257
						28.0 Electronic Safety and Security	2,731.00 SF	4.28 /SF	/SF	2.93 /SF	0.37 /SF	7.57 /SF	20,676	11.81 /SF	32,257
						28.20.ID Intrusion Detection System	6.00 DOOR	1,945.96 /DOOR	/DOOR	1,333.33 /DOOR	166.67 /DOOR	3,445.96 /DOOR	20,676	5,376.18 /DOOR	32,257
						06.02 Funks Reservoir Maintenance and Storage BLDG	2,731.00 SF	92.38 /SF	5.90 /SF	73.19 /SF	37.81 /SF	209.48 /SF	565,392	357.61 /SF	976,624
	06.03					*Funks Reservoir Flow Meter Vault*									
		01.00.102				*Funks Reservoir FlowMeter Vault, Removal and Control of Water*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					31.15.02.00	*Dewatering*									
						CBD Discharge Structure, Removal and Control of Water	3.00 MO		-		45,000.00 /MO	45,000.00 /MO	135,000	68,943.90 /MO	206,832
						31.15.02.00 Dewatering	3.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	135,000	68,943.90 /MO	206,832
						01.01 Construction Operations	3.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	135,000	68,943.90 /MO	206,832
						01.0 General Requirements	3.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	135,000	68,943.90 /MO	206,832
						01.00.102 Funks Reservoir FlowMeter Vault, Removal and Control of Water	3.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	135,000	68,943.90 /MO	206,832
		03.00.004				*Funks Reservoir FlowMeter Vault, Concrete*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.36	*Cast-In-Place Concrete, Slabs on Grade, 36" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	732.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	6,798	14.30 /sfca	10,466
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	30.10 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	77,385	4,025.91 /ton	121,180
						Reinforcing in place, unloading & sorting, add to above - slabs	30.10 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,677	85.34 /ton	2,569
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	30.10 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	1,823	92.77 /ton	2,792
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	355.00 cy	-	-	131.00 /cy	-	131.00 /cy	46,505	210.20 /cy	74,621
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	344.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	9,976	44.43 /CY	15,285
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	3,096.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	2,900	1.44 /sf	4,443
						Curing, sprayed membrane curing compound	30.96 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	714	36.21 /csf	1,121
						Fine grading, fine grade for slab on grade, machine	344.00 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	645	2.87 /sy	968
						03.10.05.36 Cast-In-Place Concrete, Slabs on Grade, 36" thick	344.00 CY	180.43 /CY	7.65 /CY	243.37 /CY	/CY	431.46 /CY	148,425	678.68 /CY	233,465
						03.18 Cast-In-Place Concrete, Slabs on Grade	344.00 CY	180.43 /CY	7.65 /CY	243.37 /CY	/CY	431.46 /CY	148,425	678.68 /CY	233,465
				03.20		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.36	*Cast-In-Place Concrete, Straight Walls, 36" thick*									
						C.I.P. concrete forms, wall, box out for opening, to 16" thick, over 10 S.F. (use perimeter), includes erecting, bracing, stripping and cleaning	304.00 lf	37.07 /lf	-	2.45 /lf	-	39.52 /lf	12,014	60.73 /lf	18,461
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	10,296.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	151,738	22.97 /sfca	236,544
						Form oil, coverage varies greatly, maximum, includes material only	27.50 gal	-	-	23.50 /gal	-	23.50 /gal	646	37.71 /gal	1,037

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Jacobs			
Project type:	DETAIL REPORT		Estimator: Cavalleri/Wells - Jacobs
Job Size:	Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2		Revision/Date: 2 / Feb 1, 2021
Duration:	Project Number: D3880600		Estimate Class: 4
	Design Stage: Feasibility		

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.06.36	Cast-In-Place Concrete, Straight Walls, 36" thick									
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	41.30 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	106,180	4,025.91 /ton	166,270
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	41.30 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,301	85.34 /ton	3,525
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	41.30 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	2,501	92.77 /ton	3,831
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	486.00 cy	-	-	131.00 /cy	-	131.00 /cy	63,666	210.20 /cy	102,158
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	472.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	21,103	68.50 /CY	32,331
						Concrete finishing, walls, includes breaking ties and patching voids	8,486.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	8,650	1.56 /sf	13,277
						03.10.06.36 Cast-In-Place Concrete, Straight Walls, 36" thick	472.00 CY	409.18 /CY	9.74 /CY	362.44 /CY	/CY	781.35 /CY	368,798	1,223.39 /CY	577,433
						03.30 Cast-In-Place Concrete, Straight Walls	472.00 CY	409.18 /CY	9.74 /CY	362.44 /CY	/CY	781.35 /CY	368,798	1,223.39 /CY	577,433
				03.24		Cast-In-Place Concrete, Elevated Slabs									
					03.10.10.12	Cast-In-Place Concrete, Elevated Decks, 12" thick									
						Slab shoring	59,400.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	40,673	1.05 /cf	62,529
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	2,400.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	21,304	13.70 /sf	32,870
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	220.00 lf	6.15 /lf	-	0.22 /lf	-	6.37 /lf	1,401	9.77 /lf	2,150
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	7.75 ton	1,370.95 /ton	-	1,200.00 /ton	-	2,570.95 /ton	19,925	4,025.91 /ton	31,201
						Reinforcing in place, unloading & sorting, add to above - decks	7.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	432	85.34 /ton	661
						Reinforcing steel, crane cost for handling, maximum, add	7.75 ton	140.59 /ton	18.56 /ton	-	-	159.16 /ton	1,233	243.84 /ton	1,890
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	90.00 cy	-	-	131.00 /cy	-	131.00 /cy	11,790	210.20 /cy	18,918
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	87.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	2,593	45.67 /CY	3,973
						Finishing elev slab, bull float, manual float & manual steel trowel	2,337.00 sf	1.23 /sf	-	-	-	1.23 /sf	2,884	1.89 /sf	4,418
						Curing, sprayed membrane curing compound, elevated decks	23.37 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	539	36.21 /csf	846
						03.10.10.12 Cast-In-Place Concrete, Elevated Decks, 12" thick	87.00 CY	856.23 /CY	7.93 /CY	317.14 /CY	/CY	1,181.30 /CY	102,773	1,832.85 /CY	159,456
						03.24 Cast-In-Place Concrete, Elevated Slabs	87.00 CY	856.23 /CY	7.93 /CY	317.14 /CY	/CY	1,181.30 /CY	102,773	1,832.85 /CY	159,456
						03.0 Concrete Work	903.00 CY	365.11 /CY	8.77 /CY	312.72 /CY	/CY	686.59 /CY	619,993	1,074.59 /CY	970,356
						03.00.004 Funks Reservoir FlowMeter Vault, Concrete	903.00 CY	365.11 /CY	8.77 /CY	312.72 /CY	/CY	686.59 /CY	619,993	1,074.59 /CY	970,356
		05.00.004				Funks Reservoir FlowMeter Vault, Catwalk									
			05.0			Metals									
				05.50		Metal Fabrications									
					05.50.02.50	Metals, Elevated Platforms, Complete									
						Channel (C or MC), A36, floor or roof framing, average cost per ton	0.80 ton	1,846.90 /ton	863.43 /ton	2,400.00 /ton	-	5,112.33 /ton	4,090	9,029.00 /ton	7,223
						Ladder, shop fabricated, aluminum, 20" W, bolted to concrete, excl cage	151.00 vlf	34.15 /vlf	1.27 /vlf	51.00 /vlf	-	86.42 /vlf	13,049	153.38 /vlf	23,161
						Railing, pipe, aluminum, clear finish, 3 rails, 3'-6" high, posts @ 5' O.C., 1-1/2" dia, shop fabricated	64.00 lf	21.19 /lf	0.79 /lf	90.50 /lf	-	112.48 /lf	7,198	201.38 /lf	12,888
						Handrail Gates, at Ladders	5.00 ea	181.40 /ea	13.53 /ea	200.00 /ea	-	394.93 /ea	1,975	698.55 /ea	3,493
						Floor grating, steel, 1-3/4" x 3/16" bearing bars @ 1-3/16" O.C., cross bars @ 4" O.C., up to 300 S.F., field fabricated from panels	260.00 SF	12.64 /SF	4.64 /SF	20.50 /SF	-	37.78 /SF	9,823	66.93 /SF	17,401
						Miscellaneous Consumables Allowance	1.00 ls		-		7,000.00 /ls	7,000.00 /ls	7,000	12,124.60 /ls	12,125
						05.50.02.50 Metals, Elevated Platforms, Complete	260.00 SF	46.87 /SF	8.49 /SF	83.63 /SF	26.92 /SF	165.91 /SF	43,135	293.43 /SF	76,291
						05.50 Metal Fabrications	260.00 SF	46.87 /SF	8.49 /SF	83.63 /SF	26.92 /SF	165.91 /SF	43,135	293.43 /SF	76,291
						05.0 Metals	260.00 SF	46.87 /SF	8.49 /SF	83.63 /SF	26.92 /SF	165.91 /SF	43,135	293.43 /SF	76,291
						05.00.004 Funks Reservoir FlowMeter Vault, Catwalk	260.00 SF	46.87 /SF	8.49 /SF	83.63 /SF	26.92 /SF	165.91 /SF	43,135	293.43 /SF	76,291
		08.00.003				Funks Reservoir FlowMeter Vault, Access Hatches									
			08.0			Openings									
				08.32		Specialty Doors and Frames - Floor Doors									
					08.30.01.10	Specialty Doors and Frames, Access Doors									
						Doors, specialty, access, floor, industrial, aluminum, 300 psf L.L., single leaf, 2.5' x 3', 100 lb	2.00 EA	534.03 /EA	-	1,200.00 /EA	-	1,734.03 /EA	3,468	3,090.50 /EA	6,181
						Doors, specialty, access, floor, industrial, aluminum, 300 psf L.L., double leaf, 4' x 6', 235 lb	2.00 EA	712.04 /EA	-	3,600.00 /EA	-	4,312.04 /EA	8,624	7,729.82 /EA	15,460
						08.30.01.10 Specialty Doors and Frames, Access Doors	4.00 EA	623.04 /EA	/EA	2,400.00 /EA	/EA	3,023.04 /EA	12,092	5,410.16 /EA	21,641
						08.32 Specialty Doors and Frames - Floor Doors	4.00 EA	623.04 /EA	/EA	2,400.00 /EA	/EA	3,023.04 /EA	12,092	5,410.16 /EA	21,641
						08.0 Openings	4.00 EA	623.04 /EA	/EA	2,400.00 /EA	/EA	3,023.04 /EA	12,092	5,410.16 /EA	21,641
						08.00.003 Funks Reservoir FlowMeter Vault, Access Hatches	4.00 EA	623.04 /EA	/EA	2,400.00 /EA	/EA	3,023.04 /EA	12,092	5,410.16 /EA	21,641
		23.00.004				Funks Reservoir FlowMeter Vault, HVAC									
			23.0			HVAC									
				23.00		HVAC									
					23.00.02.00	Mechanical, HVAC									
						Exhaust Fans	2.00 ea	2,187.71 /ea	140.00 /ea	5,000.00 /ea	-	7,327.71 /ea	14,655	13,054.74 /ea	26,109
						Exhaust and Air Vents	3.00 ea	91.16 /ea	-	250.00 /ea	-	341.16 /ea	1,023	609.03 /ea	1,827
						23.00.02.00 Mechanical, HVAC	**3,096.00** SF	1.50 /SF	0.09 /SF	3.47 /SF	/SF	5.06 /SF	15,679	9.02 /SF	27,937
						23.00 HVAC	**3,096.00** SF	1.50 /SF	0.09 /SF	3.47 /SF	/SF	5.06 /SF	15,679	9.02 /SF	27,937
						23.0 HVAC	**3,096.00** SF	1.50 /SF	0.09 /SF	3.47 /SF	/SF	5.06 /SF	15,679	9.02 /SF	27,937
						23.00.004 Funks Reservoir FlowMeter Vault, HVAC	**3,096.00** SF	1.50 /SF	0.09 /SF	3.47 /SF	/SF	5.06 /SF	15,679	9.02 /SF	27,937
		27.30.COMC DT				Comm Conduit to Admin									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	300.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	5,008	30.02 /lf	9,005
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	5,008	/EA	9,005
						26.10 Site Electrical	**1.00** LS	3,891.92 /LS	/LS	1,116.00 /LS	/LS	5,007.92 /LS	5,008	9,005.38 /LS	9,005
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	13.00 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	5,440	757.26 /clf	9,844
						26.15.01.00 Process Electrical, Wire/Cable	**1,300.00** LF	2.60 /LF	/LF	1.59 /LF	/LF	4.19 /LF	5,440	7.57 /LF	9,844
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	3.09 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	2,423	1,427.88 /clf	4,412
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	3.00 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	482	288.68 /ea	866
						26.15.11.00 Process Electrical, Grounding	**309.00** LF	4.90 /LF	/LF	4.50 /LF	/LF	9.40 /LF	2,905	17.08 /LF	5,279
						26.15 Process Electrical	**3,096.00** SF	1.58 /SF	/SF	1.12 /SF	/SF	2.70 /SF	8,345	4.88 /SF	15,123
						26.0 Electrical Work	**3,096.00** SF	2.84 /SF	/SF	1.48 /SF	/SF	4.31 /SF	13,353	7.79 /SF	24,128
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	17.81 CY	194.63 /CY	1.76 /CY	77.50 /CY	-	273.89 /CY	4,877	425.24 /CY	7,572

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					31.20.07.15	Earthworks, Sitework, Borrow									
						End bulkheads, plywood, concrete envelope/encasement	2.13 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	30	21.85 /sf	47
						31.20.07.15 Earthworks, Sitework, Borrow	17.81 CY	196.24 /CY	1.76 /CY	77.59 /CY	/CY	275.59 /CY	4,907	427.85 /CY	7,618
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	232.09 CY	1.94 /CY	23.32 /CY	-	-	25.26 /CY	5,863	38.71 /CY	8,983
						31.20.09.10 Earthworks, Sitework, Backfill	232.09 CY	1.94 /CY	23.32 /CY	/CY	/CY	25.26 /CY	5,863	38.71 /CY	8,983
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	19.74 CY	10.88 /CY	9.31 /CY	-	-	20.19 /CY	399	30.94 /CY	611
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	19.74 CY	10.88 /CY	9.31 /CY	/CY	/CY	20.19 /CY	399	30.94 /CY	611
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	251.83 CY	5.93 /CY	23.02 /CY	-	-	28.95 /CY	7,289	44.35 /CY	11,168
						31.25.01.00 Earthworks, Structural, Excavation	251.83 CY	5.93 /CY	23.02 /CY	/CY	/CY	28.95 /CY	7,289	44.35 /CY	11,168
						58.10 Site Electrical	1.00 LS	5,652.57 /LS	11,424.37 /LS	1,381.53 /LS	/LS	18,458.47 /LS	18,458	28,380.14 /LS	28,380
						31.0 Earthwork	521.47 CY	10.84 /CY	21.91 /CY	2.65 /CY	/CY	35.40 /CY	18,458	54.42 /CY	28,380
						27.30.COMCDT Comm Conduit to Admin	300.00 LF	48.11 /LF	38.08 /LF	19.85 /LF	/LF	106.04 /LF	31,812	175.03 /LF	52,508
		31.00.106				Funks Reservoir FlowMeter Vault, Excavation and Backfill									
			31.0			Earthwork									
				31.25		Earthworks, Structural									
					31.25.01.00	Earthworks, Structural, Excavation									
						Structural Excavation, excludes sheeting or dewatering	8,350.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	49,117	9.01 /CY	75,252
						Stockpile Excavated Spoils	8,350.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	23,690	4.36 /cy	36,447
						31.25.01.00 Earthworks, Structural, Excavation	8,350.00 CY	3.89 /CY	4.58 /CY	0.25 /CY	/CY	8.72 /CY	72,808	13.38 /CY	111,699
					31.25.02.00	Earthworks, Structural, Import Aggregates (Slab)									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	133.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	6,717	79.91 /CY	10,628
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	133.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	/CY	50.50 /CY	6,717	79.91 /CY	10,628
					31.25.03.00	Earthworks, Structural, Backfill									
						Backfill, Native material	6,820.00 CY	6.18 /CY	1.69 /CY	0.00 /CY	-	7.87 /CY	53,682	12.06 /CY	82,245
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	5,420.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	11,007	3.11 /cy	16,863
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	1,400.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	2,013	2.20 /cy	3,083
						Compaction, water for, 6000 gallon wagon, 6 mile haul	6,820.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	12,642	2.93 /cy	19,962
						31.25.03.00 Earthworks, Structural, Backfill	6,820.00 CY	7.46 /CY	2.98 /CY	1.20 /CY	/CY	11.63 /CY	79,343	17.91 /CY	122,154
					31.25.05.00	Earthworks, Structural, Hauling and Disposal									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	1,530.00 CY	7.24 /CY	8.80 /CY	-	-	16.04 /CY	24,534	24.57 /CY	37,588
						Load excavated spoils	1,530.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	3,299	3.30 /cy	5,054
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	1,530.00 CY	8.27 /CY	9.92 /CY	/CY	/CY	18.19 /CY	27,833	27.87 /CY	42,642
						31.25 Earthworks, Structural	16,833.00 CY	5.82 /CY	4.38 /CY	0.89 /CY	/CY	11.09 /CY	186,700	17.06 /CY	287,123
						31.0 Earthwork	16,833.00 CY	5.82 /CY	4.38 /CY	0.89 /CY	/CY	11.09 /CY	186,700	17.06 /CY	287,123
						31.00.106 Funks Reservoir FlowMeter Vault, Excavation and Backfill	16,833.00 CY	5.82 /CY	4.38 /CY	0.89 /CY	/CY	11.09 /CY	186,700	17.06 /CY	287,123
		40.00.000				Funks Reservoir FlowMeter Vault, Piping									
			40.0			Process Pipe									
				40.11		Process Pipe, Carbon Steel									
					40.10.02.85	Process Pipe, Carbon Steel, 144"									
						Piping, pipe, WSP, plain end, welded, 144" diameter, excludes excavation or backfill	144.00 LF	121.97 /LF	62.10 /LF	970.00 /LF	-	1,154.07 /LF	166,186	1,838.45 /LF	264,737
						Pipe Wall Anchor, 144" Dia Piping	8.00 ea	725.59 /ea	54.12 /ea	750.00 /ea	-	1,529.71 /ea	12,238	2,398.03 /ea	19,184
						40.10.02.85 Process Pipe, Carbon Steel, 144"	144.00 LF	162.28 /LF	65.10 /LF	1,011.67 /LF	/LF	1,239.05 /LF	178,423	1,971.68 /LF	283,922
						40.11 Process Pipe, Carbon Steel	144.00 LF	162.28 /LF	65.10 /LF	1,011.67 /LF	/LF	1,239.05 /LF	178,423	1,971.68 /LF	283,922
						40.0 Process Pipe	144.00 LF	162.28 /LF	65.10 /LF	1,011.67 /LF	/LF	1,239.05 /LF	178,423	1,971.68 /LF	283,922
						40.00.000 Funks Reservoir FlowMeter Vault, Piping	144.00 LF	162.28 /LF	65.10 /LF	1,011.67 /LF	/LF	1,239.05 /LF	178,423	1,971.68 /LF	283,922
		40.90.102				Funks Reservoir FlowMeter Vault, I&C									
			40.9			Instrumentation & Controls									
				40.90		Instrumentation & Controls									
					40.90.99.01	I&C, Other									
						Ultrasonic Flow Meter Transducer Sensor Array	4.00 ea	2,637.73 /ea	1,040.00 /ea	40,000.00 /ea	-	43,677.73 /ea	174,711	78,553.60 /ea	314,214
						40.90.99.01 I&C, Other	3,096.00 SF	3.41 /SF	1.34 /SF	51.68 /SF	/SF	56.43 /SF	174,711	101.49 /SF	314,214
						40.90 Instrumentation & Controls	3,096.00 SF	3.41 /SF	1.34 /SF	51.68 /SF	/SF	56.43 /SF	174,711	101.49 /SF	314,214
						40.9 Instrumentation & Controls	3,096.00 SF	3.41 /SF	1.34 /SF	51.68 /SF	/SF	56.43 /SF	174,711	101.49 /SF	314,214
						40.90.102 Funks Reservoir Flow Meter Vault, I&C	3,096.00 SF	3.41 /SF	1.34 /SF	51.68 /SF	/SF	56.43 /SF	174,711	101.49 /SF	314,214
						98.03 Funks Reservoir Flow Meter Vault	3,096.00 SF	158.87 /SF	36.29 /SF	218.29 /SF	65.87 /SF	481.30 /SF	1,397,549	725.78 /SF	2,246,922
	06.63					Funks Reservoir									
		01.00.204				Funks Reservoir, Dewatering/Erosion Controls/Dust Abatement									
			01.0			General Requirements									
				01.01		Construction Operations									
					01.01.05.00	General Conditions, Other									
						Funks Reservoir, Dewatering/Erosion Controls/Dust Abatement Allowance	18.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	-	60,000.00 /MO	1,080,000	93,012.69 /MO	1,674,228
						01.01.05.00 General Conditions, Other	18.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,080,000	93,012.69 /MO	1,674,228
						01.01 Construction Operations	18.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,080,000	93,012.69 /MO	1,674,228
						01.0 General Requirements	18.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,080,000	93,012.69 /MO	1,674,228
						01.00.204 Funks Reservoir, Dewatering/Erosion Controls/Dust Abatement	18.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	1,080,000	93,012.69 /MO	1,674,228
		31.00.107				Funks Reservoir, Prepare Access/Haul Roads and Stockpile Areas									
			31.0			Earthwork									
				31.22		Earthworks, Site									
					31.15.01.00	Site Preparation, Clearing and Grubbing									
						Topsoil stripping and stockpiling, loam or topsoil, remove and stockpile on site, 200 HP dozer, 6" deep, 200' haul per C.Y.	184,000.00 CY	1.14 /CY	1.62 /CY	-	-	2.76 /CY	508,317	4.23 /CY	778,785
						Load excavated spoils	184,000.00 cy	0.62 /cy	0.68 /cy	0.00 /cy	-	1.29 /cy	238,021	1.98 /cy	364,668
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	184,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	811,400	6.76 /cy	1,243,135
						Stockpile Management	184,000.00 cy	0.18 /cy	0.20 /cy			0.37 /cy	68,641	0.57 /cy	105,164
						31.15.01.00 Site Preparation, Clearing and Grubbing	184,000.00 CY	2.90 /CY	5.94 /CY	/CY	/CY	8.84 /CY	1,626,378	13.54 /CY	2,491,753
						31.22 Earthworks, Site	184,000.00 CY	2.90 /CY	5.94 /CY	/CY	/CY	8.84 /CY	1,626,378	13.54 /CY	2,491,753
						31.0 Earthwork	184,000.00 CY	2.90 /CY	5.94 /CY	/CY	/CY	8.84 /CY	1,626,378	13.54 /CY	2,491,753
						31.00.107 Funks Reservoir, Prepare Access/Haul Roads and Stockpile Areas	184,000.00 CY	2.90 /CY	5.94 /CY	/CY	/CY	8.84 /CY	1,626,378	13.54 /CY	2,491,753
		31.00.108				Funks Reservoir, Sediment Removal									
			31.0			Earthwork									
				31.22		Earthworks, Site									
					31.25.05.00	Earthworks, Structural, Hauling and Disposal									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	29,000.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	465,026	24.57 /cy	712,460
						Load excavated spoils	29,000.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	62,524	3.30 /cy	95,791
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	29,000.00 CY	8.27 /CY	9.92 /CY	/CY	/CY	18.19 /CY	527,549	27.87 /CY	808,251
					35.00.20.04	Hydraulic Dredging									
						Dredging, mobilization and demobilization, add to below	1.00 ls	48,411.52 /ls	31,682.56 /ls	-	-	80,094.08 /ls	80,094	122,711.07 /ls	122,711
						Hydraulic dredging, pumped to shore dump, hydraulic method	286,000.00 CY	9.20 /CY	5.03 /CY	-	-	14.23 /CY	4,068,585	21.80 /CY	6,233,424

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					35.00.20.04	*Hydraulic Dredging*									
						Moving/Drying Dredging Spoils, Stockpile Area Construction and Maintenance Allowance	1.00 ls	362,736.00 /ls	297,127.60 /ls	286,000.00 /ls	-	945,863.60 /ls	945,864	1,469,879.90 /ls	1,469,880
						35.00.20.04 Hydraulic Dredging	*286,000.00 CY*	*10.64 /CY*	*6.18 /CY*	*1.00 /CY*	*/CY*	*17.81 /CY*	*5,094,542*	*27.36 /CY*	*7,826,015*
						31.22 Earthworks, Site	*286,000.00 CY*	*11.47 /CY*	*7.18 /CY*	*1.00 /CY*	*/CY*	*19.66 /CY*	*5,622,092*	*30.19 /CY*	*8,634,266*
						31.0 Earthwork	*286,000.00 CY*	*11.47 /CY*	*7.18 /CY*	*1.00 /CY*	*/CY*	*19.66 /CY*	*5,622,092*	*30.19 /CY*	*8,634,266*
						31.00.108 Funks Reservoir, Sediment Removal	*286,000.00 CY*	*11.47 /CY*	*7.18 /CY*	*1.00 /CY*	*/CY*	*19.66 /CY*	*5,622,092*	*30.19 /CY*	*8,634,266*
		31.00.110				*Funks Reservoir, Reservoir Excavation*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.25.05.00	*Earthworks, Structural, Hauling and Disposal*									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	36,000.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	577,274	24.57 /cy	884,433
						Load excavated spoils	36,000.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	77,615	3.30 /cy	118,914
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	***36,000.00** CY*	*8.27 /CY*	*9.92 /CY*	*/CY*	*/CY*	*18.19 /CY*	*654,889*	*27.87 /CY*	*1,003,347*
					35.00.20.04	*Hydraulic Dredging*									
						Hydraulic dredging, pumped to shore dump, hydraulic method	358,000.00 CY	9.20 /CY	5.03 /CY	-	-	14.23 /CY	5,092,844	21.80 /CY	7,802,677
						Moving/Drying Dredging Spoils, Stockpile Area Construction and Maintenance Allowance	1.00 ls	453,420.00 /ls	371,409.50 /ls	358,000.00 /ls	-	1,182,829.50 /ls	1,182,830	1,838,152.18 /ls	1,838,152
						35.00.20.04 Hydraulic Dredging	*358,000.00 CY*	*10.47 /CY*	*6.07 /CY*	*1.00 /CY*	*/CY*	*17.53 /CY*	*6,275,673*	*26.93 /CY*	*9,640,829*
						31.22 Earthworks, Site	*358,000.00 CY*	*11.30 /CY*	*7.06 /CY*	*1.00 /CY*	*/CY*	*19.36 /CY*	*6,930,562*	*29.73 /CY*	*10,644,176*
						31.0 Earthwork	*358,000.00 CY*	*11.30 /CY*	*7.06 /CY*	*1.00 /CY*	*/CY*	*19.36 /CY*	*6,930,562*	*29.73 /CY*	*10,644,176*
						31.00.110 Funks Reservoir, Reservoir Excavation	*358,000.00 CY*	*11.30 /CY*	*7.06 /CY*	*1.00 /CY*	*/CY*	*19.36 /CY*	*6,930,562*	*29.73 /CY*	*10,644,176*
		31.00.112				*Funks Reservoir, Construct Pipeline Cofferdam*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.07.15	*Earthworks, Sitework, Borrow*									
						Excavate material at deadpool area for levee embankments, 21 C.Y. bucket, self propelled scrapers, 1/4 push dozer	77,000.00 CY	0.65 /CY	1.77 /CY	-	-	2.42 /CY	185,978	3.70 /CY	284,934
						Grading deadpool area w/dozer	46,200.00 sy	0.58 /sy	0.82 /sy	-	-	1.40 /sy	64,670	2.14 /sy	99,080
						Load excavated spoils	77,000.00 cy	0.62 /cy	0.68 /cy	0.00 /cy	-	1.29 /cy	99,606	1.98 /cy	152,606
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	77,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	339,553	6.76 /cy	520,225
						31.20.07.15 Earthworks, Sitework, Borrow	*77,000.00 CY*	*2.57 /CY*	*6.39 /CY*	*/CY*	*/CY*	*8.96 /CY*	*689,809*	*13.73 /CY*	*1,056,845*
					31.20.09.40	*Earthworks, Sitework, Embankments/Berms*									
						Construct cofferdam embankment w/200 HP dozer	68,000.00 CY	1.35 /CY	1.90 /CY	-	-	3.25 /CY	221,048	4.98 /CY	338,665
						Load excavated spoils	68,000.00 cy	0.62 /cy	0.68 /cy	0.00 /cy	-	1.29 /cy	87,964	1.98 /cy	134,769
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	68,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	299,865	6.76 /cy	459,419
						Compaction, water for, 3000 gallon truck, 3 mile haul	68,000.00 cy	0.65 /cy	0.44 /cy	0.00 /cy	-	1.09 /cy	74,306	1.67 /cy	113,842
						Compaction, structural, common fill, 8" lifts, sheepsfoot	68,000.00 cy	0.74 /cy	1.09 /cy	-	-	1.83 /cy	124,281	2.80 /cy	190,409
						Cut & finish cofferdam top/sideslopes w/dozer	57,350.00 sy	0.74 /sy	1.05 /sy	-	-	1.79 /sy	102,784	2.75 /sy	157,474
						Pond and reservoir liners, membrane lining systems HDPE, 100,000 S.F. or more, 60 mil thick, per M.S.F.	158.60 msf	1,050.86 /msf	322.16 /msf	570.00 /msf	-	1,943.02 /msf	308,163	3,018.20 /msf	478,686
						31.20.09.40 Earthworks, Sitework, Embankments/Berms	*68,000.00 CY*	*7.38 /CY*	*9.18 /CY*	*1.33 /CY*	*/CY*	*17.92 /CY*	*1,218,410*	*27.56 /CY*	*1,873,364*
						31.22 Earthworks, Site	*145,000.00 CY*	*4.83 /CY*	*7.70 /CY*	*0.62 /CY*	*/CY*	*13.16 /CY*	*1,908,218*	*20.21 /CY*	*2,930,109*
						31.0 Earthwork	*145,000.00 CY*	*4.83 /CY*	*7.70 /CY*	*0.62 /CY*	*/CY*	*13.16 /CY*	*1,908,218*	*20.21 /CY*	*2,930,109*
						31.00.112 Funks Reservoir, Construct Pipeline Cofferdam	*145,000.00 CY*	*4.83 /CY*	*7.70 /CY*	*0.62 /CY*	*/CY*	*13.16 /CY*	*1,908,218*	*20.21 /CY*	*2,930,109*
		31.00.114				*Funks Reservoir, Construct PGP Cofferdam*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.07.15	*Earthworks, Sitework, Borrow*									
						Excavate material at deadpool area for levee embankments, 21 C.Y. bucket, self propelled scrapers, 1/4 push dozer	19,000.00 CY	0.65 /CY	1.77 /CY	-	-	2.42 /CY	45,891	3.70 /CY	70,309
						Grading deadpool area w/dozer	11,400.00 sy	0.58 /sy	0.82 /sy	-	-	1.40 /sy	15,958	2.14 /sy	24,448
						Load excavated spoils	19,000.00 cy	0.62 /cy	0.68 /cy	-	-	1.29 /cy	24,578	1.98 /cy	37,656
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	19,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	83,786	6.76 /cy	128,367
						31.20.07.15 Earthworks, Sitework, Borrow	*19,000.00 CY*	*2.57 /CY*	*6.39 /CY*	*/CY*	*/CY*	*8.96 /CY*	*170,213*	*13.73 /CY*	*260,780*
					31.20.09.40	*Earthworks, Sitework, Embankments/Berms*									
						Construct cofferdam embankment w/200 HP dozer	40,000.00 CY	1.35 /CY	1.90 /CY	-	-	3.25 /CY	130,029	4.98 /CY	199,215
						Load excavated spoils	40,000.00 cy	0.62 /cy	0.68 /cy	-	-	1.29 /cy	51,744	1.98 /cy	79,276
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	40,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	176,391	6.76 /cy	270,247
						Compaction, water for, 3000 gallon truck, 3 mile haul	40,000.00 cy	0.65 /cy	0.44 /cy		-	1.09 /cy	43,709	1.67 /cy	66,966
						Compaction, structural, common fill, 8" lifts, sheepsfoot	40,000.00 cy	0.74 /cy	1.09 /cy	-	-	1.83 /cy	73,106	2.80 /cy	112,005
						Cut & finish cofferdam top/sideslopes w/dozer	18,865.00 sy	0.74 /sy	1.05 /sy	-	-	1.79 /sy	33,810	2.75 /sy	51,800
						Pond and reservoir liners, membrane lining systems HDPE, 100,000 S.F. or more, 60 mil thick, per M.S.F.	52.50 msf	1,050.86 /msf	322.16 /msf	570.00 /msf	-	1,943.02 /msf	102,008	3,018.20 /msf	158,455
						31.20.09.40 Earthworks, Sitework, Embankments/Berms	*40,000.00 CY*	*6.05 /CY*	*8.48 /CY*	*0.75 /CY*	*/CY*	*15.27 /CY*	*610,798*	*23.45 /CY*	*937,964*
						31.22 Earthworks, Site	*59,000.00 CY*	*4.93 /CY*	*7.80 /CY*	*0.51 /CY*	*/CY*	*13.24 /CY*	*781,010*	*20.32 /CY*	*1,198,744*
						31.0 Earthwork	*59,000.00 CY*	*4.93 /CY*	*7.80 /CY*	*0.51 /CY*	*/CY*	*13.24 /CY*	*781,010*	*20.32 /CY*	*1,198,744*
						31.00.114 Funks Reservoir, Construct PGP Cofferdam	*59,000.00 CY*	*4.93 /CY*	*7.80 /CY*	*0.51 /CY*	*/CY*	*13.24 /CY*	*781,010*	*20.32 /CY*	*1,198,744*
		31.00.116				*Funks Reservoir, Remove Pipeline Cofferdam*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.07.10	*Earthworks, Sitework, Excavating Bulk Measure*									
						Excavate material at deadpool area for levee embankments, 21 C.Y. bucket, self propelled scrapers, 1/4 push dozer	68,000.00 CY	0.65 /CY	1.77 /CY	-	-	2.42 /CY	164,240	3.70 /CY	251,630
						Grading area w/dozer	45,880.00 sy	0.58 /sy	0.82 /sy	-	-	1.40 /sy	64,222	2.14 /sy	98,394
						Load excavated spoils	68,000.00 cy	0.62 /cy	0.68 /cy	-	-	1.29 /cy	87,964	1.98 /cy	134,769
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	68,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	299,865	6.76 /cy	459,419
						31.20.07.10 Earthworks, Sitework, Excavating Bulk Measure	*68,000.00 CY*	*2.61 /CY*	*6.45 /CY*	*/CY*	*/CY*	*9.06 /CY*	*616,292*	*13.89 /CY*	*944,212*
						31.22 Earthworks, Site	*68,000.00 CY*	*2.61 /CY*	*6.45 /CY*	*/CY*	*/CY*	*9.06 /CY*	*616,292*	*13.89 /CY*	*944,212*
						31.0 Earthwork	*68,000.00 CY*	*2.61 /CY*	*6.45 /CY*	*/CY*	*/CY*	*9.06 /CY*	*616,292*	*13.89 /CY*	*944,212*
						31.00.116 Funks Reservoir, Remove Pipeline Cofferdam	*68,000.00 CY*	*2.61 /CY*	*6.45 /CY*	*/CY*	*/CY*	*9.06 /CY*	*616,292*	*13.89 /CY*	*944,212*
		31.00.118				*Funks Reservoir, Remove PGP Cofferdam*									
			31.0			*Earthwork*									
				31.22		*Earthworks, Site*									
					31.20.07.10	*Earthworks, Sitework, Excavating Bulk Measure*									
						Excavate material at deadpool area for levee embankments, 21 C.Y. bucket, self propelled scrapers, 1/4 push dozer	40,000.00 CY	0.65 /CY	1.77 /CY	-	-	2.42 /CY	96,612	3.70 /CY	148,018
						Grading area w/dozer	15,720.00 sy	0.58 /sy	0.82 /sy	-	-	1.40 /sy	22,005	2.14 /sy	33,713
						Load excavated spoils	40,000.00 cy	0.62 /cy	0.68 /cy	-	-	1.29 /cy	51,744	1.98 /cy	79,276

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks Reservoir Rev 2
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					31.20.07.10	*Earthworks, Sitework, Excavating Bulk Measure*									
						Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/wt/,42 cy truck,cycle 4 mile,25 mph,exclds loadng eqpmnt	40,000.00 cy	0.96 /cy	3.45 /cy	-	-	4.41 /cy	176,391	6.76 /cy	270,247
						31.20.07.10 Earthworks, Sitework, Excavating Bulk Measure	*40,000.00 CY*	*2.45 /CY*	*6.22 /CY*	*/CY*	*/CY*	*8.67 /CY*	*346,751*	*13.28 /CY*	*531,253*
						31.22 Earthworks, Site	*40,000.00 CY*	*2.45 /CY*	*6.22 /CY*	*/CY*	*/CY*	*8.67 /CY*	*346,751*	*13.28 /CY*	*531,253*
						31.0 Earthwork	*40,000.00 CY*	*2.45 /CY*	*6.22 /CY*	*/CY*	*/CY*	*8.67 /CY*	*346,751*	*13.28 /CY*	*531,253*
						31.00 118 Funks Reservoir, Remove PGP Cofferdam	*40,000.00 CY*	*2.45 /CY*	*6.22 /CY*	*/CY*	*/CY*	*8.67 /CY*	*346,751*	*13.28 /CY*	*531,253*
						06.04 Funks Reservoir	**132.73 AC**	79,734.43 /AC	65,092.35 /AC	7,799.72 /AC	/AC	142,473.48 /AC	18,911,500	218,855.53 /AC	29,046,742
						06 Funks Reservoir	***1.00 LS***	***10,653,475.12 /LS***	***8,641,641.11 /LS***	***2,263,480.97 /LS***	***407,715.00 /LS***	***21,966,312.20 /LS***	***21,966,312***	***34,151,725.21 /LS***	***34,151,725***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	10,653,475		131,956.228 hrs	
Material	2,263,481			
Allowance	407,715			
Equipment	8,641,641		348,060.160 hrs	
Other				
Subtotal Direct Costs	21,966,312	21,966,312		
Material Sales Tax, Dunnigan Ca	164,102			7.250 %
Subtotal W/ Sales Tax	164,102	22,130,414		
Masonry Work I,OH&P	41,167			20.000 %
Metals Work I,OH&P	21,565			20.000 %
Architectural (Div 6-12)I,OH&P	43,179			20.000 %
Mechanical Work I,OH&P	62,795			20.000 %
Electrical Work I,OH&P	129,683			25.000 %
Instruments & Controls I,OH&P	34,942			20.000 %
Subtotal W/ Subcontractor OH&P	333,331	22,463,745		
General Conditions	1,123,187			5.000 %
Subtotal W/ General Conditions	1,123,187	23,586,932		
Mobilization/Demobilization	707,608			3.000 %
Prime Contractor Overhead	2,429,454			10.000 %
Prime Contractor Profit	1,603,440			6.000 %
Bonds & Insurance	614,705			2.170 %
Subtotal W/ Prime Markups	5,355,207	28,942,139		
Contractor Contingency	868,264			3.000 %
Design Contingency	4,341,321			15.000 %
Subtotal W/ Contingency	5,209,585	34,151,724		
Total Construction Cost		**34,151,724**		
Non-Contract Costs	6,147,311			18.000 %
Total Project Costs	**6,147,311**	**40,299,035**		

Funks Pumping Generating Plant (PGP)

SUMMARY REPORT

Jacobs	Project type: Job Size: Duration:	Project Name: Sites Reservoir Project Task Order 1 Funks PGP Rev 2 Project Number: D3380602 Design Stage: Feasibility	Estimator: Cavalleri/Wells - Jacobs Revision/Date: 2 / Feb 1, 2021 Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
03			***Funks Pumping Generating Plant (PGP)***									
	03.01		Funks Reservoir Pumping Generating Plant									
		03.00.300	Funk PGP Foundation Slab	5,332.00 CY	155.81 /CY	7.53 /CY	232.33 /CY	/CY	395.47 /CY	2,108,522	640.78 /CY	3,416,663
		03.00.302	Funk PGP Concrete Walls, Perimeter	2,094.00 CY	299.31 /CY	9.70 /CY	309.96 /CY	/CY	618.96 /CY	1,296,110	999.03 /CY	2,091,977
		03.00.304	Funk PGP Concrete Walls, Pier Walls	4,480.00 CY	349.91 /CY	9.74 /CY	338.58 /CY	/CY	698.22 /CY	3,128,034	1,126.16 /CY	5,045,189
		03.00.306	Funk PGP Elevated Slab	3,400.00 CY	243.35 /CY	7.71 /CY	243.54 /CY	/CY	494.60 /CY	1,681,625	798.00 /CY	2,713,197
		03.00.308	Funk PGP Slab on Grade @ El 214.00	471.00 CY	179.80 /CY	8.11 /CY	243.04 /CY	/CY	430.96 /CY	202,980	697.56 /CY	328,549
		05.00.300	Funk PGP, Metals	**35,990.00** SF	3.23 /SF	0.31 /SF	2.78 /SF	18.06 /SF	24.38 /SF	877,294	43.54 /SF	1,566,850
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	33,729.80 /LS	2,600.00 /LS	19,500.00 /LS	/LS	55,929.80 /LS	55,930	103,455.99 /LS	103,456
		40.00.300	Funk PGP, Process Piping	720.00 LF	384.38 /LF	161.00 /LF	2,935.28 /LF	347.22 /LF	3,827.88 /LF	2,756,072	6,252.20 /LF	4,501,582
		44.40.300	Funk PGP, Furnish and Install Pumps	13.00 EA	14,117.37 /EA	/EA	839,294.54 /EA	4,200.00 /EA	857,611.91 /EA	11,148,955	1,413,935.75 /EA	18,381,165
			03.01 Funks Reservoir Pumping Generating Plant	**35,990.00** SF	128.35 /SF	7.38 /SF	483.92 /SF	26.52 /SF	646.17 /SF	23,255,523	1,059.98 /SF	38,148,627
	03.02		Funks Reservoir Turbine Buildings									
		03.00.316	Funk PGP Turbine Buildings Foundation Slab	3,248.00 CY	128.62 /CY	6.61 /CY	210.32 /CY	/CY	345.55 /CY	1,122,355	560.44 /CY	1,820,308
		03.00.318	Funk PGP Turbine Buildings Concrete Walls	1,332.00 CY	331.60 /CY	9.57 /CY	323.79 /CY	/CY	664.96 /CY	885,726	1,072.60 /CY	1,428,707
		03.00.320	Funk PGP Turbine Buildings Elevated Slab	394.00 CY	533.20 /CY	7.90 /CY	278.52 /CY	/CY	819.61 /CY	322,925	1,313.32 /CY	517,447
		04.00.300	Funk PGP Turbine Buildings Masonry	2,400.00 SF	21.57 /SF	0.18 /SF	11.45 /SF	/SF	33.20 /SF	79,672	59.84 /SF	143,627
		05.00.302	Funk PGP Turbine Building, Metals	**2.00** LS	14,950.80 /LS	4,072.24 /LS	43,590.00 /LS	30,000.00 /LS	92,613.04 /LS	185,226	167,801.99 /LS	335,604
		08.00.300	Funk PGP Turbine Building, Openings	2.00 EA	340.22 /EA	15.00 /EA	1,500.40 /EA	/EA	1,855.62 /EA	3,711	3,407.59 /EA	6,815
		23.00.300	Funk PGP Turbine Building, HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.22 /SF	331,015
		26.05.GRDG	Facility Grounding	**3,250.00** SF	2.22 /SF	0.10 /SF	1.10 /SF	/SF	3.41 /SF	11,092	6.31 /SF	20,514
		26.12.SEC	Subfeed from Elec Building	**600.00** LF	41.92 /LF	4.18 /LF	24.95 /LF	/LF	71.05 /LF	42,629	128.42 /LF	77,051
		26.20.DIST	Electrical Distribution Equipment	**450.00** AMP	46.44 /AMP	0.79 /AMP	49.26 /AMP	/AMP	96.49 /AMP	43,422	179.93 /AMP	80,970
		26.25.LTG	Interior Lighting and Control	**1.00** LS	15,144.99 /LS	/LS	6,724.85 /LS	/LS	21,869.84 /LS	21,870	40,459.87 /LS	40,460
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	1,713.08 /LS	/LS	143.26 /LS	/LS	1,856.34 /LS	1,856	3,403.33 /LS	3,403
		26.30.DEV	Device Outlets	**1.00** LS	10,060.56 /LS	/LS	6,095.20 /LS	/LS	16,155.76 /LS	16,156	29,970.39 /LS	29,970
		26.40.EQCON	Facility Equipment Connections and Controls	**1.00** ALO	25,946.13 /ALO	3,000.00 /ALO	10,000.00 /ALO	/ALO	38,946.13 /ALO	38,946	71,908.30 /ALO	71,908
		26.40.HYDTURB	13.8kV 15MW Hyd Turbine Pwr Feeders 4-[4" 3#4/0 #4/0G] 800A	**600.00** LF	380.99 /LF	7.83 /LF	154.39 /LF	2.67 /LF	545.88 /LF	327,529	1,003.15 /LF	601,887
		26.41.HYDTURB	Hyd Turbine Controls Circuits	**600.00** LF	164.55 /LF	7.83 /LF	29.81 /LF	/LF	202.19 /LF	121,314	365.94 /LF	219,561
		26.90.LPS	Facility Lightning Protection System	**3,250.00** SF	1.44 /SF	/SF	0.76 /SF	0.46 /SF	2.68 /SF	8,702	4.95 /SF	16,089
		27.30.COMCDT	Comm Conduit to Admin	**1,200.00** LF	28.15 /LF	8.36 /LF	11.74 /LF	/LF	48.25 /LF	57,904	83.76 /LF	100,517
		28.20.AC	Access Control System	**2.00** DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	4,714	3,776.37 /DOOR	7,553
		28.20.CCTV	Closed Circuit TV and Cameras	**2.00** CAM	1,701.66 /CAM	/CAM	1,730.00 /CAM	500.00 /CAM	3,931.66 /CAM	7,863	6,708.28 /CAM	13,417
		28.20.ID	Intrusion Detection System	**2.00** DOOR	2,918.94 /DOOR	/DOOR	2,000.00 /DOOR	250.00 /DOOR	5,168.94 /DOOR	10,338	8,300.24 /DOOR	16,600
		40.00.304	Funk PGP Turbine Building, Process Piping	230.00 LF	160.02 /LF	89.23 /LF	1,133.04 /LF	282.61 /LF	1,664.90 /LF	382,926	2,708.92 /LF	623,050
			03.02 Funks Reservoir Turbine Buildings	**2.00** EA	835,461.45 /EA	46,833.15 /EA	901,138.83 /EA	157,966.06 /EA	1,941,531.44 /EA	3,883,063	3,253,237.96 /EA	6,506,476
	03.03		Funks Reservoir Energy Dissipation Valve Structures									
		03.00.310	Funk PGP Energy Dissipation Structures Foundation Slab	740.00 CY	160.90 /CY	6.96 /CY	229.25 /CY	/CY	397.11 /CY	293,857	643.15 /CY	475,929
		03.00.312	Funk PGP Energy Dissipation Structures Concrete Walls	829.00 CY	315.74 /CY	9.57 /CY	316.26 /CY	/CY	641.56 /CY	531,857	1,035.15 /CY	858,136
		03.00.314	Funk PGP Energy Dissipation Structures Elevated Deck	223.00 CY	358.76 /CY	7.58 /CY	248.88 /CY	/CY	615.23 /CY	137,195	988.71 /CY	220,482
		40.00.302	Funk PGP Energy Dissipation Structures Piping	120.00 LF	267.82 /LF	91.35 /LF	1,153.33 /LF	/LF	1,512.50 /LF	181,500	2,469.95 /LF	296,394
			03.03 Funks Reservoir Energy Dissipation Valve Structures	**2.00** EA	246,476.79 /EA	12,868.81 /EA	312,861.80 /EA	/EA	572,204.70 /EA	1,144,409	925,471.56 /EA	1,850,943
	03.04		Funks Reservoir Electrical Building									
		04.00.302	Funk PGP Electrical Building, Masonry	14,600.00 SF	12.79 /SF	0.12 /SF	7.97 /SF	/SF	20.88 /SF	304,790	37.69 /SF	550,268
		05.00.304	Funk PGP Electrical Building, Metal Roof Framing	14,384.00 SF	2.55 /SF	0.28 /SF	4.27 /SF	/SF	7.10 /SF	102,052	12.92 /SF	185,875
		07.00.300	Funk PGP Electrical Building, Roofing	14,384.00 SF	4.48 /SF	0.37 /SF	3.67 /SF	/SF	8.51 /SF	122,419	15.40 /SF	221,452
		08.00.302	Funk PGP Electrical Building, Openings	20.00 EA	616.18 /EA	15.00 /EA	2,006.76 /EA	/EA	2,637.94 /EA	52,759	4,835.05 /EA	96,701
		21.00.300	Funk PGP Electrical Building, Fire Suppression	14,384.00 SF	/SF	/SF	/SF	15.00 /SF	15.00 /SF	215,760	26.67 /SF	383,565
		23.00.302	Funk PGP Electrical Building, HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.22 /SF	894,984
		26.02.PRI	Primary Feeds fromSubstation	**2,180.00** LF	376.38 /LF	26.06 /LF	295.94 /LF	2.20 /LF	700.58 /LF	1,527,268	1,282.07 /LF	2,794,909
		26.03.MVSWGR	MV SWGR	**30,800.00** FA	3.58 /FA	0.69 /FA	50.13 /FA	/FA	54.40 /FA	1,675,521	103.06 /FA	3,174,353
		26.03.SWGREQ	Station Aux Xfmr, Bity	**1.00** LS	54,187.72 /LS	5,931.53 /LS	160,200.00 /LS	/LS	220,319.25 /LS	220,319	414,300.37 /LS	414,300
		26.04.MVBUS	Medium Voltage Overhead Bus Duct 2000A	**540.00** LF	429.87 /LF	1.85 /LF	1,642.50 /LF	4.82 /LF	2,079.03 /LF	1,122,677	3,919.01 /LF	2,116,264
		26.04.MVVSD	Medium Voltage Variable Speed Drives	**13.00** EA	12,973.07 /EA	3,250.00 /EA	420,200.00 /EA	5,000.00 /EA	441,423.07 /EA	5,738,500	837,270.22 /EA	10,884,513
		26.05.GRDG	Facility Grounding	**14,550.00** SF	3.49 /SF	/SF	1.30 /SF	/SF	4.79 /SF	69,619	8.84 /SF	128,616
		26.20.DIST	Electrical Distribution Equipment	**550.00** AMP	36.16 /AMP	0.65 /AMP	38.29 /AMP	/AMP	75.10 /AMP	41,306	140.04 /AMP	77,023
		26.25.LTG	Interior Lighting and Control	**1.00** LS	86,265.47 /LS	/LS	38,029.50 /LS	/LS	124,294.97 /LS	124,295	229,935.79 /LS	229,936
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	6,300.47 /LS	/LS	598.58 /LS	/LS	6,899.05 /LS	6,899	12,634.05 /LS	12,634
		26.30.DEV	Device Outlets	**1.00** LS	53,247.76 /LS	/LS	19,053.60 /LS	/LS	72,301.36 /LS	72,301	133,529.32 /LS	133,529
		26.40.EQCON	Facility Equipment Connections and Controls	**1.00** ALO	8,282.95 /ALO	/ALO	4,925.85 /ALO	/ALO	13,208.80 /ALO	13,209	24,499.36 /ALO	24,499
		26.40.PMP	13.8kV 8000HP Pump Power Feeders 4", 3/C VFD Cable 300A	**780.00** LF	145.29 /LF	1.28 /LF	115.46 /LF	3.33 /LF	265.37 /LF	206,985	493.39 /LF	384,843
		26.41.PMP	8000HP Pump Process Control Circuits and Connections	**780.00** LF	43.96 /LF	/LF	12.06 /LF	/LF	56.02 /LF	43,697	103.27 /LF	80,548
		26.90.LPS	Facility Lightning Protection System	**14,550.00** SF	1.27 /SF	0.03 /SF	0.85 /SF	0.34 /SF	2.49 /SF	36,201	4.61 /SF	67,061
		27.10.COMEQ	Communications Room Equipment	**1.00** LS	28,011.60 /LS	/LS	21,023.71 /LS	/LS	49,035.31 /LS	49,035	91,147.92 /LS	91,148
		27.31.COMCDT	Comm Conduit to MH/HH	**200.00** LF	224.65 /LF	28.56 /LF	52.68 /LF	/LF	305.89 /LF	61,178	551.37 /LF	110,274

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SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks PGP Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
		28.10.FA	Fire Alarm System	**14,550.00** SF	3.58 /SF	/SF	1.41 /SF	0.17 /SF	5.16 /SF	75,070	9.06 /SF	131,853
		28.20.AC	Access Control System	**12.00** DOOR	908.12 /DOOR	/DOOR	466.67 /DOOR	/DOOR	1,374.78 /DOOR	16,497	2,202.96 /DOOR	26,435
		28.20.CCTV	Closed Circuit TV and Cameras	**12.00** CAM	3,344.91 /CAM	/CAM	2,063.33 /CAM	833.33 /CAM	6,241.57 /CAM	74,899	10,954.37 /CAM	131,452
		28.20.ID	Intrusion Detection System	**12.00** DOOR	1,675.69 /DOOR	/DOOR	1,083.33 /DOOR	125.00 /DOOR	2,884.02 /DOOR	34,608	4,628.77 /DOOR	55,545
			03.04 Funks Reservoir Electrical Building	**14,550.00** SF	156.21 /SF	19.03 /SF	637.75 /SF	55.39 /SF	859.38 /SF	12,511,294	1,608.43 /SF	23,402,583
	03.05		Funks Reservoir Site Electrical									
		26.20.DB	Site Ductbanks	**1.00** LS	/LS	/LS	/LS	50,000.00 /LS	50,000.00 /LS	50,000	91,386.89 /LS	91,387
		26.26.EXTLTG	Exterior Lighting and Control	**1.00** LS	/LS	/LS	/LS	125,000.00 /LS	125,000.00 /LS	125,000	228,467.26 /LS	228,467
		28.20.AC	Access Control System	**2.00** DOOR	/DOOR	/DOOR	/DOOR	10,000.00 /DOOR	10,000.00 /DOOR	20,000	18,277.38 /DOOR	36,555
		28.20.CCTV	Closed Circuit TV and Cameras	**10.00** CAM	/CAM	/CAM	/CAM	7,500.00 /CAM	7,500.00 /CAM	75,000	13,708.04 /CAM	137,080
			03.05 Funks Reservoir Site Electrical	**1.00** LS	/LS	/LS	/LS	270,000.00 /LS	270,000.00 /LS	270,000	493,489.26 /LS	493,489
	03.06		Funks Reservoir PGP Sitework									
		31.00.300	Funk PGP Earthworks	272,100.00 CY	7.67 /CY	8.96 /CY	2.76 /CY	4.54 /CY	24.13 /CY	6,565,968	38.27 /CY	10,413,800
		32.00.300	Funk PGP Site Improvements	**1.00** LS	488,194.34 /LS	71,080.21 /LS	833,778.18 /LS	/LS	1,393,052.73 /LS	1,393,053	2,258,321.16 /LS	2,258,321
		33.00.300	Funk PGP Yard Piping	1,850.00 LF	475.46 /LF	373.42 /LF	2,048.09 /LF	/LF	2,896.99 /LF	5,359,427	4,719.17 /LF	8,730,472
			03.06 Funks Reservoir PGP Sitework	**1.00** LS	3,506,869.63 /LS	3,206,258.47 /LS	6,374,040.18 /LS	1,235,250.00 /LS	13,316,418.28 /LS	13,316,418	21,402,592.58 /LS	21,402,593
			03 Funks Pumping Generating Plant (PGP)	***1.00 LS***	***12,494,899.96 /LS***	***3,726,796.79 /LS***	***34,572,160.21 /LS***	***3,588,850.00 /LS***	***54,382,706.96 /LS***	***54,382,707***	***91,804,709.56 /LS***	***91,804,710***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	20,387,483		134,964.944 hrs	
Material	59,433,245			
Allowance	6,076,370			
Equipment	5,907,612		36,238.123 hrs	
Other				
Total Construction Cost	**91,804,710**	**91,804,710**		
Non-Contract Costs	16,524,848			18.000 %
Total Project Costs	**16,524,848**	**108,329,558**		

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
03						***Funks Pumping Generating Plant (PGP)***									
	03.fn					*Funks Reservoir Pumping Generating Plant*									
		03.00.300				*Funk PGP Foundation Slab*									
			03.0			*Concrete Work*									
				03.18		*Cast-in-Place Concrete, Slabs on Grade*									
					03.10.05.48	*Cast-In-Place Concrete, Slabs on Grade, 48" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	3,336.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	30,980	14.72 /sfca	49,113
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	432.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	1,110,648	4,143.28 /ton	1,789,895
						Reinforcing in place, unloading & sorting, add to above - slabs	432.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	24,064	87.89 /ton	37,967
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	432.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	26,157	95.53 /ton	41,269
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	5,440.00 cy	-	-	131.00 /cy	-	131.00 /cy	712,640	216.18 /cy	1,176,026
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	5,332.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	154,632	45.76 /CY	243,969
						Cfnsh,flrs,for spcl rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	35,990.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	33,711	1.48 /sf	53,186
						Curing, sprayed membrane curing compound	359.90 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	8,295	37.27 /csf	13,413
						Fine grading, fine grade for slab on grade, machine	3,998.89 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	7,495	2.96 /sy	11,825
						03.10.05.48 Cast-In Place Concrete, Slabs on Grade, 48" thick	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.78 /CY*	*3,416,663*
						03.18 Cast-in-Place Concrete, Slabs on Grade	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.78 /CY*	*3,416,663*
						03.0 Concrete Work	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.78 /CY*	*3,416,663*
						03.00.300 Funk PGP Foundation Slab	*5,332.00 CY*	*155.81 /CY*	*7.33 /CY*	*232.33 /CY*	*/CY*	*395.47 /CY*	*2,108,622*	*640.78 /CY*	*3,416,663*
		03.00.302				*Funk PGP Concrete Walls, Perimeter*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.48	*Cast-In-Place Concrete, Straight Walls, 48" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	28,266.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	416,572	23.65 /sfca	668,409
						Form oil, coverage varies greatly, maximum, includes material only	76.00 gal	-	-	23.50 /gal	-	23.50 /gal	1,786	38.78 /gal	2,947
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	177.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	455,057	4,143.28 /ton	733,360
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	177.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	9,860	87.89 /ton	15,556
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	177.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	10,717	95.53 /ton	16,909
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	2,135.00 cy	-	-	131.00 /cy	-	131.00 /cy	279,685	216.18 /cy	461,547
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	2,094.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	93,622	70.54 /CY	147,711
						Concrete finishing, walls, includes breaking ties and patching voids	28,266.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	28,811	1.61 /sf	45,538
						03.10.06.48 Cast-In-Place Concrete, Straight Walls, 48" thick	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*999.03 /CY*	*2,091,977*
						03.30 Cast-In-Place Concrete, Straight Walls	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*999.03 /CY*	*2,091,977*
						03.0 Concrete Work	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*999.03 /CY*	*2,091,977*
						03.00.302 Funk PGP Concrete Walls, Perimeter	*2,094.00 CY*	*299.31 /CY*	*9.70 /CY*	*309.96 /CY*	*/CY*	*618.96 /CY*	*1,296,110*	*999.03 /CY*	*2,091,977*
		03.00.304				*Funk PGP Concrete Walls, Pier Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.36	*Cast-In-Place Concrete, Straight Walls, 36" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	80,640.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	1,188,436	23.65 /sfca	1,906,904
						Form oil, coverage varies greatly, maximum, includes material only	215.00 gal	-	-	23.50 /gal	-	23.50 /gal	5,053	38.78 /gal	8,338
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	392.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	1,007,810	4,143.28 /ton	1,624,164
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	392.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	21,836	87.89 /ton	34,452
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	392.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	23,735	95.53 /ton	37,448
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	4,570.00 cy	-	-	131.00 /cy	-	131.00 /cy	598,670	216.18 /cy	987,948
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	4,480.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	200,299	70.54 /CY	316,019
						Concrete finishing, walls, includes breaking ties and patching voids	80,640.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	82,195	1.61 /sf	129,917
						03.10.06.36 Cast-In-Place Concrete, Straight Walls, 36" thick	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,126.16 /CY*	*5,045,189*
						03.30 Cast-In-Place Concrete, Straight Walls	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,126.16 /CY*	*5,045,189*
						03.0 Concrete Work	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,126.16 /CY*	*5,045,189*
						03.00.304 Funk PGP Concrete Walls, Pier Walls	*4,480.00 CY*	*349.91 /CY*	*9.74 /CY*	*338.58 /CY*	*/CY*	*698.22 /CY*	*3,128,034*	*1,126.16 /CY*	*5,045,189*
		03.00.306				*Funk PGP Elevated Slab*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.36	*Cast-In-Place Concrete, Elevated Decks, 36" thick*									
						Slab shoring	3,250.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	2,225	1.08 /cf	3,523
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	31,212.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	277,052	14.10 /sf	440,125
						C.I.P. concrete forms, elevated slab, edge forms, 36" high, 3 use, includes shoring, erecting, bracing, stripping and cleaning	3,474.00 sfca	12.19 /sfca	-	0.53 /sfca	-	12.72 /sfca	44,182	20.10 /sfca	69,841
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	272.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	699,297	4,143.28 /ton	1,126,971
						Reinforcing in place, unloading & sorting, add to above - decks	272.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	15,152	87.89 /ton	23,905
						Reinforcing steel, crane cost for handling, maximum, add	272.00 ton	140.59 /ton	18.56 /ton	-	-	159.16 /ton	43,291	251.11 /ton	68,301
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	3,468.00 cy	-	-	131.00 /cy	-	131.00 /cy	454,308	216.18 /cy	749,716
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	3,400.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	101,342	47.03 /CY	159,891
						Finishing elev slab, bull float, manual float & manual steel trowel	30,575.00 sf	1.23 /sf	-	-	-	1.23 /sf	37,731	1.95 /sf	59,529
						Curing, sprayed membrane curing compound, elevated decks	305.75 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	7,047	37.27 /csf	11,394
						03.10.10.36 Cast-In-Place Concrete, Elevated Decks, 36" thick	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*798.00 /CY*	*2,713,197*
						03.24 Cast-In-Place Concrete, Elevated Slabs	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*798.00 /CY*	*2,713,197*
						03.0 Concrete Work	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*798.00 /CY*	*2,713,197*
						03.00.306 Funk PGP Elevated Slab	*3,400.00 CY*	*243.35 /CY*	*7.71 /CY*	*243.54 /CY*	*/CY*	*494.60 /CY*	*1,681,625*	*798.00 /CY*	*2,713,197*
		03.00.308				*Funk PGP Slab on Grade @ El 214.00*									
			03.0			*Concrete Work*									
				03.18		*Cast-in-Place Concrete, Slabs on Grade*									
					03.10.05.24	*Cast-In-Place Concrete, Slabs on Grade, 24" thick*									

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks PGP Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.05.24	*Cast-In-Place Concrete, Slabs on Grade, 24" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	667.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	6,194	14.72 /sfca	9,820
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	41.25 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	106,051	4,143.28 /ton	170,910
						Reinforcing in place, unloading & sorting, add to above - slabs	41.25 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,298	87.89 /ton	3,625
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	41.25 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	2,498	95.53 /ton	3,941
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	485.00 cy	-	-	131.00 /cy	-	131.00 /cy	63,535	216.18 /cy	104,848
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	471.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	13,659	45.76 /CY	21,551
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	6,358.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	5,955	1.48 /sf	9,396
						Curing, sprayed membrane curing compound	63.58 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,465	37.27 /csf	2,369
						Fine grading, fine grade for slab on grade, machine	706.44 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,324	2.96 /sy	2,089
						03.10.05.24 Cast-In Place Concrete, Slabs on Grade, 24" thick	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.56 /CY*	*328,549*
						03.10 Cast-In-Place Concrete, Slabs on Grade	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.56 /CY*	*328,549*
						03.0 Concrete Work	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.56 /CY*	*328,549*
						03.00.308 Funk PGP Slab on Grade @ El 214.00	*471.00 CY*	*179.80 /CY*	*8.11 /CY*	*243.04 /CY*	*/CY*	*430.96 /CY*	*202,980*	*697.56 /CY*	*328,549*
		05.00.300				*Funk PGP, Metals*									
			05.0			*Metals*									
				05.50		*Metal Fabrications*									
					05.50.99.00	*Metals, Other*									
						Trash Rack Allowance	13.00 ea		-		50,000.00 /ea	50,000.00 /ea	650,000	88,886.90 /ea	1,155,530
						Miscellaneous Metals Allowance	1.00 ls	116,094.40 /ls	11,200.00 /ls	100,000.00 /ls	-	227,294.40 /ls	227,294	411,319.88 /ls	411,320
						05.00.99.00 Metals, Other	***35,990.00*** *SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.54 /SF*	*1,566,850*
						05.50 Metal Fabrications	***35,990.00*** *SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.54 /SF*	*1,566,850*
						05.0 Metals	***35,990.00*** *SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.54 /SF*	*1,566,850*
						05.00.300 Funk PGP, Metals	***35,990.00*** *SF*	*3.23 /SF*	*0.31 /SF*	*2.78 /SF*	*18.06 /SF*	*24.38 /SF*	*877,294*	*43.54 /SF*	*1,566,850*
		26.26.EXTLTG				*Exterior Lighting and Control*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Allowance for lighting?	260.00 hrs	129.73 /hrs	10.00 /hrs	75.00 /hrs		214.73 /hrs	55,830	397.91 /hrs	103,456
						26.00.99.00 Electrical, Other	***35,990.00*** *SF*	*0.94 /SF*	*0.07 /SF*	*0.54 /SF*	*/SF*	*1.55 /SF*	*55,830*	*2.87 /SF*	*103,456*
						26.00 Electrical	***35,990.00*** *SF*	*0.94 /SF*	*0.07 /SF*	*0.54 /SF*	*/SF*	*1.55 /SF*	*55,830*	*2.87 /SF*	*103,456*
						26.0 Electrical Work	***35,990.00*** *SF*	*0.94 /SF*	*0.07 /SF*	*0.54 /SF*	*/SF*	*1.55 /SF*	*55,830*	*2.87 /SF*	*103,456*
						26.26.EXTLTG Exterior Lighting and Control	***1.00*** *LS*	*33,729.60 /LS*	*2,600.00 /LS*	*19,500.00 /LS*	*/LS*	*55,829.60 /LS*	*55,830*	*103,455.99 /LS*	*103,456*
		40.00.300				*Funk PGP, Process Piping*									
			40.0			*Process Pipe*									
				40.11		*Process Pipe, Carbon Steel*									
					40.10.02.60	*Process Pipe, Carbon Steel, 60"*									
						Elbow, steel, butt weld, 60' Dia	21.00 ea	3,281.57 /ea	97.68 /ea	9,500.00 /ea	-	12,879.25 /ea	270,464	21,008.83 /ea	441,185
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	720.00 LF	121.97 /LF	62.10 /LF	420.00 /LF	-	604.07 /LF	434,928	983.51 /LF	708,126
						Butterfly Valves	14.00 ea	2,187.72 /ea	1,560.00 /ea	45,000.00 /ea	-	48,747.72 /ea	682,468	80,173.63 /ea	1,122,431
						Check Valves	13.00 ea	2,187.72 /ea	1,560.00 /ea	35,000.00 /ea	-	38,747.72 /ea	503,720	63,671.25 /ea	827,726
						Dismantling Joints	13.00 ea	2,187.72 /ea	1,560.00 /ea	37,000.00 /ea	-	40,747.72 /ea	529,720	66,971.73 /ea	870,632
						ARV, Complete	13.00 ea	2,500.91 /ea	520.00 /ea	3,500.00 /ea		6,520.91 /ea	84,772	10,542.04 /ea	137,047
						Miscellaneous Items Allowance	1.00 ls				250,000.00 /ls	250,000.00 /ls	250,000	394,434.49 /ls	394,434
						40.10.02.60 Process Pipe, Carbon Steel, 60"	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,252.20 /LF*	*4,501,582*
						40.11 Process Pipe, Carbon Steel	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,252.20 /LF*	*4,501,582*
						40.0 Process Pipe	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,252.20 /LF*	*4,501,582*
						40.00.300 Funk PGP, Process Piping	*720.00 LF*	*384.38 /LF*	*161.00 /LF*	*2,935.28 /LF*	*347.22 /LF*	*3,827.88 /LF*	*2,756,072*	*6,252.20 /LF*	*4,501,582*
		44.40.300				*Funk PGP, Furnish and Install Pumps*									
			46.0			*Water and Wastewater Equipment*									
				44.40		*Process Equipment : Pumps*									
					44.05.42.06	*Vertical Turbine Pump: 8000 hp*									
						Functional Testing, Pumps, >1000 hp	13.00 ea	3,068.99 /ea	-	100.00 /ea	-	3,168.99 /ea	41,197	5,007.09 /ea	65,092
						Align Pump & Motor, >1000 hp	13.00 ea	3,836.24 /ea	-	-	2,800.00 /ea	6,636.24 /ea	86,271	10,470.25 /ea	136,113
						Vibration Testing, Pumps, >1000 hp	13.00 ea	1,534.50 /ea	-	-	1,400.00 /ea	2,934.50 /ea	38,148	4,629.87 /ea	60,188
						Sleeved anchor bolts - Large	156.00 ea	95.91 /ea	-	28.00 /ea	-	123.91 /ea	19,329	197.52 /ea	30,813
						Anchor bolts for leveling pump cans	52.00 ea	383.62 /ea	-	150.00 /ea	-	533.62 /ea	27,748	852.79 /ea	44,345
						Non-Shrink Machine Grout	208.00 cuft	91.11 /cuft	-	74.00 /cuft	-	165.11 /cuft	34,343	265.87 /cuft	55,300
						Grease, Oil, and Lube Pumps, >1000 hp	13.00 ea	1,534.50 /ea	-	150.00 /ea	-	1,684.50 /ea	21,898	2,668.57 /ea	34,691
						FURNISH Vertical Turbine Pump, SS, 8000 hp	13.00 EA	-	-	836,924.54 /EA	-	836,924.54 /EA	10,880,019	1,381,124.68 /EA	17,954,621
						44.05.42.06 Vertical Turbine Pump: 8000 hp	*13.00 EA*	*14,117.37 /EA*	*/EA*	*839,294.54 /EA*	*4,200.00 /EA*	*857,611.91 /EA*	*11,148,955*	*1,413,935.75 /EA*	*18,381,165*
						44.40 Process Equipment : Pumps	*13.00 EA*	*14,117.37 /EA*	*/EA*	*839,294.54 /EA*	*4,200.00 /EA*	*857,611.91 /EA*	*11,148,955*	*1,413,935.75 /EA*	*18,381,165*
						46.0 Water and Wastewater Equipment	*13.00 EA*	*14,117.37 /EA*	*/EA*	*839,294.54 /EA*	*4,200.00 /EA*	*857,611.91 /EA*	*11,148,955*	*1,413,935.75 /EA*	*18,381,165*
						44.40.300 Funk PGP, Furnish and Install Pumps	*13.00 EA*	*14,117.37 /EA*	*/EA*	*839,294.54 /EA*	*4,200.00 /EA*	*857,611.91 /EA*	*11,148,955*	*1,413,935.75 /EA*	*18,381,165*
						03.51 Funks Reservoir Pumping Generating Plant	***35,990.00*** *SF*	*128.35 /SF*	*7.30 /SF*	*485.39 /SF*	*28.32 /SF*	*646.17 /SF*	*23,256,523*	*1,059.95 /SF*	*38,148,637*
	03.52					*Funks Reservoir Turbine Buildings*									
		03.00.316				*Funk PGP Turbine Buildings Foundation Slab*									
			03.0			*Concrete Work*									
				03.10		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.99	*Cast-In-Place Concrete, Slabs on Grade, Other*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	4,000.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	37,147	14.72 /sfca	58,889
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	204.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	524,473	4,143.28 /ton	845,228
						Reinforcing in place, unloading & sorting, add to above - slabs	204.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	11,364	87.89 /ton	17,929
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	204.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	12,352	95.53 /ton	19,488
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	3,310.00 cy	-	-	131.00 /cy	-	131.00 /cy	433,610	216.18 /cy	715,580
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	3,248.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	94,195	45.76 /CY	148,614
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	6,700.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	6,276	1.48 /sf	9,901
						Curing, sprayed membrane curing compound	67.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,544	37.27 /csf	2,497
						Fine grading, fine grade for slab on grade, machine	744.44 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,395	2.96 /sy	2,201
						03.10.05.99 Cast-In-Place Concrete, Slabs on Grade, Other	*3,248.00 CY*	*128.82 /CY*	*6.61 /CY*	*210.32 /CY*	*/CY*	*345.55 /CY*	*1,122,355*	*560.44 /CY*	*1,820,308*
						03.10 Cast-In-Place Concrete, Slabs on Grade	*3,248.00 CY*	*128.82 /CY*	*6.61 /CY*	*210.32 /CY*	*/CY*	*345.55 /CY*	*1,122,355*	*560.44 /CY*	*1,820,308*

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						03.0 Concrete Work	*3,248.00 CY*	*128.62 /CY*	*6.61 /CY*	*210.32 /CY*	*/CY*	*345.55 /CY*	*1,122,355*	*560.44 /CY*	*1,820,308*
						03.00.318 Funk PGP Turbine Buildings Foundation Slab	*3,248.00 CY*	*128.62 /CY*	*6.61 /CY*	*210.32 /CY*	*/CY*	*345.55 /CY*	*1,122,355*	*560.44 /CY*	*1,820,308*
		03.00.318				*Funk PGP Turbine Buildings Concrete Walls*									
			03.0			*Concrete Work*									
				03.20		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.36	*Cast-In-Place Concrete, Straight Walls, 36" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	23,976.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	353,348	23.65 /sfca	566,963
						Form oil, coverage varies greatly, maximum, includes material only	64.00 gal	-	-	23.50 /gal	-	23.50 /gal	1,504	38.78 /gal	2,482
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	100.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	257,094	4,143.28 /ton	414,328
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	100.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	5,570	87.89 /ton	8,789
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	100.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	6,055	95.53 /ton	9,553
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	1,360.00 cy	-	-	131.00 /cy	-	131.00 /cy	178,160	216.18 /cy	294,006
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	1,332.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	59,553	70.54 /CY	93,959
						Concrete finishing, walls, includes breaking ties and patching voids	23,976.00 sf	0.98 /sf	-	0.04 /sf	-	1.02 /sf	24,438	1.61 /sf	38,627
						03.10.06.36 Cast-In-Place Concrete, Straight Walls, 36" thick	*1,332.00 CY*	*331.60 /CY*	*9.57 /CY*	*323.79 /CY*	*/CY*	*664.96 /CY*	*885,723*	*1,072.60 /CY*	*1,428,707*
						03.20 Cast-In-Place Concrete, Straight Walls	*1,332.00 CY*	*331.60 /CY*	*9.57 /CY*	*323.79 /CY*	*/CY*	*664.96 /CY*	*885,723*	*1,072.60 /CY*	*1,428,707*
						03.0 Concrete Work	*1,332.00 CY*	*331.60 /CY*	*9.57 /CY*	*323.79 /CY*	*/CY*	*664.96 /CY*	*885,723*	*1,072.60 /CY*	*1,428,707*
						03.00.318 Funk PGP Turbine Buildings Concrete Walls	*1,332.00 CY*	*331.60 /CY*	*9.57 /CY*	*323.79 /CY*	*/CY*	*664.96 /CY*	*885,723*	*1,072.60 /CY*	*1,428,707*
		03.00.320				*Funk PGP Turbine Buildings Elevated Slab*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.24	*Cast-In-Place Concrete, Elevated Decks, 24" thick*									
						Slab shoring	143,640.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	98,354	1.08 /cf	155,697
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	5,320.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	47,223	14.10 /sf	75,018
						C.I.P. concrete forms, elevated slab, edge forms, 24" high, 3 use, includes shoring, erecting, bracing, stripping and cleaning	680.00 sfca	12.19 /sfca	-	0.53 /sfca	-	12.72 /sfca	8,648	20.10 /sfca	13,671
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	34.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	88,698	4,143.28 /ton	142,943
						Reinforcing in place, unloading & sorting, add to above - decks	34.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,922	87.89 /ton	3,032
						Reinforcing steel, crane cost for handling, maximum, add	34.50 ton	140.59 /ton	18.56 /ton	-	-	159.16 /ton	5,491	251.11 /ton	8,663
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	405.00 cy	-	-	131.00 /cy	-	131.00 /cy	53,055	216.18 /cy	87,553
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	394.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	11,744	47.03 /CY	18,528
						Finishing elev slab, bull float, manual float & manual steel trowel	5,320.00 sf	1.23 /sf	-	-	-	1.23 /sf	6,565	1.95 /sf	10,358
						Curing, sprayed membrane curing compound, elevated decks	53.20 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,226	37.27 /csf	1,983
						03.10.10.24 Cast-In-Place Concrete, Elevated Decks, 24" thick	*394.00 CY*	*533.20 /CY*	*7.90 /CY*	*278.52 /CY*	*/CY*	*819.61 /CY*	*322,925*	*1,313.32 /CY*	*517,447*
						03.24 Cast-In-Place Concrete, Elevated Slabs	*394.00 CY*	*533.20 /CY*	*7.90 /CY*	*278.52 /CY*	*/CY*	*819.61 /CY*	*322,925*	*1,313.32 /CY*	*517,447*
						03.0 Concrete Work	*394.00 CY*	*533.20 /CY*	*7.90 /CY*	*278.52 /CY*	*/CY*	*819.61 /CY*	*322,925*	*1,313.32 /CY*	*517,447*
						03.00.320 Funk PGP Turbine Buildings Elevated Slab	*394.00 CY*	*533.20 /CY*	*7.90 /CY*	*278.52 /CY*	*/CY*	*819.61 /CY*	*322,925*	*1,313.32 /CY*	*517,447*
		04.00.300				*Funk PGP Turbine Buildings Masonry*									
			04.0			*Masonry*									
				04.21		*Concrete Unit Masonry - Exterior*									
					04.00.02.12	*Masonry Concrete Masonry Units, 12"*									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	2.00 opng	41.31 /opng	2.13 /opng	13.40 /opng	-	56.84 /opng	114	102.01 /opng	204
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	1,008.00 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	12,898	23.14 /cf	23,320
						Masonry reinforcing bars, #5 and #6 reinforcing steel bars, placed horizontally, ASTM A615	3,600.00 lb	0.79 /lb	-	0.56 /lb	-	1.35 /lb	4,845	2.43 /lb	8,759
						Masonry reinforcing bars, #5 and #6 reinforcing steel bars, placed vertically, ASTM A615	1,872.00 lb	0.97 /lb	-	0.56 /lb	-	1.53 /lb	2,859	2.76 /lb	5,158
						Masonry reinforcing bars, truss type steel joint reinforcing, mill standard galvanized, 12" wide	19.20 clf	31.43 /clf	-	29.50 /clf	-	60.93 /clf	1,170	110.46 /clf	2,121
						Concrt block,high strngt,hollow,3500 psi,12"8"16",inclds mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and verticl rnfrcng	2,400.00 SF	14.60 /SF	-	5.20 /SF	-	19.80 /SF	47,511	35.57 /SF	85,367
						Channel framing, structural steel, field fabricated, C8x11.5, incl cutting & welding	20.00 lf	62.16 /lf	3.01 /lf	9.90 /lf	-	75.07 /lf	1,501	134.17 /lf	2,683
						Silicone water repellants, sprayed on CMU, 2 coat	4,800.00 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	4,777	1.83 /sf	8,767
						Reglet, zinc and copper alloy, 20 ounce	240.00 lf	3.26 /lf	-	2.87 /lf	-	6.13 /lf	1,472	11.11 /lf	2,667
						Reglet, counter flashing for zinc and copper alloy, 20 ounce, 12" wide	240.00 lf	5.27 /lf	-	5.25 /lf	-	10.52 /lf	2,526	19.09 /lf	4,581
						04.00.02.12 Masonry Concrete Masonry Units, 12"	*2,400.00 SF*	*21.57 /SF*	*0.18 /SF*	*11.45 /SF*	*/SF*	*33.20 /SF*	*79,672*	*59.84 /SF*	*143,627*
						04.21 Concrete Unit Masonry - Exterior	*2,400.00 SF*	*21.57 /SF*	*0.18 /SF*	*11.45 /SF*	*/SF*	*33.20 /SF*	*79,672*	*59.84 /SF*	*143,627*
						04.0 Masonry	*2,400.00 SF*	*21.57 /SF*	*0.18 /SF*	*11.45 /SF*	*/SF*	*33.20 /SF*	*79,672*	*59.84 /SF*	*143,627*
						04.00.300 Funk PGP Turbine Buildings Masonry	*2,400.00 SF*	*21.57 /SF*	*0.18 /SF*	*11.45 /SF*	*/SF*	*33.20 /SF*	*79,672*	*59.84 /SF*	*143,627*
		05.00.302				*Funk PGP Turbine Building, Metals*									
			05.0			*Metals*									
				05.50		*Metal Fabrications*									
					05.00.99.00	*Metals, Other*									
						Removable Roof Allowance	1,380.00 SF	10.99 /SF	4.03 /SF	35.00 /SF	-	50.03 /SF	69,037	91.47 /SF	126,232
						Stair Well Roof Allowance	864.00 SF	5.85 /SF	2.15 /SF	25.00 /SF	-	33.00 /SF	28,513	60.48 /SF	52,254
						Stair, 4'-0" wide, w/ guardrail both sides	8.00 flt	1,209.32 /flt	90.20 /flt	2,160.00 /flt	-	3,459.52 /flt	27,676	6,306.71 /flt	50,454
						Tailbay Gate Allowance	2.00 ea				30,000.00 /ea	30,000.00 /ea	60,000	53,332.14 /ea	106,664
						05.00.99.00 Metals, Other	*2,244.00 SF*	*13.33 /SF*	*3.63 /SF*	*38.85 /SF*	*26.74 /SF*	*82.54 /SF*	*185,226*	*149.56 /SF*	*335,604*
						05.50 Metal Fabrications	*2,244.00 SF*	*13.33 /SF*	*3.63 /SF*	*38.85 /SF*	*26.74 /SF*	*82.54 /SF*	*185,226*	*149.56 /SF*	*335,604*
						05.0 Metals	*2,244.00 SF*	*13.33 /SF*	*3.63 /SF*	*38.85 /SF*	*26.74 /SF*	*82.54 /SF*	*185,226*	*149.56 /SF*	*335,604*
						05.00.302 Funk PGP Turbine Building, Metals	***2.00** LS*	*14,950.50 /LS*	*4,072.24 /LS*	*43,590.00 /LS*	*30,000.00 /LS*	*92,613.04 /LS*	*185,226*	*167,801.99 /LS*	*335,604*
		08.00.300				*Funk PGP Turbine Building, Openings*									
			08.0			*Openings*									
				08.10		*Doors and Frames*									
					08.10.01.00	*Openings, Doors, Frames and Hardware*									
						Steel frms, knock down, 14 ga., to 8-3/4" throat, to 3'-0" x 7'-0", single	2.00 EA	137.64 /EA	-	430.00 /EA	-	567.64 /EA	1,135	1,040.29 /EA	2,081
						Doors, commercial, steel, insulated, full panel, 18 ga., 3'-0" x 7'-0" x 1-3/4" thick	2.00 ea	97.88 /ea	-	520.00 /ea	-	617.88 /ea	1,236	1,136.13 /ea	2,272
						Add for baked enamel finish, average cost per leaf	2.00 leaf	12.94 /leaf	-	50.40 /leaf	-	63.34 /leaf	127	116.27 /leaf	233
						Average Door Hardware	2.00 ea	91.76 /ea	15.00 /ea	500.00 /ea		606.76 /ea	1,214	1,114.91 /ea	2,230
						08.10.01.00 Openings, Doors, Frames and Hardware	*2.00 EA*	*340.22 /EA*	*15.00 /EA*	*1,500.40 /EA*	*/EA*	*1,855.62 /EA*	*3,711*	*3,407.59 /EA*	*6,815*
						08.10 Doors and Frames	*2.00 EA*	*340.22 /EA*	*15.00 /EA*	*1,500.40 /EA*	*/EA*	*1,855.62 /EA*	*3,711*	*3,407.59 /EA*	*6,815*
						08.0 Openings	*2.00 EA*	*340.22 /EA*	*15.00 /EA*	*1,500.40 /EA*	*/EA*	*1,855.62 /EA*	*3,711*	*3,407.59 /EA*	*6,815*
						08.00.300 Funk PGP Turbine Building, Openings	*2.00 EA*	*340.22 /EA*	*15.00 /EA*	*1,500.40 /EA*	*/EA*	*1,855.62 /EA*	*3,711*	*3,407.59 /EA*	*6,815*
		23.00.300				*Funk PGP Turbine Building, HVAC*									
			23.0			*HVAC*									

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
				23.00		HVAC									
					23.00.02.00	Mechanical, HVAC									
						HVAC Allowance	5,320.00 SF				35.00 /SF	35.00 /SF	186,200	62.22 /SF	331,015
						23.00.02.00 Mechanical, HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.22 /SF	331,015
						23.00 HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.22 /SF	331,015
						23.0 HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.22 /SF	331,015
						23.00.300 Funk PGP Turbine Building, HVAC	5,320.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	186,200	62.22 /SF	331,015
		26.05.GRDG				Facility Grounding									
			26.0			Electrical Work									
				26.00		Electrical									
					01.01.06.03	GC Equip, Tools, & Consumables									
						Rent trencher chain boom gas oper walking 12 HP	2.00 day	-	156.95 /day	-	-	156.95 /day	314	286.87 /day	574
						01.01.06.03 GC Equip, Tools, & Consumables	0.00	/LS	/LS	/LS	/LS	/LS	314	/LS	574
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	314	/SF	574
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Copper Bus Bar .25"x 3.0"	2.00 lf	32.44 /lf	-	52.90 /lf	-	85.34 /lf	171	159.80 /lf	320
						Copper Bus Bar Supports	2.00 E	129.73 /E	-	48.30 /E	-	178.03 /E	356	328.90 /E	658
						Grounding rod, copper clad, 15' long, 3/4" diameter	6.00 ea	259.46 /ea	-	55.00 /ea	-	314.46 /ea	1,887	578.74 /ea	3,472
						Ground wire, copper wire, bare stranded, 4/0	4.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	3,137	1,463.68 /clf	5,855
						Water pipe ground clamps, heavy duty, bronze, 2-1/2" to 3" diameter	1.00 ea	172.97 /ea	-	60.50 /ea	-	233.47 /ea	233	431.10 /ea	431
						Exothermic weld, 4/0 wire to 4/0 wire	24.00 ea	148.26 /ea	-	9.45 /ea	-	157.71 /ea	3,785	288.94 /ea	6,935
						Exothermic weld, mold reusable for above	6.00 ea	-	-	141.00 /ea	-	141.00 /ea	846	267.94 /ea	1,608
						Protective boxes at grade level, round, concrete, 12" long, incl breather slots	2.00 ea	64.87 /ea	-	112.00 /ea	-	176.87 /ea	354	331.38 /ea	663
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	10,768	/LF	19,941
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	10,768	/SF	19,941
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	11,082	/SF	20,514
						26.05.GRDG Facility Grounding	**3,250.00** SF	2.22 /SF	0.10 /SF	1.10 /SF	/SF	3.41 /SF	11,082	6.31 /SF	20,514
		26.12.SEC				Subfeed from Elec Building									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	1.00 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,587	4,809.32 /ton	4,809
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	2,587	/LF	4,809
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	600.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	10,016	30.78 /lf	18,468
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	10,016	/EA	18,468
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	12,603	/LS	23,277
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	20.00 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	17,135	1,593.82 /clf	31,876
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	17,135	/LF	31,876
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	6.50 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	5,097	1,463.68 /clf	9,514
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	5,097	/LF	9,514
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	22,232	/SF	41,390
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	34,834	/SF	64,668
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	15.00 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	4,108	437.74 /cy	6,566
						End bulkheads, plywood, concrete envelope/encasement	24.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	341	22.49 /sf	540
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	4,450	/CY	7,106
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	50.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	1,263	39.86 /ecy	1,993
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	1,263	/CY	1,993
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	50.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	1,010	31.86 /lcy	1,593
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	1,010	/CY	1,593
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	37.04 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	1,072	45.67 /bcy	1,692
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	1,072	/CY	1,692
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	7,794	/LS	12,383
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	7,794	/CY	12,383
						26.12.SEC Subfeed from Elec Building	**600.00** LF	41.92 /LF	4.18 /LF	24.95 /LF	/LF	71.05 /LF	42,628	128.42 /LF	77,051
		26.20.DIST				Electrical Distribution Equipment									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 1-1/2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	100.00 lf	23.06 /lf	-	19.05 /lf	-	42.11 /lf	4,211	78.35 /lf	7,835
						Flexible metallic conduit, steel, 1-1/2" diameter	3.00 lf	20.76 /lf	-	2.55 /lf	-	23.31 /lf	70	42.78 /lf	128
						Flexible metallic conduit, steel, 2" diameter	3.00 lf	25.95 /lf	-	3.23 /lf	-	29.18 /lf	88	53.56 /lf	161
						Flexible metallic conduit, steel, connectors, insulated, 1-1/2" diameter	1.00 ea	32.43 /ea	-	24.50 /ea	-	56.93 /ea	57	105.83 /ea	106
						Flexible metallic conduit, steel, connectors, insulated, 2" diameter	1.00 ea	45.12 /ea	-	26.00 /ea	-	71.12 /ea	71	131.88 /ea	132
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 1-1/2" diameter	1.00 ea	45.12 /ea	-	46.00 /ea	-	91.12 /ea	91	169.86 /ea	170
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 2" diameter	1.00 ea	57.66 /ea	-	67.00 /ea	-	124.66 /ea	125	232.71 /ea	233
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	4,125.00 /ea	-	7,831.59 /ea	7,832	14,613.14 /ea	14,613
						Panelboards, 3 phase 4 wire, main circuit breaker, 277/480 V, 225 amp, 42 circuits, NEHB, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	5,175.00 /ea	-	8,881.59 /ea	8,882	16,608.41 /ea	16,608
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	21,438	/SF	39,958
					26.10.03.00	UG Conduit									
						Uninterruptible power supply, charger, inverter, and alarm 1 phase, 120 V, 5 kVA, incl 10 minutes battery	1.00 ea	6,182.64 /ea	356.18 /ea	7,100.00 /ea	-	13,638.82 /ea	13,639	25,442.95 /ea	25,443
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	13,639	/LF	25,443
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #6, type XHHW, in raceway	0.70 clf	159.67 /clf	-	54.50 /clf	-	214.17 /clf	150	395.37 /clf	277
						Wire, copper, stranded, 600 volt, #4, type XHHW, in raceway	0.70 clf	195.81 /clf	-	77.50 /clf	-	273.31 /clf	191	505.20 /clf	354
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	2.00 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	837	776.37 /clf	1,553
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	2.00 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	1,714	1,593.83 /clf	3,188
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	2,892	/LF	5,371

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	32,958	/SF	70,850
				26.25		Facility Electrical									
					26.25.06.00	Transformers, Dry Type									
						Transformer, dry-type, ventilated, 3 phase 480 V primary 120/208 V secondary, 75 kVA	1.00 ea	2,965.27 /ea	-	2,500.00 /ea	-	5,465.27 /ea	5,465	10,170.33 /ea	10,170
						26.25.06.00 Transformers, Dry Type	0.00	/EA	/EA	/EA	/EA	/EA	5,465	/EA	10,170
						26.25 Facility Electrical	0.00	/LS	/LS	/LS	/LS	/LS	5,465	/LS	10,170
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	43,422	/SF	80,970
						26.20.DIST Electrical Distribution Equipment	**450.00** AMP	46.44 /AMP	0.73 /AMP	49.26 /AMP	/AMP	96.43 /AMP	43,422	179.93 /AMP	80,970
		26.25.LTG				Interior Lighting and Control									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	500.00 lf	12.97 /lf	-	5.15 /lf	-	18.12 /lf	9,062	33.50 /lf	16,749
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	25.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	1,382	101.25 /ea	2,531
						Outlet boxes, pressed steel, covers, blank, 4" square	24.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	408	31.10 /ea	746
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	1.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	18	32.81 /ea	33
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	10,269	/SF	20,059
					26.10.03.00	UG Conduit									
						Toggle switch, quiet type, single pole, 20 amp	1.00 ea	38.44 /ea	-	3.46 /ea	-	41.90 /ea	42	76.83 /ea	77
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	42	/LF	77
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	16.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	1,729	198.48 /clf	3,176
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	1,729	/LF	3,176
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	12,039	/SF	23,312
				26.20		Facility Electrical									
					26.20.03.00	Facility Electrical, Lighting									
						LED Strip Light, hdwe	24.00 ea	182.08 /ea	-	110.00 /ea	-	292.08 /ea	7,010	541.82 /ea	13,004
						Emergency ballast, material only, interior, factory installed in fixture	6.00 ea	-	-	152.00 /ea	-	152.00 /ea	912	288.84 /ea	1,733
						Exit lighting, L.E.D. standard, single face, ceiling or wall mount	2.00 ea	129.73 /ea	-	70.00 /ea	-	199.73 /ea	399	370.14 /ea	740
						Fixture whips, 3/8" greenfield, 2 connectors, THHN wire, three #14, 6' long	24.00 ea	32.43 /ea	-	5.45 /ea	-	37.88 /ea	909	69.63 /ea	1,671
						26.20.03.00 Facility Electrical, Lighting	0.00	/SF	/SF	/SF	/SF	/SF	9,231	/SF	17,148
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	9,231	/SF	17,148
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	21,870	/SF	40,460
						26.25.LTG Interior Lighting and Control	**1.00** LS	15,144.59 /LS	/LS	6,724.85 /LS	/LS	21,869.54 /LS	21,870	40,459.57 /LS	40,460
		26.26.EXTLTG				Exterior Lighting and Control									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	80.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	724	16.63 /lf	1,330
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	4.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	221	101.25 /ea	405
						Outlet boxes, pressed steel, covers, blank, 4" square	4.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	68	31.11 /ea	124
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	1,013	/SF	1,859
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	3.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	324	198.48 /clf	595
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	324	/LF	595
					26.15.07.00	Lighting									
						LED Area Light	4.00 E	97.30 /E	-		-	97.30 /E	389	177.84 /E	711
						Wallpack Photocell	4.00 E	32.43 /E	-		-	32.43 /E	130	59.28 /E	237
						26.15.07.00 Lighting	0.00	/LS	/LS	/LS	/LS	/LS	519	/LS	948
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	1,856	/SF	3,403
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	1,856	/SF	3,403
						26.26.EXTLTG Exterior Lighting and Control	**1.00** LS	1,713.08 /LS	/LS	143.26 /LS	/LS	1,856.34 /LS	1,856	3,403.33 /LS	3,403
		26.30.DEV				Device Outlets									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	500.00 lf	14.83 /lf	-	10.00 /lf	-	24.83 /lf	12,413	46.10 /lf	23,051
						Outlet boxes, cast, 1 gang, FD, 3/4" hub, 2-11/16" deep	8.00 ea	86.49 /ea	-	22.00 /ea	-	108.49 /ea	868	199.88 /ea	1,599
						Duplex receptacle, ground fault interrupting, 20 amp	8.00 ea	38.44 /ea	-	45.00 /ea	-	83.44 /ea	668	155.77 /ea	1,246
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	13,949	/SF	25,896
					26.10.03.00	UG Conduit									
						WP cover	8.00 ea	17.30 /ea	-	42.50 /ea	-	59.80 /ea	478	112.38 /ea	899
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	478	/LF	899
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	16.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	1,729	198.48 /clf	3,176
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	1,729	/LF	3,176
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	16,156	/SF	29,970
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	16,156	/SF	29,970
						26.30.DEV Device Outlets	**1.00** LS	10,060.56 /LS	/LS	6,095.20 /LS	/LS	16,155.76 /LS	16,156	29,970.39 /LS	29,970
		26.40.EQCON				Facility Equipment Connections and Controls									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.20.05.00	Facility Electrical, HVAC									
						Allowance for HVAC circuit, connection, controls	200.00 HR	129.73 /HR	15.00 /HR	50.00 /HR	-	194.73 /HR	38,946	359.54 /HR	71,908
						26.20.05.00 Facility Electrical, HVAC	0.00	/SF	/SF	/SF	/SF	/SF	38,946	/SF	71,908
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	38,946	/SF	71,908
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	38,946	/SF	71,908
						26.40.EQCON Facility Equipment Connections and Controls	**1.00** ALO	25,946.13 /ALO	3,000.00 /ALO	10,000.00 /ALO	/ALO	38,946.13 /ALO	38,946	71,908.30 /ALO	71,908
		26.40.HYDTURB				13.8kV 15MW Hyd Turbine Pwr Feeders 4-[4" 3#4/0 #4/0G] 500A									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	3.00 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	7,760	4,809.32 /ton	14,428
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	7,760	/LF	14,428
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	7,760	/LS	14,428
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	80.00 lf	64.87 /lf	-	62.50 /lf	-	127.37 /lf	10,189	237.32 /lf	18,986
						Rigid galvanized steel plastic coated conduit elbows, 4" diameter, to 15' high	16.00 ea	389.19 /ea	-	196.00 /ea	-	585.19 /ea	9,363	1,063.79 /ea	17,341
						Rigid galvanized steel plastic coated conduit couplings, 4" diameter, to 15' high	16.00 ea	28.83 /ea	-	57.50 /ea	-	86.33 /ea	1,381	161.96 /ea	2,591

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.00.99.00	*Electrical, Other*									
						Flexible metallic conduit, sealtite, 4" diameter	24.00 lf	86.40 /lf	-	20.00 /lf	-	106.40 /lf	2,554	195.92 /lf	4,702
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 4" diameter	8.00 ea	129.73 /ea	-	163.00 /ea	-	292.73 /ea	2,342	546.85 /ea	4,375
						Flexible metallic conduit, coupling sealtite to rigid, 4" diameter	8.00 ea	129.73 /ea	-	198.00 /ea	-	327.73 /ea	2,622	613.36 /ea	4,907
						Electrical Contractor startup assistance per hour	40.00 hr	1,297.31 /hr	25.00 /hr	100.00 /hr	-	1,422.31 /hr	56,892	2,606.85 /hr	104,274
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*85,343*	*/SF*	*157,178*
					26.10.03.00	*UG Conduit*									
						PVC conduit, schedule 40, 4" diameter, to 15' H, incl terminations, fittings, & support	2,320.00 lf	32.43 /lf	-	5.75 /lf	-	38.18 /lf	88,584	70.20 /lf	162,875
						PVC conduit elbows, 4" diameter, to 15' H	16.00 ea	116.76 /ea	-	23.00 /ea	-	139.76 /ea	2,236	257.11 /ea	4,114
						PVC conduit, field bends, 45 Deg. to 90 Deg., 4" diameter	16.00 ea	129.73 /ea	-	-	-	129.73 /ea	2,076	237.12 /ea	3,794
						PVC adapters, 4" diameter, to 15' H	16.00 ea	64.87 /ea	-	4.80 /ea	-	69.67 /ea	1,115	127.68 /ea	2,043
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*94,010*	*/LF*	*172,825*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Cable terminations, indoor, insulation diameter range, 15 kV, .525" to 1.025", pad mount	48.00 ea	324.33 /ea	-	109.00 /ea	-	433.33 /ea	20,800	799.91 /ea	38,396
						Medium-cable single cable, copper, XLP shielding, ungrounded neutral, 15 kV, 4/0, in conduit, excl splicing & terminations	78.00 clf	648.65 /clf	-	660.00 /clf	-	1,308.65 /clf	102,075	2,439.73 /clf	190,299
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*122,875*	*/LF*	*228,694*
					26.25.03.00	*Electrical Equipment, Switchgear - General*									
						Hi-Pot Test 15 KV	8.00 E	259.46 /E	-	-	200.00 /E	459.46 /E	3,676	839.77 /E	6,718
						26.25.03.00 Electrical Equipment, Switchgear - General	*0.00*	*/EA*	*/EA*	*/EA*	*/EA*	*/EA*	*3,676*	*/EA*	*6,718*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*305,894*	*/SF*	*565,434*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*313,664*	*/SF*	*579,842*
			31.0			*Earthwork*									
				26.10		*Site Electrical*									
					31.20.07.15	*Earthworks, Sitework, Borrow*									
						Concrete (red) envelope/encasement, poured neat	29.63 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	8,115	437.74 /cy	12,970
						End bulkheads, plywood, concrete envelope/encasement	60.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	853	22.49 /sf	1,349
						31.20.07.15 Earthworks, Sitework, Borrow	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*8,968*	*/CY*	*14,319*
					31.20.09.10	*Earthworks, Sitework, Backfill*									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	70.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	1,768	39.86 /ecy	2,790
						31.20.09.10 Earthworks, Sitework, Backfill	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*1,768*	*/CY*	*2,790*
					31.20.15.00	*Earthworks, Sitework, Hauling and Dump Fees*									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	70.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	1,414	31.86 /lcy	2,230
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*1,414*	*/CY*	*2,230*
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	59.26 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	1,715	45.67 /bcy	2,706
						31.25.01.00 Earthworks, Structural, Excavation	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*1,715*	*/CY*	*2,706*
						26.10 Site Electrical	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*13,866*	*/LS*	*22,046*
						31.0 Earthwork	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*13,866*	*/CY*	*22,046*
						26.40.HYDTURB 13.8kV 15MW Hyd Turbine Pwr Feeders 4-[4" 3#4/0 #4/0G] 800A	***600.00*** *LF*	*380.93 /LF*	*7.83 /LF*	*154.39 /LF*	*2.67 /LF*	*545.86 /LF*	*327,523*	*1,003.15 /LF*	*601,887*
		26.41.HYDTURB				*Hyd Turbine Controls Circuits*									
			26.0			*Electrical Work*									
				26.10		*Site Electrical*									
					26.10.02.00	*Site Electrical, Buried Conduit*									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	3.00 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	7,760	4,809.32 /ton	14,428
						26.10.02.00 Site Electrical, Buried Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*7,760*	*/LF*	*14,428*
						26.10 Site Electrical	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*7,760*	*/LS*	*14,428*
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	40.00 lf	29.65 /lf	-	22.50 /lf	-	52.15 /lf	2,086	96.95 /lf	3,878
						Rigid galvanized steel plastic coated conduit elbows, 2" diameter, to 15' high	8.00 ea	129.73 /ea	-	42.00 /ea	-	171.73 /ea	1,374	316.92 /ea	2,535
						Rigid galvanized steel plastic coated conduit couplings, 2" diameter, to 15' high	8.00 ea	19.58 /ea	-	14.35 /ea	-	33.93 /ea	271	63.06 /ea	504
						Flexible metallic conduit, sealtite, 2" diameter	12.00 lf	34.60 /lf	-	4.30 /lf	-	38.90 /lf	467	71.40 /lf	857
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 2" diameter	4.00 ea	51.89 /ea	-	25.50 /ea	-	77.39 /ea	310	143.30 /ea	573
						Flexible metallic conduit, coupling sealtite to rigid, 2" diameter	4.00 ea	103.79 /ea	-	31.50 /ea	-	135.29 /ea	541	249.55 /ea	998
						Electrical Contractor startup assistance per hour	40.00 hr	1,297.31 /hr	25.00 /hr	100.00 /hr	-	1,422.31 /hr	56,892	2,606.85 /hr	104,274
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*61,941*	*/SF*	*113,620*
					26.10.03.00	*UG Conduit*									
						PVC conduit, schedule 40, 2" diameter, to 15' H, incl terminations, fittings, & support	1,160.00 lf	11.53 /lf	-	3.36 /lf	-	14.89 /lf	17,274	27.46 /lf	31,855
						PVC conduit elbows, 2" diameter, to 15' H	8.00 ea	51.32 /ea	-	3.54 /ea	-	54.86 /ea	439	100.53 /ea	804
						PVC conduit, field bends, 45 Deg. to 90 Deg., 2" diameter	8.00 ea	51.89 /ea	-	-	-	51.89 /ea	415	94.85 /ea	759
						PVC adapters, 2" diameter, to 15' H	8.00 ea	38.44 /ea	-	1.39 /ea	-	39.83 /ea	319	72.90 /ea	583
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*18,447*	*/LF*	*34,002*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	120.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	10,744	164.35 /clf	19,722
						Cable, copper braided shield, PVC jacket, 300 V, #18 stranded, 2 conductor	48.00 clf	148.26 /clf	-	30.00 /clf	-	178.26 /clf	8,557	327.99 /clf	15,744
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*19,301*	*/LF*	*35,466*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*99,689*	*/SF*	*183,087*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*107,449*	*/SF*	*197,515*
			31.0			*Earthwork*									
				26.10		*Site Electrical*									
					31.20.07.15	*Earthworks, Sitework, Borrow*									
						Concrete (red) envelope/encasement, poured neat	29.63 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	8,115	437.74 /cy	12,970
						End bulkheads, plywood, concrete envelope/encasement	60.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	853	22.49 /sf	1,349
						31.20.07.15 Earthworks, Sitework, Borrow	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*8,968*	*/CY*	*14,319*
					31.20.09.10	*Earthworks, Sitework, Backfill*									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	70.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	1,768	39.86 /ecy	2,790
						31.20.09.10 Earthworks, Sitework, Backfill	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*1,768*	*/CY*	*2,790*
					31.20.15.00	*Earthworks, Sitework, Hauling and Dump Fees*									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	70.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	1,414	31.86 /lcy	2,230
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*1,414*	*/CY*	*2,230*
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	59.26 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	1,715	45.67 /bcy	2,706
						31.25.01.00 Earthworks, Structural, Excavation	*0.00*	*/CY*	*/CY*	*/CY*	*/CY*	*/CY*	*1,715*	*/CY*	*2,706*

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Jacobs

DETAIL REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Funks PGP Rev 2	Estimator: Cavalleri/Wells - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	13,866	/LS	22,046
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	13,866	/CY	22,046
						26.41.HYDTURB Hyd Turbine Controls Circuits	**600.00** LF	164.55 /LF	7.53 /LF	29.81 /LF	/LF	202.19 /LF	121,314	365.94 /LF	219,561
		26.80.LPS				Facility Lightning Protection System									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.15.10.00	Process Electrical, Lightning Protection									
						Air terminal and base, copper, 3/8" dia x 10", to 75' h	10.00 ea	129.73 /ea	-	26.00 /ea	-	155.73 /ea	1,557	286.52 /ea	2,885
						Lightning protection cable, copper, 220 lb per thousand feet, to 75' h	400.00 lf	3.24 /lf	-	3.18 /lf	-	6.42 /lf	2,569	11.97 /lf	4,788
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	4,127	/SF	7,653
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	4,127	/SF	7,653
				26.20		Facility Electrical									
					26.15.10.00	Process Electrical, Lightning Protection									
						LPS design and certification, misc mat and labor	1.00 LS	2,075.69 /LS	-	1,000.00 /LS	1,500.00 /LS	4,575.69 /LS	4,576	8,435.66 /LS	8,436
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	4,576	/SF	8,436
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	4,576	/SF	8,436
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	8,702	/SF	16,089
						26.80.LPS Facility Lightning Protection System	**3,250.00** SF	1.44 /SF	/SF	0.78 /SF	0.46 /SF	2.68 /SF	8,702	4.95 /SF	16,089
		27.30.COMCDT				Comm Conduit to Admin									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.90 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,328	4,809.31 /ton	4,328
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	2,328	/LF	4,328
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	1,200.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	20,032	30.78 /lf	36,936
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	20,032	/EA	36,936
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	22,360	/LS	41,264
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	13.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	10,194	1,463.68 /clf	19,028
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	10,194	/LF	19,028
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	10,194	/SF	19,028
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	32,554	/SF	60,293
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	40.00 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	10,955	437.74 /cy	17,510
						End bulkheads, plywood, concrete envelope/encasement	75.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	1,066	22.49 /sf	1,687
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	12,022	/CY	19,196
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	180.00 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	4,547	39.86 /ecy	7,175
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	4,547	/CY	7,175
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	180.00 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	3,635	31.86 /lcy	5,735
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	3,635	/CY	5,735
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	177.78 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	5,146	45.67 /bcy	8,119
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	5,146	/CY	8,119
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	25,350	/LS	40,224
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	25,350	/CY	40,224
						27.30.COMCDT Comm Conduit to Admin	**1,200.00** LF	29.15 /LF	8.36 /LF	11.74 /LF	/LF	48.25 /LF	57,904	83.76 /LF	100,517
		28.20.AC				Access Control System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Card reader - all in allowance per each (incl circuit, cards, CX)	2.00 ea	1,556.77 /ea	-	800.00 /ea	-	2,356.77 /ea	4,714	3,776.37 /ea	7,553
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,714	/SF	7,553
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,714	/SF	7,553
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,714	/SF	7,553
						28.20.AC Access Control System	**2.00** DOOR	1,556.77 /DOOR	/DOOR	800.00 /DOOR	/DOOR	2,356.77 /DOOR	4,714	3,776.37 /DOOR	7,553
		28.20.CCTV				Closed Circuit TV and Cameras									
			26.0			Electrical Work									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Camera allowance (licenses, circuit, startup, CX)	1.00 LS	1,037.85 /LS	-	1,000.00 /LS	1,000.00 /LS	3,037.85 /LS	3,038	5,624.90 /LS	5,625
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	3,038	/SF	5,625
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	3,038	/SF	5,625
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	3,038	/SF	5,625
			28.0			Electronic Safety and Security									
				28.30		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Closed circuit television system (CCTV), industrial quality, for additional camera stations, add	2.00 ea	384.39 /ea	-	690.00 /ea	-	1,074.39 /ea	2,149	1,745.13 /ea	3,490
						Closed circuit television system (CCTV), industrial quality, for weatherproof camera station, add	2.00 ea	798.35 /ea	-	540.00 /ea	-	1,338.35 /ea	2,677	2,150.71 /ea	4,301
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,825	/SF	7,792
						28.30 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,825	/SF	7,792
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	4,825	/SF	7,792
						28.20.CCTV Closed Circuit TV and Cameras	**2.00** CAM	1,701.68 /CAM	/CAM	1,730.00 /CAM	500.00 /CAM	3,931.68 /CAM	7,863	6,708.28 /CAM	13,417
		28.20.ID				Intrusion Detection System									
			28.0			Electronic Safety and Security									
				28.30		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Securitized door, all-in allowance per each (incl circuit, devices, CX)	2.00 ea	2,594.62 /ea	-	1,000.00 /ea	-	3,594.62 /ea	7,189	5,743.86 /ea	11,488
						Door controller (all-in cost including vendor program and startup)	1.00 ea	648.65 /ea	-	2,000.00 /ea	500.00 /ea	3,148.65 /ea	3,149	5,112.75 /ea	5,113
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	10,338	/SF	16,600
						28.30 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	10,338	/SF	16,600
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	10,338	/SF	16,600
						28.20.ID Intrusion Detection System	**2.00** DOOR	2,918.94 /DOOR	/DOOR	2,000.00 /DOOR	250.00 /DOOR	5,168.94 /DOOR	10,338	8,300.24 /DOOR	16,600
		40.50.304				Funk PGP Turbine Building, Process Piping									
			40.0			Process Pipe									
				40.11		Process Pipe, Carbon Steel									
					40.10.02.60	Process Pipe, Carbon Steel, 60"									
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	230.00 LF	121.97 /LF	62.10 /LF	420.00 /LF	-	604.07 /LF	138,935	983.51 /LF	226,207

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					40.10.02.60	*Process Pipe, Carbon Steel, 60"*									
						Dismantling Joints	2.00 ea	2,187.72 /ea	1,560.00 /ea	37,000.00 /ea	-	40,747.72 /ea	81,495	66,971.72 /ea	133,943
						Turbine Shutoff Valves	2.00 ea	2,187.72 /ea	1,560.00 /ea	45,000.00 /ea	-	48,747.72 /ea	97,495	80,173.63 /ea	160,347
						Miscellaneous Items Allowance	1.00 ls	0.00 /ls	0.00 /ls	0.00 /ls	65,000.00 /ls	65,000.00 /ls	65,000	102,552.97 /ls	102,553
						40.10.02.60 Process Pipe, Carbon Steel, 60"	*230.00 LF*	*160.02 /LF*	*89.23 /LF*	*1,133.04 /LF*	*282.61 /LF*	*1,664.90 /LF*	*382,926*	*2,708.92 /LF*	*623,050*
						40.11 Process Pipe, Carbon Steel	*230.00 LF*	*160.02 /LF*	*89.23 /LF*	*1,133.04 /LF*	*282.61 /LF*	*1,664.90 /LF*	*382,926*	*2,708.92 /LF*	*623,050*
						40.0 Process Pipe	*230.00 LF*	*160.02 /LF*	*89.23 /LF*	*1,133.04 /LF*	*282.61 /LF*	*1,664.90 /LF*	*382,926*	*2,708.92 /LF*	*623,050*
						40.00.304 Funk PGP Turbine Building, Process Piping	*230.00 LF*	*160.02 /LF*	*89.23 /LF*	*1,133.04 /LF*	*282.61 /LF*	*1,664.90 /LF*	*382,926*	*2,708.92 /LF*	*623,050*
						03.02 Funks Reservoir Turbine Buildings	**2.00 EA**	**835,881.45 /EA**	**46,073.15 /EA**	**901,136.93 /EA**	**157,500.00 /EA**	**1,941,591.44 /EA**	**3,883,083**	**3,253,337.90 /EA**	**6,506,475**
	03.03					**Funks Reservoir Energy Dissipation Valve Structures**									
		03.00.310				*Funk PGP Energy Dissipation Structures Foundation Slab*									
			03.0			*Concrete Work*									
				03.12		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.36	*Cast-In-Place Concrete, Slabs on Grade, 36" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,848.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	16,328	14.01 /sfca	25,891
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	56.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	143,973	4,143.28 /ton	232,023
						Reinforcing in place, unloading & sorting, add to above - slabs	56.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	3,119	87.89 /ton	4,922
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	762.00 cy	-	-	131.00 /cy	-	131.00 /cy	99,822	216.18 /cy	164,730
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	740.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	21,461	45.76 /CY	33,859
						Cfnsh,flrs,for spcl rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl pcn,strkn	6,656.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	6,234	1.48 /sf	9,836
						Curing, sprayed membrane curing compound	66.56 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	1,534	37.27 /csf	2,481
						Fine grading, fine grade for slab on grade, machine	739.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	1,386	2.96 /sy	2,187
						03.10.05.36 Cast-In-Place Concrete, Slabs on Grade, 36" thick	*740.00 CY*	*160.90 /CY*	*6.96 /CY*	*229.25 /CY*	*/CY*	*397.11 /CY*	*293,857*	*643.15 /CY*	*475,929*
						03.12 Cast-In-Place Concrete, Slabs on Grade	*740.00 CY*	*160.90 /CY*	*6.96 /CY*	*229.25 /CY*	*/CY*	*397.11 /CY*	*293,857*	*643.15 /CY*	*475,929*
						03.0 Concrete Work	*740.00 CY*	*160.90 /CY*	*6.96 /CY*	*229.25 /CY*	*/CY*	*397.11 /CY*	*293,857*	*643.15 /CY*	*475,929*
						03.00.310 Funk PGP Energy Dissipation Structures Foundation Slab	*740.00 CY*	*160.90 /CY*	*6.96 /CY*	*229.25 /CY*	*/CY*	*397.11 /CY*	*293,857*	*643.15 /CY*	*475,929*
		03.00.312				*Funk PGP Energy Dissipation Structures Concrete Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.36	*Cast-In-Place Concrete, Straight Walls, 36" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	12,800.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	188,641	23.65 /sfca	302,683
						Form oil, coverage varies greatly, maximum, includes material only	34.25 gal	-	-	23.50 /gal	-	23.50 /gal	805	38.78 /gal	1,328
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	53.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	137,546	4,143.28 /ton	221,665
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	53.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,980	87.89 /ton	4,702
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	53.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	3,239	95.53 /ton	5,111
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	734.00 cy	-	-	131.00 /cy	-	131.00 /cy	96,154	216.18 /cy	158,677
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	712.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	31,833	70.54 /CY	50,224
						Finishing: break ties & patch voids (walls, cols or beams)	12,800.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	12,915	1.59 /sf	20,404
						03.10.06.36 Cast-In-Place Concrete, Straight Walls, 36" thick	*712.00 CY*	*331.46 /CY*	*9.57 /CY*	*324.86 /CY*	*/CY*	*665.89 /CY*	*474,113*	*1,074.15 /CY*	*764,795*
					03.10.06.90	*Cast-In-Place Concrete, Straight Walls, 7'6" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	840.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	12,380	23.65 /sfca	19,864
						Form oil, coverage varies greatly, maximum, includes material only	2.25 gal	-	-	23.50 /gal	-	23.50 /gal	53	38.78 /gal	87
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	8.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	22,496	4,143.28 /ton	36,254
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	8.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	487	87.89 /ton	769
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	8.75 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	530	95.53 /ton	836
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	120.00 cy	-	-	131.00 /cy	-	131.00 /cy	15,720	216.18 /cy	25,942
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	117.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	5,231	70.54 /CY	8,253
						Finishing: break ties & patch voids (walls, cols or beams)	840.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	848	1.59 /sf	1,339
						03.10.06.90 Cast-In-Place Concrete, Straight Walls, 7'6" thick	*117.00 CY*	*229.08 /CY*	*9.57 /CY*	*263.90 /CY*	*/CY*	*493.54 /CY*	*57,744*	*797.81 /CY*	*93,343*
						03.30 Cast-In-Place Concrete, Straight Walls	*829.00 CY*	*315.74 /CY*	*9.57 /CY*	*316.26 /CY*	*/CY*	*641.58 /CY*	*531,857*	*1,035.15 /CY*	*858,138*
						03.0 Concrete Work	*829.00 CY*	*315.74 /CY*	*9.57 /CY*	*316.26 /CY*	*/CY*	*641.58 /CY*	*531,857*	*1,035.15 /CY*	*858,138*
						03.00.312 Funk PGP Energy Dissipation Structures Concrete Walls	*829.00 CY*	*315.74 /CY*	*9.57 /CY*	*316.26 /CY*	*/CY*	*641.58 /CY*	*531,857*	*1,035.15 /CY*	*858,138*
		03.00.314				*Funk PGP Energy Dissipation Structures Elevated Deck*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.36	*Cast-In-Place Concrete, Elevated Decks, 36" thick*									
						Slab shoring	46,000.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	31,497	1.08 /cf	49,681
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	2,000.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	17,753	14.10 /sf	28,202
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	280.00 lf	5.41 /lf	-	0.22 /lf	-	5.63 /lf	1,577	8.90 /lf	2,492
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	16.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	43,063	4,143.28 /ton	69,400
						Reinforcing in place, unloading & sorting, add to above - decks	16.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	933	87.89 /ton	1,472
						Reinforcing steel, crane cost for handling, maximum, add	16.75 ton	140.59 /ton	18.56 /ton	-	-	159.16 /ton	2,666	251.11 /ton	4,206
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	230.00 cy	-	-	131.00 /cy	-	131.00 /cy	30,130	216.18 /cy	49,722
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	223.00 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	6,647	47.03 /CY	10,487
						Finishing elev slab, bull float, manual float & manual steel trowel	2,000.00 sf	1.23 /sf	-	-	-	1.23 /sf	2,468	1.95 /sf	3,894
						Curing, sprayed membrane curing compound, elevated decks	20.00 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	461	37.27 /csf	745
						03.10.10.36 Cast-In-Place Concrete, Elevated Decks, 36" thick	*223.00 CY*	*358.76 /CY*	*7.58 /CY*	*248.88 /CY*	*/CY*	*615.23 /CY*	*137,195*	*988.71 /CY*	*220,482*
						03.24 Cast-In-Place Concrete, Elevated Slabs	*223.00 CY*	*358.76 /CY*	*7.58 /CY*	*248.88 /CY*	*/CY*	*615.23 /CY*	*137,195*	*988.71 /CY*	*220,482*
						03.0 Concrete Work	*223.00 CY*	*358.76 /CY*	*7.58 /CY*	*248.88 /CY*	*/CY*	*615.23 /CY*	*137,195*	*988.71 /CY*	*220,482*
						03.00.314 Funk PGP Energy Dissipation Structures Elevated Deck	*223.00 CY*	*358.76 /CY*	*7.58 /CY*	*248.88 /CY*	*/CY*	*615.23 /CY*	*137,195*	*988.71 /CY*	*220,482*
		40.00.302				*Funk PGP Energy Dissipation Structures Piping*									
			40.0			*Process Pipe*									
				40.11		*Process Pipe, Carbon Steel*									
					40.10.02.60	*Process Pipe, Carbon Steel, 60"*									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					40.10.02.60	*Process Pipe, Carbon Steel, 60"*									
						Fittings, steel, butt weld, 60' Dia	4.00 ea	3,261.57 /ea	97.68 /ea	9,500.00 /ea	-	12,879.25 /ea	51,517	21,008.82 /ea	84,035
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	120.00 LF	121.97 /LF	62.10 /LF	420.00 /LF	-	604.07 /LF	72,488	983.51 /LF	118,021
						Energy Dissipating Valves W/ Hood	2.00 ea	2,187.72 /ea	1,560.00 /ea	25,000.00 /ea	-	28,747.72 /ea	57,495	47,168.87 /ea	94,338
						40.10.02.60 Process Pipe, Carbon Steel, 60"	*120.00 LF*	*267.82 /LF*	*91.35 /LF*	*1,153.33 /LF*	*/LF*	*1,512.50 /LF*	*181,500*	*2,469.95 /LF*	*296,394*
						40.11 Process Pipe, Carbon Steel	*120.00 LF*	*267.82 /LF*	*91.35 /LF*	*1,153.33 /LF*	*/LF*	*1,512.50 /LF*	*181,500*	*2,469.95 /LF*	*296,394*
						40.0 Process Pipe	*120.00 LF*	*267.82 /LF*	*91.35 /LF*	*1,153.33 /LF*	*/LF*	*1,512.50 /LF*	*181,500*	*2,469.95 /LF*	*296,394*
						40.00.302 Funk PGP Energy Dissipation Structures Piping	*120.00 LF*	*267.82 /LF*	*91.35 /LF*	*1,153.33 /LF*	*/LF*	*1,512.50 /LF*	*181,500*	*2,469.95 /LF*	*296,394*
						03.03 Funks Reservoir Energy Dissipation Valve Structures	**2.00** EA	346,675.[illegible] /EA	12,[illegible] /EA	312,[illegible] /EA	/EA	572,[illegible] /EA	1,144,[illegible]	925,[illegible] /EA	1,850,[illegible]
	03.04					Funks Reservoir Electrical Building									
		04.00.302				*Funk PGP Electrical Building, Masonry*									
			04.0			*Masonry*									
				04.21		*Concrete Unit Masonry - Exterior*									
					04.00.02.08	*Masonry Concrete Masonry Units, 8"*									
						Grout, door frames, 3' x 7' opening, 2.5 C.F. per opening	12.00 opng	41.31 /opng	2.12 /opng	13.40 /opng	-	56.83 /opng	682	102.01 /opng	1,224
						Grout, door frames, 6' x 7' opening, 3.5 C.F. per opening	4.00 opng	55.08 /opng	2.83 /opng	18.75 /opng	-	76.66 /opng	307	137.65 /opng	551
						Grout, for bond beams, lintels and concrete masonry unit (CMU) cores, C476, includes material only	3,649.99 cf	7.08 /cf	0.36 /cf	5.35 /cf	-	12.80 /cf	46,704	23.14 /cf	84,443
						Reinforcing, steel bars A615, placed horizontal, average #4 bar	4,963.98 lb	1.40 /lb	-	0.40 /lb	-	1.80 /lb	8,921	3.22 /lb	16,003
						Masonry reinforcing bars, #3 and #4 reinforcing steel bars, placed vertically, ASTM A615	3,649.99 lb	1.80 /lb	-	0.56 /lb	-	2.36 /lb	8,600	4.23 /lb	15,436
						Masonry reinforcing bars, truss type steel joint reinforcing, mill standard galvanized, 12" wide	109.48 clf	31.43 /clf	-	29.50 /clf	-	60.93 /clf	6,671	110.46 /clf	12,093
						Concrt block,high strngt,hollow,3500 psi,8"8"16",includs mortar and horzntl joint rnfrcng every other course,excluds scffldn,grout and vertcl rnfrcng	14,600.00 SF	8.50 /SF	-	4.07 /SF	-	12.57 /SF	183,576	22.65 /SF	330,657
						Channel framing, structural steel, field fabricated, C6x8.2, incl cutting & welding	180.00 lf	40.69 /lf	1.97 /lf	6.85 /lf	-	49.51 /lf	8,911	88.51 /lf	15,931
						Silicone water repellants, sprayed on CMU, 2 coat	29,199.88 sf	0.21 /sf	-	0.79 /sf	-	1.00 /sf	29,060	1.83 /sf	53,334
						Reglet, zinc and copper alloy, 20 ounce	682.00 lf	3.26 /lf	-	2.87 /lf	-	6.13 /lf	4,183	11.11 /lf	7,578
						Reglet, counter flashing for zinc and copper alloy, 20 ounce, 12" wide	682.00 lf	5.27 /lf	-	5.25 /lf	-	10.52 /lf	7,177	19.09 /lf	13,018
						04.00.02.08 Masonry Concrete Masonry Units, 8"	*14,600.00 SF*	*12.79 /SF*	*0.12 /SF*	*7.97 /SF*	*/SF*	*20.88 /SF*	*304,790*	*37.69 /SF*	*550,268*
						04.21 Concrete Unit Masonry - Exterior	*14,600.00 SF*	*12.79 /SF*	*0.12 /SF*	*7.97 /SF*	*/SF*	*20.88 /SF*	*304,790*	*37.69 /SF*	*550,268*
						04.0 Masonry	*14,600.00 SF*	*12.79 /SF*	*0.12 /SF*	*7.97 /SF*	*/SF*	*20.88 /SF*	*304,790*	*37.69 /SF*	*550,268*
						04.00.302 Funk PGP Electrical Building, Masonry	*14,600.00 SF*	*12.79 /SF*	*0.12 /SF*	*7.97 /SF*	*/SF*	*20.88 /SF*	*304,790*	*37.69 /SF*	*550,268*
		05.00.304				*Funk PGP Electrical Building, Metal Roof Framing*									
			05.0			*Metals*									
				05.52		*Metal Fabrications*									
					05.00.99.00	*Metals, Other*									
						Open web bar joist, K Series, 40-ton job lots, 28K8, 12.7 plf, 30' to 50' spans, shop fabricated, incl shop primer, horizontal bridging	2,450.00 lf	7.55 /lf	1.41 /lf	12.45 /lf	-	21.41 /lf	52,445	38.96 /lf	95,445
						Metal roof decking, steel, open type B wide rib, galvanized, over 500 Sq, 1-1/2" D, 20 gauge	14,384.00 SF	1.26 /SF	0.04 /SF	2.15 /SF	-	3.45 /SF	49,607	6.29 /SF	90,430
						05.00.99.00 Metals, Other	*14,384.00 SF*	*2.55 /SF*	*0.28 /SF*	*4.27 /SF*	*/SF*	*7.10 /SF*	*102,052*	*12.92 /SF*	*185,875*
						05.52 Metal Fabrications	*14,384.00 SF*	*2.55 /SF*	*0.28 /SF*	*4.27 /SF*	*/SF*	*7.10 /SF*	*102,052*	*12.92 /SF*	*185,875*
						05.0 Metals	*14,384.00 SF*	*2.55 /SF*	*0.28 /SF*	*4.27 /SF*	*/SF*	*7.10 /SF*	*102,052*	*12.92 /SF*	*185,875*
						05.00.304 Funk PGP Electrical Building, Metal Roof Framing	*14,384.00 SF*	*2.55 /SF*	*0.28 /SF*	*4.27 /SF*	*/SF*	*7.10 /SF*	*102,052*	*12.92 /SF*	*185,875*
		07.00.300				*Funk PGP Electrical Building, Roofing*									
			07.0			*Thermal and Moisture Protection*									
				07.50		*Thermal & Moisture Protection*									
					07.50.02.00	*Thermal & Moisture Protection, Membrane Roofing*									
						Roof Deck Insulation, foamglass, tapered for drainage	14,384.00 sf	1.03 /sf	-	1.16 /sf	-	2.19 /sf	31,441	3.97 /sf	57,104
						Elastomeric Roofing, vinyl and neoprene membrane traffic deck	14,384.00 SF	2.74 /SF	0.37 /SF	1.77 /SF	-	4.88 /SF	70,161	8.80 /SF	126,574
						Flashing, galvanized steel, .018", 26 ga.	676.00 sf	5.46 /sf	-	0.65 /sf	-	6.11 /sf	4,127	10.90 /sf	7,369
						Reglet, stainless steel, .020" thick	676.00 lf	3.26 /lf	-	4.21 /lf	-	7.47 /lf	5,051	13.59 /lf	9,187
						Reglet, counter flashing for stainless steel, .020" thick, 12 wide	676.00 lf	5.27 /lf	-	6.80 /lf	-	12.07 /lf	8,162	21.96 /lf	14,843
						Roof Hatches, with curb, 1" fiberglass insulation, aluminum curb & cover, 2'-6" x 3'-0"	3.00 ea	258.90 /ea	-	900.00 /ea	-	1,158.90 /ea	3,477	2,125.46 /ea	6,376
						07.50.02.00 Thermal & Moisture Protection, Membrane Roofing	*14,384.00 SF*	*4.48 /SF*	*0.37 /SF*	*3.67 /SF*	*/SF*	*8.51 /SF*	*122,419*	*15.40 /SF*	*221,452*
						07.50 Thermal & Moisture Protection	*14,384.00 SF*	*4.48 /SF*	*0.37 /SF*	*3.67 /SF*	*/SF*	*8.51 /SF*	*122,419*	*15.40 /SF*	*221,452*
						07.0 Thermal and Moisture Protection	*14,384.00 SF*	*4.48 /SF*	*0.37 /SF*	*3.67 /SF*	*/SF*	*8.51 /SF*	*122,419*	*15.40 /SF*	*221,452*
						07.00.300 Funk PGP Electrical Building, Roofing	*14,384.00 SF*	*4.48 /SF*	*0.37 /SF*	*3.67 /SF*	*/SF*	*8.51 /SF*	*122,419*	*15.40 /SF*	*221,452*
		08.00.302				*Funk PGP Electrical Building, Openings*									
			08.0			*Openings*									
				08.10		*Doors and Frames*									
					08.10.01.00	*Openings, Doors, Frames and Hardware*									
						Steel frms, knock down, 14 ga., to 8-3/4" throat, to 3'-0" x 7'-0", single	12.00 EA	137.64 /EA	-	430.00 /EA	-	567.64 /EA	6,812	1,040.29 /EA	12,484
						Steel frames, knock down, 14 ga., to 8-3/4" throat, to 6070, pair	4.00 EA	183.52 /EA	-	455.00 /EA	-	638.52 /EA	2,554	1,168.12 /EA	4,672
						Doors, commercial, steel, insulated, full panel, 18 ga., 3'-0" x 7'-0" x 1-3/4" thick	20.00 ea	97.88 /ea	-	520.00 /ea	-	617.88 /ea	12,358	1,136.13 /ea	22,723
						Add for baked enamel finish, average cost per leaf	20.00 leaf	12.94 /leaf	-	50.40 /leaf	-	63.34 /leaf	1,267	116.25 /leaf	2,325
						Average Door Hardware	20.00 ea	91.76 /ea	15.00 /ea	500.00 /ea		606.76 /ea	12,135	1,114.91 /ea	22,298
						08.10.01.00 Openings, Doors, Frames and Hardware	*16.00 EA*	*402.33 /EA*	*18.75 /EA*	*1,774.35 /EA*	*/EA*	*2,195.33 /EA*	*35,125*	*4,031.36 /EA*	*64,502*
						08.10 Doors and Frames	*16.00 EA*	*402.33 /EA*	*18.75 /EA*	*1,774.35 /EA*	*/EA*	*2,195.33 /EA*	*35,125*	*4,031.36 /EA*	*64,502*
				08.32		*Specialty Doors and Frames - Overhead Door*									
					08.30.01.20	*Specialty Doors and Frames, Coiling Doors*									
						Doors, rolling service, steel, manual, 20 gauge, 12' x 10' high, incl. hardware	4.00 EA	1,186.73 /EA	-	1,250.00 /EA	-	2,436.73 /EA	9,747	4,422.50 /EA	17,690
						Doors, rolling service, steel, manual, for weatherstripping, extruded rubber, jambs, add	80.00 lf	-	-	19.15 /lf	-	19.15 /lf	1,532	35.43 /lf	2,835
						Doors, rolling service, steel, manual, for weatherstripping, hood, extruded rubber, add	48.00 lf	-	-	8.65 /lf	-	8.65 /lf	415	16.00 /lf	768
						Doors, rolling service, steel, manual, motor operators for, to 14' x 14' opening	4.00 ea	284.82 /ea	-	1,200.00 /ea	-	1,484.82 /ea	5,939	2,726.62 /ea	10,906
						08.30.01.20 Specialty Doors and Frames, Coiling Doors	*4.00 EA*	*1,471.55 /EA*	*/EA*	*2,936.80 /EA*	*/EA*	*4,408.35 /EA*	*17,633*	*8,049.61 /EA*	*32,199*
						08.30 Specialty Doors and Frames - Overhead Door	*4.00 EA*	*1,471.55 /EA*	*/EA*	*2,936.80 /EA*	*/EA*	*4,408.35 /EA*	*17,633*	*8,049.61 /EA*	*32,199*
						08.0 Openings	*20.00 EA*	*616.18 /EA*	*15.00 /EA*	*2,006.76 /EA*	*/EA*	*2,637.94 /EA*	*52,759*	*4,835.05 /EA*	*96,701*
						08.00.302 Funk PGP Electrical Building, Openings	*20.00 EA*	*616.18 /EA*	*15.00 /EA*	*2,006.76 /EA*	*/EA*	*2,637.94 /EA*	*52,759*	*4,835.05 /EA*	*96,701*
		21.00.300				*Funk PGP Electrical Building, Fire Suppression*									
			21.0			*Fire Suppression*									
				21.00		*Fire Suppression*									
					21.00.10.10	*Fire Suppression Systems*									
						Fire Suppression System Allowance	14,384.00 SF				15.00 /SF	15.00 /SF	215,760	26.67 /SF	383,565
						21.00.10.10 Fire Suppression Systems	*14,384.00 SF*	*/SF*	*/SF*	*/SF*	*15.00 /SF*	*15.00 /SF*	*215,760*	*26.67 /SF*	*383,565*
						21.00 Fire Suppression	*14,384.00 SF*	*/SF*	*/SF*	*/SF*	*15.00 /SF*	*15.00 /SF*	*215,760*	*26.67 /SF*	*383,565*
						21.0 Fire Suppression	*14,384.00 SF*	*/SF*	*/SF*	*/SF*	*15.00 /SF*	*15.00 /SF*	*215,760*	*26.67 /SF*	*383,565*
						21.00.300 Funk PGP Electrical Building, Fire Suppression	*14,384.00 SF*	*/SF*	*/SF*	*/SF*	*15.00 /SF*	*15.00 /SF*	*215,760*	*26.67 /SF*	*383,565*
		23.00.302				*Funk PGP Electrical Building, HVAC*									
			23.0			*HVAC*									
				23.00		*HVAC*									
					23.50.02.00	*Mechanical, HVAC*									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					23.00.02.00	Mechanical, HVAC									
						HVAC Allowance	14,384.00 SF				35.00 /SF	35.00 /SF	503,440	62.22 /SF	894,984
						23.00.02.00 Mechanical, HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.22 /SF	894,984
						23.00 HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.22 /SF	894,984
						23.0 HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.22 /SF	894,984
						23.00.302 Funk PGP Electrical Building, HVAC	14,384.00 SF	/SF	/SF	/SF	35.00 /SF	35.00 /SF	503,440	62.22 /SF	894,984
		26.02.PRI				Primary Feeds fromSubstation									
			26.0			Electrical Work									
				26.00		Electrical									
					01.01.06.03	GC Equip, Tools, & Consumables									
						Roadway steel plates, 8' x 20' x 1"thick, avg cost per sf, monthly	1,600.00 sf	-	1.00 /sf	-	-	1.00 /sf	1,600	1.83 /sf	2,924
						01.01.06.03 GC Equip, Tools, & Consumables	0.00	/LS	/LS	/LS	/LS	/LS	1,600	/LS	2,924
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	1,600	/SF	2,924
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	45.42 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	117,487	4,809.32 /ton	218,439
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	117,487	/LF	218,439
					26.10.03.00	UG Conduit									
						Electrical Underground Ducts and Manholes, PVC, conduit with coupling, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	17,440.00 lf	6.49 /lf	-	3.16 /lf	-	9.65 /lf	168,236	17.86 /lf	311,486
						Electrical Underground Ducts and Manholes, PVC, elbows, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	128.00 ea	115.32 /ea	-	23.00 /ea	-	138.32 /ea	17,704	254.47 /ea	32,573
						Electrical Underground Ducts and Manholes, PVC, bell end and cap, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	256.00 ea	74.13 /ea	-	9.90 /ea	-	84.03 /ea	21,512	154.31 /ea	39,502
						Electrical Underground Ducts and Manholes, PVC, base spacer, 4" diameter, schedule 40, installed by direct burial in slab or duct bank	3,488.00 ea	25.31 /ea	-	1.78 /ea	-	27.09 /ea	94,501	49.65 /ea	173,174
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	301,954	/LF	556,735
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrc undrgr ducts and manhls,man holes,precast w/iron racks&pulling irons,cl frame and cover,6'10'7',excluds excavtn,backfil and cast place concrete	12.00 ea	3,167.96 /ea	324.85 /ea	3,775.00 /ea	-	7,267.81 /ea	87,214	13,557.34 /ea	162,688
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	87,214	/EA	162,688
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	506,654	/LS	937,862
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Cable terminations, indoor, insulation diameter range, 15 kV, .975" to 1.570", pad mount	144.00 ea	172.97 /ea	-	163.00 /ea	-	335.97 /ea	48,380	625.89 /ea	90,128
						Medium-cable single cable, copper, XLP shielding, ungrounded neutral, 15 kV, 500 kcmil, in conduit, excl splicing & terminations	400.00 clf	864.87 /clf	-	1,050.00 /clf	-	1,914.87 /clf	765,948	3,576.01 /clf	1,430,403
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	814,329	/LF	1,520,531
					26.15.11.00	Process Electrical, Grounding									
						Grounding rod, copper clad, 8' long, 3/4" diameter	12.00 ea	195.82 /ea	-	36.00 /ea	-	231.82 /ea	2,782	426.32 /ea	5,116
						Ground wire, copper wire, bare stranded, 4/0	23.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	18,036	1,463.68 /clf	33,665
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	20,817	/LF	38,780
					26.25.03.00	Electrical Equipment, Switchgear - General									
						Hi-Pot Test 15 KV	24.00 E	242.87 /E	-	-	200.00 /E	442.87 /E	10,629	809.45 /E	19,427
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	10,629	/EA	19,427
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	845,775	/SF	1,578,739
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	1,354,029	/SF	2,519,525
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	363.33 cy	194.63 /cy	0.35 /cy	77.50 /cy	-	272.48 /cy	98,999	435.52 /cy	158,237
						End bulkheads, plywood, concrete envelope/encasement	320.00 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	4,550	22.49 /sf	7,196
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	103,550	/CY	165,432
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	1,253.50 ecy	1.94 /ecy	11.66 /ecy	-	-	13.60 /ecy	17,051	21.46 /ecy	26,901
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	17,051	/CY	26,901
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 1/4 mile round trip, 5.0 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	1,670.95 lcy	4.46 /lcy	1.86 /lcy	-	-	6.33 /lcy	10,572	9.98 /lcy	16,679
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	10,572	/CY	16,679
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	1,453.33 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	42,067	45.67 /bcy	66,371
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	42,067	/CY	66,371
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	173,239	/LS	275,384
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	173,239	/CY	275,384
						26.02.PRI Primary Feeds fromSubstation	**2,180.00** LF	376.38 /LF	26.06 /LF	295.94 /LF	2.20 /LF	700.58 /LF	1,527,268	1,282.07 /LF	2,794,909
		26.03.MVSWGR				MV SWGR									
			26.0			Electrical Work									
				26.20		Facility Electrical									
					26.00.99.00	Electrical, Other									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	80.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	16,378	377.82 /hr	30,226
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	16,378	/SF	30,226
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	16,378	/SF	30,226
				26.25		Facility Electrical									
					26.25.03.00	Electrical Equipment, Switchgear - General									
						MV SWGR-A	16,000.00 ea	3.24 /ea	0.63 /ea	50.00 /ea	-	53.87 /ea	861,892	102.08 /ea	1,633,313
						MV SWGR-B	14,800.00 ea	3.24 /ea	0.63 /ea	50.00 /ea	-	53.87 /ea	797,250	102.08 /ea	1,510,815
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	1,659,143	/EA	3,144,128
						26.25 Facility Electrical	0.00	/LS	/LS	/LS	/LS	/LS	1,659,143	/LS	3,144,128
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	1,675,521	/SF	3,174,353
						26.03.MVSWGR MV SWGR	**30,800.00** EA	3.58 /EA	0.69 /EA	50.13 /EA	/EA	54.40 /EA	1,675,521	103.06 /EA	3,174,353
		26.03.SWGREQ				Station Aux Xfmr, Btty									
			26.0			Electrical Work									
				26.20		Facility Electrical									
					26.00.99.00	Electrical, Other									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	24.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	4,914	377.82 /hr	9,068
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	4,914	/SF	9,068
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	4,914	/SF	9,068
				26.25		Facility Electrical									
					26.25.01.00	Station Equipment									
						Control batteries	100.00 kah	498.29 /kah	52.02 /kah	540.00 /kah	-	1,090.30 /kah	109,030	2,031.93 /kah	203,193
						Conversion equipment, station service transformers	1.00 ea	1,245.71 /ea	130.04 /ea	105,000.00 /ea	-	106,375.75 /ea	106,376	202,039.50 /ea	202,040

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DETAIL REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Funks PGP Rev 2	Estimator: Cavalleri/Wells - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.25.01.00 Station Equipment	0.00	/LS	/LS	/LS	/LS	/LS	215,406	/LS	405,233
						26.25 Facility Electrical	0.00	/LS	/LS	/LS	/LS	/LS	215,406	/LS	405,233
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	220,319	/SF	414,300
						26.03.SWGREQ Station Aux Xfmr, Bldg	1.00 LS	54,127.72 /LS	5,931.53 /LS	160,260.00 /LS	/LS	220,319.25 /LS	220,319	414,300.37 /LS	414,300
		26.04.MVBUS				Medium Voltage Overhead Bus Duct 2000A									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.39.00	Electrical, Other									
						Threaded rod, steel, painted, 1/2" diameter	768.00 lf	7.41 /lf	-	6.75 /lf	-	14.16 /lf	10,877	26.38 /lf	20,257
						Nuts, galvanized steel, 1/2" diameter	16.00 c	-	-	46.50 /c	-	46.50 /c	744	88.36 /c	1,414
						Channels, steel, 1-1/2" x 1-1/2"	896.00 lf	14.83 /lf	-	3.68 /lf	-	18.51 /lf	16,582	34.09 /lf	30,546
						Spring nuts, steel channel, long, 1/2"	1,024.00 ea	12.97 /ea	-	0.83 /ea	-	13.80 /ea	14,134	25.29 /ea	25,895
						26.00.39.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	42,337	/SF	78,112
					26.15.01.00	Process Electrical, Wire/Cable									
						Cable terminations, indoor, insulation diameter range, 5 kV, .525" to 1.025", pad mount	26.00 ea	129.73 /ea	-	87.50 /ea	-	217.23 /ea	5,648	403.38 /ea	10,488
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	5,648	/LF	10,488
					26.15.04.00	Process Electrical, Bus Duct									
						Bus duct, copper, 3 pole 3 wire, 2000 amp	540.00 lf	172.97 /lf	-	1,000.00 /lf	-	1,172.97 /lf	633,406	2,216.39 /lf	1,196,850
						Bus duct, copper, 3 pole 3 wire, elbow, 2000 amp V	11.00 ea	1,037.85 /ea	-	5,000.00 /ea	-	6,037.85 /ea	66,416	11,398.10 /ea	125,379
						Bus duct, copper, 3 pole 3 wire, elbow, 2000 amp H	4.00 ea	1,037.85 /ea	-	5,000.00 /ea	-	6,037.85 /ea	24,151	11,398.10 /ea	45,592
						Bus duct, copper, 3 pole 3 wire, tee fittings, 2000 amp V	5.00 ea	2,075.69 /ea	-	7,500.00 /ea	-	9,575.69 /ea	47,878	18,045.60 /ea	90,228
						Bus duct, copper, 3 pole 3 wire, tee fittings, 2000 amp H	4.00 ea	2,075.69 /ea	-	7,500.00 /ea	-	9,575.69 /ea	38,303	18,045.60 /ea	72,182
						Bus duct, copper, 3 pole 3 wire, expansion fitting, 2000 amp	4.00 ea	798.34 /ea	-	7,500.00 /ea	-	8,298.34 /ea	33,193	15,710.95 /ea	62,844
						Bus duct fittings, flange, wall, with vapor barrier, 2000 amp	4.00 ea	518.92 /ea	-	850.00 /ea	-	1,368.92 /ea	5,476	2,563.66 /ea	10,255
						Bus duct fittings, switchboard stub, 3 pole, 3 wire, 2000 amp	17.00 ea	864.87 /ea	-	5,000.00 /ea	-	5,864.87 /ea	99,703	11,061.95 /ea	188,393
						Bus duct fittings, bellows, 3 pole, 3 wire, 2000 amp	21.00 ea	864.87 /ea	-	2,500.00 /ea	-	3,364.87 /ea	70,662	6,331.35 /ea	132,958
						Bus duct fittings, hanger, spring type, 2000 amp	128.00 ea	172.97 /ea	-	150.00 /ea	-	322.97 /ea	41,341	601.19 /ea	76,952
						26.15.04.00 Process Electrical, Bus Duct	0.00	/LF	/LF	/LF	/LF	/LF	1,060,530	/LF	2,001,654
					26.25.03.00	Electrical Equipment, Switchgear - General									
						Hi-Pot Test 15 KV	13.00 E	259.46 /E	-	-	200.00 /E	459.46 /E	5,973	839.77 /E	10,917
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	5,973	/EA	10,917
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	1,114,458	/SF	2,101,151
				26.20		Facility Electrical									
					26.00.39.00	Electrical, Other									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	40.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	8,189	377.82 /hr	15,113
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	8,189	/SF	15,113
						26.20 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	8,189	/SF	15,113
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	1,122,677	/SF	2,116,264
						26.04.MVBUS Medium Voltage Overhead Bus Duct 2000A	540.00 LF	426.67 /LF	1.85 /LF	1,642.50 /LF	4.82 /LF	2,079.03 /LF	1,122,677	3,919.01 /LF	2,116,264
		26.04.MVVSD				Medium Voltage Variable Speed Drives									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.39.00	Electrical, Other									
						Electrical Contractor startup assistance per hour	26.00 hr	1,297.31 /hr	25.00 /hr	100.00 /hr	-	1,422.31 /hr	36,980	2,606.85 /hr	67,778
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	36,980	/SF	67,778
					26.25.03.00	Electrical Equipment, Switchgear - General									
						MV VSP 8000A 13.8kV, includes allowance for Vendor startup, CX, train, doc	13.00 ea	10,378.45 /ea	3,200.00 /ea	420,000.00 /ea	5,000.00 /ea	438,578.45 /ea	5,701,520	832,056.51 /ea	10,816,735
						26.25.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	5,701,520	/EA	10,816,735
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	5,738,500	/SF	10,884,513
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	5,738,500	/SF	10,884,513
						26.04.MVVSD Medium Voltage Variable Speed Drives	13.00 EA	12,973.07 /EA	3,250.00 /EA	420,200.00 /EA	5,000.00 /EA	441,423.07 /EA	5,738,500	837,270.22 /EA	10,884,513
		26.05.GRDG				Facility Grounding									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.15.11.00	Process Electrical, Grounding									
						Copper Bus Bar .25"x 3.0"	20.00 lf	32.43 /lf	-	52.90 /lf	-	85.33 /lf	1,707	159.80 /lf	3,196
						Copper Bus Bar Supports	20.00 E	129.73 /E	-	48.30 /E	-	178.03 /E	3,561	328.90 /E	6,578
						Ground wire, copper wire, bare stranded, 4/0	35.00 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	27,445	1,463.68 /clf	51,229
						Exothermic weld, 4/0 wire to 4/0 wire	234.00 ea	148.26 /ea	-	9.45 /ea	-	157.71 /ea	36,905	288.94 /ea	67,613
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	69,618	/LF	128,616
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	69,618	/SF	128,616
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	69,618	/SF	128,616
						26.05.GRDG Facility Grounding	14,550.00 SF	3.48 /SF	/SF	1.30 /SF	/SF	4.78 /SF	69,618	8.84 /SF	128,616
		26.20.DIST				Electrical Distribution Equipment									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.39.00	Electrical, Other									
						Electric metallic tubing (EMT), 1-1/2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	40.00 lf	11.53 /lf	-	3.46 /lf	-	14.99 /lf	600	27.65 /lf	1,106
						Flexible metallic conduit, steel, 1-1/2" diameter	3.00 lf	20.76 /lf	-	2.55 /lf	-	23.31 /lf	70	42.78 /lf	128
						Flexible metallic conduit, steel, 2" diameter	3.00 lf	25.95 /lf	-	3.23 /lf	-	29.18 /lf	88	53.56 /lf	161
						Flexible metallic conduit, steel, connectors, insulated, 1-1/2" diameter	1.00 ea	32.43 /ea	-	24.50 /ea	-	56.93 /ea	57	105.83 /ea	106
						Flexible metallic conduit, steel, connectors, insulated, 2" diameter	1.00 ea	45.12 /ea	-	26.00 /ea	-	71.12 /ea	71	131.87 /ea	132
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 1-1/2" diameter	1.00 ea	45.12 /ea	-	46.00 /ea	-	91.12 /ea	91	169.89 /ea	170
						Flexible metallic conduit, steel, connectors, insulated, 90 Deg., 2" diameter	1.00 ea	57.66 /ea	-	67.00 /ea	-	124.66 /ea	125	232.71 /ea	233
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 100 amp, 30 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,594.61 /ea	-	2,125.00 /ea	-	4,719.61 /ea	4,720	8,760.25 /ea	8,780
						Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	4,125.00 /ea	-	7,831.59 /ea	7,832	14,613.18 /ea	14,613
						Panelboards, 3 phase 4 wire, main circuit breaker, 277/480 V, 225 amp, 42 circuits, NEHB, incl 20 A 1 pole plug-in breakers	1.00 ea	3,706.59 /ea	-	5,175.00 /ea	-	8,881.59 /ea	8,882	16,608.40 /ea	16,608
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	22,534	/SF	42,037
					26.10.03.00	UG Conduit									
						Uninterruptible power supply, charger, inverter, and alarm 1 phase, 120 V, 5 kVA, incl 10 minutes battery	1.00 ea	6,182.64 /ea	356.18 /ea	7,100.00 /ea	-	13,638.82 /ea	13,639	25,442.94 /ea	25,443
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	13,639	/LF	25,443
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #6, type XHHW, in raceway	0.25 clf	159.68 /clf	-	54.50 /clf	-	214.20 /clf	54	395.44 /clf	99
						Wire, copper, stranded, 600 volt, #4, type XHHW, in raceway	0.15 clf	195.80 /clf	-	77.50 /clf	-	273.30 /clf	41	505.13 /clf	76
						Wire, copper, stranded, 600 volt, #1, type XHHW, in raceway	1.00 clf	259.46 /clf	-	159.00 /clf	-	418.46 /clf	418	776.36 /clf	776
						Wire, copper, stranded, 600 volt, 4/0, type XHHW, in raceway	0.60 clf	471.75 /clf	-	385.00 /clf	-	856.75 /clf	514	1,593.83 /clf	956
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	1,027	/LF	1,907
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	37,200	/SF	69,387
				26.20		Facility Electrical									
					26.25.06.00	Transformers, Dry Type									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					26.25.06.00	*Transformers, Dry Type*									
						Transformer, dry-type, ventilated, 3 phase 480 V primary 120/208 V secondary, 30 kVA	1.00 ea	2,306.32 /ea	-	1,800.00 /ea	-	4,106.32 /ea	4,106	7,635.78 /ea	7,636
						26.25.06.00 Transformers, Dry Type	*0.00*	*/EA*	*/EA*	*/EA*	*/EA*	*/EA*	*4,106*	*/EA*	*7,636*
						26.25 Facility Electrical	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*4,106*	*/LS*	*7,636*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*41,306*	*/SF*	*77,023*
						26.20.DIST Electrical Distribution Equipment	***550.00** AMP*	*36.16 /AMP*	*0.65 /AMP*	*38.29 /AMP*	*/AMP*	*75.10 /AMP*	*41,306*	*140.04 /AMP*	*77,023*
		26.25.LTG				*Interior Lighting and Control*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	2,600.00 lf	12.97 /lf	-	5.15 /lf	-	18.12 /lf	47,120	33.50 /lf	87,094
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	150.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	8,289	101.25 /ea	15,187
						Outlet boxes, pressed steel, covers, blank, 4" square	150.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	2,548	31.10 /ea	4,665
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*57,957*	*/SF*	*106,946*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	80.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	8,644	198.48 /clf	15,878
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	10.00 clf	103.79 /clf	-	20.50 /clf	-	124.29 /clf	1,243	228.65 /clf	2,286
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*9,887*	*/LF*	*18,165*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*67,844*	*/SF*	*125,111*
				26.20		*Facility Electrical*									
					26.20.03.00	*Facility Electrical, Lighting*									
						LED Strip Light, hdwe	150.00 ea	182.08 /ea	-	110.00 /ea	-	292.08 /ea	43,812	541.82 /ea	81,273
						Emergency ballast, material only, interior, factory installed in fixture	30.00 ea	-	-	152.00 /ea	-	152.00 /ea	4,560	288.84 /ea	8,665
						Exit lighting, L.E.D. standard, single face, ceiling or wall mount	12.00 ea	129.73 /ea	-	70.00 /ea	-	199.73 /ea	2,397	370.13 /ea	4,442
						Fixture whips, 3/8" greenfield, 2 connectors, THHN wire, three #14, 6' long	150.00 ea	32.43 /ea	-	5.45 /ea	-	37.88 /ea	5,682	69.63 /ea	10,445
						26.20.03.00 Facility Electrical, Lighting	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*56,451*	*/SF*	*104,824*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*56,451*	*/SF*	*104,824*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*124,295*	*/SF*	*229,936*
						26.25.LTG Interior Lighting and Control	***1.00** LS*	*86,265.47 /LS*	*/LS*	*38,029.50 /LS*	*/LS*	*124,294.97 /LS*	*124,295*	*229,935.79 /LS*	*229,936*
		26.28.EXTLTG				*Exterior Lighting and Control*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	350.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	3,169	16.62 /lf	5,819
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	12.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	663	101.25 /ea	1,215
						Outlet boxes, pressed steel, covers, blank, 4" square	12.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	204	31.10 /ea	373
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*4,036*	*/SF*	*7,407*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	12.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	1,297	198.48 /clf	2,382
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*1,297*	*/LF*	*2,382*
					26.15.07.00	*Lighting*									
						LED Area Light	12.00 E	97.30 /E	-		-	97.30 /E	1,168	177.84 /E	2,134
						Wallpack Photocell	12.00 E	32.43 /E	-		-	32.43 /E	389	59.28 /E	711
						26.15.07.00 Lighting	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*1,557*	*/LS*	*2,845*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*6,889*	*/SF*	*12,634*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*6,889*	*/SF*	*12,634*
						26.28.EXTLTG Exterior Lighting and Control	***1.00** LS*	*6,300.47 /LS*	*/LS*	*588.58 /LS*	*/LS*	*6,889.05 /LS*	*6,889*	*12,634.05 /LS*	*12,634*
		26.30.DEV				*Device Outlets*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	3,000.00 lf	12.97 /lf	-	5.15 /lf	-	18.12 /lf	54,369	33.50 /lf	100,493
						Outlet boxes, cast, 1 gang, FD, 3/4" hub, 2-11/16" deep	36.00 ea	86.49 /ea	-	22.00 /ea	-	108.49 /ea	3,906	199.88 /ea	7,196
						Duplex receptacle, grounded, 120 volt, 20 amp	24.00 ea	38.44 /ea	-	10.65 /ea	-	49.09 /ea	1,178	90.49 /ea	2,172
						Duplex receptacle, ground fault interrupting, 20 amp	12.00 ea	38.44 /ea	-	45.00 /ea	-	83.44 /ea	1,001	155.77 /ea	1,869
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*60,454*	*/SF*	*111,730*
					26.10.03.00	*UG Conduit*									
						WP cover	12.00 ea	17.30 /ea	-	42.50 /ea	-	59.80 /ea	718	112.38 /ea	1,349
						26.10.03.00 UG Conduit	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*718*	*/LF*	*1,349*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	80.00 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	8,644	198.48 /clf	15,878
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	20.00 clf	103.79 /clf	-	20.50 /clf	-	124.29 /clf	2,486	228.65 /clf	4,573
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*11,130*	*/LF*	*20,451*
						26.15 Process Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*72,301*	*/SF*	*133,529*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*72,301*	*/SF*	*133,529*
						26.30.DEV Device Outlets	***1.00** LS*	*53,247.76 /LS*	*/LS*	*19,053.60 /LS*	*/LS*	*72,301.36 /LS*	*72,301*	*133,529.32 /LS*	*133,529*
		26.40.EQCON				*Facility Equipment Connections and Controls*									
			26.0			*Electrical Work*									
				26.10		*Site Electrical*									
					26.00.99.00	*Electrical, Other*									
						Motor connections, flexible conduit and fittings, 3 phase, 460 volt, 5 HP motor	4.00 ea	129.73 /ea	-	6.35 /ea	-	136.08 /ea	544	249.18 /ea	997
						Motor connections, flexible conduit and fittings, 3 phase, 460 volt, 10 HP motor	2.00 ea	129.73 /ea	-	6.35 /ea	-	136.08 /ea	272	249.19 /ea	498
						Motor connections, flexible conduit and fittings, 3 phase, sealtite, 460 volt, 10 HP motor	2.00 ea	129.73 /ea	-	9.30 /ea	-	139.03 /ea	278	254.79 /ea	510
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*1,095*	*/SF*	*2,005*
						26.10 Site Electrical	*0.00*	*/LS*	*/LS*	*/LS*	*/LS*	*/LS*	*1,095*	*/LS*	*2,005*
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	300.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	2,716	16.62 /lf	4,987
						Electric metallic tubing (EMT), 1" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	9.03 /lf	-	1.80 /lf	-	10.83 /lf	2,165	19.92 /lf	3,983
						26.00.99.00 Electrical, Other	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*4,881*	*/SF*	*8,971*
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	4.50 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	486	198.48 /clf	893
						Wire, copper, stranded, 600 volt, #10, type XHHW, in raceway	9.00 clf	103.78 /clf	-	20.50 /clf	-	124.28 /clf	1,119	228.64 /clf	2,058
						Wire, copper, stranded, 600 volt, #8, type XHHW, in raceway	13.00 clf	129.73 /clf	-	34.00 /clf	-	163.73 /clf	2,129	301.72 /clf	3,922
						26.15.01.00 Process Electrical, Wire/Cable	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*3,733*	*/LF*	*6,873*
					26.20.05.00	*Facility Electrical, HVAC*									
						HVAC controls - electrical contractor scope	1.00 LS		-	3,500.00 /LS	-	3,500.00 /LS	3,500	6,650.83 /LS	6,651
						26.20.05.00 Facility Electrical, HVAC	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*3,500*	*/SF*	*6,651*

Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Funks PGP Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	12,114	/SF	22,495
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	13,209	/SF	24,499
						26.40.EQCON Facility Equipment Connections and Controls	**1.00** ALO	8,282.85 /ALO	/ALO	4,925.85 /ALO	/ALO	13,208.50 /ALO	13,209	24,499.36 /ALO	24,499
		26.40.PMP				*13.8kV 8000HP Pump Power Feeders 4", 3/C VFD Cable 300A*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	130.00 lf	64.87 /lf	-	62.50 /lf	-	127.37 /lf	16,557	237.32 /lf	30,852
						Rigid galvanized steel plastic coated conduit elbows, 4" diameter, to 15' high	13.00 ea	389.19 /ea	-	196.00 /ea	-	585.19 /ea	7,608	1,063.79 /ea	14,089
						Rigid galvanized steel plastic coated conduit couplings, 4" diameter, to 15' high	13.00 ea	28.83 /ea	-	57.50 /ea	-	86.33 /ea	1,122	161.96 /ea	2,105
						Flexible metallic conduit, sealtite, 4" diameter	39.00 lf	86.40 /lf	-	20.00 /lf	-	106.40 /lf	4,150	195.92 /lf	7,641
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 4" diameter	13.00 ea	129.73 /ea	-	163.00 /ea	-	292.73 /ea	3,806	546.85 /ea	7,109
						Flexible metallic conduit, coupling sealtite to rigid, 4" diameter	13.00 ea	129.73 /ea	-	198.00 /ea	-	327.73 /ea	4,261	613.36 /ea	7,974
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	37,503	/SF	69,770
					26.10.03.00	*UG Conduit*									
						PVC conduit, schedule 40, 4" diameter, to 15' H, incl terminations, fittings, & support	650.00 lf	32.43 /lf	-	5.75 /lf	-	38.18 /lf	24,819	70.20 /lf	45,633
						PVC conduit elbows, 4" diameter, to 15' H	13.00 ea	116.76 /ea	-	23.00 /ea	-	139.76 /ea	1,817	257.11 /ea	3,342
						PVC conduit, field bends, 45 Deg. to 90 Deg., 4" diameter	13.00 ea	129.73 /ea	-	-	-	129.73 /ea	1,687	237.11 /ea	3,082
						PVC adapters, 4" diameter, to 15' H	26.00 ea	64.87 /ea	-	4.80 /ea	-	69.67 /ea	1,811	127.68 /ea	3,320
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	30,133	/LF	55,378
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Cable terminations, indoor, insulation diameter range, 15 kV, .525" to 1.025", pad mount	78.00 ea	324.33 /ea	-	109.00 /ea	-	433.33 /ea	33,799	799.91 /ea	62,393
						MV VFD Cable 3/C	9.75 clf	3,373.00 /clf	-	6,000.00 /clf	-	9,373.00 /clf	91,387	17,566.39 /clf	171,272
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	125,186	/LF	233,665
					26.35.03.00	*Electrical Equipment, Switchgear - General*									
						Hi-Pot Test 15 KV	13.00 E	259.46 /E	-	-	200.00 /E	459.46 /E	5,973	839.77 /E	10,917
						26.35.03.00 Electrical Equipment, Switchgear - General	0.00	/EA	/EA	/EA	/EA	/EA	5,973	/EA	10,917
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	198,795	/SF	369,730
				26.30		*Facility Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	40.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	8,189	377.82 /hr	15,113
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	8,189	/SF	15,113
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	8,189	/SF	15,113
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	206,985	/SF	384,843
						26.40.PMP 13.8kV 8000HP Pump Power Feeders 4", 3/C VFD Cable 300A	**780.00** LF	145.22 /LF	1.26 /LF	115.48 /LF	3.33 /LF	265.37 /LF	206,985	493.39 /LF	384,843
		26.41.PMP				*8000HP Pump Process Control Circuits and Connections*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Rigid galvanized steel plastic coated conduit, 40 mil. thick, 2" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	130.00 lf	29.65 /lf	-	22.50 /lf	-	52.15 /lf	6,780	96.95 /lf	12,604
						Rigid galvanized steel plastic coated conduit elbows, 2" diameter, to 15' high	13.00 ea	129.73 /ea	-	42.00 /ea	-	171.73 /ea	2,233	316.92 /ea	4,120
						Rigid galvanized steel plastic coated conduit couplings, 2" diameter, to 15' high	13.00 ea	19.58 /ea	-	14.35 /ea	-	33.93 /ea	441	63.06 /ea	820
						Flexible metallic conduit, sealtite, 2" diameter	39.00 lf	34.60 /lf	-	4.30 /lf	-	38.90 /lf	1,517	71.40 /lf	2,785
						Flexible metallic conduit, sealtite, connectors, insulated, 90 Deg., 2" diameter	13.00 ea	51.89 /ea	-	25.50 /ea	-	77.39 /ea	1,006	143.30 /ea	1,863
						Flexible metallic conduit, coupling sealtite to rigid, 2" diameter	13.00 ea	103.79 /ea	-	31.50 /ea	-	135.29 /ea	1,759	249.55 /ea	3,244
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	13,735	/SF	25,435
					26.10.03.00	*UG Conduit*									
						PVC conduit, schedule 40, 2" diameter, to 15' H, incl terminations, fittings, & support	650.00 lf	11.53 /lf	-	3.36 /lf	-	14.89 /lf	9,680	27.46 /lf	17,850
						PVC conduit elbows, 2" diameter, to 15' H	13.00 ea	51.32 /ea	-	3.54 /ea	-	54.86 /ea	713	100.53 /ea	1,307
						PVC conduit, field bends, 45 Deg. to 90 Deg., 2" diameter	13.00 ea	51.89 /ea	-	-	-	51.89 /ea	675	94.85 /ea	1,233
						PVC adapters, 2" diameter, to 15' H	26.00 ea	38.44 /ea	-	1.39 /ea	-	39.83 /ea	1,036	72.90 /ea	1,895
						26.10.03.00 UG Conduit	0.00	/LF	/LF	/LF	/LF	/LF	12,103	/LF	22,285
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	80.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	7,163	164.35 /clf	13,148
						Cable, copper braided shield, PVC jacket, 300 V, #18 stranded, 2 conductor	60.00 clf	148.26 /clf	-	30.00 /clf	-	178.26 /clf	10,696	327.99 /clf	19,680
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	17,859	/LF	32,828
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	43,697	/SF	80,548
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	43,697	/SF	80,548
						26.41.PMP 8000HP Pump Process Control Circuits and Connections	**780.00** LF	43.96 /LF	/LF	12.06 /LF	/LF	56.02 /LF	43,697	103.27 /LF	80,548
		26.90.LPS				*Facility Lightning Protection System*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.15.10.00	*Process Electrical, Lightning Protection*									
						Air terminal and base, copper, 3/8" dia x 10", to 75' h	50.00 ea	129.73 /ea	-	26.00 /ea	-	155.73 /ea	7,787	286.52 /ea	14,326
						Lightning protection cable, copper, 220 lb per thousand feet, to 75' h	1,650.00 lf	3.24 /lf	-	3.18 /lf	-	6.42 /lf	10,598	11.97 /lf	19,751
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	18,385	/SF	34,077
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	18,385	/SF	34,077
				26.30		*Facility Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electrical startup, FAT, demonstration, documentation, testing, commissioning	16.00 hr	129.73 /hr	25.00 /hr	50.00 /hr	-	204.73 /hr	3,276	377.82 /hr	6,045
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	3,276	/SF	6,045
					26.15.10.00	*Process Electrical, Lightning Protection*									
						LPS design and certification, misc mat and labor	1.00 LS	4,540.57 /LS	-	5,000.00 /LS	5,000.00 /LS	14,540.57 /LS	14,541	26,938.86 /LS	26,939
						26.15.10.00 Process Electrical, Lightning Protection	0.00	/SF	/SF	/SF	/SF	/SF	14,541	/SF	26,939
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	17,816	/SF	32,984
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	36,201	/SF	67,061
						26.90.LPS Facility Lightning Protection System	**14,550.00** SF	1.27 /SF	0.03 /SF	0.95 /SF	0.24 /SF	2.49 /SF	36,201	4.61 /SF	67,061
		27.10.COMEQ				*Communications Room Equipment*									
			26.0			*Electrical Work*									
				26.15		*Process Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	1,811	16.62 /lf	3,325
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	4.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	221	101.25 /ea	405
						Outlet boxes, pressed steel, covers, blank, 4" square	4.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	68	31.10 /ea	124
						Duplex receptacle, grounded, 120 volt, 20 amp	4.00 ea	38.44 /ea	-	10.65 /ea	-	49.09 /ea	196	90.50 /ea	362
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	2,296	/SF	4,216
					26.15.01.00	*Process Electrical, Wire/Cable*									
						Closet Distribution Frame (CDF), 7 feet tall, 19 inches wide	1.00 E	364.31 /E	-	123.00 /E	-	487.31 /E	487	899.60 /E	900
						Network Equipment Allowance	1.00 LS	24,287.06 /LS	-	20,000.00 /LS	-	44,287.06 /LS	44,287	82,395.13 /LS	82,395
						Wire, copper, stranded, 600 volt, #12, type XHHW, in raceway	6.50 clf	94.35 /clf	-	13.70 /clf	-	108.05 /clf	702	198.48 /clf	1,290

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	45,477	/LF	84,585
					26.15.03.00	Process Electrical, Cable Tray									
						Cable tray, ladder type, galvanized steel, 4" deep, 4" rung spacing, 12" wide, to 15' elevation, incl fittings & supports	30.00 lf	24.14 /lf	-	17.95 /lf	-	42.09 /lf	1,263	78.22 /lf	2,347
						26.15.03.00 Process Electrical, Cable Tray	0.00	/LF	/LF	/LF	/LF	/LF	1,263	/LF	2,347
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	49,035	/SF	91,148
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	49,035	/SF	91,148
						27.10.COMEQ Communications Room Equipment	1.00 LS	28,011.60 /LS	/LS	21,023.71 /LS	/LS	49,035.31 /LS	49,035	91,147.92 /LS	91,148
		27.31.COMCDT				Comm Conduit to MH/HH									
			26.0			Electrical Work									
				26.10		Site Electrical									
					26.10.02.00	Site Electrical, Buried Conduit									
						Reinforcing Steel, in place, beams and girders, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	0.90 ton	1,461.67 /ton	-	1,125.00 /ton	-	2,586.67 /ton	2,328	4,809.31 /ton	4,328
						26.10.02.00 Site Electrical, Buried Conduit	0.00	/LF	/LF	/LF	/LF	/LF	2,328	/LF	4,328
					26.10.04.00	Site Electrical, Manholes/Handholes									
						Elctrcl undrgrn ducts and manhols,undrgrn duct banks ready for concrete fill,pvc,type eb,2 @ 4"dm,excludes excavation,backfill and cast place concrete	800.00 lf	12.97 /lf	-	3.72 /lf	-	16.69 /lf	13,354	30.78 /lf	24,624
						26.10.04.00 Site Electrical, Manholes/Handholes	0.00	/EA	/EA	/EA	/EA	/EA	13,354	/EA	24,624
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	15,682	/LS	28,952
				26.15		Process Electrical									
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	130.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	11,639	164.35 /clf	21,365
						Cable, copper braided shield, PVC jacket, 300 V, #18 stranded, 2 conductor	130.00 clf	148.26 /clf	-	30.00 /clf	-	178.26 /clf	23,174	327.99 /clf	42,639
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	34,814	/LF	64,005
					26.15.11.00	Process Electrical, Grounding									
						Ground wire, copper wire, bare stranded, 4/0	1.55 clf	364.16 /clf	-	420.00 /clf	-	784.16 /clf	1,212	1,463.70 /clf	2,261
						Water pipe ground clamps, heavy duty, bronze, 1-1/4" to 2" diameter	1.50 ea	129.73 /ea	-	31.00 /ea	-	160.73 /ea	241	296.01 /ea	444
						26.15.11.00 Process Electrical, Grounding	0.00	/LF	/LF	/LF	/LF	/LF	1,453	/LF	2,705
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	36,268	/SF	66,710
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	51,949	/SF	95,663
			31.0			Earthwork									
				26.10		Site Electrical									
					31.20.07.15	Earthworks, Sitework, Borrow									
						Concrete (red) envelope/encasement, poured neat	8.90 cy	194.63 /cy	1.76 /cy	77.50 /cy	-	273.89 /cy	2,438	437.74 /cy	3,897
						End bulkheads, plywood, concrete envelope/encasement	1.07 sf	13.49 /sf	-	0.73 /sf	-	14.22 /sf	15	22.48 /sf	24
						31.20.07.15 Earthworks, Sitework, Borrow	0.00	/CY	/CY	/CY	/CY	/CY	2,454	/CY	3,921
					31.20.09.10	Earthworks, Sitework, Backfill									
						Backfill, trench, 6" to 12" lifts, dozer backfilling, compaction with vibrating roller	116.05 ecy	1.94 /ecy	23.32 /ecy	-	-	25.26 /ecy	2,932	39.86 /ecy	4,625
						31.20.09.10 Earthworks, Sitework, Backfill	0.00	/CY	/CY	/CY	/CY	/CY	2,932	/CY	4,625
					31.20.15.00	Earthworks, Sitework, Hauling and Dump Fees									
						Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	9.87 lcy	10.88 /lcy	9.31 /lcy	-	-	20.19 /lcy	199	31.86 /lcy	315
						31.20.15.00 Earthworks, Sitework, Hauling and Dump Fees	0.00	/CY	/CY	/CY	/CY	/CY	199	/CY	315
					31.25.01.00	Earthworks, Structural, Excavation									
						Excavating, trench or continuous footing, common earth, 3/4 C.Y. excavator, 4' to 6' deep, excavator, excludes sheeting or dewatering	125.92 bcy	5.93 /bcy	23.02 /bcy	-	-	28.95 /bcy	3,645	45.67 /bcy	5,750
						31.25.01.00 Earthworks, Structural, Excavation	0.00	/CY	/CY	/CY	/CY	/CY	3,645	/CY	5,750
						26.10 Site Electrical	0.00	/LS	/LS	/LS	/LS	/LS	9,229	/LS	14,611
						31.0 Earthwork	0.00	/CY	/CY	/CY	/CY	/CY	9,229	/CY	14,611
						27.31.COMCDT Comm Conduit to MH/HH	200.00 LF	224.65 /LF	26.56 /LF	52.68 /LF	/LF	305.89 /LF	61,178	551.37 /LF	110,274
		28.10.FA				Fire Alarm System									
			26.0			Electrical Work									
				26.15		Process Electrical									
					26.00.99.00	Electrical, Other									
						Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	1,820.00 lf	7.98 /lf	-	1.07 /lf	-	9.05 /lf	16,477	16.62 /lf	30,257
						Outlet boxes, pressed steel, 4" square, 2-1/8" deep, 1" KO	60.00 ea	51.89 /ea	-	3.37 /ea	-	55.26 /ea	3,316	101.25 /ea	6,075
						Outlet boxes, pressed steel, covers, blank, 4" square	8.00 ea	16.22 /ea	-	0.77 /ea	-	16.99 /ea	136	31.10 /ea	249
						Outlet boxes, pressed steel, plaster rings, 4" square, concealed	52.00 ea	16.22 /ea	-	1.66 /ea	-	17.88 /ea	930	32.79 /ea	1,705
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	20,859	/SF	38,286
					26.15.01.00	Process Electrical, Wire/Cable									
						Wire, copper, stranded, 600 volt, #14, type XHHW, in raceway	300.00 clf	79.83 /clf	-	9.70 /clf	-	89.53 /clf	26,860	164.35 /clf	49,305
						26.15.01.00 Process Electrical, Wire/Cable	0.00	/LF	/LF	/LF	/LF	/LF	26,860	/LF	49,305
						26.15 Process Electrical	0.00	/SF	/SF	/SF	/SF	/SF	47,719	/SF	87,591
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	47,719	/SF	87,591
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Detection Systems, fire alarm control panel, alarm device, excluding wires & conduits	24.00 ea	129.73 /ea	-	230.00 /ea	-	359.73 /ea	8,634	584.24 /ea	14,022
						Detection Systems, fire alarm control panel, actuating device, excluding wires & conduits	4.00 ea	129.73 /ea	-	340.00 /ea	-	469.73 /ea	1,879	765.76 /ea	3,063
						Detection Systems, fire alarm control panel, addressable without voice, up to 200 points, excluding wires & conduits, inluding vendor design, startup	1.00 ea	1,816.00 /ea	-	4,575.00 /ea	2,500.00 /ea	8,891.00 /ea	8,891	14,359.39 /ea	14,359
						Detection Systems, fire alarm control panel, battery & rack, excluding wires & conduits	1.00 ea	259.46 /ea	-	460.00 /ea	-	719.46 /ea	719	1,168.46 /ea	1,168
						Detection Systems, fire alarm control panel, battery & rack, automatic charger, excluding wires & conduits	1.00 ea	129.73 /ea	-	525.00 /ea	-	654.73 /ea	655	1,071.05 /ea	1,071
						Detection Systems, visual alarm, ADA type, excluding wires & conduits	24.00 ea	154.90 /ea	-	119.00 /ea	-	273.90 /ea	6,574	440.77 /ea	10,579
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	27,351	/SF	44,262
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	27,351	/SF	44,262
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	27,351	/SF	44,262
						28.10.FA Fire Alarm System	14,550.00 SF	3.58 /SF	/SF	1.41 /SF	0.17 /SF	5.16 /SF	75,070	9.06 /SF	131,853
		28.20.AC				Access Control System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Card reader - all in allowance per each (incl circuit, cards, CX)	7.00 ea	1,556.77 /ea	-	800.00 /ea	-	2,356.77 /ea	16,497	3,776.36 /ea	26,435
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	16,497	/SF	26,435
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	16,497	/SF	26,435
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	16,497	/SF	26,435
						28.20.AC Access Control System	12.00 DOOR	908.12 /DOOR	/DOOR	466.67 /DOOR	/DOOR	1,374.78 /DOOR	16,497	2,202.88 /DOOR	26,435
		28.30.CCTV				Closed Circuit TV and Cameras									
			28.0			Electrical Work									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					28.35.01.00	Electronic Safety and Security									
						Camera allowance (licenses, circuit, startup, CX)	1.00 LS	25,946.13 /LS	-	10,000.00 /LS	10,000.00 /LS	45,946.13 /LS	45,946	84,702.49 /LS	84,702
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	45,946	/SF	84,702
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	45,946	/SF	84,702
						28.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	45,946	/SF	84,702
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Closed circuit television system (CCTV), industrial quality, for additional camera stations, add	12.00 ea	384.39 /ea	-	690.00 /ea	-	1,074.39 /ea	12,893	1,745.13 /ea	20,942
						Closed circuit television system (CCTV), industrial quality, for weatherproof camera station, add	12.00 ea	798.34 /ea	-	540.00 /ea	-	1,338.34 /ea	16,060	2,150.70 /ea	25,808
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	28,953	/SF	46,750
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	28,953	/SF	46,750
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	28,953	/SF	46,750
						28.20 CCTV Closed Circuit TV and Cameras	**12.00** CAM	3,344.91 /CAM	/CAM	2,063.33 /CAM	833.33 /CAM	6,241.57 /CAM	74,899	10,954.37 /CAM	131,452
		28.20.ID				Intrusion Detection System									
			28.0			Electronic Safety and Security									
				28.00		Electronic Safety and Security									
					28.35.01.00	Electronic Safety and Security									
						Securitized door, all-in allowance per each (incl circuit, devices, CX)	7.00 ea	2,594.61 /ea	-	1,000.00 /ea	-	3,594.61 /ea	25,162	5,743.86 /ea	40,207
						Door controller (all-in cost including vendor program and startup)	3.00 ea	648.65 /ea	-	2,000.00 /ea	500.00 /ea	3,148.65 /ea	9,446	5,112.75 /ea	15,338
						28.35.01.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	34,608	/SF	55,545
						28.00 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	34,608	/SF	55,545
						28.0 Electronic Safety and Security	0.00	/SF	/SF	/SF	/SF	/SF	34,608	/SF	55,545
						28.20.ID Intrusion Detection System	**12.00** DOOR	1,875.69 /DOOR	/DOOR	1,083.33 /DOOR	125.00 /DOOR	2,884.02 /DOOR	34,608	4,628.77 /DOOR	55,545
						03.04 Funks Reservoir Electrical Building	**14,550.00** SF	156.21 /SF	16.03 /SF	[illegible] /SF	[illegible] /SF	859.86 /SF	[illegible]	[illegible] /SF	[illegible]
	03.05					Funks Reservoir Site Electrical									
		26.20.DB				Site Ductbanks									
			26.0			Electrical Work									
				26.00		Electrical									
					26.00.99.00	Electrical, Other									
						In addition to those itemized, lump sum allowance	1.00 ls	-	-	-	50,000.00 /ls	50,000.00 /ls	50,000	91,386.89 /ls	91,387
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	50,000	/SF	91,387
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	50,000	/SF	91,387
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	50,000	/SF	91,387
						26.20 DB Site Ductbanks	**1.00** LS	/LS	/LS	/LS	50,000.00 /LS	50,000.00 /LS	50,000	91,386.89 /LS	91,387
		26.26.EXTLTG				Exterior Lighting and Control									
			26.0			Electrical Work									
				26.00		Electrical									
					26.00.99.00	Electrical, Other									
						Site lighting, pole, base, circuit, controls, per each (qty assumed)	25.00 ea	-	-	-	5,000.00 /ea	5,000.00 /ea	125,000	9,138.69 /ea	228,467
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	125,000	/SF	228,467
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	125,000	/SF	228,467
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	125,000	/SF	228,467
						26.26.EXTLTG Exterior Lighting and Control	**1.00** LS	/LS	/LS	/LS	125,000.00 /LS	125,000.00 /LS	125,000	228,467.26 /LS	228,467
		25.50.AC				Access Control System									
			26.0			Electrical Work									
				26.00		Electrical									
					26.00.99.00	Electrical, Other									
						Gate Operator, with card reader, power and control circuit, per each	2.00 ea	-	-	-	10,000.00 /ea	10,000.00 /ea	20,000	18,277.38 /ea	36,555
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	20,000	/SF	36,555
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	20,000	/SF	36,555
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	20,000	/SF	36,555
						28.20.AC Access Control System	**2.00** DOOR	/DOOR	/DOOR	/DOOR	10,000.00 /DOOR	10,000.00 /DOOR	20,000	18,277.38 /DOOR	36,555
		25.20.CCTV				Closed Circuit TV and Cameras									
			26.0			Electrical Work									
				26.00		Electrical									
					26.00.99.00	Electrical, Other									
						Cameras, installed on site ltg poles, assumed qty, per each	10.00 ea	-	-	-	7,500.00 /ea	7,500.00 /ea	75,000	13,708.04 /ea	137,080
						26.00.99.00 Electrical, Other	0.00	/SF	/SF	/SF	/SF	/SF	75,000	/SF	137,080
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	75,000	/SF	137,080
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	75,000	/SF	137,080
						28.20.CCTV Closed Circuit TV and Cameras	**10.00** CAM	/CAM	/CAM	/CAM	7,500.00 /CAM	7,500.00 /CAM	75,000	13,708.04 /CAM	137,080
						03.05 Funks Reservoir Site Electrical	**1.00** LS	/LS	/LS	/LS	270,000.00 /LS	270,000.00 /LS	270,000	[illegible] /LS	[illegible]
	03.06					Funks Reservoir PGP Sitework									
		31.00.300				Funk PGP Earthworks									
			01.0			General Requirements									
				01.01		Construction Operations									
					01.01.05.00	General Conditions, Other									
						Funks Reservoir, Dewatering/Erosion Controls/Dust Abatement Allowance	36.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	-	60,000.00 /MO	2,160,000	95,751.78 /MO	3,447,064
						01.01.05.00 General Conditions, Other	36.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	2,160,000	95,751.78 /MO	3,447,064
						01.01 Construction Operations	36.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	2,160,000	95,751.78 /MO	3,447,064
						01.0 General Requirements	36.00 MO	15,000.00 /MO	30,000.00 /MO	15,000.00 /MO	/MO	60,000.00 /MO	2,160,000	95,751.78 /MO	3,447,064
			31.0			Earthwork									
				31.25		Earthworks, Structural									
					31.16.01.00	Earthworks, Sheeting and Shoring									
						Sheet Pile Wall	27,450.00 SF				45.00 /SF	45.00 /SF	1,235,250	71.00 /SF	1,948,901
						31.16.01.00 Earthworks, Sheeting and Shoring	27,450.00 SF	/SF	/SF	/SF	45.00 /SF	45.00 /SF	1,235,250	71.00 /SF	1,948,901
					31.25.01.00	Earthworks, Structural, Excavation									
						Structural Excavation, excludes sheeting or dewatering	135,000.00 CY	2.65 /CY	3.23 /CY	-	-	5.88 /CY	794,111	9.28 /CY	1,252,898
						Stockpile Excavated Spoils	135,000.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	383,019	4.49 /cy	606,751
						31.25.01.00 Earthworks, Structural, Excavation	135,000.00 CY	3.89 /CY	4.58 /CY	0.25 /CY	/CY	8.72 /CY	1,177,130	13.78 /CY	1,859,649
					31.25.02.00	Earthworks, Structural, Import Aggregates (Slab)									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	2,100.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	-	50.50 /CY	106,051	82.21 /CY	172,650
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	2,100.00 CY	14.75 /CY	0.76 /CY	35.00 /CY	/CY	50.50 /CY	106,051	82.21 /CY	172,650
					31.25.03.00	Earthworks, Structural, Backfill									
						Backfill, Native material	86,710.00 CY	6.18 /CY	1.69 /CY		-	7.87 /CY	682,514	12.42 /CY	1,076,828
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	69,370.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	140,872	3.20 /cy	222,259
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	17,340.00 cy	1.29 /cy	0.15 /cy	-	-	1.44 /cy	24,927	2.27 /cy	39,328
						Compaction, water for, 6000 gallon wagon, 6 mile haul	86,710.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	160,734	3.01 /cy	261,140
						31.25.03.00 Earthworks, Structural, Backfill	86,710.00 CY	7.45 /CY	2.98 /CY	1.20 /CY	/CY	11.64 /CY	1,009,046	18.45 /CY	1,599,555
					31.25.05.00	Earthworks, Structural, Hauling and Disposal									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	48,290.00 CY	7.24 /CY	8.80 /CY	-	-	16.04 /CY	774,348	25.30 /CY	1,221,719
						Load excavated spoils	48,290.00 cy	1.03 /cy	1.13 /cy		-	2.16 /cy	104,112	3.40 /cy	164,262
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	48,290.00 CY	8.27 /CY	9.93 /CY	/CY	/CY	18.19 /CY	878,461	28.70 /CY	1,385,981

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						31.25 Earthwork, Structural	*272,100.00 CY*	*5.86 /CY*	*4.99 /CY*	*0.76 /CY*	*4.54 /CY*	*16.19 /CY*	*4,405,936*	*25.60 /CY*	*6,966,735*
						31.0 Earthwork	*272,100.00 CY*	*5.86 /CY*	*4.99 /CY*	*0.76 /CY*	*4.54 /CY*	*16.19 /CY*	*4,405,936*	*25.60 /CY*	*6,966,735*
						31.00.300 Funk PGP Earthworks	*272,100.00 CY*	*7.87 /CY*	*8.96 /CY*	*2.76 /CY*	*4.54 /CY*	*24.13 /CY*	*6,565,936*	*38.27 /CY*	*10,413,900*
		32.00.300				*Funk PGP Site Improvements*									
			32.0			*Exterior Improvements*									
				32.12		*Paving*									
					32.40.02.00	*Site Improvements, Paving, Concrete*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	2,086.00 sfca	8.32 /sfca	-	0.97 /sfca	-	9.29 /sfca	19,372	14.72 /sfca	30,711
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	167.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	430,633	4,143.28 /ton	693,999
						Reinforcing in place, unloading & sorting, add to above - slabs	167.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	9,331	87.89 /ton	14,721
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	2,284.70 cy	-	-	131.00 /cy	-	131.00 /cy	299,296	216.18 /cy	493,909
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	2,240.48 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	64,976	45.76 /CY	102,515
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	90,284.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	84,566	1.48 /sf	133,423
						Curing, sprayed membrane curing compound	902.84 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	20,809	37.27 /csf	33,646
						Fine grading, fine grade for slab on grade, machine	10,031.56 SY	1.19 /SY	0.68 /SY	-	-	1.87 /SY	18,802	2.96 /SY	29,664
						32.40.02.00 Site Improvements, Paving, Concrete	*10,031.56 SY*	*41.02 /SY*	*2.27 /SY*	*51.19 /SY*	*/SY*	*94.48 /SY*	*947,783*	*152.78 /SY*	*1,532,587*
					32.40.04.00	*Site Improvements, Access Roads, Gravel*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	18,893.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	18,413	1.54 /SY	29,051
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	18,893.00 sy	0.94 /sy	0.92 /sy	7.30 /sy	-	9.16 /sy	173,037	14.98 /sy	283,005
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	18,893.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	18,421	1.54 /sy	29,064
						32.40.04.00 Site Improvements, Access Roads, Gravel	*18,893.00 SY*	*2.13 /SY*	*1.68 /SY*	*7.30 /SY*	*/SY*	*11.11 /SY*	*209,871*	*18.06 /SY*	*341,121*
					32.40.04.90	*Site Improvements, Access Roads, Asphalt*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	4,692.00 sy	0.62 /sy	0.35 /sy	-	-	0.98 /sy	4,573	1.54 /sy	7,215
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,12"deep	4,692.00 sy	1.34 /sy	1.31 /sy	15.00 /sy	-	17.64 /sy	82,773	28.92 /sy	135,697
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	4,692.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	4,575	1.54 /sy	7,218
						Plant-mix asphalt paving, for highways and large paved areas, binder course, 2" thick, no hauling included	4,692.00 SY	0.99 /SY	0.39 /SY	7.40 /SY	-	8.78 /SY	41,209	14.39 /SY	67,534
						Plant-mix asphalt paving, for highways and large paved areas, wearing course, 2" thick, no hauling included	4,692.00 sy	1.11 /sy	0.43 /sy	8.25 /sy	-	9.79 /sy	45,930	16.04 /sy	75,273
						32.40.04.90 Site Improvements, Access Roads, Asphalt	*4,692.00 SY*	*4.62 /SY*	*2.89 /SY*	*30.65 /SY*	*/SY*	*38.16 /SY*	*179,060*	*62.43 /SY*	*292,936*
						32.12 Paving	*33,616.56 SY*	*14.08 /SY*	*2.03 /SY*	*23.80 /SY*	*/SY*	*39.76 /SY*	*1,336,715*	*64.45 /SY*	*2,166,644*
				32.31		*Fencing*									
					32.45.01.00	*Fencing, Chain Link*									
						Fence,chain link industrial,galvanized steel,3 strands barb wire,2"posts @ 10'oc,9ga wire,6'high,schedule 40,includes excavation,& concrete	1,400.00 LF	6.52 /LF	0.94 /LF	19.95 /LF	-	27.41 /LF	38,369	44.69 /LF	62,560
						Fence, chain link industrial, gate, chain link, 8' high, to 18' wide, includes excavation, in concrete	60.00 LF	95.45 /LF	28.04 /LF	176.00 /LF	-	299.49 /LF	17,970	485.28 /LF	29,117
						32.45.01.00 Fencing, Chain Link	*1,460.00 LF*	*10.17 /LF*	*2.05 /LF*	*26.36 /LF*	*/LF*	*38.59 /LF*	*56,338*	*62.79 /LF*	*91,677*
						32.31 Fencing	*1,460.00 LF*	*10.17 /LF*	*2.05 /LF*	*26.36 /LF*	*/LF*	*38.59 /LF*	*56,338*	*62.79 /LF*	*91,677*
						32.0 Exterior Improvements	***1.00** LS*	*486,194.34 /LS*	*71,080.21 /LS*	*833,778.18 /LS*	*/LS*	*1,393,052.73 /LS*	*1,393,053*	*2,258,321.18 /LS*	*2,258,321*
						32.00.300 Funk PGP Site Improvements	***1.00** LS*	*486,194.34 /LS*	*71,080.21 /LS*	*833,778.18 /LS*	*/LS*	*1,393,052.73 /LS*	*1,393,053*	*2,258,321.18 /LS*	*2,258,321*
		33.00.300				*Funk PGP Yard Piping*									
			33.2			*Pipeline Specialties*									
				33.01		*Pipeline Specialties*									
					33.10.99.01	*Buried Pipe Specials, Other*									
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	36,710.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	161,954	6.96 /cy	255,522
						Pipe bedding and zone, CLSM	20,832.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	1,567,242	123.77 /cy	2,578,419
						Backfill native material	9,350.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	73,596	12.42 /cy	116,115
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	27,360.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	438,728	25.30 /cy	692,198
						Load excavated spoils	27,360.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	44,241	2.55 /cy	69,800
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	9,350.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	18,987	3.20 /cy	29,957
						Compaction, water for, 6000 gallon wagon, 6 mile haul	9,350.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	17,332	3.01 /cy	28,159
						Piping, pipe, WSP, plain end, welded, 144" diameter, excludes excavation or backfill	1,850.00 LF	121.97 /LF	62.10 /LF	970.00 /LF	-	1,154.07 /LF	2,135,022	1,891.14 /LF	3,496,607
						Pipe Fittings and Connections Allowance	1.00 ls	162,500.00 /ls	162,500.00 /ls	325,000.00 /ls	-	650,000.00 /ls	650,000	1,049,092.19 /ls	1,049,092
						Surge Tanks and Piping Connections	4.00 ea	9,107.20 /ea	3,974.08 /ea	50,000.00 /ea	-	63,081.28 /ea	252,325	103,150.74 /ea	412,603
						33.10.99.01 Buried Pipe Specials, Other	*1,850.00 LF*	*475.48 /LF*	*373.42 /LF*	*2,048.09 /LF*	*/LF*	*2,896.99 /LF*	*5,359,427*	*4,719.17 /LF*	*8,730,472*
						33.01 Pipeline Specialties	***1.00** LS*	*879,641.14 /LS*	*690,826.28 /LS*	*3,788,960.00 /LS*	*/LS*	*5,359,427.42 /LS*	*5,359,427*	*8,730,471.91 /LS*	*8,730,472*
						33.2 Pipeline Specialties	***1.00** LS*	*879,641.14 /LS*	*690,826.28 /LS*	*3,788,960.00 /LS*	*/LS*	*5,359,427.42 /LS*	*5,359,427*	*8,730,471.91 /LS*	*8,730,472*
						33.00.300 Funk PGP Yard Piping	*1,850.00 LF*	*475.48 /LF*	*373.42 /LF*	*2,048.09 /LF*	*/LF*	*2,896.99 /LF*	*5,359,427*	*4,719.17 /LF*	*8,730,472*
						03.06 Funks Reservoir PGP Sitework	***1.00** LS*	*3,566,663.65 /LS*	*3,250,358.47 /LS*	*5,374,045.15 /LS*	*1,235,250.00 /LS*	*13,358,418.28 /LS*	*13,358,418*	*21,402,562.59 /LS*	*21,402,595*
						03 Funks Pumping Generating Plant (PGP)	***1.00 LS***	***12,494,899.96 /LS***	***3,726,796.79 /LS***	***34,572,160.21 /LS***	***3,588,850.00 /LS***	***54,382,706.96 /LS***	***54,382,707***	***91,804,709.56 /LS***	***91,804,710***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	12,494,900		134,964.944 hrs	
Material	34,572,160			
Allowance	3,588,850			
Equipment	3,726,797		36,238.123 hrs	
Other				
Subtotal Direct Costs	54,382,707	54,382,707		
Material Sales Tax, Dunnigan Ca	2,506,482			7.250 %
Subtotal W/ Sales Tax	2,506,482	56,889,189		
Masonry Work I,OH&P	76,892			20.000 %
Metals Work I,OH&P	232,914			20.000 %
Architectural (Div 6-12)I,OH&P	35,778			20.000 %
Mechanical Work I,OH&P	181,080			20.000 %
Electrical Work I,OH&P	2,969,900			25.000 %
Instruments & Controls I,OH&P				20.000 %
Subtotal W/ Subcontractor OH&P	3,496,564	60,385,753		
General Conditions	3,019,288			5.000 %
Subtotal W/ General Conditions	3,019,288	63,405,041		
Mobilization/Demobilization	1,902,151			3.000 %
Prime Contractor Overhead	6,530,719			10.000 %
Prime Contractor Profit	4,310,275			6.000 %
Bonds & Insurance	1,652,416			2.170 %
Subtotal W/ Prime Markups	14,395,561	77,800,602		
Contractor Contingency	2,334,018			3.000 %
Design Contingency	11,670,090			15.000 %
Subtotal W/ Contingency	14,004,108	91,804,710		
Total Construction Cost		**91,804,710**		
Non-Contract Costs	16,524,848			18.000 %
Total Project Costs	**16,524,848**	**108,329,558**		

Dunnigan Pipelines Alt 1 (CBD)

SUMMARY REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Dunnigan Pipeline Alt 1 (CBD)	Estimator: Cavalleri/Wells Jacobs
Job Size:	Project Number: D3880600	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
01			***Dunnigan Pipelines - Alt 1 (CBD)***									
	01.01		Dunnigan Pipeline - CBD									
		33.00.100	*Dunnigan Pipeline, Open Cut*	*18,658.00 LF*	*620.75 /LF*	*251.91 /LF*	*1,380.98 /LF*	*120.27 /LF*	*2,373.91 /LF*	*44,292,343*	*3,758.84 /LF*	*70,132,361*
		33.00.102	*Dunnigan Pipeline, Trenchless Pipe installation, at I-5*	*540.00 LF*	*1,822.53 /LF*	*251.04 /LF*	*2,335.17 /LF*	*1,401.48 /LF*	*5,810.22 /LF*	*3,137,516*	*9,124.13 /LF*	*4,927,029*
		33.00.104	*Dunnigan Pipeline, Trenchless Pipe installation, at Highway 99/Rail Road Crossing*	*440.00 LF*	*1,331.57 /LF*	*256.26 /LF*	*2,362.22 /LF*	*1,720.00 /LF*	*6,170.04 /LF*	*2,714,819*	*9,680.66 /LF*	*4,259,492*
			01.01 Dunnigan Pipeline - CBD	19,638.00 LF	680.93 /LF	251.98 /LF	1,428.20 /LF	191.35 /LF	2,553.45 /LF	50,144,678	3,988.05 /LF	78,318,883
	01.02		Dunnigan - TCC Intake Structure									
		01.00.100	*Dunnigan - TCC Intake Structure, Removal and Control of Water*	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,354.96 /MO*	*208,065*
		02.00.100	*Dunnigan - TCC Intake Structure, Partial Demolition of Existing Canal Lining*	*940.00 SF*	*2.05 /SF*	*0.58 /SF*	*1.06 /SF*	*/SF*	*3.70 /SF*	*3,476*	*5.78 /SF*	*5,430*
		03.00.100	*Dunnigan - TCC Intake Structure, Foundation Slab*	*271.00 CY*	*178.82 /CY*	*7.44 /CY*	*244.10 /CY*	*/CY*	*430.36 /CY*	*116,628*	*680.98 /CY*	*184,546*
		03.00.102	*Dunnigan - TCC Intake Structure, Concrete Walls*	*276.00 CY*	*444.94 /CY*	*9.74 /CY*	*390.40 /CY*	*/CY*	*845.08 /CY*	*233,241*	*1,330.75 /CY*	*367,288*
		03.00.104	*Dunnigan - TCC Intake Structure, Elevated Slab*	*14.25 CY*	*563.51 /CY*	*7.90 /CY*	*287.67 /CY*	*/CY*	*859.09 /CY*	*12,242*	*1,344.90 /CY*	*19,165*
		26.00.100	*Dunnigan - TCC Intake Structure, Electrical*	***3,524.00*** *SF*	*5.61 /SF*	*0.80 /SF*	*23.27 /SF*	*/SF*	*29.68 /SF*	*104,583*	*47.43 /SF*	*167,130*
		31.00.100	*Dunnigan - TCC Intake Structure, Excavation and Backfill*	*8,870.00 CY*	*5.77 /CY*	*2.96 /CY*	*1.21 /CY*	*/CY*	*9.94 /CY*	*88,181*	*15.41 /CY*	*136,684*
		40.00.100	*Dunnigan - TCC Intake Structure, Water Control Gates*	*2.00 EA*	*3,605.56 /EA*	*1,453.15 /EA*	*25,000.00 /EA*	*/EA*	*30,058.71 /EA*	*60,117*	*48,139.61 /EA*	*96,279*
		40.90.100	*Dunnigan - TCC Intake Structure, I&C*	***3,524.00*** *SF*	*1.87 /SF*	*0.40 /SF*	*11.35 /SF*	*/SF*	*13.62 /SF*	*47,994*	*21.81 /SF*	*76,870*
			01.02 Dunnigan - TCC Intake Structure	**3,524.00** SF	75.48 /SF	10.99 /SF	102.65 /SF	38.31 /SF	227.43 /SF	801,463	357.96 /SF	1,261,458
	01.03		Dunnigan - CBD Discharge Structure									
		01.00.200	*Dunnigan - CBD Discharge Structure, Removal and Control of Water*	*4.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*180,000*	*69,354.96 /MO*	*277,420*
		02.00.200	*Dunnigan - CBD Discharge Structure, Partial Demolition of Existing Canal Lining*	*1,218.00 SF*	*1.58 /SF*	*0.45 /SF*	*0.82 /SF*	*/SF*	*2.85 /SF*	*3,476*	*4.46 /SF*	*5,430*
		03.00.106	*Dunnigan - CBD Discharge Structure, Foundation Slab*	*520.00 CY*	*174.07 /CY*	*6.95 /CY*	*243.14 /CY*	*/CY*	*424.16 /CY*	*220,561*	*671.35 /CY*	*349,100*
		03.00.108	*Dunnigan - CBD Discharge Structure, Concrete Walls*	*675.00 CY*	*388.50 /CY*	*9.65 /CY*	*358.07 /CY*	*/CY*	*756.22 /CY*	*510,450*	*1,191.47 /CY*	*804,240*
		03.00.110	*Dunnigan - CBD Discharge Structure, Concrete Coverging Walls*	*114.00 CY*	*276.35 /CY*	*9.74 /CY*	*310.20 /CY*	*/CY*	*596.29 /CY*	*67,977*	*941.51 /CY*	*107,332*
		31.00.102	*Dunnigan - CBD Discharge Structure, Excavation and Backfill*	*21,500.00 CY*	*5.78 /CY*	*3.09 /CY*	*0.93 /CY*	*/CY*	*9.81 /CY*	*210,900*	*15.18 /CY*	*326,343*
		33.00.108	*Dunnigan - CBD Discharge Structure, CBD Pipeline Connection*	***111.00*** *LF*	*586.06 /LF*	*305.09 /LF*	*1,482.99 /LF*	*270.45 /LF*	*2,644.59 /LF*	*293,550*	*4,183.42 /LF*	*464,360*
		33.00.110	*Dunnigan - CBD Discharge Structure, Above Grade Piping*	*80.00 LF*	*395.44 /LF*	*185.10 /LF*	*2,320.00 /LF*	*/LF*	*2,900.53 /LF*	*232,042*	*4,638.56 /LF*	*371,085*
			01.03 Dunnigan - CBD Discharge Structure	**4,258.00** SF	142.80 /SF	28.80 /SF	181.95 /SF	49.32 /SF	403.68 /SF	1,718,857	635.35 /SF	2,705,399
			01 Dunnigan Pipelines - Alt 1 (CBD)	***19,718.00 LF***	***722.44 /LF***	***259.36 /LF***	***1,481.04 /LF***	***208.07 /LF***	***2,670.91 /LF***	***52,664,998***	***4,223.84 /LF***	***83,285,648***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	21,954,938		179,451.026 hrs	
Material	47,125,783			
Allowance	6,323,128			
Equipment	7,881,799		60,704.979 hrs	
Other				
Total Construction Cost	**83,285,648**	**83,285,648**		
Non-Contract Costs	14,991,417			18.000 %
Total Project Costs	**14,991,417**	**98,277,065**		

Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Dunnigan Pipeline Alt 1 (CBD)
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
01						**Dunnigan Pipelines - Alt 1 (CBD)**									
	01.01					Dunnigan Pipeline - CBD									
		33.00.100				*Dunnigan Pipeline, Open Cut*									
			33.0			*Pipelines*									
				33.03		*Buried Process Pipe, Carbon Steel*									
					33.00.05.97	*Buried Pipe, Carbon Steel, 108"*									
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	421,340.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	1,858,836	6.80 /cy	2,864,878
						Trench Stabilization, Geotextile Wrapped	6,272.00 cy	5.50 /cy	2.25 /cy	40.00 /cy	-	47.75 /cy	299,469	76.49 /cy	479,737
						Pipe bedding and zone, CLSM	99,254.00 cy	4.52 /cy	0.71 /cy	35.00 /cy	-	40.23 /cy	3,993,228	64.54 /cy	6,406,306
						Backfill native material	312,730.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	2,461,569	12.13 /cy	3,793,822
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	108,610.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	1,741,602	24.71 /cy	2,684,195
						Load excavated spoils	108,610.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	175,621	2.49 /cy	270,671
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	312,730.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	635,071	3.13 /cy	978,785
						Compaction, water for, 6000 gallon wagon, 6 mile haul	312,730.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	579,706	2.94 /cy	920,663
						Piping, WSP 0.5" Wt Polyurethand Coating Insitu Morter Lining, 108" diameter	18,658.00 LF	379.47 /LF	82.79 /LF	1,160.00 /LF	-	1,622.26 /LF	30,268,103	2,584.36 /LF	48,218,983
						Dewatering Allowance	308.00 msf	0.00 /msf	0.00 /msf	0.00 /msf	3,000.00 /msf	3,000.00 /msf	924,000	4,623.66 /msf	1,424,088
						Erosion Controls Allowance	18,658.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	1,026,190	84.77 /lf	1,581,586
						Surface Restorations Allowance	1,959.09 msf	0.00 /msf	0.00 /msf	0.00 /msf	150.00 /msf	150.00 /msf	293,864	231.18 /msf	452,909
						ARV, Complete	2.00 ea	2,500.91 /ea	520.00 /ea	3,500.00 /ea		6,520.91 /ea	13,042	10,303.91 /ea	20,608
						Blowoff, Complete	2.00 ea	2,500.91 /ea	520.00 /ea	8,000.00 /ea		11,020.91 /ea	22,042	17,565.67 /ea	35,131
						33.00.05.97 Buried Pipe, Carbon Steel, 108"	*18,658.00 LF*	*620.75 /LF*	*251.91 /LF*	*1,380.98 /LF*	*120.27 /LF*	*2,373.91 /LF*	*44,292,343*	*3,758.84 /LF*	*70,132,361*
						33.03 Buried Process Pipe, Carbon Steel	*18,658.00 LF*	*620.75 /LF*	*251.91 /LF*	*1,380.98 /LF*	*120.27 /LF*	*2,373.91 /LF*	*44,292,343*	*3,758.84 /LF*	*70,132,361*
						33.0 Pipelines	*18,658.00 LF*	*620.75 /LF*	*251.91 /LF*	*1,380.98 /LF*	*120.27 /LF*	*2,373.91 /LF*	*44,292,343*	*3,758.84 /LF*	*70,132,361*
						33.00.100 Dunnigan Pipeline, Open Cut	*18,658.00 LF*	*620.75 /LF*	*251.91 /LF*	*1,380.98 /LF*	*120.27 /LF*	*2,373.91 /LF*	*44,292,343*	*3,758.84 /LF*	*70,132,361*
		33.00.102				*Dunnigan Pipeline, Trenchless Pipe installation, at I-5*									
			33.0			*Pipelines*									
				33.60		*Trenchless Technology, Tunneling*									
					33.60.01.07	*Pipeline Specials, Tunneling, 108" Piping in 150" Casing*									
						Grout Annular Space Between Carrier Pipe and Casing	31,910.00 cf	9.30 /cf	0.43 /cf	0.95 /cf	-	10.68 /cf	340,767	16.53 /cf	527,395
						Final Surface Restoration Allowance	355.55 sy	0.00 /sy	0.00 /sy	0.00 /sy	13.50 /sy	13.50 /sy	4,800	20.81 /sy	7,398
						Excavating jacking and Receiving Pits, excludes sheeting or dewatering	1,660.00 cy	2.65 /cy	2.21 /cy	-	-	4.85 /cy	8,057	7.48 /cy	12,417
						Jacking and Receiving Pits Shoring, SF of Pit Walls	5,600.00 sf	0.00 /sf	0.00 /sf	0.00 /sf	45.00 /sf	45.00 /sf	252,000	69.35 /sf	388,388
						Backfill Pits, Native material	680.00 cy	6.18 /cy	1.15 /cy	0.00 /cy	-	7.33 /cy	4,987	11.30 /cy	7,686
						Pipe bedding and zone in pits, CLSM	878.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	66,054	121.02 /cy	106,260
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	3,435.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	45,466	20.40 /cy	70,074
						Load excavated spoils	3,435.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	6,176	2.77 /cy	9,518
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	680.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	1,120	2.54 /cy	1,726
						Compaction, water for, 6000 gallon wagon, 6 mile haul	680.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	1,195	2.80 /cy	1,902
						Horizontal boring, roadwork, 150" diameter casing, includes casing only, 100' minimum, excludes jacking pits or dewatering	540.00 lf	596.42 /lf	142.23 /lf	900.00 /lf	-	1,638.65 /lf	884,869	2,590.77 /lf	1,399,014
						Carrier Pipe Spacers	112.00 ea	14.91 /ea	4.74 /ea	500.00 /ea	0.00 /ea	519.65 /ea	58,201	837.15 /ea	93,761
						Piping, WSP 0.5" Wt Polyurethand Coating Insitu Morter Lining, 108" diameter	540.00 LF	596.41 /LF	28.45 /LF	1,160.00 /LF	-	1,784.86 /LF	963,824	2,834.96 /LF	1,530,881
						Dewatering Allowance	1.00 ls	0.00 /ls	0.00 /ls	0.00 /ls	500,000.00 /ls	500,000.00 /ls	500,000	770,610.66 /ls	770,611
						33.60.01.07 Pipeline Specials, Tunneling, 108" Piping in 150" Casing	*540.00 LF*	*1,822.53 /LF*	*251.04 /LF*	*2,335.17 /LF*	*1,401.48 /LF*	*5,810.22 /LF*	*3,137,516*	*9,124.13 /LF*	*4,927,029*
						33.60 Trenchless Technology, Tunneling	*540.00 LF*	*1,822.53 /LF*	*251.04 /LF*	*2,335.17 /LF*	*1,401.48 /LF*	*5,810.22 /LF*	*3,137,516*	*9,124.13 /LF*	*4,927,029*
						33.0 Pipelines	*540.00 LF*	*1,822.53 /LF*	*251.04 /LF*	*2,335.17 /LF*	*1,401.48 /LF*	*5,810.22 /LF*	*3,137,516*	*9,124.13 /LF*	*4,927,029*
						33.00.102 Dunnigan Pipeline, Trenchless Pipe Installation, at I-5	*540.00 LF*	*1,822.53 /LF*	*251.04 /LF*	*2,335.17 /LF*	*1,401.48 /LF*	*5,810.22 /LF*	*3,137,516*	*9,124.13 /LF*	*4,927,029*
		33.00.104				*Dunnigan Pipeline, Trenchless Pipe installation, at Highway 99/Rail Road Crossing*									
			33.0			*Pipelines*									
				33.60		*Trenchless Technology, Tunneling*									
					33.60.01.07	*Pipeline Specials, Tunneling, 108" Piping in 150" Casing*									
						Grout Annular Space Between Carrier Pipe and Casing	26,000.00 cf	9.30 /cf	0.43 /cf	0.95 /cf	-	10.68 /cf	277,654	16.53 /cf	429,717
						Final Surface Restoration Allowance	355.55 sy				13.50 /sy	13.50 /sy	4,800	20.81 /sy	7,398
						Excavating jacking and Receiving Pits, excludes sheeting or dewatering	1,660.00 cy	2.65 /cy	2.21 /cy	-	-	4.85 /cy	8,057	7.48 /cy	12,417
						Jacking and Receiving Pits Shoring, SF of Pit Walls	5,600.00 sf				45.00 /sf	45.00 /sf	252,000	69.35 /sf	388,388
						Backfill Pits, Native material	680.00 cy	6.18 /cy	1.15 /cy		-	7.33 /cy	4,987	11.30 /cy	7,686
						Pipe bedding and zone in pits, CLSM	878.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	66,054	121.02 /cy	106,260
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	2,980.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	39,444	20.40 /cy	60,792
						Load excavated spoils	2,980.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	5,358	2.77 /cy	8,257
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	680.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	1,120	2.54 /cy	1,726
						Compaction, water for, 6000 gallon wagon, 6 mile haul	680.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	1,195	2.80 /cy	1,902
						Horizontal boring, roadwork, 150" diameter casing, includes casing only, 100' minimum, excludes jacking pits or dewatering	440.00 lf	596.42 /lf	142.23 /lf	900.00 /lf	-	1,638.65 /lf	721,004	2,590.77 /lf	1,139,937
						Carrier Pipe Spacers	92.00 ea	14.91 /ea	4.74 /ea	500.00 /ea		519.65 /ea	47,808	837.15 /ea	77,018
						Piping, WSP 0.5" Wt Polyurethand Coating Insitu Morter Lining, 108" diameter	440.00 LF	596.41 /LF	28.45 /LF	1,160.00 /LF	-	1,784.86 /LF	785,338	2,834.96 /LF	1,247,384
						Dewatering Allowance	1.00 ls				500,000.00 /ls	500,000.00 /ls	500,000	770,610.67 /ls	770,611
						33.60.01.07 Pipeline Specials, Tunneling, 108" Piping in 150" Casing	*440.00 LF*	*1,831.57 /LF*	*256.26 /LF*	*2,362.22 /LF*	*1,720.00 /LF*	*6,170.04 /LF*	*2,714,819*	*9,680.66 /LF*	*4,259,492*
						33.60 Trenchless Technology, Tunneling	*440.00 LF*	*1,831.57 /LF*	*256.26 /LF*	*2,362.22 /LF*	*1,720.00 /LF*	*6,170.04 /LF*	*2,714,819*	*9,680.66 /LF*	*4,259,492*
						33.0 Pipelines	*440.00 LF*	*1,831.57 /LF*	*256.26 /LF*	*2,362.22 /LF*	*1,720.00 /LF*	*6,170.04 /LF*	*2,714,819*	*9,680.66 /LF*	*4,259,492*
						33.00.104 Dunnigan Pipeline, Trenchless Pipe Installation, at Highway 99/Rail Road Crossing	*440.00 LF*	*1,831.57 /LF*	*256.26 /LF*	*2,362.22 /LF*	*1,720.00 /LF*	*6,170.04 /LF*	*2,714,819*	*9,680.66 /LF*	*4,259,492*
						01.01 Dunnigan Pipeline - CBD	19,638.00 LF	889.92 /LF	251.38 /LF	1,425.30 /LF	181.35 /LF	2,563.45 /LF	50,144,678	4,058.05 /LF	79,318,882
	01.02					Dunnigan - TCC Intake Structure									
		01.00.100				*Dunnigan - TCC Intake Structure, Removal and Control of Water*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					31.15.02.00	*Dewatering*									
						TCC Intake Structure, Removal and Control of Water	3.00 MO		-		45,000.00 /MO	45,000.00 /MO	135,000	69,354.96 /MO	208,065
						31.15.02.00 Dewatering	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,354.96 /MO*	*208,065*
						01.01 Construction Operations	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,354.96 /MO*	*208,065*
						01.0 General Requirements	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,354.96 /MO*	*208,065*
						01.00.100 Dunnigan - TCC Intake Structure, Removal and Control of Water	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,354.96 /MO*	*208,065*
		02.00.100				*Dunnigan - TCC Intake Structure, Partial Demolition of Existing Canal Lining*									
			02.0			*Existing Conditions*									
				02.40		*Demolition*									
					02.01.01.00	*General Site Demolition*									
						Partial Demolition of Existing Canal Lining	940.00 SF	1.79 /SF	0.37 /SF	1.06 /SF	-	3.22 /SF	3,025	5.04 /SF	4,735
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	30.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	397	20.40 /cy	612

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					02.01.01.00	*General Site Demolition*									
						Load excavated spoils	30.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	54	2.77 /cy	83
						02.01.01.00 General Site Demolition	940.00 SF	2.05 /SF	0.58 /SF	1.06 /SF	/SF	3.70 /SF	3,476	5.78 /SF	5,430
						02.40 Demolition	940.00 SF	2.05 /SF	0.58 /SF	1.06 /SF	/SF	3.70 /SF	3,476	5.78 /SF	5,430
						02.0 Existing Conditions	940.00 SF	2.05 /SF	0.58 /SF	1.06 /SF	/SF	3.70 /SF	3,476	5.78 /SF	5,430
						02.00.100 Dunnigan - TCC Intake Structure, Partial Demolition of Existing Canal Lining	940.00 SF	2.05 /SF	0.58 /SF	1.06 /SF	/SF	3.70 /SF	3,476	5.78 /SF	5,430
		03.00.100				*Dunnigan - TCC Intake Structure, Foundation Slab*									
			03.0			*Concrete Work*									
				03.15		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.24	*Cast-In-Place Concrete, Slabs on Grade, 24" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	550.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	4,859	13.69 /sfca	7,528
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	23.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	61,060	4,049.39 /ton	96,173
						Reinforcing in place, unloading & sorting, add to above - slabs	23.75 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	1,323	85.85 /ton	2,039
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	280.00 cy	-	-	131.00 /cy	-	131.00 /cy	36,680	211.40 /cy	59,191
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	271.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	7,859	44.70 /CY	12,113
						Cfnsh,flrs,for spcf rndm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	3,524.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	3,301	1.44 /sf	5,087
						Curing, sprayed membrane curing compound	35.24 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	812	36.43 /csf	1,284
						Fine grading, fine grade for slab on grade, machine	391.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	734	2.89 /sy	1,131
						03.10.05.24 Cast-In-Place Concrete, Slabs on Grade, 24" thick	271.00 CY	178.82 /CY	7.44 /CY	244.10 /CY	/CY	430.36 /CY	116,628	680.96 /CY	184,546
						03.15 Cast-In-Place Concrete, Slabs on Grade	271.00 CY	178.82 /CY	7.44 /CY	244.10 /CY	/CY	430.36 /CY	116,628	680.96 /CY	184,546
						03.0 Concrete Work	271.00 CY	178.82 /CY	7.44 /CY	244.10 /CY	/CY	430.36 /CY	116,628	680.96 /CY	184,546
						03.00.100 Dunnigan - TCC Intake Structure, Foundation Slab	271.00 CY	178.82 /CY	7.44 /CY	244.10 /CY	/CY	430.36 /CY	116,628	680.96 /CY	184,546
		03.00.102				*Dunnigan - TCC Intake Structure, Concrete Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.24	*Cast-In-Place Concrete, Straight Walls, 24" thick*									
						C.I.P. concrete forms, wall, box out for opening, to 16" thick, over 10 S.F. (use perimeter), includes erecting, bracing, stripping and cleaning	30.00 lf	23.48 /lf	-	2.45 /lf	-	25.93 /lf	778	40.14 /lf	1,204
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	7,440.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	109,647	23.11 /sfca	171,931
						Form oil, coverage varies greatly, maximum, includes material only	20.00 gal	-	-	23.50 /gal	-	23.50 /gal	470	37.92 /gal	758
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	24.25 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	62,345	4,049.39 /ton	98,198
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	24.25 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,351	85.85 /ton	2,082
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	24.25 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	1,468	93.32 /ton	2,263
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	285.00 cy	-	-	131.00 /cy	-	131.00 /cy	37,335	211.40 /cy	60,248
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	276.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	12,340	68.91 /CY	19,018
						Finishing: break ties & patch voids (walls, cols or beams)	7,440.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	7,507	1.56 /sf	11,586
						03.10.06.24 Cast-In-Place Concrete, Straight Walls, 24" thick	276.00 CY	444.94 /CY	8.74 /CY	390.40 /CY	/CY	845.08 /CY	233,241	1,330.75 /CY	367,288
						03.30 Cast-In-Place Concrete, Straight Walls	276.00 CY	444.94 /CY	8.74 /CY	390.40 /CY	/CY	845.08 /CY	233,241	1,330.75 /CY	367,288
						03.0 Concrete Work	276.00 CY	444.94 /CY	8.74 /CY	390.40 /CY	/CY	845.08 /CY	233,241	1,330.75 /CY	367,288
						03.00.102 Dunnigan - TCC Intake Structure, Concrete Walls	276.00 CY	444.94 /CY	8.74 /CY	390.40 /CY	/CY	845.08 /CY	233,241	1,330.75 /CY	367,288
		03.00.104				*Dunnigan - TCC Intake Structure, Elevated Slab*									
			03.0			*Concrete Work*									
				03.34		*Cast-In-Place Concrete, Elevated Slabs*									
					03.10.10.14	*Cast-In-Place Concrete, Elevated Decks, 14" thick*									
						Slab shoring	3,250.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	2,225	1.06 /cf	3,442
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	325.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	2,885	13.78 /sf	4,478
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	145.00 lf	5.41 /lf	-	0.22 /lf	-	5.63 /lf	817	8.70 /lf	1,261
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	1.25 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	3,214	4,049.40 /ton	5,062
						Reinforcing in place, unloading & sorting, add to above - decks	1.25 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	70	85.86 /ton	107
						Reinforcing steel, crane cost for handling, maximum, add	1.25 ton	140.59 /ton	18.56 /ton	-	-	159.15 /ton	199	245.28 /ton	307
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	14.75 cy	-	-	131.00 /cy	-	131.00 /cy	1,932	211.40 /cy	3,118
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	14.25 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	425	45.94 /CY	655
						Finishing elev slab, bull float, manual float & manual steel trowel	325.00 sf	1.23 /sf	-	-	-	1.23 /sf	401	1.90 /sf	618
						Curing, sprayed membrane curing compound, elevated decks	3.25 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	75	36.42 /csf	118
						03.10.10.14 Cast-In-Place Concrete, Elevated Decks, 14" thick	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,344.90 /CY	19,165
						03.34 Cast-In-Place Concrete, Elevated Slabs	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,344.90 /CY	19,165
						03.0 Concrete Work	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,344.90 /CY	19,165
						03.00.104 Dunnigan - TCC Intake Structure, Elevated Slab	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,344.90 /CY	19,165
		26.00.100				*Dunnigan - TCC Intake Structure, Electrical*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					26.00.99.00	*Electrical, Other*									
						Electrical Allowance	1.00 LS	19,782.96 /LS	2,800.00 /LS	82,000.00 /LS	-	104,582.96 /LS	104,583	167,130.49 /LS	167,130
						26.00.99.00 Electrical, Other	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.43 /SF	167,130
						26.00 Electrical	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.43 /SF	167,130
						26.0 Electrical Work	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.43 /SF	167,130
						26.00.100 Dunnigan - TCC Intake Structure, Electrical	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.43 /SF	167,130
		31.00.100				*Dunnigan - TCC Intake Structure, Excavation and Backfill*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	4,360.00 CY	2.65 /CY	2.21 /CY	-	-	4.85 /CY	21,161	7.48 /CY	32,614
						Stockpile Excavated Spoils	3,780.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	10,725	4.39 /cy	16,597
						31.25.01.00 Earthworks, Structural, Excavation	4,360.00 CY	3.72 /CY	3.38 /CY	0.22 /CY	/CY	7.31 /CY	31,885	11.29 /CY	49,211
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	150.00 CY	12.50 /CY	0.76 /CY	35.00 /CY	-	48.26 /CY	7,238	76.91 /CY	11,536
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	150.00 CY	12.50 /CY	0.76 /CY	35.00 /CY	/CY	48.26 /CY	7,238	76.91 /CY	11,536
					31.25.03.00	*Earthworks, Structural, Backfill*									

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					31.25.03.00	Earthworks, Structural, Backfill									
						Backfill, Native material	3,780.00 CY	6.18 /CY	1.15 /CY	0.00 /CY	-	7.33 /CY	27,723	11.30 /CY	42,727
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	2,780.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	4,578	2.54 /cy	7,056
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	1,000.00 cy	1.29 /cy	0.10 /cy	-	-	1.39 /cy	1,391	2.14 /cy	2,144
						Compaction, water for, 6000 gallon wagon, 6 mile haul	3,780.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	6,645	2.80 /cy	10,571
						31.25.03.00 Earthworks, Structural, Backfill	3,780.00 CY	7.48 /CY	1.99 /CY	1.20 /CY	/CY	10.67 /CY	40,337	16.53 /CY	62,497
					31.25.05.00	Earthworks, Structural, Hauling and Disposal									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	580.00 CY	7.24 /CY	6.00 /CY	-	-	13.24 /CY	7,677	20.40 /CY	11,832
						Load excavated spoils	580.00 cy	1.03 /cy	0.77 /cy		-	1.80 /cy	1,043	2.77 /cy	1,607
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	580.00 CY	8.27 /CY	6.77 /CY	/CY	/CY	15.03 /CY	8,720	23.17 /CY	13,439
						31.25 Earthworks, Structural	6,870.00 CY	5.77 /CY	2.96 /CY	1.21 /CY	/CY	9.94 /CY	68,181	15.41 /CY	136,684
						31.0 Earthwork	6,870.00 CY	5.77 /CY	2.96 /CY	1.21 /CY	/CY	9.94 /CY	68,181	15.41 /CY	136,684
						31.00.100 Dunnigan - TCC Intake Structure, Excavation and Backfill	6,870.00 CY	5.77 /CY	2.96 /CY	1.21 /CY	/CY	9.94 /CY	68,181	15.41 /CY	136,684
		40.00.100				Dunnigan - TCC Intake Structure, Water Control Gates									
			46.0			Water and Wastewater Equipment									
				40.30		Water Control Gates, Other Gates									
					40.30.06.01	Other Gates									
						Furnish and Install Water Control Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	-	30,058.71 /EA	60,117	48,139.61 /EA	96,279
						40.30.06.01 Other Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,139.61 /EA	96,279
						40.30 Water Control Gates, Other Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,139.61 /EA	96,279
						46.0 Water and Wastewater Equipment	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,139.61 /EA	96,279
						40.00.100 Dunnigan - TCC Intake Structure, Water Control Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,139.61 /EA	96,279
		40.90.100				Dunnigan - TCC Intake Structure, I&C									
			40.9			Instrumentation & Controls									
				40.90		Instrumentation & Controls									
					40.90.99.01	I&C, Other									
						I&C Allowance	1.00 LS	6,594.32 /LS	1,400.00 /LS	40,000.00 /LS	-	47,994.32 /LS	47,994	76,869.86 /LS	76,870
						40.90.99.01 I&C, Other	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.81 /SF	76,870
						40.90 Instrumentation & Controls	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.81 /SF	76,870
						40.9 Instrumentation & Controls	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.81 /SF	76,870
						40.90.100 Dunnigan - TCC Intake Structure, I&C	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.81 /SF	76,870
						01.02 Dunnigan - TCC Intake Structure	**3,524.00** SF	79.48 /SF	16.39 /SF	103.65 /SF	28.31 /SF	227.43 /SF	801,463	387.86 /SF	1,361,496
	01.03					Dunnigan - CBD Discharge Structure									
		01.00.200				Dunnigan - CBD Discharge Structure, Removal and Control of Water									
			01.0			General Requirements									
				01.01		Construction Operations									
					31.15.02.00	Dewatering									
						CBD Discharge Structure, Removal and Control of Water	4.00 MO		-		45,000.00 /MO	45,000.00 /MO	180,000	69,354.96 /MO	277,420
						31.15.02.00 Dewatering	4.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	180,000	69,354.96 /MO	277,420
						01.01 Construction Operations	4.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	180,000	69,354.96 /MO	277,420
						01.0 General Requirements	4.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	180,000	69,354.96 /MO	277,420
						01.00.200 Dunnigan - CBD Discharge Structure, Removal and Control of Water	4.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	180,000	69,354.96 /MO	277,420
		02.00.200				Dunnigan - CBD Discharge Structure, Partial Demolition of Existing Canal Lining									
			02.0			Existing Conditions									
				02.40		Demolition									
					02.01.01.00	General Site Demolition									
						Partial Demolition of Existing Canal Lining	1,218.00 SF	1.38 /SF	0.28 /SF	0.82 /SF	-	2.48 /SF	3,025	3.89 /SF	4,735
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	30.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	397	20.40 /cy	612
						Load excavated spoils	30.00 cy	1.03 /cy	0.77 /cy		-	1.80 /cy	54	2.77 /cy	83
						02.01.01.00 General Site Demolition	1,218.00 SF	1.58 /SF	0.45 /SF	0.82 /SF	/SF	2.85 /SF	3,476	4.46 /SF	5,430
						02.40 Demolition	1,218.00 SF	1.58 /SF	0.45 /SF	0.82 /SF	/SF	2.85 /SF	3,476	4.46 /SF	5,430
						02.0 Existing Conditions	1,218.00 SF	1.58 /SF	0.45 /SF	0.82 /SF	/SF	2.85 /SF	3,476	4.46 /SF	5,430
						02.00.200 Dunnigan - CBD Discharge Structure, Partial Demolition of Existing Canal Lining	1,218.00 SF	1.58 /SF	0.45 /SF	0.82 /SF	/SF	2.85 /SF	3,476	4.46 /SF	5,430
		03.00.100				Dunnigan - CBD Discharge Structure, Foundation Slab									
			03.0			Concrete Work									
				03.18		Cast-in-Place Concrete, Slabs on Grade									
					03.10.05.36	Cast-In-Place Concrete, Slabs on Grade, 36" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	1,120.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	9,896	13.69 /sfca	15,330
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	45.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	116,978	4,049.39 /ton	184,247
						Reinforcing in place, unloading & sorting, add to above - slabs	45.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,535	85.85 /ton	3,906
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	536.00 cy	-	-	131.00 /cy	-	131.00 /cy	70,216	211.40 /cy	113,309
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	520.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	15,080	44.70 /CY	23,242
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl pln,strkn	4,258.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	3,988	1.44 /sf	6,147
						Curing, sprayed membrane curing compound	42.58 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	981	36.43 /csf	1,551
						Fine grading, fine grade for slab on grade, machine	473.11 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	887	2.89 /sy	1,367
						03.10.05.36 Cast-In-Place Concrete, Slabs on Grade, 36" thick	520.00 CY	174.07 /CY	6.95 /CY	243.14 /CY	/CY	424.16 /CY	220,561	671.35 /CY	349,100
						03.18 Cast-in-Place Concrete, Slabs on Grade	520.00 CY	174.07 /CY	6.95 /CY	243.14 /CY	/CY	424.16 /CY	220,561	671.35 /CY	349,100
						03.0 Concrete Work	520.00 CY	174.07 /CY	6.95 /CY	243.14 /CY	/CY	424.16 /CY	220,561	671.35 /CY	349,100
						03.00.100 Dunnigan - CBD Discharge Structure, Foundation Slab	520.00 CY	174.07 /CY	6.95 /CY	243.14 /CY	/CY	424.16 /CY	220,561	671.35 /CY	349,100
		03.00.100				Dunnigan - CBD Discharge Structure, Concrete Walls									
			03.0			Concrete Work									
				03.20		Cast-In-Place Concrete, Straight Walls									
					03.10.06.24	Cast-In-Place Concrete, Straight Walls, 24" thick									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	14,294.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	210,659	23.11 /sfca	330,319
						Form oil, coverage varies greatly, maximum, includes material only	38.20 gal	-	-	23.50 /gal	-	23.50 /gal	898	37.92 /gal	1,449
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	46.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	119,549	4,049.39 /ton	188,297
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	46.50 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	2,590	85.85 /ton	3,992
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	46.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	2,816	93.32 /ton	4,339
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	546.00 cy	-	-	131.00 /cy	-	131.00 /cy	71,526	211.40 /cy	115,423
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	530.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	23,696	68.91 /CY	36,521
						Finishing: break ties & patch voids (walls, cols or beams)	14,294.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	14,422	1.56 /sf	22,259
						03.10.06.24 Cast-In-Place Concrete, Straight Walls, 24" thick	530.00 CY	442.34 /CY	9.74 /CY	389.73 /CY	/CY	841.80 /CY	446,155	1,325.66 /CY	702,589
					03.10.06.90	Cast-In-Place Concrete, Straight Walls, 7'8" thick									

Jacobs

DETAIL REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Dunnigan Pipeline Alt 1 (CBD)	Estimator: Cavalleri/Wells Jacobs
Job Size:	Project Number: D3880600	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.06.90	*Cast-In-Place Concrete, Straight Walls, 7' 8" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	1,020.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	15,032	23.11 /sfca	23,571
						Form oil, coverage varies greatly, maximum, includes material only	2.80 gal	-	-	23.50 /gal	-	23.50 /gal	66	37.93 /gal	106
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	8.20 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	21,082	4,049.39 /ton	33,205
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	8.20 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	457	85.85 /ton	704
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	8.20 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	497	93.32 /ton	765
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	150.00 cy	-	-	131.00 /cy	-	131.00 /cy	19,650	211.40 /cy	31,710
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	145.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	6,483	68.91 /CY	9,992
						Finishing: break ties & patch voids (walls, cols or beams)	1,020.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	1,029	1.56 /sf	1,588
						03.10.06.90 Cast-In-Place Concrete, Straight Walls, 7' 8" thick	*145.00 CY*	*191.72 /CY*	*9.32 /CY*	*242.38 /CY*	*/CY*	*443.42 /CY*	*64,295*	*700.97 /CY*	*101,641*
						03.30 Cast-In-Place Concrete, Straight Walls	*675.00 CY*	*388.50 /CY*	*9.65 /CY*	*358.07 /CY*	*/CY*	*756.22 /CY*	*510,450*	*1,191.47 /CY*	*804,240*
						03.0 Concrete Work	*675.00 CY*	*388.50 /CY*	*9.65 /CY*	*358.07 /CY*	*/CY*	*756.22 /CY*	*510,450*	*1,191.47 /CY*	*804,240*
						03.00.108 Dunnigan - CBD Discharge Structure, Concrete Walls	*675.00 CY*	*388.50 /CY*	*9.65 /CY*	*358.07 /CY*	*/CY*	*756.22 /CY*	*510,450*	*1,191.47 /CY*	*804,240*
		03.00.110				*Dunnigan - CBD Discharge Structure, Concrete Coverang Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.99	*Cast-In-Place Concrete, Straight Walls, Other*									
						Concrete surface treatment, bonding agent, epoxy resin, 80 S.F. per gallon, 4 gallon case, includes material only	16.00 gal	-	-	69.00 /gal	-	69.00 /gal	1,104	111.35 /gal	1,782
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	1,226.00 sfca	9.34 /sfca	-	5.45 /sfca	-	14.79 /sfca	18,127	23.18 /sfca	28,422
						Form oil, coverage varies greatly, maximum, includes material only	3.50 gal	-	-	23.50 /gal	-	23.50 /gal	82	37.93 /gal	133
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	10.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	25,709	4,049.39 /ton	40,494
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	10.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	557	85.86 /ton	859
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	10.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	605	93.32 /ton	933
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	118.00 cy	-	-	131.00 /cy	-	131.00 /cy	15,458	211.40 /cy	24,945
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	114.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	5,097	68.91 /CY	7,855
						Finishing: break ties & patch voids (walls, cols or beams)	1,226.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	1,237	1.56 /sf	1,909
						03.10.06.99 Cast-In-Place Concrete, Straight Walls, Other	*114.00 CY*	*276.35 /CY*	*9.74 /CY*	*310.20 /CY*	*/CY*	*596.29 /CY*	*67,977*	*941.51 /CY*	*107,332*
						03.30 Cast-In-Place Concrete, Straight Walls	*114.00 CY*	*276.35 /CY*	*9.74 /CY*	*310.20 /CY*	*/CY*	*596.29 /CY*	*67,977*	*941.51 /CY*	*107,332*
						03.0 Concrete Work	*114.00 CY*	*276.35 /CY*	*9.74 /CY*	*310.20 /CY*	*/CY*	*596.29 /CY*	*67,977*	*941.51 /CY*	*107,332*
						03.00.110 Dunnigan - CBD Discharge Structure, Concrete Coverang Walls	*114.00 CY*	*276.35 /CY*	*9.74 /CY*	*310.20 /CY*	*/CY*	*596.29 /CY*	*67,977*	*941.51 /CY*	*107,332*
		31.00.102				*Dunnigan - CBD Discharge Structure, Excavation and Backfill*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	10,660.00 CY	2.65 /CY	2.21 /CY	-	-	4.85 /CY	51,737	7.48 /CY	79,739
						Stockpile Excavated Spoils	10,660.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	30,244	4.39 /cy	46,806
						31.25.01.00 Earthworks, Structural, Excavation	*10,660.00 CY*	*3.89 /CY*	*3.56 /CY*	*0.25 /CY*	*/CY*	*7.69 /CY*	*81,982*	*11.87 /CY*	*126,545*
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	180.00 CY	12.50 /CY	0.76 /CY	35.00 /CY	-	48.26 /CY	8,686	76.91 /CY	13,844
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*180.00 CY*	*12.50 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*48.26 /CY*	*8,686*	*76.91 /CY*	*13,844*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, Native material	9,230.00 CY	6.18 /CY	1.15 /CY	0.00 /CY	-	7.33 /CY	67,693	11.30 /CY	104,331
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	7,330.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	12,072	2.54 /cy	18,605
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	1,900.00 cy	1.29 /cy	0.10 /cy	-	-	1.39 /cy	2,643	2.14 /cy	4,073
						Compaction, water for, 6000 gallon wagon, 6 mile haul	9,230.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	16,226	2.80 /cy	25,811
						31.25.03.00 Earthworks, Structural, Backfill	*9,230.00 CY*	*7.46 /CY*	*2.03 /CY*	*1.20 /CY*	*/CY*	*10.69 /CY*	*98,634*	*16.56 /CY*	*152,820*
					31.25.05.00	*Earthworks, Structural, Hauling and Disposal*									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	1,430.00 CY	7.24 /CY	6.00 /CY	-	-	13.24 /CY	18,928	20.40 /CY	29,172
						Load excavated spoils	1,430.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	2,571	2.77 /cy	3,962
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	*1,430.00 CY*	*8.27 /CY*	*6.77 /CY*	*/CY*	*/CY*	*15.03 /CY*	*21,499*	*23.17 /CY*	*33,134*
						31.25 Earthworks, Structural	*21,500.00 CY*	*5.78 /CY*	*3.09 /CY*	*0.93 /CY*	*/CY*	*9.81 /CY*	*210,800*	*15.18 /CY*	*326,343*
						31.0 Earthwork	*21,500.00 CY*	*5.78 /CY*	*3.09 /CY*	*0.93 /CY*	*/CY*	*9.81 /CY*	*210,800*	*15.18 /CY*	*326,343*
						31.00.102 Dunnigan - CBD Discharge Structure, Excavation and Backfill	*21,500.00 CY*	*5.78 /CY*	*3.09 /CY*	*0.93 /CY*	*/CY*	*9.81 /CY*	*210,800*	*15.18 /CY*	*326,343*
		33.00.108				*Dunnigan - CBD Discharge Structure, CBD Pipeline Connection*									
			33.2			*Pipeline Specialties*									
				33.11		*Pipeline Specialties*									
					33.10.99.01	*Buried Pipe Specials, Other*									
						Reducer, steel, butt weld, 9' x 7'	1.00 ea	3,281.57 /ea	900.00 /ea	16,600.00 /ea	-	20,781.57 /ea	20,782	33,232.51 /ea	33,233
						Reducer, steel, butt weld, 7' x 5'	2.00 ea	3,281.57 /ea	900.00 /ea	13,700.00 /ea	-	17,881.57 /ea	35,763	28,552.71 /ea	57,105
						Wye, steel, butt weld, 7' Dia	1.00 ea	4,375.42 /ea	1,200.00 /ea	23,900.00 /ea	-	29,475.42 /ea	29,475	47,160.89 /ea	47,161
						Elbow, 45 deg, steel, butt weld, 7' Dia	1.00 ea	3,281.57 /ea	900.00 /ea	13,200.00 /ea	-	17,381.57 /ea	17,382	27,745.86 /ea	27,746
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	3,000.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	13,235	6.80 /cy	20,398
						Pipe bedding and zone, CLSM	650.00 cy	4.52 /cy	0.71 /cy	35.00 /cy	-	40.23 /cy	26,151	64.54 /cy	41,954
						Backfill native material	2,460.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	19,363	12.13 /cy	29,843
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	540.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	8,659	24.71 /cy	13,346
						Load excavated spoils	540.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	873	2.49 /cy	1,346
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	2,460.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	4,996	3.13 /cy	7,699
						Compaction, water for, 6000 gallon wagon, 6 mile haul	2,460.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	4,560	2.94 /cy	7,242
						Piping, pipe, WSP, plain end, welded, 84" diameter, excludes excavation or backfill	13.00 lf	121.97 /lf	62.10 /lf	570.00 /lf	-	754.07 /lf	9,803	1,203.51 /lf	15,646
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	120.00 lf	121.97 /lf	62.10 /lf	420.00 /lf	-	604.07 /lf	72,488	961.45 /lf	115,374
						Erosion Controls Allowance	320.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	17,600	84.77 /lf	27,125
						Dewatering Allowance	1.38 msf	0.00 /msf	0.00 /msf	0.00 /msf	9,000.00 /msf	9,000.00 /msf	12,420	13,870.99 /msf	19,142
						33.10.99.01 Buried Pipe Specials, Other	***111.00*** *LF*	*586.06 /LF*	*305.09 /LF*	*1,482.99 /LF*	*270.45 /LF*	*2,644.59 /LF*	*293,550*	*4,183.42 /LF*	*464,360*
						33.11 Pipeline Specialties	***1.00*** *LS*	*65,053.08 /LS*	*33,864.82 /LS*	*164,612.00 /LS*	*30,020.00 /LS*	*293,549.90 /LS*	*293,550*	*464,359.74 /LS*	*464,360*
						33.2 Pipeline Specialties	***1.00*** *LS*	*65,053.08 /LS*	*33,864.82 /LS*	*164,612.00 /LS*	*30,020.00 /LS*	*293,549.90 /LS*	*293,550*	*464,359.74 /LS*	*464,360*
						33.00.108 Dunnigan - CBD Discharge Structure, CBD Pipeline Connection	***111.00*** *LF*	*586.06 /LF*	*305.09 /LF*	*1,482.99 /LF*	*270.45 /LF*	*2,644.59 /LF*	*293,550*	*4,183.42 /LF*	*464,360*
		33.00.110				*Dunnigan - CBD Discharge Structure, Above Grade Piping*									
			40.0			*Process Pipe*									
				40.11		*Process Pipe, Carbon Steel*									
					40.10.02.60	*Process Pipe, Carbon Steel, 60"*									
						Elbow, 45 deg, steel, butt weld, 60' Dia	4.00 ea	3,281.57 /ea	900.00 /ea	9,500.00 /ea	-	13,681.57 /ea	54,726	21,775.08 /ea	87,100
						Piping, pipe, WSP, plain end, welded, 60" diameter, excludes excavation or backfill	80.00 LF	121.97 /LF	62.10 /LF	420.00 /LF	-	604.07 /LF	48,325	961.45 /LF	76,916

Area	Facility	WorkActv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					40.10.02.60	*Process Pipe, Carbon Steel, 60"*									
						Isolation Valves	2.00 ea	2,187.72 /ea	1,560.00 /ea	32,000.00 /ea	-	35,747.72 /ea	71,495	57,415.16 /ea	114,830
						Energy Dissipating Valves W/ Hood	2.00 ea	2,187.72 /ea	1,560.00 /ea	25,000.00 /ea	-	28,747.72 /ea	57,495	46,119.09 /ea	92,238
						40.10.02.60 Process Pipe, Carbon Steel, 60"	*80.00 LF*	*395.44 /LF*	*185.10 /LF*	*2,320.00 /LF*	*/LF*	*2,900.53 /LF*	*232,042*	*4,638.56 /LF*	*371,085*
						40.11 Process Pipe, Carbon Steel	*80.00 LF*	*395.44 /LF*	*185.10 /LF*	*2,320.00 /LF*	*/LF*	*2,900.53 /LF*	*232,042*	*4,638.56 /LF*	*371,085*
						40.0 Process Pipe	*80.00 LF*	*395.44 /LF*	*185.10 /LF*	*2,320.00 /LF*	*/LF*	*2,900.53 /LF*	*232,042*	*4,638.56 /LF*	*371,085*
						33.00.110 Dunnigan - CBD Discharge Structure, Above Grade Piping	*80.00 LF*	*395.44 /LF*	*185.10 /LF*	*2,320.00 /LF*	*/LF*	*2,900.53 /LF*	*232,042*	*4,638.56 /LF*	*371,085*
						01.08 Dunnigan - CBD Discharge Structure	***4,258.00** SF*	[illegible] /SF	[illegible] /SF	[illegible] /SF	[illegible] /SF	[illegible] /SF	[illegible]	[illegible] /SF	[illegible]
						01 Dunnigan Pipelines - Alt 1 (CBD)	***19,718.00 LF***	***722.44 /LF***	***259.36 /LF***	***1,481.04 /LF***	***208.07 /LF***	***2,670.91 /LF***	***52,664,998***	***4,223.84 /LF***	***83,285,648***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	14,245,156		179,451.026 hrs	
Material	29,203,173			
Allowance	4,102,673			
Equipment	5,113,996		60,704.979 hrs	
Other				
Subtotal Direct Costs	52,664,998	52,664,998		
Material Sales Tax, Dunnigan Ca	2,117,230			7.250 %
Subtotal W/ Sales Tax	2,117,230	54,782,228		
General Conditions	2,739,111			5.000 %
Subtotal W/ General Conditions	2,739,111	57,521,339		
Mobilization/Demobilization	1,725,640			3.000 %
Prime Contractor Overhead	5,924,698			10.000 %
Prime Contractor Profit	3,910,301			6.000 %
Bonds & Insurance	1,499,079			2.170 %
Subtotal W/ Prime Markups	13,059,718	70,581,057		
Contractor Contingency	2,117,432			3.000 %
Design Contingency	10,587,159			15.000 %
Subtotal W/ Contingency	12,704,591	83,285,648		
Total Construction Cost		**83,285,648**		
Non-Contract Costs	14,991,417			18.000 %
Total Project Costs	**14,991,417**	**98,277,065**		

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Dunnigan Pipelines Alt 2 (Sac River)

Jacobs

SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Dunnigan Pipeline Alt 2 (Sac River)
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
02			***Dunnigan Pipelines - Alt 2 (Sac River)***									
	02.01		Dunnigan Pipeline - Sac River									
		32.00.002	Dunnigan Pipeline Access Road	6,029.00 SY	3.79 /SY	4.19 /SY	20.00 /SY	/SY	27.98 /SY	168,691	44.61 /SY	268,929
		33.00.100	Dunnigan Pipeline, Open Cut	47,644.00 LF	667.88 /LF	286.41 /LF	1,605.32 /LF	120.25 /LF	2,679.87 /LF	127,679,514	4,249.80 /LF	202,477,269
		33.00.102	Dunnigan Pipeline, Trenchless Pipe Installation, at I-5	540.00 LF	1,516.63 /LF	234.47 /LF	2,469.21 /LF	1,401.48 /LF	5,621.79 /LF	3,035,764	8,850.03 /LF	4,779,015
		33.00.104	Dunnigan Pipeline, Trenchless Pipe Installation, at Highway 99/Rail Road Crossing	440.00 LF	1,525.71 /LF	239.71 /LF	2,496.26 /LF	1,720.00 /LF	5,981.68 /LF	2,631,937	9,407.08 /LF	4,139,116
		33.00.106	Dunnigan Pipeline, Trenchless Pipe Installation, at CBD	840.00 LF	1,502.39 /LF	226.26 /LF	2,426.69 /LF	900.95 /LF	5,056.30 /LF	4,247,291	7,974.74 /LF	6,698,784
			02.01 Dunnigan Pipeline - Sac River	49,464.00 LF	699.41 /LF	284.92 /LF	1,639.07 /LF	161.73 /LF	2,785.12 /LF	137,763,197	4,414.59 /LF	218,363,113
	02.02		Dunnigan - TCC Intake Structure									
		01.00.100	Dunnigan - TCC Intake Structure, Removal and Control of Water	3.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	135,000	69,407.75 /MO	208,223
		02.00.100	Dunnigan - TCC Intake Structure, Partial Demolition of Existing Canal Lining	940.00 SF	2.05 /SF	0.58 /SF	1.06 /SF	/SF	3.70 /SF	3,476	5.78 /SF	5,434
		03.00.100	Dunnigan - TCC Intake Structure, Foundation Slab	271.00 CY	178.82 /CY	7.44 /CY	244.10 /CY	/CY	430.36 /CY	116,628	681.49 /CY	184,683
		03.00.102	Dunnigan - TCC Intake Structure, Concrete Walls	276.00 CY	444.94 /CY	9.74 /CY	390.40 /CY	/CY	845.08 /CY	233,241	1,331.75 /CY	367,562
		03.00.104	Dunnigan - TCC Intake Structure, Elevated Slab	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,345.91 /CY	19,179
		26.00.100	Dunnigan - TCC Intake Structure, Electrical	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.46 /SF	167,253
		31.00.100	Dunnigan - TCC Intake Structure, Excavation and Backfill	8,870.00 CY	5.77 /CY	2.96 /CY	1.21 /CY	/CY	9.94 /CY	88,181	15.42 /CY	136,787
		40.00.100	Dunnigan - TCC Intake Structure, Water Control Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,174.88 /EA	96,350
		40.90.100	Dunnigan - TCC Intake Structure, I&C	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.83 /SF	76,926
			02.02 Dunnigan - TCC Intake Structure	**3,524.00** SF	75.48 /SF	10.99 /SF	102.65 /SF	38.31 /SF	227.43 /SF	801,463	358.23 /SF	1,262,398
	02.03		Dunnigan - CBD Discharge Structure									
		01.00.200	Dunnigan - CBD Discharge Structure, Removal and Control of Water	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.74 /MO	138,815
		02.00.200	Dunnigan - CBD Discharge Structure, Partial Demolition of Existing Canal Lining	770.00 SF	1.64 /SF	0.49 /SF	0.97 /SF	/SF	3.11 /SF	2,391	4.86 /SF	3,742
		03.00.106	Dunnigan - CBD Discharge Structure, Foundation Slab	338.00 CY	181.52 /CY	6.96 /CY	245.19 /CY	/CY	433.67 /CY	146,581	686.67 /CY	232,094
		03.00.108	Dunnigan - CBD Discharge Structure, Concrete Walls	331.00 CY	429.78 /CY	9.75 /CY	383.61 /CY	/CY	823.13 /CY	272,457	1,297.41 /CY	429,441
		03.00.110	Dunnigan - CBD Discharge Structure, Concrete Coverging Walls	27.00 CY	333.06 /CY	9.81 /CY	346.67 /CY	/CY	689.53 /CY	18,617	1,089.66 /CY	29,394
		31.00.102	Dunnigan - CBD Discharge Structure, Excavation and Backfill	10,918.00 CY	5.80 /CY	3.09 /CY	1.02 /CY	/CY	9.90 /CY	108,108	15.35 /CY	167,549
		33.00.108	Dunnigan - CBD Discharge Structure, CBD Pipeline Connection	20.00 LF	1,322.81 /LF	540.23 /LF	832.70 /LF	200.00 /LF	2,895.73 /LF	57,915	4,526.73 /LF	90,535
		33.00.110	Dunnigan - CBD Discharge Structure, Above Grade Piping	55.00 LF	436.99 /LF	120.24 /LF	975.00 /LF	/LF	1,532.23 /LF	84,273	2,433.99 /LF	133,869
			02.03 Dunnigan - CBD Discharge Structure	**2,765.00** SF	118.50 /SF	20.75 /SF	108.98 /SF	34.00 /SF	282.22 /SF	780,341	443.20 /SF	1,225,440
	02.04		Dunnigan - Sac River Discharge Structure									
		01.00.202	Dunnigan - Sac River Discharge Structure, Removal and Control of Water	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.75 /MO	138,816
		03.00.112	Dunnigan - Sac River Discharge Structure, Foundation Slab	274.00 CY	183.10 /CY	7.37 /CY	244.11 /CY	/CY	434.59 /CY	119,076	688.00 /CY	188,512
		03.00.114	Dunnigan - Sac River Discharge Structure, Concrete Walls	912.00 CY	303.04 /CY	9.70 /CY	311.52 /CY	/CY	624.25 /CY	569,316	985.42 /CY	898,708
		03.00.116	Dunnigan - Sac River Discharge Structure, Discharge Pipes Support Wall	59.00 CY	444.44 /CY	8.92 /CY	363.45 /CY	/CY	816.81 /CY	48,192	1,286.19 /CY	75,885
		31.00.104	Dunnigan - Sac River Discharge Structure, Excavation and Backfill	10,390.00 CY	8.63 /CY	5.71 /CY	15.25 /CY	36.55 /CY	66.14 /CY	687,213	103.12 /CY	1,071,439
		33.00.112	Dunnigan - Sac River Discharge Structure, Above Grade Piping	1,450.00 LF	55.59 /LF	36.45 /LF	495.03 /LF	/LF	587.07 /LF	851,249	941.38 /LF	1,365,002
			02.04 Dunnigan - Sac River Discharge Structure	**1,848.00** SF	263.01 /SF	86.88 /SF	675.67 /SF	254.22 /SF	1,279.78 /SF	2,365,046	2,022.92 /SF	3,738,351
			02 Dunnigan Pipelines - Alt 2 (Sac River)	***49,464.00 LF***	***721.98 /LF***	***289.36 /LF***	***1,677.72 /LF***	***175.85 /LF***	***2,864.91 /LF***	***141,710,047***	***4,540.46 /LF***	***224,589,311***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	55,082,278		449,771.656 hrs	
Material	134,014,430			
Allowance	13,416,456			
Equipment	22,076,147		166,316.996 hrs	
Other				
Total Construction Cost	**224,589,311**	**224,589,311**		
Non-Contract Costs	40,426,076			18.000 %
Total Project Costs	**40,426,076**	**265,015,387**		

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Area	Facility	WorkActv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
02						***Dunnigan Pipelines - Alt 2 (Sac River)***									
	02.01					Dunnigan Pipeline - Sac River									
		32.00.002				*Dunnigan Pipeline Access Road*									
			32.0			*Exterior Improvements*									
				32.12		*Paving*									
					32.40.04.00	*Site Improvements, Access Roads, Gravel*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	6,029.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	5,876	1.50 /SY	9,063
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	1,350.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	8,516	9.73 /cy	13,135
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	675.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	10,824	24.73 /cy	16,695
						Load excavated spoils	675.00 cy	0.77 /cy	0.84 /cy		-	1.62 /cy	1,091	2.49 /cy	1,683
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,18"deep	6,029.00 sy	1.34 /sy	1.31 /sy	20.00 /sy	-	22.64 /sy	136,505	36.37 /sy	219,287
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	6,029.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	5,878	1.50 /sy	9,067
						32.40.04.00 Site Improvements, Access Roads, Gravel	*6,029.00 SY*	*3.79 /SY*	*4.19 /SY*	*20.00 /SY*	*/SY*	*27.98 /SY*	*168,691*	*44.61 /SY*	*268,929*
						32.12 Paving	*6,029.00 SY*	*3.79 /SY*	*4.19 /SY*	*20.00 /SY*	*/SY*	*27.98 /SY*	*168,691*	*44.61 /SY*	*268,929*
						32.0 Exterior Improvements	***1.00*** *LS*	*22,875.04 /LS*	*25,235.53 /LS*	*120,580.00 /LS*	*/LS*	*168,690.57 /LS*	*168,691*	*268,929.46 /LS*	*268,929*
						32.00.002 Dunnigan Pipeline Access Road	*6,029.00 SY*	*3.79 /SY*	*4.19 /SY*	*20.00 /SY*	*/SY*	*27.98 /SY*	*168,691*	*44.61 /SY*	*268,929*
		33.00.100				*Dunnigan Pipeline, Open Cut*									
			33.0			*Pipelines*									
				33.05		*Buried Process Pipe, Carbon Steel*									
					33.00.05.98	*Buried Pipe, Carbon Steel, 126"*									
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	1,291,795.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	5,699,044	6.80 /cy	8,790,174
						Trench Stabilization, Geotextile Wrapped	16,014.00 cy	5.50 /cy	2.25 /cy	40.00 /cy	-	47.75 /cy	764,620	76.54 /cy	1,225,786
						Pipe bedding and zone, CLSM	294,970.00 cy	4.52 /cy	0.71 /cy	35.00 /cy	-	40.23 /cy	11,867,356	64.59 /cy	19,052,630
						Backfill native material	952,220.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	7,495,139	12.14 /cy	11,560,461
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	339,575.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	5,445,213	24.73 /cy	8,398,667
						Load excavated spoils	339,575.00 cy	0.77 /cy	0.84 /cy	0.00 /cy	-	1.62 /cy	549,089	2.49 /cy	846,911
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	952,220.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	1,933,705	3.13 /cy	2,982,536
						Compaction, water for, 6000 gallon wagon, 6 mile haul	952,220.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	1,765,125	2.95 /cy	2,805,363
						Piping, WSP 0.5" Wt Polyurethand Coating Insitu Morter Lining, 126" diameter	47,644.00 LF	379.47 /LF	82.79 /LF	1,350.00 /LF	-	1,812.26 /LF	86,343,253	2,893.09 /LF	137,838,511
						Dewatering Allowance	786.13 msf	0.00 /msf	0.00 /msf	0.00 /msf	3,000.00 /msf	3,000.00 /msf	2,358,390	4,627.18 /msf	3,637,568
						Erosion Controls Allowance	47,644.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	2,620,420	84.83 /lf	4,041,721
						Surface Restorations Allowance	5,003.00 msf	0.00 /msf	0.00 /msf	0.00 /msf	150.00 /msf	150.00 /msf	750,450	231.36 /msf	1,157,490
						ARV, Complete	5.00 ea	2,500.91 /ea	520.00 /ea	3,500.00 /ea	0.00 /ea	6,520.91 /ea	32,605	10,311.57 /ea	51,558
						Blowoff, Complete	5.00 ea	2,500.91 /ea	520.00 /ea	8,000.00 /ea	0.00 /ea	11,020.91 /ea	55,105	17,578.59 /ea	87,893
						33.00.05.98 Buried Pipe, Carbon Steel, 126"	*47,644.00 LF*	*867.88 /LF*	*286.41 /LF*	*1,605.32 /LF*	*120.25 /LF*	*2,879.87 /LF*	*127,679,514*	*4,249.80 /LF*	*202,477,269*
						33.05 Buried Process Pipe, Carbon Steel	*47,644.00 LF*	*867.88 /LF*	*286.41 /LF*	*1,605.32 /LF*	*120.25 /LF*	*2,879.87 /LF*	*127,679,514*	*4,249.80 /LF*	*202,477,269*
						33.0 Pipelines	*47,644.00 LF*	*867.88 /LF*	*286.41 /LF*	*1,605.32 /LF*	*120.25 /LF*	*2,879.87 /LF*	*127,679,514*	*4,249.80 /LF*	*202,477,269*
						33.00.100 Dunnigan Pipeline, Open Cut	*47,644.00 LF*	*867.88 /LF*	*286.41 /LF*	*1,605.32 /LF*	*120.25 /LF*	*2,879.87 /LF*	*127,679,514*	*4,249.80 /LF*	*202,477,269*
		33.00.102				*Dunnigan Pipeline, Trenchless Pipe installation, at I-5*									
			33.0			*Pipelines*									
				33.60		*Trenchless Technology, Tunneling*									
					33.60.01.09	*Pipeline Specials, Tunneling, 126" Piping in 144" Casing*									
						Grout Annular Space Between Carrier Pipe and Casing	14,310.00 cf	9.30 /cf	0.43 /cf	0.95 /cf	-	10.68 /cf	152,816	16.54 /cf	236,689
						Final Surface Restoration Allowance	355.55 sy				13.50 /sy	13.50 /sy	4,800	20.82 /sy	7,403
						Excavating jacking and Receiving Pits, excludes sheeting or dewatering	1,660.00 cy	2.65 /cy	2.21 /cy	-	-	4.85 /cy	8,057	7.49 /cy	12,427
						Jacking and Receiving Pits Shoring, SF of Pit Walls	5,600.00 sf				45.00 /sf	45.00 /sf	252,000	69.41 /sf	388,683
						Backfill Pits, Native material	680.00 cy	6.18 /cy	1.15 /cy		-	7.33 /cy	4,987	11.31 /cy	7,692
						Pipe bedding and zone in pits, CLSM	878.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	66,054	121.11 /cy	106,337
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	3,242.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	42,912	20.42 /cy	66,187
						Load excavated spoils	3,242.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	5,829	2.77 /cy	8,990
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	680.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	1,120	2.54 /cy	1,727
						Compaction, water for, 6000 gallon wagon, 6 mile haul	680.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	1,195	2.80 /cy	1,903
						Horizontal boring, roadwork, 144" diameter casing, includes casing only, 100' minimum, excludes jacking pits or dewatering	540.00 lf	596.42 /lf	142.23 /lf	875.00 /lf	-	1,613.65 /lf	871,369	2,552.32 /lf	1,378,251
						Carrier Pipe Spacers	112.00 ea	14.91 /ea	4.74 /ea	500.00 /ea		519.65 /ea	56,201	837.76 /ea	93,829
						Piping, WSP 0.5" Wt Polyurethand Coating Insitu Morter Lining, 126" diameter	540.00 LF	596.41 /LF	28.45 /LF	1,350.00 /LF	-	1,974.86 /LF	1,066,424	3,143.89 /LF	1,697,700
						Dewatering Allowance	1.00 ls				500,000.00 /ls	500,000.00 /ls	500,000	771,197.22 /ls	771,197
						33.60.01.09 Pipeline Specials, Tunneling, 126" Piping in 144" Casing	*540.00 LF*	*1,516.63 /LF*	*234.47 /LF*	*2,469.21 /LF*	*1,401.48 /LF*	*5,621.79 /LF*	*3,035,764*	*8,850.03 /LF*	*4,779,015*
						33.60 Trenchless Technology, Tunneling	*540.00 LF*	*1,516.63 /LF*	*234.47 /LF*	*2,469.21 /LF*	*1,401.48 /LF*	*5,621.79 /LF*	*3,035,764*	*8,850.03 /LF*	*4,779,015*
						33.0 Pipelines	*540.00 LF*	*1,516.63 /LF*	*234.47 /LF*	*2,469.21 /LF*	*1,401.48 /LF*	*5,621.79 /LF*	*3,035,764*	*8,850.03 /LF*	*4,779,015*
						33.00.102 Dunnigan Pipeline, Trenchless Pipe Installation, at I-5	*540.00 LF*	*1,516.63 /LF*	*234.47 /LF*	*2,469.21 /LF*	*1,401.48 /LF*	*5,621.79 /LF*	*3,035,764*	*8,850.03 /LF*	*4,779,015*
		33.00.104				*Dunnigan Pipeline, Trenchless Pipe installation, at Highway 99/Rail Road Crossing*									
			33.0			*Pipelines*									
				33.60		*Trenchless Technology, Tunneling*									
					33.60.01.09	*Pipeline Specials, Tunneling, 126" Piping in 144" Casing*									
						Grout Annular Space Between Carrier Pipe and Casing	11,660.00 cf	9.30 /cf	0.43 /cf	0.95 /cf	-	10.68 /cf	124,517	16.54 /cf	192,858
						Final Surface Restoration Allowance	355.55 sy				13.50 /sy	13.50 /sy	4,800	20.82 /sy	7,403
						Excavating jacking and Receiving Pits, excludes sheeting or dewatering	1,660.00 cy	2.65 /cy	2.21 /cy	-	-	4.85 /cy	8,057	7.49 /cy	12,427
						Jacking and Receiving Pits Shoring, SF of Pit Walls	5,600.00 sf				45.00 /sf	45.00 /sf	252,000	69.41 /sf	388,683
						Backfill Pits, Native material	680.00 cy	6.18 /cy	1.15 /cy		-	7.33 /cy	4,987	11.31 /cy	7,692
						Pipe bedding and zone in pits, CLSM	878.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	66,054	121.11 /cy	106,337
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	2,824.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	37,379	20.42 /cy	57,653
						Load excavated spoils	2,824.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	5,077	2.77 /cy	7,831
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	680.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	1,120	2.54 /cy	1,727
						Compaction, water for, 6000 gallon wagon, 6 mile haul	680.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	1,195	2.80 /cy	1,903
						Horizontal boring, roadwork, 144" diameter casing, includes casing only, 100' minimum, excludes jacking pits or dewatering	440.00 lf	596.42 /lf	142.23 /lf	875.00 /lf	-	1,613.65 /lf	710,004	2,552.32 /lf	1,123,019
						Carrier Pipe Spacers	92.00 ea	14.91 /ea	4.74 /ea	500.00 /ea		519.65 /ea	47,808	837.76 /ea	77,074
						Piping, WSP 0.5" Wt Polyurethand Coating Insitu Morter Lining, 126" diameter	440.00 LF	596.41 /LF	28.45 /LF	1,350.00 /LF	-	1,974.86 /LF	868,938	3,143.89 /LF	1,383,311
						Dewatering Allowance	1.00 ls				500,000.00 /ls	500,000.00 /ls	500,000	771,197.25 /ls	771,197
						33.60.01.09 Pipeline Specials, Tunneling, 126" Piping in 144" Casing	*440.00 LF*	*1,525.71 /LF*	*239.71 /LF*	*2,496.26 /LF*	*1,720.00 /LF*	*5,981.68 /LF*	*2,631,937*	*9,407.08 /LF*	*4,139,116*
						33.60 Trenchless Technology, Tunneling	*440.00 LF*	*1,525.71 /LF*	*239.71 /LF*	*2,496.26 /LF*	*1,720.00 /LF*	*5,981.68 /LF*	*2,631,937*	*9,407.08 /LF*	*4,139,116*
						33.0 Pipelines	*440.00 LF*	*1,525.71 /LF*	*239.71 /LF*	*2,496.26 /LF*	*1,720.00 /LF*	*5,981.68 /LF*	*2,631,937*	*9,407.08 /LF*	*4,139,116*
						33.00.104 Dunnigan Pipeline, Trenchless Pipe Installation, at Highway 99/Rail Road Crossing	*440.00 LF*	*1,525.71 /LF*	*239.71 /LF*	*2,496.26 /LF*	*1,720.00 /LF*	*5,981.68 /LF*	*2,631,937*	*9,407.08 /LF*	*4,139,116*

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
		33.00.106				*Dunnigan Pipeline, Trenchless Pipe Installation, at CBD*									
			33.0			*Pipelines*									
				33.60		*Trenchless Technology, Tunneling*									
					33.60.01.09	*Pipeline Specials, Tunneling, 126" Piping in 144" Casing*									
						Grout Annular Space Between Carrier Pipe and Casing	22,260.00 cf	9.30 /cf	0.43 /cf	0.95 /cf	-	10.68 /cf	237,715	16.54 /cf	368,183
						Final Surface Restoration Allowance	355.55 sy				13.50 /sy	13.50 /sy	4,800	20.82 /sy	7,403
						Excavating jacking and Receiving Pits, excludes sheeting or dewatering	1,660.00 cy	2.65 /cy	2.21 /cy	-	-	4.85 /cy	8,057	7.49 /cy	12,427
						Jacking and Receiving Pits Shoring, SF of Pit Walls	5,600.00 sf				45.00 /sf	45.00 /sf	252,000	69.41 /sf	388,683
						Backfill Pits, Native material	680.00 cy	6.18 /cy	1.15 /cy		-	7.33 /cy	4,987	11.31 /cy	7,692
						Pipe bedding and zone in pits, CLSM	878.00 cy	4.52 /cy	0.71 /cy	70.00 /cy	-	75.23 /cy	66,054	121.11 /cy	106,337
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	4,499.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	59,550	20.42 /cy	91,849
						Load excavated spoils	4,499.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	8,089	2.77 /cy	12,476
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	680.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	1,120	2.54 /cy	1,727
						Compaction, water for, 6000 gallon wagon, 6 mile haul	680.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	1,195	2.80 /cy	1,903
						Horizontal boring, roadwork, 144" diameter casing, includes casing only, 100' minimum, excludes jacking pits or dewatering	840.00 lf	596.42 /lf	142.23 /lf	875.00 /lf	-	1,613.65 /lf	1,355,463	2,552.32 /lf	2,143,946
						Carrier Pipe Spacers	172.00 ea	14.91 /ea	4.74 /ea	500.00 /ea	0.00 /ea	519.65 /ea	89,380	837.76 /ea	144,094
						Piping, WSP 0.5" Wt Polyurethand Coating Insitu Morter Lining, 126" diameter	840.00 LF	596.41 /LF	28.45 /LF	1,350.00 /LF	-	1,974.86 /LF	1,658,882	3,143.89 /LF	2,640,866
						Dewatering Allowance	1.00 ls				500,000.00 /ls	500,000.00 /ls	500,000	771,197.23 /ls	771,197
						33.60.01.09 Pipeline Specials, Tunneling, 126" Piping in 144" Casing	*840.00 LF*	*1,502.39 /LF*	*226.26 /LF*	*2,426.69 /LF*	*900.95 /LF*	*5,056.30 /LF*	*4,247,291*	*7,974.74 /LF*	*6,698,784*
						33.60 Trenchless Technology, Tunneling	*840.00 LF*	*1,502.39 /LF*	*226.26 /LF*	*2,426.69 /LF*	*900.95 /LF*	*5,056.30 /LF*	*4,247,291*	*7,974.74 /LF*	*6,698,784*
						33.0 Pipelines	*840.00 LF*	*1,502.39 /LF*	*226.26 /LF*	*2,426.69 /LF*	*900.95 /LF*	*5,056.30 /LF*	*4,247,291*	*7,974.74 /LF*	*6,698,784*
						33.00.106 Dunnigan Pipeline, Trenchless Pipe Installation, at CBD	*840.00 LF*	*1,502.39 /LF*	*226.26 /LF*	*2,426.69 /LF*	*900.95 /LF*	*5,056.30 /LF*	*4,247,291*	*7,974.74 /LF*	*6,698,784*
						02.03 Dunnigan Pipeline - Sac River	49,464.90 LF	689.41 /LF	284.92 /LF	1,639.97 /LF	181.75 /LF	2,785.12 /LF	137,765,137	4,413.59 /LF	219,363,115
	02.93					Dunnigan - TCC Intake Structure									
		01.00.100				*Dunnigan - TCC Intake Structure, Removal and Control of Water*									
			01.0			*General Requirements*									
				01.01		*Construction Operations*									
					31.15.02.00	*Dewatering*									
						TCC Intake Structure, Removal and Control of Water	3.00 MO		-		45,000.00 /MO	45,000.00 /MO	135,000	69,407.75 /MO	208,223
						31.15.02.00 Dewatering	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,407.75 /MO*	*208,223*
						01.01 Construction Operations	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,407.75 /MO*	*208,223*
						01.0 General Requirements	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,407.75 /MO*	*208,223*
						01.00.100 Dunnigan - TCC Intake Structure, Removal and Control of Water	*3.00 MO*	*/MO*	*/MO*	*/MO*	*45,000.00 /MO*	*45,000.00 /MO*	*135,000*	*69,407.75 /MO*	*208,223*
		02.00.100				*Dunnigan - TCC Intake Structure, Partial Demolition of Existing Canal Lining*									
			02.0			*Existing Conditions*									
				02.40		*Demolition*									
					02.01.01.00	*General Site Demolition*									
						Patial Demolition of Existing Canal Lining	940.00 SF	1.79 /SF	0.37 /SF	1.06 /SF	-	3.22 /SF	3,025	5.04 /SF	4,738
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	30.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	397	20.42 /cy	612
						Load excavated spoils	30.00 cy	1.03 /cy	0.77 /cy		-	1.80 /cy	54	2.77 /cy	83
						02.01.01.00 General Site Demolition	*940.00 SF*	*2.05 /SF*	*0.58 /SF*	*1.06 /SF*	*/SF*	*3.70 /SF*	*3,476*	*5.78 /SF*	*5,434*
						02.40 Demolition	*940.00 SF*	*2.05 /SF*	*0.58 /SF*	*1.06 /SF*	*/SF*	*3.70 /SF*	*3,476*	*5.78 /SF*	*5,434*
						02.0 Existing Conditions	*940.00 SF*	*2.05 /SF*	*0.58 /SF*	*1.06 /SF*	*/SF*	*3.70 /SF*	*3,476*	*5.78 /SF*	*5,434*
						02.00.100 Dunnigan - TCC Intake Structure, Partial Demolition of Existing Canal Lining	*940.00 SF*	*2.05 /SF*	*0.58 /SF*	*1.06 /SF*	*/SF*	*3.70 /SF*	*3,476*	*5.78 /SF*	*5,434*
		03.00.100				*Dunnigan - TCC Intake Structure, Foundation Slab*									
			03.0			*Concrete Work*									
				03.18		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.24	*Cast-In-Place Concrete, Slabs on Grade, 24" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	550.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	4,859	13.70 /sfca	7,534
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	23.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	61,060	4,052.41 /ton	96,245
						Reinforcing in place, unloading & sorting, add to above - slabs	23.75 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	1,323	85.92 /ton	2,041
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	280.00 cy	-	-	131.00 /cy	-	131.00 /cy	36,680	211.55 /cy	59,234
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	271.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	7,859	44.73 /CY	12,122
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	3,524.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	3,301	1.44 /sf	5,091
						Curing, sprayed membrane curing compound	35.24 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	812	36.45 /csf	1,285
						Fine grading, fine grade for slab on grade, machine	391.56 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	734	2.89 /sy	1,132
						03.10.05.24 Cast-In-Place Concrete, Slabs on Grade, 24" thick	*271.00 CY*	*178.82 /CY*	*7.44 /CY*	*244.10 /CY*	*/CY*	*430.36 /CY*	*116,628*	*681.49 /CY*	*184,683*
						03.18 Cast-In-Place Concrete, Slabs on Grade	*271.00 CY*	*178.82 /CY*	*7.44 /CY*	*244.10 /CY*	*/CY*	*430.36 /CY*	*116,628*	*681.49 /CY*	*184,683*
						03.0 Concrete Work	*271.00 CY*	*178.82 /CY*	*7.44 /CY*	*244.10 /CY*	*/CY*	*430.36 /CY*	*116,628*	*681.49 /CY*	*184,683*
						03.00.100 Dunnigan - TCC Intake Structure, Foundation Slab	*271.00 CY*	*178.82 /CY*	*7.44 /CY*	*244.10 /CY*	*/CY*	*430.36 /CY*	*116,628*	*681.49 /CY*	*184,683*
		03.00.102				*Dunnigan - TCC Intake Structure, Concrete Walls*									
			03.0			*Concrete Work*									
				03.20		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.24	*Cast-In-Place Concrete, Straight Walls, 24" thick*									
						C.I.P. concrete forms, wall, box out for opening, to 16" thick, over 10 S.F. (use perimeter), includes erecting, bracing, stripping and cleaning	30.00 lf	23.48 /lf	-	2.45 /lf	-	25.93 /lf	778	40.17 /lf	1,205
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	7,440.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	109,647	23.13 /sfca	172,059
						Form oil, coverage varies greatly, maximum, includes material only	20.00 gal	-	-	23.50 /gal	-	23.50 /gal	470	37.95 /gal	759
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	24.25 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	62,345	4,052.41 /ton	96,271
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	24.25 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,351	85.92 /ton	2,084
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	24.25 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	1,468	93.39 /ton	2,265
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	285.00 cy	-	-	131.00 /cy	-	131.00 /cy	37,335	211.55 /cy	60,292
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	276.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	12,340	68.96 /CY	19,033
						Finishing: break ties & patch voids (walls, cols or beams)	7,440.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	7,507	1.56 /sf	11,595
						03.10.06.24 Cast-In-Place Concrete, Straight Walls, 24" thick	*276.00 CY*	*444.94 /CY*	*9.74 /CY*	*390.40 /CY*	*/CY*	*845.08 /CY*	*233,241*	*1,331.75 /CY*	*367,562*
						03.20 Cast-In-Place Concrete, Straight Walls	*276.00 CY*	*444.94 /CY*	*9.74 /CY*	*390.40 /CY*	*/CY*	*845.08 /CY*	*233,241*	*1,331.75 /CY*	*367,562*
						03.0 Concrete Work	*276.00 CY*	*444.94 /CY*	*9.74 /CY*	*390.40 /CY*	*/CY*	*845.08 /CY*	*233,241*	*1,331.75 /CY*	*367,562*
						03.00.102 Dunnigan - TCC Intake Structure, Concrete Walls	*276.00 CY*	*444.94 /CY*	*9.74 /CY*	*390.40 /CY*	*/CY*	*845.08 /CY*	*233,241*	*1,331.75 /CY*	*367,562*
		03.00.104				*Dunnigan - TCC Intake Structure, Elevated Slab*									
			03.0			*Concrete Work*									
				03.24		*Cast-In-Place Concrete, Elevated Slabs*									

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					03.10.10.14	Cast-In-Place Concrete, Elevated Decks, 14" thick									
						Slab shoring	3,250.00 cf	0.64 /cf	-	0.05 /cf	-	0.69 /cf	2,225	1.06 /cf	3,444
						C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	325.00 sf	7.55 /sf	-	1.33 /sf	-	8.88 /sf	2,885	13.79 /sf	4,481
						C.I.P. concrete forms, elevated slab, edge forms, to 6" high, 4 use, includes shoring, erecting, bracing, stripping and cleaning	145.00 lf	5.41 /lf	-	0.22 /lf	-	5.63 /lf	817	8.70 /lf	1,262
						Reinforcing Steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	1.25 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	3,214	4,052.42 /ton	5,066
						Reinforcing in place, unloading & sorting, add to above - decks	1.25 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	70	85.90 /ton	107
						Reinforcing steel, crane cost for handling, maximum, add	1.25 ton	140.59 /ton	18.56 /ton	-	-	159.15 /ton	199	245.48 /ton	307
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	14.75 cy	-	-	131.00 /cy	-	131.00 /cy	1,932	211.55 /cy	3,120
						Structural concrete, placing, elevated slab, pumped, over 10" thick, includes strike off & consolidation, excludes material	14.25 CY	24.11 /CY	5.70 /CY	-	-	29.81 /CY	425	45.97 /CY	655
						Finishing elev slab, bull float, manual float & manual steel trowel	325.00 sf	1.23 /sf	-	-	-	1.23 /sf	401	1.90 /sf	619
						Curing, sprayed membrane curing compound, elevated decks	3.25 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	75	36.45 /csf	118
						03.10.10.14 Cast-In-Place Concrete, Elevated Decks, 14" thick	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,345.91 /CY	19,179
						03.24 Cast-In-Place Concrete, Elevated Slabs	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,345.91 /CY	19,179
						03.0 Concrete Work	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,345.91 /CY	19,179
						03.00.104 Dunnigan - TCC Intake Structure, Elevated Slab	14.25 CY	563.51 /CY	7.90 /CY	287.67 /CY	/CY	859.09 /CY	12,242	1,345.91 /CY	19,179
		26.00.100				Dunnigan - TCC Intake Structure, Electrical									
			26.0			Electrical Work									
				26.00		Electrical									
					26.00.99.00	Electrical, Other									
						Electrical Allowance	1.00 LS	19,782.96 /LS	2,800.00 /LS	82,000.00 /LS	-	104,582.96 /LS	104,583	167,253.19 /LS	167,253
						26.00.99.00 Electrical, Other	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.46 /SF	167,253
						26.00 Electrical	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.46 /SF	167,253
						26.0 Electrical Work	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.46 /SF	167,253
						26.00.100 Dunnigan - TCC Intake Structure, Electrical	**3,524.00** SF	5.61 /SF	0.80 /SF	23.27 /SF	/SF	29.68 /SF	104,583	47.46 /SF	167,253
		31.00.100				Dunnigan - TCC Intake Structure, Excavation and Backfill									
			31.0			Earthwork									
				31.25		Earthworks, Structural									
					31.25.01.00	Earthworks, Structural, Excavation									
						Structural Excavation, excludes sheeting or dewatering	4,360.00 CY	2.65 /CY	2.21 /CY	-	-	4.85 /CY	21,161	7.49 /CY	32,638
						Stockpile Excavated Spoils	3,780.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	10,725	4.39 /cy	16,610
						31.25.01.00 Earthworks, Structural, Excavation	4,360.00 CY	3.72 /CY	3.36 /CY	0.22 /CY	/CY	7.31 /CY	31,885	11.30 /CY	49,248
					31.25.02.00	Earthworks, Structural, Import Aggregates (Slab)									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	150.00 CY	12.50 /CY	0.76 /CY	35.00 /CY	-	48.26 /CY	7,238	76.97 /CY	11,545
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	150.00 CY	12.50 /CY	0.76 /CY	35.00 /CY	/CY	48.26 /CY	7,238	76.97 /CY	11,545
					31.25.03.00	Earthworks, Structural, Backfill									
						Backfill, Native material	3,780.00 CY	6.18 /CY	1.15 /CY		-	7.33 /CY	27,723	11.31 /CY	42,759
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	2,780.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	4,578	2.54 /cy	7,062
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	1,000.00 cy	1.29 /cy	0.10 /cy	-	-	1.39 /cy	1,391	2.15 /cy	2,145
						Compaction, water for, 6000 gallon wagon, 6 mile haul	3,780.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	6,645	2.80 /cy	10,578
						31.25.03.00 Earthworks, Structural, Backfill	3,780.00 CY	7.48 /CY	1.99 /CY	1.20 /CY	/CY	10.67 /CY	40,337	16.55 /CY	62,545
					31.25.05.00	Earthworks, Structural, Hauling and Disposal									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	580.00 CY	7.24 /CY	6.00 /CY	-	-	13.24 /CY	7,677	20.42 /CY	11,841
						Load excavated spoils	580.00 cy	1.03 /cy	0.77 /cy		-	1.80 /cy	1,043	2.77 /cy	1,608
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	580.00 CY	8.27 /CY	6.77 /CY	/CY	/CY	15.03 /CY	8,720	23.19 /CY	13,449
						31.25 Earthworks, Structural	8,870.00 CY	5.77 /CY	2.96 /CY	1.21 /CY	/CY	9.94 /CY	88,181	15.42 /CY	136,787
						31.0 Earthwork	8,870.00 CY	5.77 /CY	2.96 /CY	1.21 /CY	/CY	9.94 /CY	88,181	15.42 /CY	136,787
						31.00.100 Dunnigan - TCC Intake Structure, Excavation and Backfill	8,870.00 CY	5.77 /CY	2.96 /CY	1.21 /CY	/CY	9.94 /CY	88,181	15.42 /CY	136,787
		40.00.100				Dunnigan - TCC Intake Structure, Water Control Gates									
			46.0			Water and Wastewater Equipment									
				40.55		Water Control Gates, Other Gates									
					40.30.06.01	Other Gates									
						Furnish and Install Water Control Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	-	30,058.71 /EA	60,117	48,174.88 /EA	96,350
						40.30.06.01 Other Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,174.88 /EA	96,350
						40.55 Water Control Gates, Other Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,174.88 /EA	96,350
						46.0 Water and Wastewater Equipment	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,174.88 /EA	96,350
						40.00.100 Dunnigan - TCC Intake Structure, Water Control Gates	2.00 EA	3,605.56 /EA	1,453.15 /EA	25,000.00 /EA	/EA	30,058.71 /EA	60,117	48,174.88 /EA	96,350
		40.90.100				Dunnigan - TCC Intake Structure, I&C									
			40.9			Instrumentation & Controls									
				40.90		Instrumentation & Controls									
					40.90.99.01	I&C, Other									
						I&C Allowance	1.00 LS	6,594.32 /LS	1,400.00 /LS	40,000.00 /LS	-	47,994.32 /LS	47,994	76,926.17 /LS	76,926
						40.90.99.01 I&C, Other	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.83 /SF	76,926
						40.90 Instrumentation & Controls	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.83 /SF	76,926
						40.9 Instrumentation & Controls	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.83 /SF	76,926
						40.90.100 Dunnigan - TCC Intake Structure, I&C	**3,524.00** SF	1.87 /SF	0.40 /SF	11.35 /SF	/SF	13.62 /SF	47,994	21.83 /SF	76,926
						02.02 Dunnigan - TCC Intake Structure	**3,524.00** SF	75.38 /SF	10.39 /SF	102.85 /SF	38.31 /SF	227.43 /SF	801,465	355.35 /SF	1,252,398
	02.03					Dunnigan - CBD Discharge Structure									
		01.00.200				Dunnigan - CBD Discharge Structure, Removal and Control of Water									
			01.0			General Requirements									
				01.01		Construction Operations									
					31.15.02.00	Dewatering									
						CBD Discharge Structure, Removal and Control of Water	2.00 MO		-		45,000.00 /MO	45,000.00 /MO	90,000	69,407.74 /MO	138,815
						31.15.02.00 Dewatering	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.74 /MO	138,815
						01.01 Construction Operations	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.74 /MO	138,815
						01.0 General Requirements	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.74 /MO	138,815
						01.00.200 Dunnigan - CBD Discharge Structure, Removal and Control of Water	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.74 /MO	138,815
		02.00.200				Dunnigan - CBD Discharge Structure, Partial Demolition of Existing Canal Lining									
			02.0			Existing Conditions									
				02.40		Demolition									
					02.01.01.00	General Site Demolition									
						Partial Demolition of Existing Canal Lining	770.00 SF	1.38 /SF	0.28 /SF	0.97 /SF	-	2.64 /SF	2,030	4.14 /SF	3,186
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	24.00 cy	7.24 /cy	6.00 /cy	-	-	13.24 /cy	318	20.42 /cy	490
						Load excavated spoils	24.00 cy	1.03 /cy	0.77 /cy		-	1.80 /cy	43	2.77 /cy	67
						02.01.01.00 General Site Demolition	770.00 SF	1.64 /SF	0.49 /SF	0.97 /SF	/SF	3.11 /SF	2,391	4.86 /SF	3,742
						02.40 Demolition	770.00 SF	1.64 /SF	0.49 /SF	0.97 /SF	/SF	3.11 /SF	2,391	4.86 /SF	3,742
						02.0 Existing Conditions	770.00 SF	1.64 /SF	0.49 /SF	0.97 /SF	/SF	3.11 /SF	2,391	4.86 /SF	3,742
						02.00.200 Dunnigan - CBD Discharge Structure, Partial Demolition of Existing Canal Lining	770.00 SF	1.64 /SF	0.49 /SF	0.97 /SF	/SF	3.11 /SF	2,391	4.86 /SF	3,742
		03.00.106				Dunnigan - CBD Discharge Structure, Foundation Slab									

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Area	Facility	WorkActv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
			03.0			*Concrete Work*									
				03.15		*Cast-In-Place Concrete, Slabs on Grade*									
					03.10.05.36	*Cast-In-Place Concrete, Slabs on Grade, 36" thick*									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	972.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	8,588	13.70 /sfca	13,314
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	30.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	77,128	4,052.41 /ton	121,572
						Reinforcing in place, unloading & sorting, add to above - slabs	30.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,671	85.92 /ton	2,578
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	348.00 cy	-	-	131.00 /cy	-	131.00 /cy	45,588	211.55 /cy	73,620
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	338.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	9,802	44.73 /CY	15,119
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	2,765.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	2,590	1.44 /sf	3,995
						Curing, sprayed membrane curing compound	27.65 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	637	36.45 /csf	1,008
						Fine grading, fine grade for slab on grade, machine	307.22 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	576	2.89 /sy	888
						03.10.05.36 Cast-In-Place Concrete, Slabs on Grade, 36" thick	*338.00 CY*	*181.52 /CY*	*6.96 /CY*	*245.19 /CY*	*/CY*	*433.67 /CY*	*146,581*	*686.67 /CY*	*232,094*
						03.15 Cast-In-Place Concrete, Slabs on Grade	*338.00 CY*	*181.52 /CY*	*6.96 /CY*	*245.19 /CY*	*/CY*	*433.67 /CY*	*146,581*	*686.67 /CY*	*232,094*
						03.0 Concrete Work	*338.00 CY*	*181.52 /CY*	*6.96 /CY*	*245.19 /CY*	*/CY*	*433.67 /CY*	*146,581*	*686.67 /CY*	*232,094*
						03.00.106 Dunnigan - CBD Discharge Structure, Foundation Slab	*338.00 CY*	*181.52 /CY*	*6.96 /CY*	*245.19 /CY*	*/CY*	*433.67 /CY*	*146,581*	*686.67 /CY*	*232,094*
		03.00.108				*Dunnigan - CBD Discharge Structure, Concrete Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.24	*Cast-In-Place Concrete, Straight Walls, 24" thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	8,206.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	120,936	23.13 /sfca	189,774
						Form oil, coverage varies greatly, maximum, includes material only	22.00 gal	-	-	23.50 /gal	-	23.50 /gal	517	37.95 /gal	835
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	26.75 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	68,773	4,052.41 /ton	108,402
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	26.75 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,490	85.92 /ton	2,298
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	26.75 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	1,620	93.39 /ton	2,498
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	314.00 cy	-	-	131.00 /cy	-	131.00 /cy	41,134	211.55 /cy	66,427
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	304.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	13,592	68.96 /CY	20,964
						Finishing: break ties & patch voids (walls, cols or beams)	8,206.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	8,280	1.56 /sf	12,788
						03.10.06.24 Cast-In-Place Concrete, Straight Walls, 24" thick	*304.00 CY*	*442.96 /CY*	*9.74 /CY*	*390.53 /CY*	*/CY*	*843.23 /CY*	*256,341*	*1,328.80 /CY*	*403,958*
					03.10.06.91	*Cast-In-Place Concrete, Straight Walls, 5' thick*									
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	286.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	4,215	23.13 /sfca	6,614
						Form oil, coverage varies greatly, maximum, includes material only	0.80 gal	-	-	23.50 /gal	-	23.50 /gal	19	37.96 /gal	30
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	2.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	6,427	4,052.41 /ton	10,131
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	2.50 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	139	85.92 /ton	215
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	2.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	151	93.39 /ton	233
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	28.00 cy	-	-	131.00 /cy	-	131.00 /cy	3,668	211.55 /cy	5,923
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	27.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	1,207	68.96 /CY	1,862
						Finishing: break ties & patch voids (walls, cols or beams)	286.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	289	1.56 /sf	446
						03.10.06.91 Cast-In-Place Concrete, Straight Walls, 5' thick	*27.00 CY*	*281.36 /CY*	*8.81 /CY*	*305.71 /CY*	*/CY*	*596.87 /CY*	*16,115*	*942.77 /CY*	*25,455*
						03.30 Cast-In-Place Concrete, Straight Walls	*331.00 CY*	*429.78 /CY*	*9.75 /CY*	*383.61 /CY*	*/CY*	*823.13 /CY*	*272,457*	*1,297.41 /CY*	*429,441*
						03.0 Concrete Work	*331.00 CY*	*429.78 /CY*	*9.75 /CY*	*383.61 /CY*	*/CY*	*823.13 /CY*	*272,457*	*1,297.41 /CY*	*429,441*
						03.00.108 Dunnigan - CBD Discharge Structure, Concrete Walls	*331.00 CY*	*429.78 /CY*	*9.75 /CY*	*383.61 /CY*	*/CY*	*823.13 /CY*	*272,457*	*1,297.41 /CY*	*429,441*
		03.00.110				*Dunnigan - CBD Discharge Structure, Concrete Coverging Walls*									
			03.0			*Concrete Work*									
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.99	*Cast-In-Place Concrete, Straight Walls, Other*									
						Concrete surface treatment, bonding agent, epoxy resin, 80 S.F. per gallon, 4 gallon case, includes material only	5.25 gal	-	-	69.00 /gal	-	69.00 /gal	362	111.42 /gal	585
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	420.00 sfca	9.34 /sfca	-	5.45 /sfca	-	14.79 /sfca	6,210	23.20 /sfca	9,744
						Form oil, coverage varies greatly, maximum, includes material only	1.20 gal	-	-	23.50 /gal	-	23.50 /gal	28	37.96 /gal	46
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	2.50 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	6,427	4,052.40 /ton	10,131
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	2.50 ton	49.21 /ton	6.50 /ton	-	-	55.70 /ton	139	85.92 /ton	215
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	2.50 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	151	93.39 /ton	233
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	28.00 cy	-	-	131.00 /cy	-	131.00 /cy	3,668	211.55 /cy	5,923
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	27.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	1,207	68.96 /CY	1,862
						Finishing: break ties & patch voids (walls, cols or beams)	420.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	424	1.56 /sf	655
						03.10.06.99 Cast-In-Place Concrete, Straight Walls, Other	*27.00 CY*	*333.06 /CY*	*9.81 /CY*	*346.67 /CY*	*/CY*	*689.53 /CY*	*18,617*	*1,088.66 /CY*	*29,394*
						03.30 Cast-In-Place Concrete, Straight Walls	*27.00 CY*	*333.06 /CY*	*9.81 /CY*	*346.67 /CY*	*/CY*	*689.53 /CY*	*18,617*	*1,088.66 /CY*	*29,394*
						03.0 Concrete Work	*27.00 CY*	*333.06 /CY*	*9.81 /CY*	*346.67 /CY*	*/CY*	*689.53 /CY*	*18,617*	*1,088.66 /CY*	*29,394*
						03.00.110 Dunnigan - CBD Discharge Structure, Concrete Coverging Walls	*27.00 CY*	*333.06 /CY*	*9.81 /CY*	*346.67 /CY*	*/CY*	*689.53 /CY*	*18,617*	*1,088.66 /CY*	*29,394*
		31.00.102				*Dunnigan - CBD Discharge Structure, Excavation and Backfill*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	5,400.00 CY	2.65 /CY	2.21 /CY	-	-	4.85 /CY	26,208	7.49 /CY	40,424
						Stockpile Excavated Spoils	5,400.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	15,321	4.39 /cy	23,729
						31.25.01.00 Earthworks, Structural, Excavation	*5,400.00 CY*	*3.89 /CY*	*3.56 /CY*	*0.25 /CY*	*/CY*	*7.69 /CY*	*41,529*	*11.88 /CY*	*64,152*
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	118.00 CY	12.50 /CY	0.76 /CY	35.00 /CY	-	48.26 /CY	5,694	76.97 /CY	9,082
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*118.00 CY*	*12.50 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*48.26 /CY*	*5,694*	*76.97 /CY*	*9,082*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, Native material	4,670.00 CY	6.18 /CY	1.15 /CY	0.00 /CY	-	7.33 /CY	34,250	11.31 /CY	52,827
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	3,730.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	6,143	2.54 /cy	9,475
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	940.00 cy	1.29 /cy	0.10 /cy	-	-	1.39 /cy	1,307	2.15 /cy	2,017
						Compaction, water for, 6000 gallon wagon, 6 mile haul	4,670.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	8,210	2.80 /cy	13,069

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						31.25.03.00 Earthworks, Structural, Backfill	4,870.00 CY	7.45 /CY	2.03 /CY	1.20 /CY	/CY	10.69 /CY	49,910	15.57 /CY	77,367
					31.25.05.00	Earthworks, Structural, Hauling and Disposal									
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	730.00 CY	7.24 /CY	6.00 /CY	-	-	13.24 /CY	9,662	20.42 /CY	14,903
						Load excavated spoils	730.00 cy	1.03 /cy	0.77 /cy	0.00 /cy	-	1.80 /cy	1,312	2.77 /cy	2,024
						31.25.05.00 Earthworks, Structural, Hauling and Disposal	730.00 CY	8.27 /CY	6.77 /CY	/CY	/CY	15.03 /CY	10,975	23.19 /CY	16,928
						31.35 Earthworks, Structural	10,918.00 CY	5.80 /CY	3.09 /CY	1.02 /CY	/CY	9.90 /CY	108,108	15.35 /CY	167,549
						31.0 Earthwork	10,918.00 CY	5.80 /CY	3.09 /CY	1.02 /CY	/CY	9.90 /CY	108,108	15.35 /CY	167,549
						31.00.102 Dunnigan - CBD Discharge Structure, Excavation and Backfill	10,918.00 CY	5.80 /CY	3.09 /CY	1.02 /CY	/CY	9.90 /CY	108,108	15.35 /CY	167,549
		33.00.108				Dunnigan - CBD Discharge Structure, CBD Pipeline Connection									
			33.2			Pipeline Specialties									
				33.01		Pipeline Specialties									
					33.10.99.01	Buried Pipe Specials, Other									
						Elbow, 45 deg, steel, butt weld, 36' Dia	1.00 ea	5,757.16 /ea	171.37 /ea	3,425.00 /ea	-	9,353.53 /ea	9,354	14,675.15 /ea	14,675
						Excavating, trench or continuous footing, common earth, 2-1/2 C.Y. excavator, 14' to 20' deep, excludes sheeting or dewatering	1,570.00 cy	1.99 /cy	2.43 /cy	-	-	4.41 /cy	6,926	6.80 /cy	10,683
						Pipe bedding and zone, CLSM	7.00 cy	4.52 /cy	0.71 /cy	35.00 /cy	-	40.23 /cy	282	64.59 /cy	452
						Backfill native material	1,570.00 cy	6.18 /cy	1.69 /cy	0.00 /cy	-	7.87 /cy	12,358	12.14 /cy	19,061
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	1,570.00 cy	0.82 /cy	1.21 /cy	-	-	2.03 /cy	3,188	3.13 /cy	4,918
						Compaction, water for, 6000 gallon wagon, 6 mile haul	1,570.00 cy	0.35 /cy	0.30 /cy	1.20 /cy	-	1.85 /cy	2,910	2.95 /cy	4,625
						Piping, pipe, WSP, plain end, welded, 36" diameter, excludes excavation or backfill	20.00 LF	174.60 /LF	76.19 /LF	305.00 /LF	-	555.79 /LF	11,116	879.36 /LF	17,587
						Outlet Connection from 126" Dia Pipeline	1.00 ls	2,500.91 /ls	280.00 /ls	5,000.00 /ls	-	7,780.91 /ls	7,781	12,363.73 /ls	12,364
						Erosion Controls Allowance	40.00 lf	0.00 /lf	0.00 /lf	0.00 /lf	55.00 /lf	55.00 /lf	2,200	84.83 /lf	3,393
						Dewatering Allowance	0.20 msf	0.00 /msf	0.00 /msf	0.00 /msf	9,000.00 /msf	9,000.00 /msf	1,800	13,881.55 /msf	2,776
						33.10.99.01 Buried Pipe Specials, Other	20.00 LF	1,322.81 /LF	540.23 /LF	832.70 /LF	200.00 /LF	2,895.73 /LF	57,915	4,526.73 /LF	90,535
						33.01 Pipeline Specialties	1.00 LS	26,456.12 /LS	10,804.54 /LS	16,654.00 /LS	4,000.00 /LS	57,914.66 /LS	57,915	90,534.66 /LS	90,535
						33.2 Pipeline Specialties	1.00 LS	26,456.12 /LS	10,804.54 /LS	16,654.00 /LS	4,000.00 /LS	57,914.66 /LS	57,915	90,534.66 /LS	90,535
						33.00.108 Dunnigan - CBD Discharge Structure, CBD Pipeline Connection	20.00 LF	1,322.81 /LF	540.23 /LF	832.70 /LF	200.00 /LF	2,895.73 /LF	57,915	4,526.73 /LF	90,535
		33.00.110				Dunnigan - CBD Discharge Structure, Above Grade Piping									
			40.0			Process Pipe									
				40.11		Process Pipe, Carbon Steel									
					40.10.02.36	Process Pipe, Carbon Steel, 36"									
						Elbow, 45 deg, steel, butt weld, 36' Dia	2.00 ea	5,757.16 /ea	171.37 /ea	3,425.00 /ea	-	9,353.53 /ea	18,707	14,675.15 /ea	29,350
						Piping, pipe, WSP, plain end, welded, 36" diameter, excludes excavation or backfill	55.00 LF	174.60 /LF	76.19 /LF	305.00 /LF	-	555.79 /LF	30,568	879.36 /LF	48,365
						Isolation Valves	1.00 ea	1,458.48 /ea	1,040.00 /ea	16,000.00 /ea	-	18,498.48 /ea	18,498	29,691.96 /ea	29,692
						Energy Dissipating Valves W/ Hood	1.00 ea	1,458.48 /ea	1,040.00 /ea	14,000.00 /ea	-	16,498.48 /ea	16,498	26,462.15 /ea	26,462
						40.10.02.36 Process Pipe, Carbon Steel, 36"	55.00 LF	436.99 /LF	120.24 /LF	975.00 /LF	/LF	1,532.23 /LF	84,273	2,433.99 /LF	133,869
						40.11 Process Pipe, Carbon Steel	55.00 LF	436.99 /LF	120.24 /LF	975.00 /LF	/LF	1,532.23 /LF	84,273	2,433.99 /LF	133,869
						40.0 Process Pipe	55.00 LF	436.99 /LF	120.24 /LF	975.00 /LF	/LF	1,532.23 /LF	84,273	2,433.99 /LF	133,869
						33.00.110 Dunnigan - CBD Discharge Structure, Above Grade Piping	55.00 LF	436.99 /LF	120.24 /LF	975.00 /LF	/LF	1,532.23 /LF	84,273	2,433.99 /LF	133,869
						03.00 Dunnigan - CBD Discharge Structure	**2,765.00** SF	118.30 /SF	26.75 /SF	158.36 /SF	34.50 /SF	[illegible] /SF	[illegible]	[illegible] /SF	[illegible]
	03.04					Dunnigan - Sac River Discharge Structure									
		01.00.202				Dunnigan - Sac River Discharge Structure, Removal and Control of Water									
			01.0			General Requirements									
				01.01		Construction Operations									
					31.15.02.00	Dewatering									
						CBD Discharge Structure, Removal and Control of Water	2.00 MO		-		45,000.00 /MO	45,000.00 /MO	90,000	69,407.75 /MO	138,816
						31.15.02.00 Dewatering	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.75 /MO	138,816
						01.01 Construction Operations	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.75 /MO	138,816
						01.0 General Requirements	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.75 /MO	138,816
						01.00.202 Dunnigan - Sac River Discharge Structure, Removal and Control of Water	2.00 MO	/MO	/MO	/MO	45,000.00 /MO	45,000.00 /MO	90,000	69,407.75 /MO	138,816
		03.00.112				Dunnigan - Sac River Discharge Structure, Foundation Slab									
			03.0			Concrete Work									
				03.10		Cast-In-Place Concrete, Slabs on Grade									
					03.10.05.48	Cast-In-Place Concrete, Slabs on Grade, 48" thick									
						C.I.P. concrete forms, slab on grade, edge, wood, over 12", 4 use, includes erecting, bracing, stripping and cleaning	808.00 sfca	7.87 /sfca	-	0.97 /sfca	-	8.84 /sfca	7,139	13.70 /sfca	11,068
						Reinforcing Steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	24.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	61,703	4,052.41 /ton	97,258
						Reinforcing in place, unloading & sorting, add to above - slabs	24.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,337	85.92 /ton	2,062
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	24.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	1,337	85.92 /ton	2,062
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	283.00 cy	-	-	131.00 /cy	-	131.00 /cy	37,073	211.55 /cy	59,869
						Structural concrete, placing, slab on grade, pumped, over 6" thick, includes strike off & consolidation, excludes material	274.00 CY	23.45 /CY	5.55 /CY	-	-	29.00 /CY	7,946	44.73 /CY	12,256
						Cfnsh,flrs,for spcf mdm accs flrs aci clss 1,2,3 and 4,achv a cmps ovrl flr fltn&lvln val f35/25,bull flt,mchn flt&stl trwl (wlk-bhn),excl plcn,strkn	1,848.00 sf	0.91 /sf	0.03 /sf	-	-	0.94 /sf	1,731	1.44 /sf	2,670
						Curing, sprayed membrane curing compound	18.48 csf	10.60 /csf	-	12.45 /csf	-	23.05 /csf	426	36.45 /csf	674
						Fine grading, fine grade for slab on grade, machine	205.33 sy	1.19 /sy	0.68 /sy	-	-	1.87 /sy	385	2.89 /sy	594
						03.10.05.48 Cast-In-Place Concrete, Slabs on Grade, 48" thick	274.00 CY	183.10 /CY	7.37 /CY	244.11 /CY	/CY	434.59 /CY	119,076	688.00 /CY	188,512
						03.10 Cast-In-Place Concrete, Slabs on Grade	274.00 CY	183.10 /CY	7.37 /CY	244.11 /CY	/CY	434.59 /CY	119,076	688.00 /CY	188,512
						03.0 Concrete Work	274.00 CY	183.10 /CY	7.37 /CY	244.11 /CY	/CY	434.59 /CY	119,076	688.00 /CY	188,512
						03.00.112 Dunnigan - Sac River Discharge Structure, Foundation Slab	274.00 CY	183.10 /CY	7.37 /CY	244.11 /CY	/CY	434.59 /CY	119,076	688.00 /CY	188,512
		03.00.114				Dunnigan - Sac River Discharge Structure, Concrete Walls									
			03.0			Concrete Work									
				03.20		Cast-In-Place Concrete, Straight Walls									
					03.10.06.48	Cast-In-Place Concrete, Straight Walls, 48" thick									
						C.I.P. concrete forms, wall, box out for opening, includes erecting, bracing, stripping and cleaning	130.00 lf	27.09 /lf	-	2.45 /lf	-	29.54 /lf	3,840	45.74 /lf	5,946
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	12,312.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	181,449	23.13 /sfca	284,730
						Form oil, coverage varies greatly, maximum, includes material only	33.00 gal	-	-	23.50 /gal	-	23.50 /gal	776	37.95 /gal	1,252
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	77.00 ton	1,370.94 /ton	-	1,200.00 /ton	-	2,570.94 /ton	197,963	4,052.41 /ton	312,036
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	77.00 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	4,289	85.92 /ton	6,616
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	77.00 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	4,662	93.39 /ton	7,191
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	940.00 cy	-	-	131.00 /cy	-	131.00 /cy	123,140	211.55 /cy	198,858
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	912.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	40,775	68.96 /CY	62,891
						Finishing: break ties & patch voids (walls, cols or beams)	12,312.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	12,422	1.56 /sf	19,187
						03.10.06.48 Cast-In-Place Concrete, Straight Walls, 48" thick	912.00 CY	303.04 /CY	8.70 /CY	311.52 /CY	/CY	624.25 /CY	569,316	985.42 /CY	898,708

Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Dunnigan Pipeline Alt 2 (Sac River)
Project Number: D3880600
Design Stage: Feasibility

Estimator: Cavalleri/Wells - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
						03.30 Cast-In-Place Concrete, Straight Walls	*912.00 CY*	*303.04 /CY*	*9.70 /CY*	*311.52 /CY*	*/CY*	*624.25 /CY*	*569,316*	*985.42 /CY*	*898,708*
						03.0 Concrete Work	*912.00 CY*	*303.04 /CY*	*9.70 /CY*	*311.52 /CY*	*/CY*	*624.25 /CY*	*569,316*	*985.42 /CY*	*898,708*
						03.00.114 Dunnigan - Sac River Discharge Structure, Concrete Walls	*912.00 CY*	*303.04 /CY*	*9.70 /CY*	*311.52 /CY*	*/CY*	*624.25 /CY*	*569,316*	*985.42 /CY*	*898,708*
		03.00.116				*Dunnigan - Sac River Discharge Structure, Discharge Pipes Support Wall*									
			03.0			*Concrete Work*									
				03.13		*Cast-In-Place Concrete, Continuous Footings*									
					03.10.02.24	*Cast-In-Place Concrete, Continuous Footings, 24" thick*									
						C.I.P. concrete forms, footing, keyway, tapered wood, 2" x 6", 4 use, includes erecting, bracing, stripping and cleaning	61.00 lf	9.08 /lf	-	0.34 /lf	-	9.42 /lf	575	14.56 /lf	888
						Reinforcing Steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	2.00 ton	1,094.91 /ton	-	1,125.00 /ton	-	2,219.91 /ton	4,440	3,505.53 /ton	7,011
						Reinforcing steel, unload and sort, add to base	2.00 ton	40.02 /ton	6.50 /ton	-	-	46.51 /ton	93	71.75 /ton	143
						Reinforcing steel, crane cost for handling, average, add	2.00 ton	43.50 /ton	7.06 /ton	-	-	50.56 /ton	101	77.97 /ton	156
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	24.00 cy	-	-	131.00 /cy	-	131.00 /cy	3,144	211.55 /cy	5,077
						Structural concrete, placing, continuous footing, deep, pumped, includes strike off & consolidation, excludes material	23.00 CY	23.33 /CY	6.41 /CY	-	-	29.74 /CY	684	45.87 /CY	1,055
						03.10.02.24 Cast-In-Place Concrete, Continuous Footings, 24" thick	*23.00 CY*	*148.89 /CY*	*7.59 /CY*	*235.42 /CY*	*/CY*	*392.90 /CY*	*9,037*	*623.08 /CY*	*14,331*
						03.13 Cast-In-Place Concrete, Continuous Footings	*23.00 CY*	*148.89 /CY*	*7.59 /CY*	*235.42 /CY*	*/CY*	*392.90 /CY*	*9,037*	*623.08 /CY*	*14,331*
				03.30		*Cast-In-Place Concrete, Straight Walls*									
					03.10.06.16	*Cast-In-Place Concrete, Straight Walls, 16" thick*									
						C.I.P. concrete forms, wall, box out for opening, includes erecting, bracing, stripping and cleaning	71.00 lf	49.60 /lf	-	2.45 /lf	-	52.05 /lf	3,696	80.46 /lf	5,713
						Forms in place, wall, steel framed plywood, >16' high, 3 use/month	1,282.00 sfca	9.29 /sfca	-	5.45 /sfca	-	14.74 /sfca	18,894	23.13 /sfca	29,648
						Form oil, coverage varies greatly, maximum, includes material only	3.50 gal	-	-	23.50 /gal	-	23.50 /gal	82	37.95 /gal	133
						Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	3.25 ton	1,370.95 /ton	-	1,200.00 /ton	-	2,570.95 /ton	8,356	4,052.41 /ton	13,170
						Reinforcing in place, unloading & sorting, add - walls, cols, beams	3.25 ton	49.21 /ton	6.50 /ton	-	-	55.71 /ton	181	85.93 /ton	279
						Reinforcing, crane cost for handling, add to above, walls, cols, beams	3.25 ton	53.49 /ton	7.06 /ton	-	-	60.55 /ton	197	93.39 /ton	304
						Struct concrete,ready mix,normal wt,4500 psi,includes local aggregate,sand,portland cement and water,delivered,excludes all additives and treatments	37.00 cy	-	-	131.00 /cy	-	131.00 /cy	4,847	211.55 /cy	7,827
						Structural concrete, placing, walls, pumped, 15" thick, includes strike off & consolidation, excludes material	36.00 CY	36.16 /CY	8.55 /CY	-	-	44.71 /CY	1,610	68.96 /CY	2,483
						Finishing: break ties & patch voids (walls, cols or beams)	1,282.00 sf	0.98 /sf	-	0.03 /sf	-	1.01 /sf	1,294	1.56 /sf	1,998
						03.10.06.16 Cast-In-Place Concrete, Straight Walls, 16" thick	*36.00 CY*	*632.62 /CY*	*8.76 /CY*	*445.24 /CY*	*/CY*	*1,087.64 /CY*	*39,155*	*1,709.64 /CY*	*61,554*
						03.30 Cast-In-Place Concrete, Straight Walls	*36.00 CY*	*632.62 /CY*	*8.76 /CY*	*445.24 /CY*	*/CY*	*1,087.64 /CY*	*39,155*	*1,709.64 /CY*	*61,554*
						03.0 Concrete Work	*59.00 CY*	*444.44 /CY*	*8.92 /CY*	*363.45 /CY*	*/CY*	*816.81 /CY*	*48,192*	*1,286.19 /CY*	*75,885*
						03.00.116 Dunnigan - Sac River Discharge Structure, Discharge Pipes Support Wall	*59.00 CY*	*444.44 /CY*	*8.92 /CY*	*363.45 /CY*	*/CY*	*816.81 /CY*	*48,192*	*1,286.19 /CY*	*75,885*
		31.00.104				*Dunnigan - Sac River Discharge Structure, Excavation and Backfill*									
			31.0			*Earthwork*									
				31.25		*Earthworks, Structural*									
					31.16.01.00	*Earthworks, Sheeting and Shoring*									
						Three Sided Shoring of Excavation	8,440.00 SF				45.00 /SF	45.00 /SF	379,800	69.41 /SF	585,801
						31.16.01.00 Earthworks, Sheeting and Shoring	*8,440.00 SF*	*/SF*	*/SF*	*/SF*	*45.00 /SF*	*45.00 /SF*	*379,800*	*69.41 /SF*	*585,801*
					31.25.01.00	*Earthworks, Structural, Excavation*									
						Structural Excavation, excludes sheeting or dewatering	3,200.00 CY	2.65 /CY	2.21 /CY	-	-	4.85 /CY	15,531	7.49 /CY	23,955
						Stockpile Excavated Spoils	3,200.00 cy	1.24 /cy	1.35 /cy	0.25 /cy	-	2.84 /cy	9,079	4.39 /cy	14,061
						31.25.01.00 Earthworks, Structural, Excavation	*3,200.00 CY*	*3.89 /CY*	*3.56 /CY*	*0.25 /CY*	*/CY*	*7.69 /CY*	*24,610*	*11.88 /CY*	*38,016*
					31.25.02.00	*Earthworks, Structural, Import Aggregates (Slab)*									
						Fill, gravel fill, compacted, under floor slabs, alternate pricing method, 12" deep	80.00 CY	12.50 /CY	0.76 /CY	35.00 /CY	-	48.26 /CY	3,860	76.97 /CY	6,157
						31.25.02.00 Earthworks, Structural, Import Aggregates (Slab)	*80.00 CY*	*12.50 /CY*	*0.76 /CY*	*35.00 /CY*	*/CY*	*48.26 /CY*	*3,860*	*76.97 /CY*	*6,157*
					31.25.03.00	*Earthworks, Structural, Backfill*									
						Backfill, Native material	4,630.00 CY	6.18 /CY	1.15 /CY	0.00 /CY	-	7.33 /CY	33,957	11.31 /CY	52,375
						Purchase and Deliver Fill Material	1,430.00 cy			35.00 /cy	-	35.00 /cy	50,050	56.52 /cy	80,825
						Compaction, 4 passes, 6" lifts, riding, sheepsfoot or wobbly wheel roller	4,000.00 cy	0.82 /cy	0.82 /cy	-	-	1.65 /cy	6,588	2.54 /cy	10,161
						Compaction, 4 passes, 13" to 18", 8" lifts, rammer tamper	930.00 cy	1.29 /cy	0.10 /cy	-	-	1.39 /cy	1,293	2.15 /cy	1,995
						Compaction, water for, 6000 gallon wagon, 6 mile haul	4,630.00 cy	0.35 /cy	0.21 /cy	1.20 /cy	-	1.76 /cy	8,139	2.80 /cy	12,957
						31.25.03.00 Earthworks, Structural, Backfill	*4,630.00 CY*	*7.51 /CY*	*2.08 /CY*	*12.01 /CY*	*/CY*	*21.60 /CY*	*100,027*	*34.19 /CY*	*158,313*
					31.30.09.00	*Site Specialties, Rip Rap*									
						Rip-rap and rock lining, random, broken stone, machine placed for slope protection	2,480.00 CY	16.71 /CY	15.43 /CY	40.00 /CY	-	72.14 /CY	178,916	114.17 /CY	283,151
						31.30.09.00 Site Specialties, Rip Rap	*2,480.00 CY*	*16.71 /CY*	*15.43 /CY*	*40.00 /CY*	*/CY*	*72.14 /CY*	*178,916*	*114.17 /CY*	*283,151*
						31.25 Earthworks, Structural	*10,390.00 CY*	*8.63 /CY*	*5.71 /CY*	*15.25 /CY*	*36.55 /CY*	*66.14 /CY*	*687,213*	*103.12 /CY*	*1,071,439*
						31.0 Earthwork	*10,390.00 CY*	*8.63 /CY*	*5.71 /CY*	*15.25 /CY*	*36.55 /CY*	*66.14 /CY*	*687,213*	*103.12 /CY*	*1,071,439*
						31.00.104 Dunnigan - Sac River Discharge Structure, Excavation and Backfill	*10,390.00 CY*	*8.63 /CY*	*5.71 /CY*	*15.25 /CY*	*36.55 /CY*	*66.14 /CY*	*687,213*	*103.12 /CY*	*1,071,439*
		33.00.112				*Dunnigan - Sac River Discharge Structure, Above Grade Piping*									
			40.0			*Process Pipe*									
				40.11		*Process Pipe, Carbon Steel*									
					40.10.02.36	*Process Pipe, Carbon Steel, 36"*									
						Piping, pipe, WSP, plain end, welded, 36" diameter, excludes excavation or backfill	1,450.00 LF	31.40 /LF	13.70 /LF	305.00 /LF	-	350.11 /LF	507,656	562.12 /LF	815,070
						TideFlex Check Valves, 36" Dia	10.00 ea	729.24 /ea	520.00 /ea	22,000.00 /ea	-	23,249.24 /ea	232,492	37,454.50 /ea	374,545
						Miscellaneous Items Allowance	1.00 ls	27,775.00 /ls	27,775.00 /ls	55,550.00 /ls	-	111,100.00 /ls	111,100	175,387.39 /ls	175,387
						40.10.02.36 Process Pipe, Carbon Steel, 36"	*1,450.00 LF*	*55.59 /LF*	*36.45 /LF*	*495.03 /LF*	*/LF*	*587.07 /LF*	*851,249*	*941.38 /LF*	*1,365,002*
						40.11 Process Pipe, Carbon Steel	*1,450.00 LF*	*55.59 /LF*	*36.45 /LF*	*495.03 /LF*	*/LF*	*587.07 /LF*	*851,249*	*941.38 /LF*	*1,365,002*
						40.0 Process Pipe	*1,450.00 LF*	*55.59 /LF*	*36.45 /LF*	*495.03 /LF*	*/LF*	*587.07 /LF*	*851,249*	*941.38 /LF*	*1,365,002*
						33.00.112 Dunnigan - Sac River Discharge Structure, Above Grade Piping	*1,450.00 LF*	*55.59 /LF*	*36.45 /LF*	*495.03 /LF*	*/LF*	*587.07 /LF*	*851,249*	*941.38 /LF*	*1,365,002*
						02.04 Dunnigan - Sac River Discharge Structure	1,848.00 SF	[illegible] /SF	[illegible] /SF	675.67 /SF	284.32 /SF	1,279.73 /SF	2,365,636	2,022.32 /SF	3,758,361
						02 Dunnigan Pipelines - Alt 2 (Sac River)	***49,464.00 LF***	***721.98 /LF***	***289.36 /LF***	***1,677.72 /LF***	***175.85 /LF***	***2,864.91 /LF***	***141,710,047***	***4,540.46 /LF***	***224,589,311***

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	35,712,186		449,771.656 hrs	
Material	82,986,495			
Allowance	8,698,460			
Equipment	14,312,906		166,316.996 hrs	
Other				
Subtotal Direct Costs	141,710,047	141,710,047		
Material Sales Tax, Dunnigan Ca	6,016,521			7.250 %
Subtotal W/ Sales Tax	6,016,521	147,726,568		
General Conditions	7,386,328			5.000 %
Subtotal W/ General Conditions	7,386,328	155,112,896		
Mobilization/Demobilization	4,653,387			3.000 %
Prime Contractor Overhead	15,976,628			10.000 %
Prime Contractor Profit	10,544,575			6.000 %
Bonds & Insurance	4,042,438			2.170 %
Subtotal W/ Prime Markups	35,217,028	190,329,924		
Contractor Contingency	5,709,898			3.000 %
Design Contingency	28,549,489			15.000 %
Subtotal W/ Contingency	34,259,387	224,589,311		
Total Construction Cost		**224,589,311**		
Non-Contract Costs	40,426,076			18.000 %
Total Project Costs	**40,426,076**	**265,015,387**		

Substations for WAPA Connection

Jacobs

SUMMARY REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Substations for WAPA Connections	Estimator: Wells/Cavalleri - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
08			***Substations for WAPA Connection***									
	08.01		Three Breaker Substation									
		32.00.004	*Substation Fencing*	***1,158.00*** *LF*	*9.09 /LF*	*1.70 /LF*	*24.39 /LF*	*/LF*	*35.19 /LF*	*40,741*	*64.20 /LF*	*74,347*
		32.00.006	*Substation Gravel Surfacing*	*9,240.00 SY*	*3.74 /SY*	*4.06 /SY*	*7.30 /SY*	*/SY*	*15.10 /SY*	*139,541*	*27.33 /SY*	*252,518*
		34.10.STEEL	*SUBSTATION STEEL*	***1.00*** *LS*	*594,750.00 /LS*	*/LS*	*2,100,000.00 /LS*	*/LS*	*2,694,750.00 /LS*	*2,694,750*	*4,395,380.12 /LS*	*4,395,380*
		34.10.SUBEQ	*SUBSTATION EQUIPMENT/WORK PACKAGES*	***1.00*** *LS*	*2,045,940.00 /LS*	*/LS*	*12,690,000.00 /LS*	*/LS*	*14,735,940.00 /LS*	*14,735,940*	*24,123,109.02 /LS*	*24,123,109*
		34.30.FNDT	*SUBSTATION FOUNDATIONS*	***1.00*** *LS*	*1,308,450.00 /LS*	*/LS*	*350,000.00 /LS*	*/LS*	*1,658,450.00 /LS*	*1,658,450*	*2,636,756.05 /LS*	*2,636,756*
		34.90.CX	*ENGINEERING, STARTUP, COMMISSIONING*	***1.00*** *LS*	*1,415,160.00 /LS*	*/LS*	*150,000.00 /LS*	*/LS*	*1,565,160.00 /LS*	*1,565,160*	*2,475,362.46 /LS*	*2,475,362*
		34.95.CONEQ	*CONSTRUCTION EQUIPMENT*	***1.00*** *LS*	*2,766.57 /LS*	*697,053.40 /LS*	*/LS*	*/LS*	*699,819.97 /LS*	*699,820*	*1,101,930.49 /LS*	*1,101,930*
			08.01 Three Breaker Substation	**1.00** LS	5,412,152.32 /LS	726,552.76 /LS	15,385,696.98 /LS	/LS	21,534,401.98 /LS	21,534,402	35,059,403.06 /LS	35,059,403
	08.02		Six Breaker Substation									
		32.00.004	*Substation Fencing*	***1,632.00*** *LF*	*9.21 /LF*	*1.75 /LF*	*24.63 /LF*	*/LF*	*35.59 /LF*	*58,085*	*64.95 /LF*	*105,992*
		32.00.006	*Substation Gravel Surfacing*	*18,096.00 SY*	*3.74 /SY*	*4.06 /SY*	*7.30 /SY*	*/SY*	*15.11 /SY*	*273,378*	*27.34 /SY*	*494,712*
		34.10.STEEL	*SUBSTATION STEEL*	***1.00*** *LS*	*951,600.00 /LS*	*/LS*	*2,400,000.00 /LS*	*/LS*	*3,351,600.00 /LS*	*3,351,600*	*5,451,400.44 /LS*	*5,451,400*
		34.10.SUBEQ	*SUBSTATION EQUIPMENT/WORK PACKAGES*	***1.00*** *LS*	*3,065,936.25 /LS*	*/LS*	*16,485,000.00 /LS*	*/LS*	*19,550,936.25 /LS*	*19,550,936*	*31,979,898.09 /LS*	*31,979,898*
		34.30.FNDT	*SUBSTATION FOUNDATIONS*	***1.00*** *LS*	*3,106,974.00 /LS*	*/LS*	*700,000.00 /LS*	*/LS*	*3,806,974.00 /LS*	*3,806,974*	*6,045,178.43 /LS*	*6,045,178*
		34.90.CX	*ENGINEERING, STARTUP, COMMISSIONING*	***1.00*** *LS*	*1,462,740.00 /LS*	*/LS*	*150,000.00 /LS*	*/LS*	*1,612,740.00 /LS*	*1,612,740*	*2,550,281.51 /LS*	*2,550,282*
		34.95.CONEQ	*CONSTRUCTION EQUIPMENT*	***1.00*** *LS*	*2,766.57 /LS*	*762,098.69 /LS*	*/LS*	*/LS*	*764,865.25 /LS*	*764,865*	*1,204,350.21 /LS*	*1,204,350*
			08.02 Six Breaker Substation	**1.00** LS	8,672,779.58 /LS	848,500.42 /LS	19,907,298.72 /LS	/LS	29,418,578.81 /LS	29,418,579	47,831,812.27 /LS	47,831,812
			08 Substations for WAPA Connection	***1.00 LS***	***14,084,931.91 /LS***	***1,575,053.18 /LS***	***35,292,995.70 /LS***	***/LS***	***50,952,980.79 /LS***	***50,952,981***	***82,891,215.33 /LS***	***82,891,215***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	22,203,582		123,609.120 hrs	
Material	58,184,388			
Allowance				
Equipment	2,503,245		17,035.797 hrs	
Other				
Total Construction Cost	**82,891,215**	**82,891,215**		
Non-Contract Costs	14,920,419			18.000 %
Total Project Costs	**14,920,419**	**97,811,634**		

DETAIL REPORT

Jacobs

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Substations for WAPA Connections
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
08						**Substations for WAPA Connection**									
	08.01					Three Breaker Substation									
		32.00.004				Substation Fencing									
			32.0			Exterior Improvements									
				32.31		Fencing									
					32.45.01.00	Fencing, Chain Link									
						Fence,chain link industrial,galvanized steel,3 strands barb wire,2"posts @ 10'oc,9ga wire,6'high,schedule 40,includes excavation,& concrete	1,122.00 lf	6.52 /lf	0.94 /lf	19.95 /lf	-	27.41 /lf	30,750	50.08 /lf	56,191
						Fence, chain link industrial, gate, galvanized steel, 4' wide, 5' high, 2" frame, includes excavation, in concrete	1.00 ea	156.42 /ea	22.53 /ea	229.00 /ea	-	407.95 /ea	408	740.55 /ea	741
						Fence, chain link industrial, overhead slide gate, cantilever type, chain link, 8' high, to 18' wide, includes excavation, in concrete	32.00 lf	95.45 /lf	28.04 /lf	176.00 /lf	-	299.49 /lf	9,584	544.24 /lf	17,416
						32.45.01.00 Fencing, Chain Link	**1,158.00** LF	9.09 /LF	1.70 /LF	24.39 /LF	/LF	35.18 /LF	40,741	64.20 /LF	74,347
						32.31 Fencing	**1,158.00** LF	9.09 /LF	1.70 /LF	24.39 /LF	/LF	35.18 /LF	40,741	64.20 /LF	74,347
						32.0 Exterior Improvements	**1.00** LS	10,523.21 /LS	1,973.23 /LS	28,244.90 /LS	/LS	40,741.34 /LS	40,741	74,346.96 /LS	74,347
						32.00.004 Substation Fencing	**1,158.00** LF	9.09 /LF	1.70 /LF	24.39 /LF	/LF	35.18 /LF	40,741	64.20 /LF	74,347
		32.00.008				Substation Gravel Surfacing									
			32.0			Exterior Improvements									
				32.12		Paving									
					32.40.04.00	Site Improvements, Access Roads, Gravel									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	9,240.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	9,005	1.73 /SY	15,981
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	1,540.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	9,714	11.19 /cy	17,239
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	1,540.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	24,694	28.46 /cy	43,823
						Load excavated spoils	1,540.00 cy	0.77 /cy	0.84 /cy	-	-	1.62 /cy	2,490	2.87 /cy	4,419
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	9,240.00 sy	0.94 /sy	0.92 /sy	7.30 /sy	-	9.16 /sy	84,627	16.78 /sy	155,069
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	9,240.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	9,009	1.73 /sy	15,988
						32.40.04.00 Site Improvements, Access Roads, Gravel	9,240.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.10 /SY	139,541	27.33 /SY	252,518
						32.12 Paving	9,240.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.10 /SY	139,541	27.33 /SY	252,518
						32.0 Exterior Improvements	**1.00** LS	34,562.54 /LS	37,526.13 /LS	67,452.00 /LS	/LS	139,540.67 /LS	139,541	252,517.94 /LS	252,518
						32.00.008 Substation Gravel Surfacing	9,240.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.10 /SY	139,541	27.33 /SY	252,518
		34.10.STEEL				SUBSTATION STEEL									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Substation Steel	1.00 ea	594,750.00 /ea	-	2,100,000.00 /ea	-	2,694,750.00 /ea	2,694,750	4,395,380.12 /ea	4,395,380
						33.71.91.01 Power Substation	**1.00** LS	594,750.00 /LS	/LS	2,100,000.00 /LS	/LS	2,694,750.00 /LS	2,694,750	4,395,380.12 /LS	4,395,380
						26.20 Facility Electrical	**83,160.00** SF	7.15 /SF	/SF	25.25 /SF	/SF	32.40 /SF	2,694,750	52.85 /SF	4,395,380
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	2,694,750	/LF	4,395,380
						34.10.STEEL SUBSTATION STEEL	**1.00** LS	594,750.00 /LS	/LS	2,100,000.00 /LS	/LS	2,694,750.00 /LS	2,694,750	4,395,380.12 /LS	4,395,380
		34.10.SUBEQ				SUBSTATION EQUIPMENT/WORK PACKAGES									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Power Transformer, 100MVA 230kV-13.2kV	2.00 ea	118,950.00 /ea	-	2,500,000.00 /ea	-	2,618,950.00 /ea	5,237,900	4,305,026.08 /ea	8,610,052
						SF6 CB 3000A 230kV	3.00 ea	35,685.00 /ea	-	180,000.00 /ea	-	215,685.00 /ea	647,055	352,665.74 /ea	1,057,997
						Air Disconnect Switch 3000A motorized 3ph 230kV	10.00 ea	11,895.00 /ea	-	50,000.00 /ea	-	61,895.00 /ea	618,950	101,084.33 /ea	1,010,843
						CCVT / CT / VT / SA 230kV	4.00 ea	14,868.75 /ea	-	175,000.00 /ea	-	189,868.75 /ea	759,475	311,653.20 /ea	1,246,613
						Control Building (Relays, CP, HVAC, AC/DC)	1.00 ea	237,900.00 /ea	-	1,750,000.00 /ea	-	1,987,900.00 /ea	1,987,900	3,257,005.22 /ea	3,257,005
						Surface and Below Grade Package (Fence, Rock, Conduit, Grdg, Ltg)	1.00 ea	475,800.00 /ea	-	1,700,000.00 /ea	-	2,175,800.00 /ea	2,175,800	3,549,245.90 /ea	3,549,246
						Above Grade Package (Bus, Jumpers, Fittings)	1.00 ea	475,800.00 /ea	-	1,800,000.00 /ea	-	2,275,800.00 /ea	2,275,800	3,713,955.05 /ea	3,713,955
						Above/Below Conduit, Cable Trench, Cables	1.00 ea	333,060.00 /ea	-	700,000.00 /ea	-	1,033,060.00 /ea	1,033,060	1,677,397.37 /ea	1,677,397
						33.71.91.01 Power Substation	**1.00** LS	2,045,940.00 /LS	/LS	12,690,000.00 /LS	/LS	14,735,940.00 /LS	14,735,940	24,123,109.02 /LS	24,123,109
						26.20 Facility Electrical	**83,160.00** SF	24.60 /SF	/SF	152.59 /SF	/SF	177.20 /SF	14,735,940	290.08 /SF	24,123,109
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	14,735,940	/LF	24,123,109
						34.10.SUBEQ SUBSTATION EQUIPMENT/WORK PACKAGES	**1.00** LS	2,045,940.00 /LS	/LS	12,690,000.00 /LS	/LS	14,735,940.00 /LS	14,735,940	24,123,109.02 /LS	24,123,109
		34.30.FNDT				SUBSTATION FOUNDATIONS									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Transformer Foundations 100MVA	2.00 ea	47,580.00 /ea	-	20,000.00 /ea	-	67,580.00 /ea	135,160	107,860.89 /ea	215,722
						Breaker Foundations	3.00 ea	23,790.00 /ea	-	10,000.00 /ea	-	33,790.00 /ea	101,370	53,930.44 /ea	161,791
						Takeoff Structure Foundations	4.00 ea	28,548.00 /ea	-	25,000.00 /ea	-	53,548.00 /ea	214,192	86,128.72 /ea	344,515
						Bus Support / CCVT / CT-VT / SA /AS Foundations	36.00 ea	28,548.00 /ea	-	5,000.00 /ea	-	33,548.00 /ea	1,207,728	53,186.89 /ea	1,914,728
						33.71.91.01 Power Substation	**1.00** LS	1,308,450.00 /LS	/LS	350,000.00 /LS	/LS	1,658,450.00 /LS	1,658,450	2,636,756.05 /LS	2,636,756
						26.20 Facility Electrical	**83,160.00** SF	15.73 /SF	/SF	4.21 /SF	/SF	19.94 /SF	1,658,450	31.71 /SF	2,636,756
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	1,658,450	/LF	2,636,756
						34.30.FNDT SUBSTATION FOUNDATIONS	**1.00** LS	1,308,450.00 /LS	/LS	350,000.00 /LS	/LS	1,658,450.00 /LS	1,658,450	2,636,756.05 /LS	2,636,756
		34.90.CX				ENGINEERING, STARTUP, COMMISSIONING									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Testing	400.00 hrs	118.95 /hrs	-		-	118.95 /hrs	47,580	187.30 /hrs	74,919
						Startup, Commissioning, Training, Documentation, Warranty	400.00 hrs	118.95 /hrs	-		-	118.95 /hrs	47,580	187.30 /hrs	74,919
						Power Engineering, Seismic Engineering	2,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	490,000	387.59 /hrs	775,175
						Protective Device Coordination Stidy	2,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	490,000	387.59 /hrs	775,175
						Protective Device Coordination Stidy	2,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	490,000	387.59 /hrs	775,175
						33.71.91.01 Power Substation	**1.00** LS	1,415,160.00 /LS	/LS	150,000.00 /LS	/LS	1,565,160.00 /LS	1,565,160	2,475,362.46 /LS	2,475,362
						26.20 Facility Electrical	**83,160.00** SF	17.02 /SF	/SF	1.80 /SF	/SF	18.82 /SF	1,565,160	29.77 /SF	2,475,362
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	1,565,160	/LF	2,475,362
						34.90.CX ENGINEERING, STARTUP, COMMISSIONING	**1.00** LS	1,415,160.00 /LS	/LS	150,000.00 /LS	/LS	1,565,160.00 /LS	1,565,160	2,475,362.46 /LS	2,475,362
		34.95.CONEQ				CONSTRUCTION EQUIPMENT									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Forklift crew, all-terrain forklift, 45' lift, 35' reach, 9000 lb. capacity, weekly use	104.00 week		2,663.32 /week	-	-	2,663.32 /week	276,985	4,193.64 /week	436,139
						Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal	250.00 day		835.38 /day	-	-	835.38 /day	208,846	1,315.39 /day	328,847
						Crane crew, daily use for small jobs, 100-ton truck-mounted hydraulic crane, portal to portal	60.00 day		2,168.18 /day	-	-	2,168.18 /day	130,091	3,413.99 /day	204,839
						Rent crawler mounted, lattice boom crane, 165 ton, 60' boom	30.00 day	-	2,649.00 /day	-	-	2,649.00 /day	79,470	4,171.09 /day	125,133
						Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00 ea	122.38 /ea	71.41 /ea	-	-	193.79 /ea	388	305.14 /ea	610

Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Substations for WAPA Connections
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					33.71.91.01	Power Substation									
						Mobilization or demobilization, crane, truck-mounted, up to 75 ton, (driver only, one-way)	2.00 ea	82.95 /ea	-	-	-	82.95 /ea	166	130.62 /ea	261
						Mobilization or demobilization, crane, truck-mounted, over 75 ton	2.00 ea	441.74 /ea	55.72 /ea	-	-	497.46 /ea	995	763.29 /ea	1,567
						Mobilization or demobilization, crane, crawler-mounted, over 75 ton	2.00 ea	736.23 /ea	703.65 /ea	-	-	1,439.88 /ea	2,880	2,267.22 /ea	4,534
						33.71.91.01 Power Substation	1.00 LS	2,766.57 /LS	697,053.40 /LS	/LS	/LS	699,819.97 /LS	699,820	1,101,930.49 /LS	1,101,930
						26.20 Facility Electrical	83,160.00 SF	0.03 /SF	8.38 /SF	/SF	/SF	8.42 /SF	699,820	13.25 /SF	1,101,930
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	699,820	/LF	1,101,930
						34.95.CONEQ CONSTRUCTION EQUIPMENT	1.00 LS	2,766.57 /LS	697,053.40 /LS	/LS	/LS	699,819.97 /LS	699,820	1,101,930.49 /LS	1,101,930
						08.01 Three Breaker Substation	1.00 LS	6,412,153.32 /LS	736,552.79 /LS	[illegible] /LS	/LS	21,534,401.89 /LS	21,534,402	35,659,408.05 /LS	35,659,408
	08.02					Six Breaker Substation									
		32.00.004				Substation Fencing									
			32.0			Exterior Improvements									
				32.31		Fencing									
					32.45.01.00	Fencing, Chain Link									
						Fence,chain link industrial,galvanized steel,3 strands barb wire,2"posts @ 10'oc,9ga wire,6'high,schedule 40,includes excavation,& concrete	1,580.00 lf	6.52 /lf	0.94 /lf	19.95 /lf	-	27.41 /lf	43,302	50.08 /lf	79,128
						Fence, chain link industrial, gate, galvanized steel, 4' wide, 5' high, 2" frame, includes excavation, in concrete	1.00 ea	156.42 /ea	22.53 /ea	229.00 /ea	-	407.95 /ea	408	740.54 /ea	741
						Fence, chain link industrial, overhead slide gate, cantilever type, chain link, 8' high, to 18' wide, includes excavation, in concrete	48.00 lf	95.45 /lf	28.04 /lf	176.00 /lf	-	299.49 /lf	14,376	544.24 /lf	26,123
						32.45.01.00 Fencing, Chain Link	1,632.00 LF	9.21 /LF	1.75 /LF	24.63 /LF	/LF	35.59 /LF	58,085	64.95 /LF	105,992
						32.31 Fencing	1,632.00 LF	9.21 /LF	1.75 /LF	24.63 /LF	/LF	35.59 /LF	58,085	64.95 /LF	105,992
						32.0 Exterior Improvements	1.00 LS	15,035.32 /LS	2,851.88 /LS	40,198.00 /LS	/LS	58,085.20 /LS	58,085	105,991.84 /LS	105,992
						32.00.004 Substation Fencing	1,632.00 LF	9.21 /LF	1.75 /LF	24.63 /LF	/LF	35.59 /LF	58,085	64.95 /LF	105,992
		32.00.006				Substation Gravel Surfacing									
			32.0			Exterior Improvements									
				32.12		Paving									
					32.40.04.00	Site Improvements, Access Roads, Gravel									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	18,096.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	17,637	1.73 /SY	31,298
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul. 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	3,020.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	19,050	11.19 /cy	33,807
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	3,020.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	48,427	28.46 /cy	85,938
						Load excavated spoils	3,020.00 cy	0.77 /cy	0.84 /cy		-	1.62 /cy	4,883	2.87 /cy	8,666
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	18,096.00 sy	0.94 /sy	0.92 /sy	7.30 /sy	-	9.16 /sy	165,737	16.78 /sy	303,693
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	18,096.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	17,644	1.73 /sy	31,311
						32.40.04.00 Site Improvements, Access Roads, Gravel	18,096.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.11 /SY	273,378	27.34 /SY	494,712
						32.12 Paving	18,096.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.11 /SY	273,378	27.34 /SY	494,712
						32.0 Exterior Improvements	1.00 LS	67,727.45 /LS	73,549.86 /LS	132,100.80 /LS	/LS	273,378.11 /LS	273,378	494,711.75 /LS	494,712
						32.00.006 Substation Gravel Surfacing	18,096.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.11 /SY	273,378	27.34 /SY	494,712
		34.10.STEEL				SUBSTATION STEEL									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Substation Steel	1.00 ea	951,600.00 /ea	-	2,400,000.00 /ea	-	3,351,600.00 /ea	3,351,600	5,451,400.44 /ea	5,451,400
						33.71.91.01 Power Substation	1.00 LS	951,600.00 /LS	/LS	2,400,000.00 /LS	/LS	3,351,600.00 /LS	3,351,600	5,451,400.44 /LS	5,451,400
						26.20 Facility Electrical	162,864.00 SF	5.84 /SF	/SF	14.74 /SF	/SF	20.58 /SF	3,351,600	33.47 /SF	5,451,400
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	3,351,600	/LF	5,451,400
						34.10.STEEL SUBSTATION STEEL	1.00 LS	951,600.00 /LS	/LS	2,400,000.00 /LS	/LS	3,351,600.00 /LS	3,351,600	5,451,400.44 /LS	5,451,400
		34.10.SUBEQ				SUBSTATION EQUIPMENT/WORK PACKAGES									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Power Transformer, 100MVA 230kV-13.2kV	2.00 ea	118,950.00 /ea	-	2,500,000.00 /ea	-	2,618,950.00 /ea	5,237,900	4,305,026.08 /ea	8,610,052
						SF6 CB 3000A 230kV	7.00 ea	35,685.00 /ea	-	180,000.00 /ea	-	215,685.00 /ea	1,509,795	352,665.74 /ea	2,468,660
						Air Disconnect Switch 3000A motorized 3ph 230kV	20.00 ea	11,895.00 /ea	-	50,000.00 /ea	-	61,895.00 /ea	1,237,900	101,084.33 /ea	2,021,687
						CCVT / CT / VT / SA 230kV	7.00 ea	14,868.75 /ea	-	175,000.00 /ea	-	189,868.75 /ea	1,329,081	311,653.20 /ea	2,181,572
						Control Building (Relays, CP, HVAC. AC/DC)	1.00 ea	356,850.00 /ea	-	2,500,000.00 /ea	-	2,856,850.00 /ea	2,856,850	4,679,621.37 /ea	4,679,621
						Surface and Below Grade Package (Fence, Rock, Conduit, Grdg, Ltg)	1.00 ea	713,700.00 /ea	-	2,100,000.00 /ea	-	2,813,700.00 /ea	2,813,700	4,582,677.74 /ea	4,582,678
						Above Grade Package (Bus, Jumpers, Fittings)	1.00 ea	785,070.00 /ea	-	2,400,000.00 /ea	-	3,185,070.00 /ea	3,185,070	5,189,183.77 /ea	5,189,184
						Above/Below Conduit, Cable Trench, Cables	1.00 ea	380,640.00 /ea	-	1,000,000.00 /ea	-	1,380,640.00 /ea	1,380,640	2,246,443.82 /ea	2,246,444
						33.71.91.01 Power Substation	1.00 LS	3,065,936.25 /LS	/LS	16,485,000.00 /LS	/LS	19,550,936.25 /LS	19,550,936	31,979,898.09 /LS	31,979,898
						26.20 Facility Electrical	162,864.00 SF	18.83 /SF	/SF	101.22 /SF	/SF	120.05 /SF	19,550,936	196.36 /SF	31,979,898
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	19,550,936	/LF	31,979,898
						34.10.SUBEQ SUBSTATION EQUIPMENT/WORK PACKAGES	1.00 LS	3,065,936.25 /LS	/LS	16,485,000.00 /LS	/LS	19,550,936.25 /LS	19,550,936	31,979,898.09 /LS	31,979,898
		34.30.FNDT				SUBSTATION FOUNDATIONS									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Transformer Foundations 100MVA	2.00 ea	47,580.00 /ea	-	20,000.00 /ea	-	67,580.00 /ea	135,160	107,860.90 /ea	215,722
						Breaker Foundations	9.00 ea	23,790.00 /ea	-	10,000.00 /ea	-	33,790.00 /ea	304,110	53,930.44 /ea	485,374
						Takeoff Structure Foundations	4.00 ea	28,548.00 /ea	-	25,000.00 /ea	-	53,548.00 /ea	214,192	86,128.72 /ea	344,515
						Bus Support / CCVT / CT-VT / SA / AS Foundations	94.00 ea	28,548.00 /ea	-	5,000.00 /ea	-	33,548.00 /ea	3,153,512	53,186.89 /ea	4,999,568
						33.71.91.01 Power Substation	1.00 LS	3,106,974.00 /LS	/LS	700,000.00 /LS	/LS	3,806,974.00 /LS	3,806,974	6,045,178.43 /LS	6,045,178
						26.20 Facility Electrical	162,864.00 SF	19.08 /SF	/SF	4.30 /SF	/SF	23.38 /SF	3,806,974	37.12 /SF	6,045,178
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	3,806,974	/LF	6,045,178
						34.30.FNDT SUBSTATION FOUNDATIONS	1.00 LS	3,106,974.00 /LS	/LS	700,000.00 /LS	/LS	3,806,974.00 /LS	3,806,974	6,045,178.43 /LS	6,045,178
		34.90.CX				ENGINEERING, STARTUP, COMMISSIONING									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Testing	600.00 hrs	118.95 /hrs	-		-	118.95 /hrs	71,370	187.30 /hrs	112,379
						Startup, Commissioning, Training, Documentation, Warranty	600.00 hrs	118.95 /hrs	-		-	118.95 /hrs	71,370	187.30 /hrs	112,379
						Power Engineering, Seismic Engineering	3,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	735,000	387.59 /hrs	1,162,762
						Protective Device Coordination Stidy	3,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	735,000	387.59 /hrs	1,162,762
						33.71.91.01 Power Substation	1.00 LS	1,462,740.00 /LS	/LS	150,000.00 /LS	/LS	1,612,740.00 /LS	1,612,740	2,550,281.51 /LS	2,550,282
						26.20 Facility Electrical	162,864.00 SF	8.98 /SF	/SF	0.92 /SF	/SF	9.90 /SF	1,612,740	15.66 /SF	2,550,282
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	1,612,740	/LF	2,550,282
						34.90.CX ENGINEERING, STARTUP, COMMISSIONING	1.00 LS	1,462,740.00 /LS	/LS	150,000.00 /LS	/LS	1,612,740.00 /LS	1,612,740	2,550,281.51 /LS	2,550,282
		34.95.CONEQ				CONSTRUCTION EQUIPMENT									
			33.0			Utilities									
				26.20		Facility Electrical									
					33.71.91.01	Power Substation									
						Forklift crew, all-terrain forklift, 45' lift, 35' reach, 9000 lb. capacity, weekly use	104.00 week		2,663.32 /week	-	-	2,663.32 /week	276,985	4,193.64 /week	436,139

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Substations for WAPA Connections
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					33.71.91.01	*Power Substation*									
						Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal	250.00 day		835.38 /day	-	-	835.38 /day	208,846	1,315.39 /day	328,847
						Crane crew, daily use for small jobs, 100-ton truck-mounted hydraulic crane, portal to portal	90.00 day		2,168.18 /day	-	-	2,168.18 /day	195,136	3,413.99 /day	307,259
						Rent crawler mounted, lattice boom crane, 165 ton, 60' boom	30.00 day	-	2,649.00 /day	-	-	2,649.00 /day	79,470	4,171.09 /day	125,133
						Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00 ea	122.38 /ea	71.41 /ea	-	-	193.79 /ea	388	305.15 /ea	610
						Mobilization or demobilization, crane, truck-mounted, up to 75 ton, (driver only, one-way)	2.00 ea	82.95 /ea	-	-	-	82.95 /ea	166	130.60 /ea	261
						Mobilization or demobilization, crane, truck-mounted, over 75 ton	2.00 ea	441.74 /ea	55.72 /ea	-	-	497.46 /ea	995	783.29 /ea	1,567
						Mobilization or demobilization, crane, crawler-mounted, over 75 ton	2.00 ea	736.23 /ea	703.65 /ea	-	-	1,439.88 /ea	2,880	2,267.22 /ea	4,534
						33.71.91.01 Power Substation	***1.00*** *LS*	*2,766.57 /LS*	*762,098.68 /LS*	*/LS*	*/LS*	*764,865.25 /LS*	*764,865*	*1,204,350.21 /LS*	*1,204,350*
						26.30 Facility Electrical	***162,864.00*** *SF*	*0.02 /SF*	*4.68 /SF*	*/SF*	*/SF*	*4.70 /SF*	*764,865*	*7.39 /SF*	*1,204,350*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*764,865*	*/LF*	*1,204,350*
						34.95 CONEQ CONSTRUCTION EQUIPMENT	***1.00*** *LS*	*2,766.57 /LS*	*762,098.68 /LS*	*/LS*	*/LS*	*764,865.25 /LS*	*764,865*	*1,204,350.21 /LS*	*1,204,350*
						06.02 Six Breaker Substation	***1.00*** *LS*	*5,672,773.59 /LS*	*835,500.42 /LS*	*16,907,305.90 /LS*	*/LS*	*23,415,579.91 /LS*	*23,415,579*	*37,831,512.27 /LS*	*37,831,512*
						08 Substations for WAPA Connection	***1.00 LS***	***14,084,931.91 /LS***	***1,575,053.18 /LS***	***35,292,995.70 /LS***	***/LS***	***50,952,980.79 /LS***	***50,952,981***	***82,891,215.33 /LS***	***82,891,215***

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	14,084,932		123,609.120 hrs	
Material	35,292,996			
Allowance				
Equipment	1,575,053		17,035.797 hrs	
Other				
Subtotal Direct Costs	50,952,981	50,952,981		
Material Sales Tax, Dunnigan Ca	2,558,742			7.250 %
Subtotal W/ Sales Tax	2,558,742	53,511,723		
Site/Civil I,OH&P	102,349			20.000 %
Subtotal W/ Subcontractor OH&P	102,349	53,614,072		
General Conditions	2,680,704			5.000 %
Subtotal W/ General Conditions	2,680,704	56,294,776		
Mobilization/Demobilization	1,688,843			3.000 %
Prime Contractor Overhead	5,798,362			10.000 %
Prime Contractor Profit	3,826,919			6.000 %
Bonds & Insurance	1,467,113			2.170 %
Subtotal W/ Prime Markups	12,781,237	69,076,013		
Contractor Contingency	3,453,801			5.000 %
Design Contingency	10,361,402			15.000 %
Subtotal W/ Contingency	13,815,203	82,891,216		
Total Construction Cost		**82,891,216**		
Non-Contract Costs	14,920,419			18.000 %
Total Project Costs	**14,920,419**	**97,811,635**		

Substations for PG&E Connection

Jacobs

SUMMARY REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Substations for PG&E Connections
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
09			***Substations for PG&E Connection***									
	09.01		Three Breaker Substation									
		32.00.004	*Substation Fencing*	**1,158.00** LF	9.09 /LF	1.70 /LF	24.39 /LF	/LF	35.18 /LF	40,741	64.20 /LF	74,347
		32.00.006	*Substation Gravel Surfacing*	9,240.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.10 /SY	139,541	27.33 /SY	252,518
		34.10.STEEL	*SUBSTATION STEEL*	**1.00** LS	594,750.00 /LS	/LS	2,100,000.00 /LS	/LS	2,694,750.00 /LS	2,694,750	4,395,380.12 /LS	4,395,380
		34.10.SUBEQ	*SUBSTATION EQUIPMENT/WORK PACKAGES*	**1.00** LS	2,045,940.00 /LS	/LS	12,690,000.00 /LS	/LS	14,735,940.00 /LS	14,735,940	24,123,109.02 /LS	24,123,109
		34.30.FNDT	*SUBSTATION FOUNDATIONS*	**1.00** LS	1,308,450.00 /LS	/LS	350,000.00 /LS	/LS	1,658,450.00 /LS	1,658,450	2,636,756.05 /LS	2,636,756
		34.90.CX	*ENGINEERING, STARTUP, COMMISSIONING*	**1.00** LS	1,415,160.00 /LS	/LS	150,000.00 /LS	/LS	1,565,160.00 /LS	1,565,160	2,475,362.46 /LS	2,475,362
		34.95.CONEQ	*CONSTRUCTION EQUIPMENT*	**1.00** LS	2,766.57 /LS	697,053.40 /LS	/LS	/LS	699,819.97 /LS	699,820	1,101,930.49 /LS	1,101,930
			09.01 Three Breaker Substation	**1.00** LS	5,412,152.32 /LS	726,552.76 /LS	15,385,696.98 /LS	/LS	21,524,401.98 /LS	21,524,402	35,059,403.06 /LS	35,059,403
	09.02		Six Breaker Substation									
		32.00.004	*Substation Fencing*	**1,632.00** LF	9.21 /LF	1.75 /LF	24.63 /LF	/LF	35.59 /LF	58,085	64.95 /LF	105,992
		32.00.006	*Substation Gravel Surfacing*	18,096.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.11 /SY	273,378	27.34 /SY	494,712
		34.10.STEEL	*SUBSTATION STEEL*	**1.00** LS	951,600.00 /LS	/LS	2,400,000.00 /LS	/LS	3,351,600.00 /LS	3,351,600	5,451,400.44 /LS	5,451,400
		34.10.SUBEQ	*SUBSTATION EQUIPMENT/WORK PACKAGES*	**1.00** LS	3,065,936.25 /LS	/LS	16,485,000.00 /LS	/LS	19,550,936.25 /LS	19,550,936	31,979,898.09 /LS	31,979,898
		34.30.FNDT	*SUBSTATION FOUNDATIONS*	**1.00** LS	3,106,974.00 /LS	/LS	700,000.00 /LS	/LS	3,806,974.00 /LS	3,806,974	6,045,178.43 /LS	6,045,178
		34.90.CX	*ENGINEERING, STARTUP, COMMISSIONING*	**1.00** LS	1,462,740.00 /LS	/LS	150,000.00 /LS	/LS	1,612,740.00 /LS	1,612,740	2,550,281.51 /LS	2,550,282
		34.95.CONEQ	*CONSTRUCTION EQUIPMENT*	**1.00** LS	2,766.57 /LS	762,098.69 /LS	/LS	/LS	764,865.25 /LS	764,865	1,204,350.21 /LS	1,204,350
			09.02 Six Breaker Substation	**1.00** LS	8,672,779.58 /LS	848,500.42 /LS	19,907,298.80 /LS	/LS	29,428,578.81 /LS	29,428,579	47,831,812.27 /LS	47,831,812
			09 Substations for PG&E Connection	***1.00 LS***	***14,084,931.91 /LS***	***1,575,053.18 /LS***	***35,292,995.70 /LS***	***/LS***	***50,952,980.79 /LS***	***50,952,981***	***82,891,215.33 /LS***	***82,891,215***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	22,203,582		123,609.120 hrs	
Material	58,184,388			
Allowance				
Equipment	2,503,245		17,035.797 hrs	
Other				
Total Construction Cost	**82,891,215**	**82,891,215**		
Non-Contract Costs	14,920,419			18.000 %
Total Project Costs	**14,920,419**	**97,811,634**		

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Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
09						***Substations for PG&E Connection***									
	09.01					Three Breaker Substation									
		32.00.004				*Substation Fencing*									
			32.0			*Exterior Improvements*									
				32.31		*Fencing*									
					32.45.01.00	*Fencing, Chain Link*									
						Fence,chain link industrial,galvanized steel,3 strands barb wire,2"posts @ 10'oc,9ga wire,6'high,schedule 40,includes excavation,& concrete	1,122.00 lf	6.52 /lf	0.94 /lf	19.95 /lf	-	27.41 /lf	30,750	50.08 /lf	56,191
						Fence, chain link industrial, gate, galvanized steel, 4' wide, 5' high, 2" frame, includes excavation, in concrete	1.00 ea	156.42 /ea	22.53 /ea	229.00 /ea	-	407.95 /ea	408	740.55 /ea	741
						Fence, chain link industrial, overhead slide gate, cantilever type, chain link, 8' high, to 18' wide, includes excavation, in concrete	32.00 lf	95.45 /lf	28.04 /lf	176.00 /lf	-	299.49 /lf	9,584	544.24 /lf	17,416
						32.45.01.00 Fencing, Chain Link	**1,158.00** LF	9.09 /LF	1.70 /LF	24.39 /LF	/LF	35.18 /LF	40,741	64.20 /LF	74,347
						32.31 Fencing	**1,158.00** LF	9.09 /LF	1.70 /LF	24.39 /LF	/LF	35.18 /LF	40,741	64.20 /LF	74,347
						32.0 Exterior Improvements	**1.00** LS	10,523.21 /LS	1,973.23 /LS	28,244.90 /LS	/LS	40,741.34 /LS	40,741	74,346.96 /LS	74,347
						32.00.004 Substation Fencing	**1,158.00** LF	9.09 /LF	1.70 /LF	24.39 /LF	/LF	35.18 /LF	40,741	64.20 /LF	74,347
		32.00.008				*Substation Gravel Surfacing*									
			32.0			*Exterior Improvements*									
				32.12		*Paving*									
					32.40.04.00	*Site Improvements, Access Roads, Gravel*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	9,240.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	9,005	1.73 /SY	15,981
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	1,540.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	9,714	11.19 /cy	17,239
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	1,540.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	24,694	28.46 /cy	43,823
						Load excavated spoils	1,540.00 cy	0.77 /cy	0.84 /cy		-	1.62 /cy	2,490	2.87 /cy	4,419
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	9,240.00 sy	0.94 /sy	0.92 /sy	7.30 /sy	-	9.16 /sy	84,627	16.78 /sy	155,069
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	9,240.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	9,009	1.73 /sy	15,988
						32.40.04.00 Site Improvements, Access Roads, Gravel	9,240.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.10 /SY	139,541	27.33 /SY	252,518
						32.12 Paving	9,240.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.10 /SY	139,541	27.33 /SY	252,518
						32.0 Exterior Improvements	**1.00** LS	34,562.54 /LS	37,526.13 /LS	67,452.00 /LS	/LS	139,540.67 /LS	139,541	252,517.94 /LS	252,518
						32.00.008 Substation Gravel Surfacing	9,240.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.10 /SY	139,541	27.33 /SY	252,518
		34.10.STEEL				*SUBSTATION STEEL*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Substation Steel	1.00 ea	594,750.00 /ea	-	2,100,000.00 /ea	-	2,694,750.00 /ea	2,694,750	4,395,380.12 /ea	4,395,380
						33.71.91.01 Power Substation	**1.00** LS	594,750.00 /LS	/LS	2,100,000.00 /LS	/LS	2,694,750.00 /LS	2,694,750	4,395,380.12 /LS	4,395,380
						26.20 Facility Electrical	**83,160.00** SF	7.15 /SF	/SF	25.25 /SF	/SF	32.40 /SF	2,694,750	52.85 /SF	4,395,380
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	2,694,750	/LF	4,395,380
						34.10.STEEL SUBSTATION STEEL	**1.00** LS	594,750.00 /LS	/LS	2,100,000.00 /LS	/LS	2,694,750.00 /LS	2,694,750	4,395,380.12 /LS	4,395,380
		34.10.SUBEQ				*SUBSTATION EQUIPMENT/WORK PACKAGES*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Power Transformer, 100MVA 230kV-13.2kV	2.00 ea	118,950.00 /ea	-	2,500,000.00 /ea	-	2,618,950.00 /ea	5,237,900	4,305,026.08 /ea	8,610,052
						SF6 CB 3000A 230kV	3.00 ea	35,685.00 /ea	-	180,000.00 /ea	-	215,685.00 /ea	647,055	352,665.74 /ea	1,057,997
						Air Disconnect Switch 3000A motorized 3ph 230kV	10.00 ea	11,895.00 /ea	-	50,000.00 /ea	-	61,895.00 /ea	618,950	101,084.33 /ea	1,010,843
						CCVT / CT / VT / SA 230kV	4.00 ea	14,868.75 /ea	-	175,000.00 /ea	-	189,868.75 /ea	759,475	311,653.20 /ea	1,246,613
						Control Building (Relays, CP, HVAC. AC/DC)	1.00 ea	237,900.00 /ea	-	1,750,000.00 /ea	-	1,987,900.00 /ea	1,987,900	3,257,005.22 /ea	3,257,005
						Surface and Below Grade Package (Fence, Rock, Conduit, Grdg, Ltg)	1.00 ea	475,800.00 /ea	-	1,700,000.00 /ea	-	2,175,800.00 /ea	2,175,800	3,549,245.90 /ea	3,549,246
						Above Grade Package (Bus, Jumpers, Fittings)	1.00 ea	475,800.00 /ea	-	1,800,000.00 /ea	-	2,275,800.00 /ea	2,275,800	3,713,955.05 /ea	3,713,955
						Above/Below Conduit, Cable Trench, Cables	1.00 ea	333,060.00 /ea	-	700,000.00 /ea	-	1,033,060.00 /ea	1,033,060	1,677,397.37 /ea	1,677,397
						33.71.91.01 Power Substation	**1.00** LS	2,045,940.00 /LS	/LS	12,690,000.00 /LS	/LS	14,735,940.00 /LS	14,735,940	24,123,109.02 /LS	24,123,109
						26.20 Facility Electrical	**83,160.00** SF	24.60 /SF	/SF	152.60 /SF	/SF	177.20 /SF	14,735,940	290.08 /SF	24,123,109
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	14,735,940	/LF	24,123,109
						34.10.SUBEQ SUBSTATION EQUIPMENT/WORK PACKAGES	**1.00** LS	2,045,940.00 /LS	/LS	12,690,000.00 /LS	/LS	14,735,940.00 /LS	14,735,940	24,123,109.02 /LS	24,123,109
		34.30.FNDT				*SUBSTATION FOUNDATIONS*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Transformer Foundations 100MVA	2.00 ea	47,580.00 /ea	-	20,000.00 /ea	-	67,580.00 /ea	135,160	107,860.89 /ea	215,722
						Breaker Foundations	3.00 ea	23,790.00 /ea	-	10,000.00 /ea	-	33,790.00 /ea	101,370	53,930.44 /ea	161,791
						Takeoff Structure Foundations	4.00 ea	28,548.00 /ea	-	25,000.00 /ea	-	53,548.00 /ea	214,192	86,128.72 /ea	344,515
						Bus Support / CCVT / CT-VT / SA /AS Foundations	36.00 ea	28,548.00 /ea	-	5,000.00 /ea	-	33,548.00 /ea	1,207,728	53,186.89 /ea	1,914,728
						33.71.91.01 Power Substation	**1.00** LS	1,308,450.00 /LS	/LS	350,000.00 /LS	/LS	1,658,450.00 /LS	1,658,450	2,636,756.05 /LS	2,636,756
						26.20 Facility Electrical	**83,160.00** SF	15.73 /SF	/SF	4.21 /SF	/SF	19.94 /SF	1,658,450	31.71 /SF	2,636,756
						33.0 Utilities		/LF	/LF	/LF	/LF	/LF	1,658,450	/LF	2,636,756
						34.30.FNDT SUBSTATION FOUNDATIONS	**1.00** LS	1,308,450.00 /LS	/LS	350,000.00 /LS	/LS	1,658,450.00 /LS	1,658,450	2,636,756.05 /LS	2,636,756
		34.90.CX				*ENGINEERING, STARTUP, COMMISSIONING*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Testing	400.00 hrs	118.95 /hrs	-		-	118.95 /hrs	47,580	187.30 /hrs	74,919
						Startup, Commissioning, Training, Documentation, Warranty	400.00 hrs	118.95 /hrs	-		-	118.95 /hrs	47,580	187.30 /hrs	74,919
						Power Engineering, Seismic Engineering	2,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	490,000	387.59 /hrs	775,175
						Protective Device Coordination Stidy	2,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	490,000	387.59 /hrs	775,175
						Protective Device Coordination Stidy	2,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	490,000	387.59 /hrs	775,175
						33.71.91.01 Power Substation	**1.00** LS	1,415,160.00 /LS	/LS	150,000.00 /LS	/LS	1,565,160.00 /LS	1,565,160	2,475,362.46 /LS	2,475,362
						26.20 Facility Electrical	**83,160.00** SF	17.02 /SF	/SF	1.80 /SF	/SF	18.82 /SF	1,565,160	29.77 /SF	2,475,362
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	1,565,160	/LF	2,475,362
						34.90.CX ENGINEERING, STARTUP, COMMISSIONING	**1.00** LS	1,415,160.00 /LS	/LS	150,000.00 /LS	/LS	1,565,160.00 /LS	1,565,160	2,475,362.46 /LS	2,475,362
		34.95.CONEQ				*CONSTRUCTION EQUIPMENT*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Forklift crew, all-terrain forklift, 45' lift, 35' reach, 9000 lb. capacity, weekly use	104.00 week		2,663.32 /week	-	-	2,663.32 /week	276,985	4,193.64 /week	436,139
						Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal	250.00 day		835.38 /day	-	-	835.38 /day	208,846	1,315.39 /day	328,847
						Crane crew, daily use for small jobs, 100-ton truck-mounted hydraulic crane, portal to portal	60.00 day		2,168.18 /day	-	-	2,168.18 /day	130,091	3,413.99 /day	204,839
						Rent crawler mounted, lattice boom crane, 165 ton, 60' boom	30.00 day	-	2,649.00 /day	-	-	2,649.00 /day	79,470	4,171.09 /day	125,133
						Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00 ea	122.38 /ea	71.41 /ea	-	-	193.79 /ea	388	305.14 /ea	610

Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Substations for PG&E Connections
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					33.71.91.01	*Power Substation*									
						Mobilization or demobilization, crane, truck-mounted, up to 75 ton, (driver only, one-way)	2.00 ea	82.95 /ea	-	-	-	82.95 /ea	166	130.62 /ea	261
						Mobilization or demobilization, crane, truck-mounted, over 75 ton	2.00 ea	441.74 /ea	55.72 /ea	-	-	497.46 /ea	995	783.29 /ea	1,567
						Mobilization or demobilization, crane, crawler-mounted, over 75 ton	2.00 ea	736.23 /ea	703.65 /ea	-	-	1,439.88 /ea	2,880	2,267.22 /ea	4,534
						33.71.91.01 Power Substation	**1.00** LS	2,766.57 /LS	697,053.40 /LS	/LS	/LS	699,819.97 /LS	699,820	1,101,930.49 /LS	1,101,930
						26.20 Facility Electrical	**83,160.00** SF	0.03 /SF	8.38 /SF	/SF	/SF	8.42 /SF	699,820	13.25 /SF	1,101,930
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	699,820	/LF	1,101,930
						34.95.CONEQ CONSTRUCTION EQUIPMENT	**1.00** LS	2,766.57 /LS	697,053.40 /LS	/LS	/LS	699,819.97 /LS	699,820	1,101,930.49 /LS	1,101,930
						09.01 Three Breaker Substation	**1.00** LS	5,412,163.32 /LS	736,552.76 /LS	15,385,686.90 /LS	/LS	21,534,401.98 /LS	21,534,402	35,059,408.06 /LS	35,059,408
	09.02					Six Breaker Substation									
		32.00.004				*Substation Fencing*									
			32.0			*Exterior Improvements*									
				32.31		*Fencing*									
					32.45.01.00	*Fencing, Chain Link*									
						Fence,chain link industrial,galvanized steel,3 strands barb wire,2"posts @ 10'oc,9ga wire,6'high,schedule 40,includes excavation,& concrete	1,580.00 lf	6.52 /lf	0.94 /lf	19.95 /lf	-	27.41 /lf	43,302	50.08 /lf	79,128
						Fence, chain link industrial, gate, galvanized steel, 4' wide, 5' high, 2" frame, includes excavation, in concrete	1.00 ea	156.42 /ea	22.53 /ea	229.00 /ea	-	407.95 /ea	408	740.54 /ea	741
						Fence, chain link industrial, overhead slide gate, cantilever type, chain link, 8' high, to 18' wide, includes excavation, in concrete	48.00 lf	95.45 /lf	28.04 /lf	176.00 /lf	-	299.49 /lf	14,376	544.24 /lf	26,123
						32.45.01.00 Fencing, Chain Link	**1,632.00** LF	9.21 /LF	1.75 /LF	24.63 /LF	/LF	35.59 /LF	58,085	64.95 /LF	105,992
						32.31 Fencing	**1,632.00** LF	9.21 /LF	1.75 /LF	24.63 /LF	/LF	35.59 /LF	58,085	64.95 /LF	105,992
						32.0 Exterior Improvements	**1.00** LS	15,035.32 /LS	2,851.88 /LS	40,198.00 /LS	/LS	58,085.20 /LS	58,085	105,991.84 /LS	105,992
						32.00.004 Substation Fencing	**1,632.00** LF	9.21 /LF	1.75 /LF	24.63 /LF	/LF	35.59 /LF	58,085	64.95 /LF	105,992
		32.00.006				*Substation Gravel Surfacing*									
			32.0			*Exterior Improvements*									
				32.12		*Paving*									
					32.40.04.00	*Site Improvements, Access Roads, Gravel*									
						Fine grading, for roadway, base or leveling course, large area, 6,000 S.Y. or more	18,096.00 SY	0.62 /SY	0.35 /SY	-	-	0.98 /SY	17,637	1.73 /SY	31,298
						Excavation, bulk, scrapers, bank measure, common earth, 3000' haul, 14 C.Y. bucket, self propelled scrapers, 1/4 push dozer	3,020.00 cy	1.68 /cy	4.63 /cy	-	-	6.31 /cy	19,050	11.19 /cy	33,807
						Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	3,020.00 cy	7.24 /cy	8.80 /cy	-	-	16.04 /cy	48,427	28.46 /cy	85,938
						Load excavated spoils	3,020.00 cy	0.77 /cy	0.84 /cy		-	1.62 /cy	4,883	2.87 /cy	8,666
						Base course drainage layers,aggregate base course for roadways and large paved areas,crushed stone base,compacted,crushed 1-1/2"stone base,6"deep	18,096.00 sy	0.94 /sy	0.92 /sy	7.30 /sy	-	9.16 /sy	165,737	16.78 /sy	303,693
						Base course drainage layers, prepare and roll sub-base, large areas over 2500 S.Y.	18,096.00 sy	0.57 /sy	0.41 /sy	-	-	0.98 /sy	17,644	1.73 /sy	31,311
						32.40.04.00 Site Improvements, Access Roads, Gravel	18,096.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.11 /SY	273,378	27.34 /SY	494,712
						32.12 Paving	18,096.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.11 /SY	273,378	27.34 /SY	494,712
						32.0 Exterior Improvements	**1.00** LS	67,727.45 /LS	73,549.86 /LS	132,100.80 /LS	/LS	273,378.11 /LS	273,378	494,711.75 /LS	494,712
						32.00.006 Substation Gravel Surfacing	18,096.00 SY	3.74 /SY	4.06 /SY	7.30 /SY	/SY	15.11 /SY	273,378	27.34 /SY	494,712
		34.10.STEEL				*SUBSTATION STEEL*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Substation Steel	1.00 ea	951,600.00 /ea	-	2,400,000.00 /ea	-	3,351,600.00 /ea	3,351,600	5,451,400.44 /ea	5,451,400
						33.71.91.01 Power Substation	**1.00** LS	951,600.00 /LS	/LS	2,400,000.00 /LS	/LS	3,351,600.00 /LS	3,351,600	5,451,400.44 /LS	5,451,400
						26.20 Facility Electrical	**162,864.00** SF	5.84 /SF	/SF	14.74 /SF	/SF	20.58 /SF	3,351,600	33.47 /SF	5,451,400
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	3,351,600	/LF	5,451,400
						34.10.STEEL SUBSTATION STEEL	**1.00** LS	951,600.00 /LS	/LS	2,400,000.00 /LS	/LS	3,351,600.00 /LS	3,351,600	5,451,400.44 /LS	5,451,400
		34.10.SUBEQ				*SUBSTATION EQUIPMENT/WORK PACKAGES*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Power Transformer, 100MVA 230kV-13.2kV	2.00 ea	118,950.00 /ea	-	2,500,000.00 /ea	-	2,618,950.00 /ea	5,237,900	4,305,026.08 /ea	8,610,052
						SF6 CB 3000A 230kV	7.00 ea	35,685.00 /ea	-	180,000.00 /ea	-	215,685.00 /ea	1,509,795	352,665.74 /ea	2,468,660
						Air Disconnect Switch 3000A motorized 3ph 230kV	20.00 ea	11,895.00 /ea	-	50,000.00 /ea	-	61,895.00 /ea	1,237,900	101,084.33 /ea	2,021,687
						CCVT / CT / VT / SA 230kV	7.00 ea	14,868.75 /ea	-	175,000.00 /ea	-	189,868.75 /ea	1,329,081	311,653.20 /ea	2,181,572
						Control Building (Relays, CP, HVAC. AC/DC)	1.00 ea	356,850.00 /ea	-	2,500,000.00 /ea	-	2,856,850.00 /ea	2,856,850	4,679,621.37 /ea	4,679,621
						Surface and Below Grade Package (Fence, Rock, Conduit, Grdg, Ltg)	1.00 ea	713,700.00 /ea	-	2,100,000.00 /ea	-	2,813,700.00 /ea	2,813,700	4,582,677.74 /ea	4,582,678
						Above Grade Package (Bus, Jumpers, Fittings)	1.00 ea	785,070.00 /ea	-	2,400,000.00 /ea	-	3,185,070.00 /ea	3,185,070	5,189,183.77 /ea	5,189,184
						Above/Below Conduit, Cable Trench, Cables	1.00 ea	380,640.00 /ea	-	1,000,000.00 /ea	-	1,380,640.00 /ea	1,380,640	2,246,443.82 /ea	2,246,444
						33.71.91.01 Power Substation	**1.00** LS	3,065,936.25 /LS	/LS	16,485,000.00 /LS	/LS	19,550,936.25 /LS	19,550,936	31,979,898.09 /LS	31,979,898
						26.20 Facility Electrical	**162,864.00** SF	18.83 /SF	/SF	101.22 /SF	/SF	120.05 /SF	19,550,936	196.36 /SF	31,979,898
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	19,550,936	/LF	31,979,898
						34.10.SUBEQ SUBSTATION EQUIPMENT/WORK PACKAGES	**1.00** LS	3,065,936.25 /LS	/LS	16,485,000.00 /LS	/LS	19,550,936.25 /LS	19,550,936	31,979,898.09 /LS	31,979,898
		34.30.FNDT				*SUBSTATION FOUNDATIONS*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Transformer Foundations 100MVA	2.00 ea	47,580.00 /ea	-	20,000.00 /ea	-	67,580.00 /ea	135,160	107,860.90 /ea	215,722
						Breaker Foundations	9.00 ea	23,790.00 /ea	-	10,000.00 /ea	-	33,790.00 /ea	304,110	53,930.44 /ea	485,374
						Takeoff Structure Foundations	4.00 ea	28,548.00 /ea	-	25,000.00 /ea	-	53,548.00 /ea	214,192	86,128.72 /ea	344,515
						Bus Support / CCVT / CT-VT / SA / AS Foundations	94.00 ea	28,548.00 /ea	-	5,000.00 /ea	-	33,548.00 /ea	3,153,512	53,186.89 /ea	4,999,568
						33.71.91.01 Power Substation	**1.00** LS	3,106,974.00 /LS	/LS	700,000.00 /LS	/LS	3,806,974.00 /LS	3,806,974	6,045,178.43 /LS	6,045,178
						26.20 Facility Electrical	**162,864.00** SF	19.08 /SF	/SF	4.30 /SF	/SF	23.38 /SF	3,806,974	37.12 /SF	6,045,178
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	3,806,974	/LF	6,045,178
						34.30.FNDT SUBSTATION FOUNDATIONS	**1.00** LS	3,106,974.00 /LS	/LS	700,000.00 /LS	/LS	3,806,974.00 /LS	3,806,974	6,045,178.43 /LS	6,045,178
		34.90.CX				*ENGINEERING, STARTUP, COMMISSIONING*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Testing	600.00 hrs	118.95 /hrs	-		-	118.95 /hrs	71,370	187.30 /hrs	112,379
						Startup, Commissioning, Training, Documentation, Warranty	600.00 hrs	118.95 /hrs	-		-	118.95 /hrs	71,370	187.30 /hrs	112,379
						Power Engineering, Seismic Engineering	3,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	735,000	387.59 /hrs	1,162,762
						Protective Device Coordination Stidy	3,000.00 hrs	220.00 /hrs	-	25.00 /hrs	-	245.00 /hrs	735,000	387.59 /hrs	1,162,762
						33.71.91.01 Power Substation	**1.00** LS	1,462,740.00 /LS	/LS	150,000.00 /LS	/LS	1,612,740.00 /LS	1,612,740	2,550,281.51 /LS	2,550,282
						26.20 Facility Electrical	**162,864.00** SF	8.98 /SF	/SF	0.92 /SF	/SF	9.90 /SF	1,612,740	15.66 /SF	2,550,282
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	1,612,740	/LF	2,550,282
						34.90.CX ENGINEERING, STARTUP, COMMISSIONING	**1.00** LS	1,462,740.00 /LS	/LS	150,000.00 /LS	/LS	1,612,740.00 /LS	1,612,740	2,550,281.51 /LS	2,550,282
		34.95.CONEQ				*CONSTRUCTION EQUIPMENT*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.01	*Power Substation*									
						Forklift crew, all-terrain forklift, 45' lift, 35' reach, 9000 lb. capacity, weekly use	104.00 week		2,663.32 /week	-	-	2,663.32 /week	276,985	4,193.64 /week	436,139

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DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Substations for PG&E Connections
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					33.71.91.01	*Power Substation*									
						Crane crew, daily use for small jobs, 25-ton truck-mounted hydraulic crane, portal to portal	250.00 day		835.38 /day	-	-	835.38 /day	208,846	1,315.39 /day	328,847
						Crane crew, daily use for small jobs, 100-ton truck-mounted hydraulic crane, portal to portal	90.00 day		2,168.18 /day	-	-	2,168.18 /day	195,136	3,413.99 /day	307,259
						Rent crawler mounted, lattice boom crane, 165 ton, 60' boom	30.00 day	-	2,649.00 /day	-	-	2,649.00 /day	79,470	4,171.09 /day	125,133
						Mobilization or demobilization, delivery charge for equipment, on flatbed trailer behind pickup truck	2.00 ea	122.38 /ea	71.41 /ea	-	-	193.79 /ea	388	305.15 /ea	610
						Mobilization or demobilization, crane, truck-mounted, up to 75 ton, (driver only, one-way)	2.00 ea	82.95 /ea	-	-	-	82.95 /ea	166	130.60 /ea	261
						Mobilization or demobilization, crane, truck-mounted, over 75 ton	2.00 ea	441.74 /ea	55.72 /ea	-	-	497.46 /ea	995	783.29 /ea	1,567
						Mobilization or demobilization, crane, crawler-mounted, over 75 ton	2.00 ea	736.23 /ea	703.65 /ea	-	-	1,439.88 /ea	2,880	2,267.22 /ea	4,534
						33.71.91.01 Power Substation	***1.00*** *LS*	*2,766.57 /LS*	*762,098.68 /LS*	*/LS*	*/LS*	*764,865.25 /LS*	*764,865*	*1,204,350.21 /LS*	*1,204,350*
						26.30 Facility Electrical	***162,864.00*** *SF*	*0.02 /SF*	*4.69 /SF*	*/SF*	*/SF*	*4.70 /SF*	*764,865*	*7.39 /SF*	*1,204,350*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*764,865*	*/LF*	*1,204,350*
						34.95 CONEQ CONSTRUCTION EQUIPMENT	***1.00*** *LS*	*2,766.57 /LS*	*762,096.68 /LS*	*/LS*	*/LS*	*764,865.25 /LS*	*764,865*	*1,204,350.21 /LS*	*1,204,350*
						09.02 Six Breaker Substation	**1.00** LS	5,672,773.59 /LS	835,500.42 /LS	16,907,298.80 /LS	/LS	23,415,572.81 /LS	23,415,579	37,831,512.37 /LS	37,831,512
						09 Substations for PG&E Connection	***1.00 LS***	***14,084,931.91 /LS***	***1,575,053.18 /LS***	***35,292,995.70 /LS***	***/LS***	***50,952,980.79 /LS***	***50,952,981***	***82,891,215.33 /LS***	***82,891,215***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	14,084,932		123,609.120 hrs	
Material	35,292,996			
Allowance				
Equipment	1,575,053		17,035.797 hrs	
Other				
Subtotal Direct Costs	50,952,981	50,952,981		
Material Sales Tax, Dunnigan Ca	2,558,742			7.250 %
Subtotal W/ Sales Tax	2,558,742	53,511,723		
Site/Civil I,OH&P	102,349			20.000 %
Subtotal W/ Subcontractor OH&P	102,349	53,614,072		
General Conditions	2,680,704			5.000 %
Subtotal W/ General Conditions	2,680,704	56,294,776		
Mobilization/Demobilization	1,688,843			3.000 %
Prime Contractor Overhead	5,798,362			10.000 %
Prime Contractor Profit	3,826,919			6.000 %
Bonds & Insurance	1,467,113			2.170 %
Subtotal W/ Prime Markups	12,781,237	69,076,013		
Contractor Contingency	3,453,801			5.000 %
Design Contingency	10,361,402			15.000 %
Subtotal W/ Contingency	13,815,203	82,891,216		
Total Construction Cost		**82,891,216**		
Non-Contract Costs	14,920,419			18.000 %
Total Project Costs	**14,920,419**	**97,811,635**		

Transmission Lines for WAPA Connection

Jacobs

SUMMARY REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Transmission Lines WAPA Rev 2	Estimator: Wells/Cavalleri - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
10			***Transmission Lines for WAPA Connection***									
	10.01		Funks to WAPA Connection									
		34.07.MISC	MISC, SUPERVISION, ROADS & MATTING	**1.00** LS	241,900.00 /LS	/LS	70,000.00 /LS	451,000.00 /LS	5,762,900.00 /LS	5,762,900	8,983,694.91 /LS	8,983,695
		34.09.FNDT	T-LINE FOUNDATIONS	**2.00** MO	312,600.60 /MO	40,244.78 /MO	179,733.40 /MO	/MO	532,578.78 /MO	1,065,158	842,790.41 /MO	1,685,581
		34.11.STRC	T-LINE STRUCTURES	**2.00** MO	502,444.80 /MO	71,615.43 /MO	1,035,000.00 /MO	/MO	1,609,060.23 /MO	3,218,120	2,531,959.39 /MO	5,163,919
		34.13.WIRE	T-LINE WIRE WORK	**1.00** MO	453,640.19 /MO	94,900.30 /MO	239,250.00 /MO	/MO	787,790.49 /MO	787,790	1,244,726.18 /MO	1,244,726
			10.01 Funks to WAPA Connection	**1.30** MI	1,788,946.93 /MI	245,092.85 /MI	2,106,705.23 /MI	346,923.08 /MI	8,333,821.93 /MI	10,833,968	13,136,863.07 /MI	17,077,921
	10.02		Funks to TRR									
		34.07.MISC	MISC, SUPERVISION, ROADS & MATTING	**1.00** LS	967,600.00 /LS	/LS	90,000.00 /LS	1,570,000.00 /LS	7,627,600.00 /LS	7,627,600	11,890,354.52 /LS	11,890,355
		34.09.FNDT	T-LINE FOUNDATIONS	**7.00** MO	217,372.63 /MO	40,645.89 /MO	119,442.86 /MO	/MO	377,461.37 /MO	2,642,230	596,745.84 /MO	4,177,221
		34.11.STRC	T-LINE STRUCTURES	**4.00** MO	676,587.60 /MO	126,576.10 /MO	1,303,750.00 /MO	/MO	2,106,913.70 /MO	8,427,655	3,377,101.35 /MO	13,508,405
		34.13.WIRE	T-LINE WIRE WORK	**7.00** MO	170,166.51 /MO	53,612.51 /MO	100,714.29 /MO	/MO	324,493.30 /MO	2,271,453	512,863.57 /MO	3,590,045
			10.02 Funks to TRR	**4.10** MI	1,557,737.64 /MI	284,417.84 /MI	1,669,780.49 /MI	382,926.83 /MI	5,114,375.00 /MI	20,968,937	8,089,274.59 /MI	33,166,026
			10 Transmission Lines for WAPA Connection	***5.40 MI***	***1,613,399.14 /MI***	***274,950.71 /MI***	***1,774,966.07 /MI***	***374,259.26 /MI***	***5,889,427.03 /MI***	***31,802,906***	***9,304,434.54 /MI***	***50,243,947***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	13,573,882		73,075.707 hrs	
Material	15,628,080			
Allowance	3,148,726			
Equipment	2,313,221		15,280.000 hrs	
Other	15,580,038			
Total Construction Cost	**50,243,947**	**50,243,947**		
Non-Contract Costs	9,043,910			18.000 %
Total Project Costs	**9,043,910**	**59,287,857**		

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Jacobs

DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Transmission Lines WAPA Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
10						***Transmission Lines for WAPA Connection***									
	10.01					Funks to WAPA Connection									
		34.07.MISC				*MISC, SUPERVISION, ROADS & MATTING*									
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Matting Structure Work Pad 50'x50'	14.00 ea		-		7,000.00 /ea	7,000.00 /ea	98,000	10,906.03 /ea	152,684
						Matting per foot (through wetlands)	1,300.00 lf		-		150.00 /lf	150.00 /lf	195,000	233.70 /lf	303,811
						Access Road per foot	3,500.00 lf		-		40.00 /lf	40.00 /lf	140,000	62.32 /lf	218,121
						ROW clearing	6.00 acre		-		3,000.00 /acre	3,000.00 /acre	18,000	4,674.01 /acre	28,044
						Field Construction Coordinator	1,600.00 hr	118.95 /hr	-			118.95 /hr	190,320	185.32 /hr	296,519
						General Supervision	400.00 hr	128.95 /hr	-			128.95 /hr	51,580	200.90 /hr	80,362
						Misc Material	1.00 ls		-	70,000.00 /ls		70,000.00 /ls	70,000	114,135.27 /ls	114,135
						Allowance at BUDGET LEVEL (Other cost type)	1.00 ls		-			5,000,000.00 /ls	5,000,000	7,790,018.83 /ls	7,790,019
						33.71.91.00 Transmission Line	***1.00*** *LS*	*241,900.00 /LS*	*/LS*	*70,000.00 /LS*	*451,000.00 /LS*	*5,762,900.00 /LS*	*5,762,900*	*8,983,694.91 /LS*	*8,983,695*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*5,762,900*	*/SF*	*8,983,695*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*5,762,900*	*/LF*	*8,983,695*
						34.07.MISC MISC, SUPERVISION, ROADS & MATTING	***1.00*** *LS*	*241,900.00 /LS*	*/LS*	*70,000.00 /LS*	*451,000.00 /LS*	*5,762,900.00 /LS*	*5,762,900*	*8,983,694.91 /LS*	*8,983,695*
		34.09.FNDT				*T-LINE FOUNDATIONS*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent auger, truck-mounted, for caissons, water wells	43.00 day	-	771.10 /day	-	-	771.10 /day	33,157	1,201.38 /day	51,659
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	43.00 day	-	629.75 /day	-	-	629.75 /day	27,079	981.15 /day	42,190
						Rent crane truck mounted, hydraulic, 12 ton capacity	43.00 day	-	471.00 /day	-	-	471.00 /day	20,253	733.82 /day	31,554
						01.01.06.03 GC Equip, Tools, & Consumables	***1.00*** *LS*	*/LS*	*80,489.55 /LS*	*/LS*	*/LS*	*80,489.55 /LS*	*80,490*	*125,403.02 /LS*	*125,403*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*80,490*	*/SF*	*125,403*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*80,490*	*/SF*	*125,403*
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,358.42 /ls	33,358
						Foundation 7' dia x 30' caisson	6.00 ea	19,032.00 /ea	-	12,477.00 /ea	-	31,509.00 /ea	189,054	49,995.72 /ea	299,974
						Foundation 8' dia x 30' caisson	2.00 ea	28,548.00 /ea	-	14,532.40 /ea	-	43,080.40 /ea	86,161	68,173.02 /ea	136,346
						Foundation 10' dia x 30' caisson	12.00 ea	34,257.60 /ea	-	21,295.00 /ea	-	55,552.60 /ea	666,631	88,095.05 /ea	1,057,141
						Demobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,358.42 /ls	33,358
						33.71.91.00 Transmission Line	***1.00*** *LS*	*625,201.20 /LS*	*/LS*	*359,466.90 /LS*	*/LS*	*984,668.00 /LS*	*984,668*	*1,560,177.60 /LS*	*1,560,178*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*984,668*	*/SF*	*1,560,178*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*984,668*	*/LF*	*1,560,178*
						34.09.FNDT T-LINE FOUNDATIONS	***2.00*** *MO*	*312,600.60 /MO*	*40,244.78 /MO*	*179,733.40 /MO*	*/MO*	*532,578.78 /MO*	*1,065,158*	*842,790.41 /MO*	*1,685,581*
		34.11.STRC				*T-LINE STRUCTURES*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	43.00 day	-	629.75 /day	-	-	629.75 /day	27,079	981.15 /day	42,190
						Rent forklift, for rough terrain, 42' lift, 35' reach, 9000 lb., 110 H.P.	43.00 day	-	534.20 /day	-	-	534.20 /day	22,971	832.29 /day	35,788
						Rent crane truck mount, cable 8x4 drive 90 ton, 15' radius	43.00 day	-	1,696.00 /day	-	-	1,696.00 /day	72,928	2,642.37 /day	113,622
						Rent crane truck mounted, hydraulic, 12 ton capacity	43.00 day	-	471.00 /day	-	-	471.00 /day	20,253	733.82 /day	31,554
						01.01.06.03 GC Equip, Tools, & Consumables	***1.00*** *LS*	*/LS*	*143,230.95 /LS*	*/LS*	*/LS*	*143,230.95 /LS*	*143,231*	*223,154.20 /LS*	*223,154*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*143,231*	*/SF*	*223,154*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*143,231*	*/SF*	*223,154*
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 LS	57,096.00 /LS	-		-	57,096.00 /LS	57,096	88,955.78 /LS	88,956
						Install Steel Double Circuit Suspension Pole	4.00 ea	45,676.80 /ea	-	85,000.00 /ea	-	130,676.80 /ea	522,707	209,757.45 /ea	839,030
						Install Steel Double Circuit Light Angle Pole	2.00 ea	57,096.00 /ea	-	130,000.00 /ea	-	187,096.00 /ea	374,192	300,921.27 /ea	601,843
						Install Steel Double Circuit Heavy Angle Pole	6.00 ea	68,515.20 /ea	-	170,000.00 /ea	-	238,515.20 /ea	1,431,091	383,932.58 /ea	2,303,595
						Install Steel Single Circuit H-Deadend Structure	1.00 ea	45,676.80 /ea	-	50,000.00 /ea	-	95,676.80 /ea	95,677	152,689.82 /ea	152,690
						Install Steel Single Circuit 3P Structure	2.00 ea	68,515.20 /ea	-	200,000.00 /ea	-	268,515.20 /ea	537,030	432,847.70 /ea	865,695
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,955.78 /ls	88,956
						33.71.91.00 Transmission Line	***1.00*** *LS*	*1,004,889.60 /LS*	*/LS*	*2,070,000.00 /LS*	*/LS*	*3,074,889.60 /LS*	*3,074,890*	*4,940,764.56 /LS*	*4,940,765*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*3,074,890*	*/SF*	*4,940,765*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*3,074,890*	*/LF*	*4,940,765*
						34.11.STRC T-LINE STRUCTURES	***2.00*** *MO*	*502,444.80 /MO*	*71,615.43 /MO*	*1,035,000.00 /MO*	*/MO*	*1,609,060.23 /MO*	*3,218,120*	*2,581,959.39 /MO*	*5,163,919*
		34.13.WIRE				*T-LINE WIRE WORK*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent dozer, crawler, torque converter, diesel 200 HP	22.00 day	-	1,504.00 /day	-	-	1,504.00 /day	33,088	2,343.24 /day	51,551
						Rent trailer with cable reel for high voltage line work	22.00 day	-	64.10 /day	-	-	64.10 /day	1,410	99.87 /day	2,197
						Rent trailer with cable tensioning rig, for high voltage line work	22.00 day	-	110.40 /day	-	-	110.40 /day	2,429	172.00 /day	3,784
						Rent trailer with cable pulling rig, for high voltage line work	22.00 day	-	607.15 /day	-	-	607.15 /day	13,357	945.94 /day	20,811
						Rent crane truck mount, cable 8x4 drive 40 ton, 12' radius	22.00 day	-	2,028.00 /day	-	-	2,028.00 /day	44,616	3,159.63 /day	69,512
						01.01.06.03 GC Equip, Tools, & Consumables	***1.00*** *LS*	*/LS*	*94,900.30 /LS*	*/LS*	*/LS*	*94,900.30 /LS*	*94,900*	*147,855.00 /LS*	*147,855*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*94,900*	*/SF*	*147,855*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*94,900*	*/SF*	*147,855*
			33.0			*Utilities*									
				26.20		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Overhead line conductors & devices, conductors, primary circuits, per wire, 1000 to 1600 kcmil	37,000.00 lf	5.15 /lf		2.25 /lf	-	7.40 /lf	273,600	11.68 /lf	432,305
						Overhead line conductors & devices, insulators and hardware, primary circuits, disk insulators, 345 to 500 kV	15.00 ea	2,854.80 /ea		9,000.00 /ea	-	11,854.80 /ea	177,822	19,122.32 /ea	286,835
						Overhead line conductors & devices, overhead ground wire	14,000.00 lf	7.59 /lf		1.50 /lf	-	9.09 /lf	127,276	14.27 /lf	199,820
						Mobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,955.79 /ls	88,956
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,955.79 /ls	88,956
						33.71.91.00 Transmission Line	***1.00*** *LS*	*453,640.19 /LS*	*/LS*	*239,250.00 /LS*	*/LS*	*692,890.19 /LS*	*692,890*	*1,096,871.18 /LS*	*1,096,871*
						26.20 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*692,890*	*/SF*	*1,096,871*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*692,890*	*/LF*	*1,096,871*
						34.13.WIRE T-LINE WIRE WORK	***1.00*** *MO*	*453,640.19 /MO*	*94,900.30 /MO*	*239,250.00 /MO*	*/MO*	*787,790.49 /MO*	*787,790*	*1,244,726.18 /MO*	*1,244,726*
						10.01 Funks to WAPA Connection	***1.30*** MI	1,795,346.92 /MI	245,082.05 /MI	2,396,765.25 /MI	348,333.05 /MI	8,335,521.92 /MI	10,835,988	13,136,862.07 /MI	17,077,821
	10.02					Funks to TRR									
		34.07.MISC				*MISC, SUPERVISION, ROADS & MATTING*									
			33.0			*Utilities*									

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Jacobs

DETAIL REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Transmission Lines WAPA Rev 2	Estimator: Wells/Cavalleri - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Matting Structure Work Pad 50'x50'	49.00 ea		-		7,000.00 /ea	7,000.00 /ea	343,000	10,906.03 /ea	534,395
						Matting per foot (through wetlands)	4,500.00 lf		-		150.00 /lf	150.00 /lf	675,000	233.70 /lf	1,051,653
						Access Road per foot	12,000.00 lf		-		40.00 /lf	40.00 /lf	480,000	62.32 /lf	747,842
						ROW clearing	24.00 acre		-		3,000.00 /acre	3,000.00 /acre	72,000	4,674.01 /acre	112,176
						Field Construction Coordinator	6,400.00 hr	118.95 /hr	-			118.95 /hr	761,280	185.32 /hr	1,186,077
						General Supervision	1,600.00 hr	128.95 /hr	-			128.95 /hr	206,320	200.90 /hr	321,447
						Misc Material	1.00 ls		-	90,000.00 /ls		90,000.00 /ls	90,000	146,745.34 /ls	146,745
						Allowance at BUDGET LEVEL (Other cost type)	1.00 ls		-			5,000,000.00 /ls	5,000,000	7,790,018.84 /ls	7,790,019
						33.71.91.00 Transmission Line	**1.00** LS	967,600.00 /LS	/LS	90,000.00 /LS	1,570,000.00 /LS	7,627,600.00 /LS	7,627,600	11,890,354.52 /LS	11,890,355
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	7,627,600	/SF	11,890,355
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	7,627,600	/LF	11,890,355
						34.07.MISC MISC, SUPERVISION, ROADS & MATTING	**1.00** LS	967,600.00 /LS	/LS	90,000.00 /LS	1,570,000.00 /LS	7,627,600.00 /LS	7,627,600	11,890,354.52 /LS	11,890,355
		34.09.FNDT				*T-LINE FOUNDATIONS*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent auger, truck-mounted, for caissons, water wells	152.00 day	-	771.10 /day	-	-	771.10 /day	117,207	1,201.38 /day	182,609
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	152.00 day	-	629.75 /day	-	-	629.75 /day	95,722	981.15 /day	149,135
						Rent crane truck mounted, hydraulic, 12 ton capacity	152.00 day	-	471.00 /day	-	-	471.00 /day	71,592	733.82 /day	111,541
						01.01.06.03 GC Equip, Tools, & Consumables	**1.00** LS	/LS	284,521.20 /LS	/LS	/LS	284,521.20 /LS	284,521	443,285.11 /LS	443,285
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	284,521	/SF	443,285
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	284,521	/SF	443,285
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,358.42 /ls	33,358
						Foundation 7' dia x 30' caisson	39.00 ea	22,838.40 /ea	-	12,477.00 /ea	-	35,315.40 /ea	1,377,301	55,926.11 /ea	2,181,118
						Foundation 8' dia x 30' caisson	5.00 ea	28,548.00 /ea	-	14,532.40 /ea	-	43,080.40 /ea	215,402	68,173.03 /ea	340,865
						Foundation 10' dia x 30' caisson	13.00 ea	34,257.60 /ea	-	21,295.00 /ea	-	55,552.60 /ea	722,184	88,095.05 /ea	1,145,236
						Demobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,358.40 /ls	33,358
						33.71.91.00 Transmission Line	**1.00** LS	1,521,609.40 /LS	/LS	836,100.00 /LS	/LS	2,357,709.40 /LS	2,357,708	3,733,935.60 /LS	3,733,936
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	2,357,708	/SF	3,733,936
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	2,357,708	/LF	3,733,936
						34.09.FNDT T-LINE FOUNDATIONS	**7.00** MO	217,372.63 /MO	40,645.89 /MO	119,442.86 /MO	/MO	377,461.37 /MO	2,642,230	596,745.94 /MO	4,177,221
		34.11.STRC				*T-LINE STRUCTURES*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	152.00 day	-	629.75 /day	-	-	629.75 /day	95,722	981.15 /day	149,135
						Rent forklift, for rough terrain, 42' lift, 35' reach, 9000 lb., 110 H.P.	152.00 day	-	534.20 /day	-	-	534.20 /day	81,198	832.29 /day	126,507
						Rent crane truck mount, cable 8x4 drive 90 ton, 15' radius	152.00 day	-	1,696.00 /day	-	-	1,696.00 /day	257,792	2,642.37 /day	401,641
						Rent crane truck mounted, hydraulic, 12 ton capacity	152.00 day	-	471.00 /day	-	-	471.00 /day	71,592	733.82 /day	111,541
						01.01.06.03 GC Equip, Tools, & Consumables	**1.00** LS	/LS	506,304.40 /LS	/LS	/LS	506,304.40 /LS	506,304	788,824.17 /LS	788,824
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	506,304	/SF	788,824
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	506,304	/SF	788,824
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 LS	57,096.00 /LS	-		-	57,096.00 /LS	57,096	88,955.78 /LS	88,956
						Install Steel Double Circuit Suspension Pole	23.00 ea	45,676.80 /ea	-	85,000.00 /ea	-	130,676.80 /ea	3,005,566	209,757.45 /ea	4,824,421
						Install Steel Double Circuit Light Angle Pole	5.00 ea	57,096.00 /ea	-	130,000.00 /ea	-	187,096.00 /ea	935,480	300,921.27 /ea	1,504,606
						Install Steel Double Circuit Heavy Angle Pole	13.00 ea	68,515.20 /ea	-	170,000.00 /ea	-	238,515.20 /ea	3,100,698	383,932.58 /ea	4,991,124
						Install Steel Single Circuit H-Deadend Structure	8.00 ea	45,676.80 /ea	-	50,000.00 /ea	-	95,676.80 /ea	765,414	152,689.81 /ea	1,221,519
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,955.76 /ls	88,956
						33.71.91.00 Transmission Line	**1.00** LS	2,706,350.40 /LS	/LS	5,215,000.00 /LS	/LS	7,921,350.40 /LS	7,921,350	12,719,581.24 /LS	12,719,581
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	7,921,350	/SF	12,719,581
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	7,921,350	/LF	12,719,581
						34.11.STRC T-LINE STRUCTURES	**4.00** MO	676,587.60 /MO	126,576.10 /MO	1,303,750.00 /MO	/MO	2,106,913.70 /MO	8,427,655	3,377,101.35 /MO	13,508,405
		34.13.WIRE				*T-LINE WIRE WORK*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent dozer, crawler, torque converter, diesel 200 HP	87.00 day	-	1,504.00 /day	-	-	1,504.00 /day	130,848	2,343.24 /day	203,862
						Rent trailer with cable reel for high voltage line work	87.00 day	-	64.10 /day	-	-	64.10 /day	5,577	99.87 /day	8,689
						Rent trailer with cable tensioning rig, for high voltage line work	87.00 day	-	110.40 /day	-	-	110.40 /day	9,605	172.00 /day	14,964
						Rent trailer with cable pulling rig, for high voltage line work	87.00 day	-	607.15 /day	-	-	607.15 /day	52,822	945.94 /day	82,297
						Rent crane truck mount, cable 8x4 drive 40 ton, 12' radius	87.00 day	-	2,028.00 /day	-	-	2,028.00 /day	176,436	3,159.63 /day	274,888
						01.01.06.03 GC Equip, Tools, & Consumables	**1.00** LS	/LS	375,287.55 /LS	/LS	/LS	375,287.55 /LS	375,288	584,699.44 /LS	584,699
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	375,288	/SF	584,699
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	375,288	/SF	584,699
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Overhead line conductors & devices, conductors, primary circuits, per wire, 795 to 954 kcmil	132,000.00 lf	4.57 /lf		1.50 /lf	-	6.07 /lf	801,077	9.56 /lf	1,262,435
						Overhead line conductors & devices, insulators and hardware, primary circuits, disk insulators, 345 to 500 kV	49.00 ea	2,854.80 /ea		9,000.00 /ea	-	11,854.80 /ea	580,885	19,122.32 /ea	936,994
						Overhead line conductors & devices, overhead ground wire	44,000.00 lf	7.59 /lf		1.50 /lf	-	9.09 /lf	400,012	14.27 /lf	628,005
						Mobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,955.79 /ls	88,956
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,955.78 /ls	88,956
						33.71.91.00 Transmission Line	**1.00** LS	1,191,165.54 /LS	/LS	705,000.00 /LS	/LS	1,896,165.54 /LS	1,896,166	3,005,345.55 /LS	3,005,346
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	1,896,166	/SF	3,005,346
						33.0 Utilities	**44,000.00** LF	27.07 /LF	/LF	16.02 /LF	/LF	43.10 /LF	1,896,166	68.30 /LF	3,005,346
						34.13.WIRE T-LINE WIRE WORK	**7.00** MO	170,166.51 /MO	53,612.51 /MO	100,714.29 /MO	/MO	324,493.30 /MO	2,271,453	512,863.57 /MO	3,590,045
						10.02 Funks to TRR	**4.10** MI	1,887,737.84 /MI	284,417.84 /MI	1,889,790.49 /MI	382,926.83 /MI	5,114,375.00 /MI	20,968,937	8,088,274.39 /MI	33,156,626
						10 Transmission Lines for WAPA Connection	***5.40 MI***	***1,613,399.14 /MI***	***274,950.71 /MI***	***1,774,966.07 /MI***	***374,259.26 /MI***	***5,889,427.03 /MI***	***31,802,906***	***9,304,434.54 /MI***	***50,243,947***

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	8,712,355		73,075.707 hrs	
Material	9,584,817			
Allowance	2,021,000			
Equipment	1,484,734		15,280.000 hrs	
Other	10,000,000			
Subtotal Direct Costs	31,802,906	31,802,906		
Material Sales Tax, Dunnigan Ca	694,899			7.250 %
Subtotal W/ Sales Tax	694,899	32,497,805		
General Conditions	1,624,890			5.000 %
Subtotal W/ General Conditions	1,624,890	34,122,695		
Mobilization/Demobilization	1,023,681			3.000 %
Prime Contractor Overhead	3,514,638			10.000 %
Prime Contractor Profit	2,319,661			6.000 %
Bonds & Insurance	889,281			2.170 %
Subtotal W/ Prime Markups	7,747,261	41,869,956		
Contractor Contingency	2,093,498			5.000 %
Design Contingency	6,280,493			15.000 %
Subtotal W/ Contingency	8,373,991	50,243,947		
Total Construction Cost		**50,243,947**		
Non-Contract Costs	9,043,910			18.000 %
Total Project Costs	**9,043,910**	**59,287,857**		

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Transmission Lines for PG&E Connection

Jacobs

SUMMARY REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Transmission Lines PG&E Rev 2	Estimator: Wells/Cavalleri - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
11			***Transmission Lines for PG&E Connection***									
	11.01		TRR to PGE Connection									
		34.07.MISC	*MISC, SUPERVISION, ROADS & MATTING*	***1.00*** *LS*	*423,325.00 /LS*	*/LS*	*70,000.00 /LS*	*703,000.00 /LS*	*6,196,325.00 /LS*	*6,196,325*	*9,658,809.97 /LS*	*9,658,810*
		34.09.FNDT	*T-LINE FOUNDATIONS*	***3.00*** *MO*	*259,152.40 /MO*	*40,556.75 /MO*	*147,516.80 /MO*	*/MO*	*447,225.95 /MO*	*1,341,678*	*707,462.94 /MO*	*2,122,389*
		34.11.STRC	*T-LINE STRUCTURES*	***3.00*** *MO*	*369,220.80 /MO*	*72,170.58 /MO*	*773,333.33 /MO*	*/MO*	*1,214,724.72 /MO*	*3,644,174*	*1,948,580.45 /MO*	*5,845,741*
		34.13.WIRE	*T-LINE WIRE WORK*	***2.00*** *MO*	*288,743.04 /MO*	*92,743.48 /MO*	*156,750.00 /MO*	*/MO*	*538,236.52 /MO*	*1,076,473*	*849,924.76 /MO*	*1,699,850*
			11.01 TRR to PGE Connection	***1.80*** MI	1,693,294.83 /MI	290,927.19 /MI	1,747,805.78 /MI	390,555.56 /MI	6,810,381.13 /MI	12,258,650	10,737,105.36 /MI	19,326,790
	11.02		TRR to Funks									
		34.07.MISC	*MISC, SUPERVISION, ROADS & MATTING*	***1.00*** *LS*	*967,600.00 /LS*	*/LS*	*90,000.00 /LS*	*1,570,000.00 /LS*	*7,627,600.00 /LS*	*7,627,600*	*11,890,154.22 /LS*	*11,890,154*
		34.09.FNDT	*T-LINE FOUNDATIONS*	***7.00*** *MO*	*217,372.63 /MO*	*40,645.89 /MO*	*119,442.86 /MO*	*/MO*	*377,461.37 /MO*	*2,642,230*	*596,735.94 /MO*	*4,177,152*
		34.11.STRC	*T-LINE STRUCTURES*	***4.00*** *MO*	*676,587.60 /MO*	*126,576.10 /MO*	*1,303,750.00 /MO*	*/MO*	*2,106,913.70 /MO*	*8,427,655*	*3,377,046.02 /MO*	*13,508,184*
		34.13.WIRE	*T-LINE WIRE WORK*	***7.00*** *MO*	*170,166.51 /MO*	*53,612.51 /MO*	*100,714.29 /MO*	*/MO*	*324,493.30 /MO*	*2,271,453*	*512,855.05 /MO*	*3,589,985*
			11.02 TRR to Funks	***4.10*** MI	1,557,737.54 /MI	254,417.84 /MI	1,658,780.49 /MI	382,926.83 /MI	5,114,375.00 /MI	20,968,937	8,089,140.29 /MI	33,165,475
			11 Transmission Lines for PG&E Connection	***5.90 MI***	***1,571,636.44 /MI***	***286,403.75 /MI***	***1,693,584.81 /MI***	***385,254.24 /MI***	***5,631,794.50 /MI***	***33,227,588***	***8,896,994.04 /MI***	***52,492,265***

Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	14,446,588		77,760.866 hrs	
Material	16,291,976			
Allowance	3,541,283			
Equipment	2,632,643		17,352.000 hrs	
Other	15,579,775			
Total Construction Cost	**52,492,265**	**52,492,265**		
Non-Contract Costs	9,448,608			18.000 %
Total Project Costs	**9,448,608**	**61,940,873**		

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DETAIL REPORT

Project type:	Project Name: Sites Reservoir Project Task Order 1 Transmission Lines PG&E Rev 2	Estimator: Wells/Cavalleri - Jacobs
Job Size:	Project Number: D3380602	Revision/Date: 2 / Feb 1, 2021
Duration:	Design Stage: Feasibility	Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
11						***Transmission Lines for PG&E Connection***									
	11.01					TRR to PGE Connection									
		34.07.MISC				*MISC, SUPERVISION, ROADS & MATTING*									
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Matting Structure Work Pad 50'x50'	19.00 ea		-		7,000.00 /ea	7,000.00 /ea	133,000	10,905.84 /ea	207,211
						Matting per foot (through wetlands)	2,000.00 lf		-		150.00 /lf	150.00 /lf	300,000	233.70 /lf	467,393
						Access Road per foot	6,000.00 lf		-		40.00 /lf	40.00 /lf	240,000	62.32 /lf	373,915
						ROW clearing	10.00 acre		-		3,000.00 /acre	3,000.00 /acre	30,000	4,673.93 /acre	46,739
						Field Construction Coordinator	2,800.00 hr	118.95 /hr	-			118.95 /hr	333,060	185.32 /hr	518,900
						General Supervision	700.00 hr	128.95 /hr	-			128.95 /hr	90,265	200.90 /hr	140,631
						Misc Material	1.00 ls		-	70,000.00 /ls		70,000.00 /ls	70,000	114,133.43 /ls	114,133
						Allowance at BUDGET LEVEL (Other cost type)	1.00 ls		-			5,000,000.00 /ls	5,000,000	7,789,887.52 /ls	7,789,888
						33.71.91.00 Transmission Line	***1.00*** *LS*	*423,325.00 /LS*	*/LS*	*70,000.00 /LS*	*703,000.00 /LS*	*6,196,325.00 /LS*	*6,196,325*	*9,658,809.97 /LS*	*9,658,810*
						26.30 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*6,196,325*	*/SF*	*9,658,810*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*6,196,325*	*/LF*	*9,658,810*
						34.07.MISC MISC, SUPERVISION, ROADS & MATTING	***1.00*** *LS*	*423,325.00 /LS*	*/LS*	*70,000.00 /LS*	*703,000.00 /LS*	*6,196,325.00 /LS*	*6,196,325*	*9,658,809.97 /LS*	*9,658,810*
		34.09.FNDT				*T-LINE FOUNDATIONS*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent auger, truck-mounted, for caissons, water wells	65.00 day	-	771.10 /day	-	-	771.10 /day	50,122	1,201.36 /day	78,098
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	65.00 day	-	629.75 /day	-	-	629.75 /day	40,934	981.14 /day	63,774
						Rent crane truck mounted, hydraulic, 12 ton capacity	65.00 day	-	471.00 /day	-	-	471.00 /day	30,615	733.81 /day	47,697
						01.01.06.03 GC Equip, Tools, & Consumables	***1.00*** *LS*	*/LS*	*121,670.25 /LS*	*/LS*	*/LS*	*121,670.25 /LS*	*121,670*	*189,558.52 /LS*	*189,560*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*121,670*	*/SF*	*189,560*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*121,670*	*/SF*	*189,560*
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,357.85 /ls	33,358
						Foundation 7' dia x 30' caisson	8.00 ea	19,032.00 /ea	-	12,477.00 /ea	-	31,509.00 /ea	252,072	49,994.89 /ea	399,959
						Foundation 8' dia x 30' caisson	6.00 ea	28,548.00 /ea	-	14,532.40 /ea	-	43,080.40 /ea	258,482	68,171.90 /ea	409,031
						Foundation 10' dia x 30' caisson	12.00 ea	34,257.60 /ea	-	21,295.00 /ea	-	55,552.60 /ea	666,631	88,093.59 /ea	1,057,123
						Demobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,357.85 /ls	33,358
						33.71.91.00 Transmission Line	***1.00*** *LS*	*777,457.60 /LS*	*/LS*	*442,550.40 /LS*	*/LS*	*1,220,007.60 /LS*	*1,220,008*	*1,932,828.39 /LS*	*1,932,829*
						26.30 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*1,220,008*	*/SF*	*1,932,829*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*1,220,008*	*/LF*	*1,932,829*
						34.09.FNDT T-LINE FOUNDATIONS	***3.00*** *MO*	*259,152.40 /MO*	*40,556.75 /MO*	*147,516.80 /MO*	*/MO*	*447,225.95 /MO*	*1,341,678*	*707,462.94 /MO*	*2,122,389*
		34.11.STRC				*T-LINE STRUCTURES*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	65.00 day	-	629.75 /day	-	-	629.75 /day	40,934	981.14 /day	63,774
						Rent forklift, for rough terrain, 42' lift, 35' reach, 9000 lb., 110 H.P.	65.00 day	-	534.20 /day	-	-	534.20 /day	34,723	832.27 /day	54,098
						Rent crane truck mount, cable 8x4 drive 90 ton, 15' radius	65.00 day	-	1,696.00 /day	-	-	1,696.00 /day	110,240	2,642.33 /day	171,751
						Rent crane truck mounted, hydraulic, 12 ton capacity	65.00 day	-	471.00 /day	-	-	471.00 /day	30,615	733.81 /day	47,697
						01.01.06.03 GC Equip, Tools, & Consumables	***1.00*** *LS*	*/LS*	*216,511.75 /LS*	*/LS*	*/LS*	*216,511.75 /LS*	*216,512*	*337,320.44 /LS*	*337,320*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*216,512*	*/SF*	*337,320*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*216,512*	*/SF*	*337,320*
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 LS	57,096.00 /LS	-		-	57,096.00 /LS	57,096	88,954.28 /LS	88,954
						Install Steel Double Circuit Suspension Pole	6.00 ea	45,676.80 /ea	-	85,000.00 /ea	-	130,676.80 /ea	784,061	209,754.02 /ea	1,258,524
						Install Steel Double Circuit Light Angle Pole	3.00 ea	57,096.00 /ea	-	130,000.00 /ea	-	187,096.00 /ea	561,288	300,916.36 /ea	902,749
						Install Steel Double Circuit Heavy Angle Pole	6.00 ea	68,515.20 /ea	-	170,000.00 /ea	-	238,515.20 /ea	1,431,091	383,926.32 /ea	2,303,558
						Install Steel Single Circuit 3P Structure	2.00 ea	68,515.20 /ea	-	200,000.00 /ea	-	268,515.20 /ea	537,030	432,840.64 /ea	865,681
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,954.27 /ls	88,954
						33.71.91.00 Transmission Line	***1.00*** *LS*	*1,107,662.40 /LS*	*/LS*	*2,320,000.00 /LS*	*/LS*	*3,427,662.40 /LS*	*3,427,662*	*5,508,420.91 /LS*	*5,508,421*
						26.30 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*3,427,662*	*/SF*	*5,508,421*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*3,427,662*	*/LF*	*5,508,421*
						34.11.STRC T-LINE STRUCTURES	***3.00*** *MO*	*369,220.80 /MO*	*72,170.58 /MO*	*773,333.33 /MO*	*/MO*	*1,214,724.72 /MO*	*3,644,174*	*1,948,580.45 /MO*	*5,845,741*
		34.13.WIRE				*T-LINE WIRE WORK*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent dozer, crawler, torque converter, diesel 200 HP	43.00 day	-	1,504.00 /day	-	-	1,504.00 /day	64,672	2,343.20 /day	100,758
						Rent trailer with cable reel for high voltage line work	43.00 day	-	64.10 /day	-	-	64.10 /day	2,756	99.87 /day	4,294
						Rent trailer with cable tensioning rig, for high voltage line work	43.00 day	-	110.40 /day	-	-	110.40 /day	4,747	172.00 /day	7,396
						Rent trailer with cable pulling rig, for high voltage line work	43.00 day	-	607.15 /day	-	-	607.15 /day	26,107	945.93 /day	40,675
						Rent crane truck mount, cable 8x4 drive 40 ton, 12' radius	43.00 day	-	2,028.00 /day	-	-	2,028.00 /day	87,204	3,159.58 /day	135,862
						01.01.06.03 GC Equip, Tools, & Consumables	***1.00*** *LS*	*/LS*	*185,486.95 /LS*	*/LS*	*/LS*	*185,486.95 /LS*	*185,487*	*288,984.51 /LS*	*288,985*
						26.00 Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*185,487*	*/SF*	*288,985*
						26.0 Electrical Work	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*185,487*	*/SF*	*288,985*
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Overhead line conductors & devices, conductors, primary circuits, per wire, 1000 to 1600 kcmil	50,000.00 lf	5.15 /lf		2.25 /lf	-	7.40 /lf	369,729	11.68 /lf	584,186
						Overhead line conductors & devices, insulators and hardware, primary circuits, disk insulators, 345 to 500 kV	19.00 ea	2,854.80 /ea		9,000.00 /ea	-	11,854.80 /ea	225,241	19,122.01 /ea	363,318
						Overhead line conductors & devices, overhead ground wire	20,000.00 lf	7.59 /lf		1.50 /lf	-	9.09 /lf	181,824	14.27 /lf	285,452
						Mobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,954.27 /ls	88,954
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,954.28 /ls	88,954
						33.71.91.00 Transmission Line	***1.00*** *LS*	*577,486.08 /LS*	*/LS*	*313,500.00 /LS*	*/LS*	*890,986.08 /LS*	*890,986*	*1,410,865.01 /LS*	*1,410,865*
						26.30 Facility Electrical	*0.00*	*/SF*	*/SF*	*/SF*	*/SF*	*/SF*	*890,986*	*/SF*	*1,410,865*
						33.0 Utilities	*0.00*	*/LF*	*/LF*	*/LF*	*/LF*	*/LF*	*890,986*	*/LF*	*1,410,865*
						34.13.WIRE T-LINE WIRE WORK	***2.00*** *MO*	*268,743.04 /MO*	*92,743.48 /MO*	*156,750.00 /MO*	*/MO*	*538,236.52 /MO*	*1,076,473*	*849,924.76 /MO*	*1,699,850*
						11.01 TRR to PGE Connection	**1.80** MI	1,603,334.83 /MI	380,937.19 /MI	1,737,808.78 /MI	390,555.56 /MI	6,859,361.13 /MI	12,258,650	10,737,169.36 /MI	19,326,790
	11.02					TRR to Funks									
		34.07.MISC				*MISC, SUPERVISION, ROADS & MATTING*									
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									

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DETAIL REPORT

Project type:
Job Size:
Duration:

Project Name: Sites Reservoir Project Task Order 1 Transmission Lines PG&E Rev 2
Project Number: D3380602
Design Stage: Feasibility

Estimator: Wells/Cavalleri - Jacobs
Revision/Date: 2 / Feb 1, 2021
Estimate Class: 4

Area	Facility	WorkActiv	Work Pkg	Trade Pkg	Unit Price	Description	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Allowance Cost/Unit	Direct Total Cost/Unit	Direct Total	Grand Total Price	Grand Total with Markups
					33.71.91.00	*Transmission Line*									
						Matting Structure Work Pad 50'x50'	49.00 ea		-		7,000.00 /ea	7,000.00 /ea	343,000	10,905.84 /ea	534,386
						Matting per foot (through wetlands)	4,500.00 lf		-		150.00 /lf	150.00 /lf	675,000	233.70 /lf	1,051,635
						Access Road per foot	12,000.00 lf		-		40.00 /lf	40.00 /lf	480,000	62.32 /lf	747,829
						ROW clearing	24.00 acre		-		3,000.00 /acre	3,000.00 /acre	72,000	4,673.93 /acre	112,174
						Field Construction Coordinator	6,400.00 hr	118.95 /hr	-			118.95 /hr	761,280	185.32 /hr	1,186,057
						General Supervision	1,600.00 hr	128.95 /hr	-			128.95 /hr	206,320	200.90 /hr	321,442
						Misc Material	1.00 ls		-	90,000.00 /ls		90,000.00 /ls	90,000	146,742.97 /ls	146,743
						Allowance at BUDGET LEVEL (Other cost type)	1.00 ls		-			5,000,000.00 /ls	5,000,000	7,789,887.53 /ls	7,789,888
						33.71.91.00 Transmission Line	**1.00** LS	967,600.00 /LS	/LS	90,000.00 /LS	1,570,000.00 /LS	7,627,600.00 /LS	7,627,600	11,890,154.22 /LS	11,890,154
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	7,627,600	/SF	11,890,154
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	7,627,600	/LF	11,890,154
						34.07.MISC MISC, SUPERVISION, ROADS & MATTING	**1.00** LS	967,600.00 /LS	/LS	90,000.00 /LS	1,570,000.00 /LS	7,627,600.00 /LS	7,627,600	11,890,154.22 /LS	11,890,154
		34.09.FNDT				*T-LINE FOUNDATIONS*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent auger, truck-mounted, for caissons, water wells	152.00 day	-	771.10 /day	-	-	771.10 /day	117,207	1,201.36 /day	182,606
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	152.00 day	-	629.75 /day	-	-	629.75 /day	95,722	981.14 /day	149,133
						Rent crane truck mounted, hydraulic, 12 ton capacity	152.00 day	-	471.00 /day	-	-	471.00 /day	71,592	733.81 /day	111,539
						01.01.06.03 GC Equip, Tools, & Consumables	**1.00** LS	/LS	284,521.30 /LS	/LS	/LS	284,521.30 /LS	284,521	443,277.64 /LS	443,278
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	284,521	/SF	443,278
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	284,521	/SF	443,278
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,357.86 /ls	33,358
						Foundation 7' dia x 30' caisson	39.00 ea	22,838.40 /ea	-	12,477.00 /ea	-	35,315.40 /ea	1,377,301	55,925.18 /ea	2,181,082
						Foundation 8' dia x 30' caisson	5.00 ea	28,548.00 /ea	-	14,532.40 /ea	-	43,080.40 /ea	215,402	68,171.89 /ea	340,859
						Foundation 10' dia x 30' caisson	13.00 ea	34,257.60 /ea	-	21,295.00 /ea	-	55,552.60 /ea	722,184	88,093.59 /ea	1,145,217
						Demobilization	1.00 ls	21,411.00 /ls	-		-	21,411.00 /ls	21,411	33,357.86 /ls	33,358
						33.71.91.00 Transmission Line	**1.00** LS	1,521,608.40 /LS	/LS	836,100.00 /LS	/LS	2,357,708.40 /LS	2,357,708	3,733,873.91 /LS	3,733,874
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	2,357,708	/SF	3,733,874
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	2,357,708	/LF	3,733,874
						34.09.FNDT T-LINE FOUNDATIONS	**7.00** MO	217,372.63 /MO	40,645.89 /MO	119,442.86 /MO	/MO	377,461.37 /MO	2,642,230	596,735.94 /MO	4,177,152
		34.11.STRC				*T-LINE STRUCTURES*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent backhoe-loader wheel type 112 HP, 1-1/2 CY capacity	152.00 day	-	629.75 /day	-	-	629.75 /day	95,722	981.14 /day	149,133
						Rent forklift, for rough terrain, 42' lift, 35' reach, 9000 lb., 110 H.P.	152.00 day	-	534.20 /day	-	-	534.20 /day	81,198	832.27 /day	126,505
						Rent crane truck mount, cable 8x4 drive 90 ton, 15' radius	152.00 day	-	1,696.00 /day	-	-	1,696.00 /day	257,792	2,642.33 /day	401,634
						Rent crane truck mounted, hydraulic, 12 ton capacity	152.00 day	-	471.00 /day	-	-	471.00 /day	71,592	733.81 /day	111,539
						01.01.06.03 GC Equip, Tools, & Consumables	**1.00** LS	/LS	506,304.40 /LS	/LS	/LS	506,304.40 /LS	506,304	788,810.86 /LS	788,811
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	506,304	/SF	788,811
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	506,304	/SF	788,811
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Mobilization	1.00 LS	57,096.00 /LS	-		-	57,096.00 /LS	57,096	88,954.28 /LS	88,954
						Install Steel Double Circuit Suspension Pole	23.00 ea	45,676.80 /ea	-	85,000.00 /ea	-	130,676.80 /ea	3,005,566	209,754.02 /ea	4,824,342
						Install Steel Double Circuit Light Angle Pole	5.00 ea	57,096.00 /ea	-	130,000.00 /ea	-	187,096.00 /ea	935,480	300,916.36 /ea	1,504,582
						Install Steel Double Circuit Heavy Angle Pole	13.00 ea	68,515.20 /ea	-	170,000.00 /ea	-	238,515.20 /ea	3,100,698	383,926.32 /ea	4,991,042
						Install Steel Single Circuit H-Deadend Structure	8.00 ea	45,676.80 /ea	-	50,000.00 /ea	-	95,676.80 /ea	765,414	152,687.30 /ea	1,221,498
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,954.27 /ls	88,954
						33.71.91.00 Transmission Line	**1.00** LS	2,706,350.40 /LS	/LS	5,215,000.00 /LS	/LS	7,921,350.40 /LS	7,921,350	12,719,373.24 /LS	12,719,373
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	7,921,350	/SF	12,719,373
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	7,921,350	/LF	12,719,373
						34.11.STRC T-LINE STRUCTURES	**4.00** MO	676,587.60 /MO	126,576.10 /MO	1,303,750.00 /MO	/MO	2,106,913.70 /MO	8,427,655	3,377,046.02 /MO	13,508,184
		34.13.WIRE				*T-LINE WIRE WORK*									
			26.0			*Electrical Work*									
				26.00		*Electrical*									
					01.01.06.03	*GC Equip, Tools, & Consumables*									
						Rent dozer, crawler, torque converter, diesel 200 HP	87.00 day	-	1,504.00 /day	-	-	1,504.00 /day	130,848	2,343.20 /day	203,858
						Rent trailer with cable reel for high voltage line work	87.00 day	-	64.10 /day	-	-	64.10 /day	5,577	99.87 /day	8,688
						Rent trailer with cable tensioning rig, for high voltage line work	87.00 day	-	110.40 /day	-	-	110.40 /day	9,605	172.00 /day	14,964
						Rent trailer with cable pulling rig, for high voltage line work	87.00 day	-	607.15 /day	-	-	607.15 /day	52,822	945.93 /day	82,296
						Rent crane truck mount, cable 8x4 drive 40 ton, 12' radius	87.00 day	-	2,028.00 /day	-	-	2,028.00 /day	176,436	3,159.58 /day	274,883
						01.01.06.03 GC Equip, Tools, & Consumables	**1.00** LS	/LS	375,287.55 /LS	/LS	/LS	375,287.55 /LS	375,288	584,689.58 /LS	584,690
						26.00 Electrical	0.00	/SF	/SF	/SF	/SF	/SF	375,288	/SF	584,690
						26.0 Electrical Work	0.00	/SF	/SF	/SF	/SF	/SF	375,288	/SF	584,690
			33.0			*Utilities*									
				26.30		*Facility Electrical*									
					33.71.91.00	*Transmission Line*									
						Overhead line conductors & devices, conductors, primary circuits, per wire, 795 to 954 kcmil	132,000.00 lf	4.57 /lf		1.50 /lf	-	6.07 /lf	801,077	9.56 /lf	1,262,414
						Overhead line conductors & devices, insulators and hardware, primary circuits, disk insulators, 345 to 500 kV	49.00 ea	2,854.80 /ea		9,000.00 /ea	-	11,854.80 /ea	580,885	19,122.01 /ea	936,979
						Overhead line conductors & devices, overhead ground wire	44,000.00 lf	7.59 /lf		1.50 /lf	-	9.09 /lf	400,012	14.27 /lf	627,994
						Mobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,954.26 /ls	88,954
						Demobilization	1.00 ls	57,096.00 /ls	-		-	57,096.00 /ls	57,096	88,954.30 /ls	88,954
						33.71.91.00 Transmission Line	**1.00** LS	1,191,165.54 /LS	/LS	705,000.00 /LS	/LS	1,896,165.54 /LS	1,896,166	3,005,295.75 /LS	3,005,296
						26.30 Facility Electrical	0.00	/SF	/SF	/SF	/SF	/SF	1,896,166	/SF	3,005,296
						33.0 Utilities	0.00	/LF	/LF	/LF	/LF	/LF	1,896,166	/LF	3,005,296
						34.13.WIRE T-LINE WIRE WORK	**7.00** MO	170,166.51 /MO	53,612.51 /MO	100,714.29 /MO	/MO	324,493.30 /MO	2,271,453	512,855.05 /MO	3,589,985
						11.02 TBR to Funks	**4.10** MI	1,557,737.64 /MI	284,417.87 /MI	1,669,780.49 /MI	382,926.83 /MI	5,114,374.90 /MI	20,968,937	8,089,140.29 /MI	33,165,475
						11 Transmission Lines for PG&E Connection	***5.90 MI***	***1,571,636.44 /MI***	***286,403.75 /MI***	***1,693,584.81 /MI***	***385,254.24 /MI***	***5,631,794.50 /MI***	***33,227,588***	***8,896,994.04 /MI***	***52,492,265***

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Estimate Totals

Description	Amount	Totals	Hours	Rate
Labor	9,272,655		77,760.866 hrs	
Material	9,992,150			
Allowance	2,273,000			
Equipment	1,689,782		17,352.000 hrs	
Other	10,000,000			
Subtotal Direct Costs	33,227,587	33,227,587		
Material Sales Tax, Dunnigan Ca	724,431			7.250 %
Subtotal W/ Sales Tax	724,431	33,952,018		
General Conditions	1,697,601			5.000 %
Subtotal W/ General Conditions	1,697,601	35,649,619		
Mobilization/Demobilization	1,069,489			3.000 %
Prime Contractor Overhead	3,671,911			10.000 %
Prime Contractor Profit	2,423,461			6.000 %
Bonds & Insurance	929,074			2.170 %
Subtotal W/ Prime Markups	8,093,935	43,743,554		
Contractor Contingency	2,187,178			5.000 %
Design Contingency	6,561,533			15.000 %
Subtotal W/ Contingency	8,748,711	52,492,265		
Escalation				
Subtotal W/ Escalation		52,492,265		
Total Construction Cost		**52,492,265**		
Non-Contract Costs	9,448,608			18.000 %
Total Project Costs	**9,448,608**	**61,940,873**		

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Interconnection Facilities WAPA and PG&E

Sites Reservoir Project

Interconnection Facilities

Budgetary Cost Estimate

And

High Level Power Flow Analysis

December 2020

By ZGlobal Inc.

Contents

1. Introduction

The Sites Reservoir Project is located in Northern California within the Pacific Gas &Electric Co. (PG&E) service territory. The project is situated such that transmission level (230 kV) interconnection can be made to PG&E as well as Western Area Power Administration (WAPA) transmission lines that run north to south between the Terminal Regulating Reservoir and Funks Reservoir.

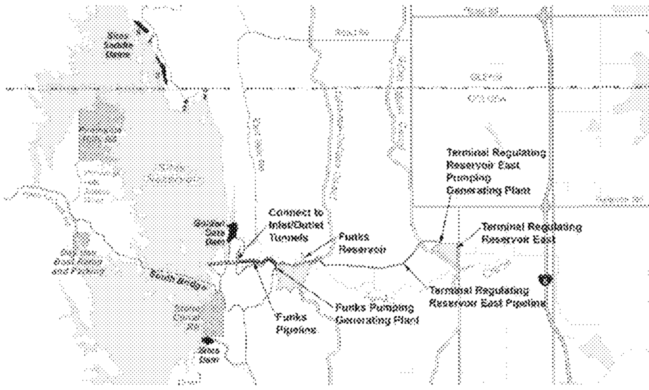

Figure 1 –Overview Diagram of Sties Project Facilities and Surrounding Area

The final determination of which entity to interconnect with is pending and both remain possible options. This document provides a budgetary (+/- 25%) cost estimate for the interconnection facilities required to loop in one of the existing 230 kV transmission lines into a new Breaker-and-a-half substation as well as providing bay positions for the lines feeding the TRR and Funks Pumping Generating Plants. Separate cost estimates are provided for PG&E and WAPA based on published cost information and ZGlobal experience working with both entities.

2. Executive Summary

The 230 kV Breaker-And-A-Half switching station required to loop in a single existing 230 kV line and provide two bays each for the TRR and Funks substations is estimated at **$16.81 Million** for WAPA and **$18.68 Million** for PG&E. The difference is attributed to historically higher costs and overhead associated with PG&E interconnection facilities. Both estimates should be considered +/- 25% budgetary estimates and do not include the cost for land or permitting.

A high level power flow analysis under N-0 conditions found that only one of the four PG&E lines, the Delevan – Cortina 230 kV line, experienced an overload. This line should not be selected during the interconnection request process. The overload occurred during pumping operations only. There were no overloads or observed issues on the WAPA lines under pumping or generating scenarios.

3. Detailed Cost Estimates

Figure 2 provides the general configuration and arrangement of the proposed BAAH switching station. The detailed estimate is specific to the area circled in red.

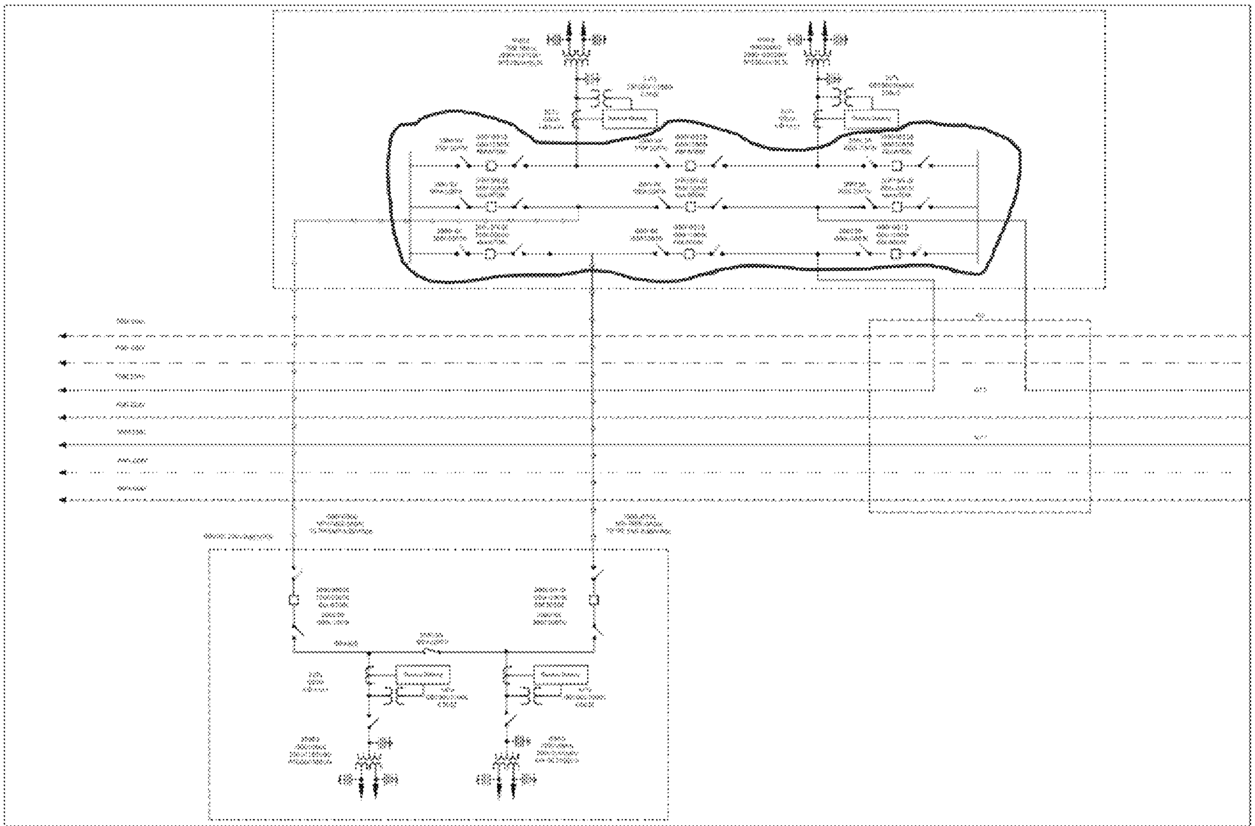

Figure 2 – Single Line Diagram of BAAH switching Station

The BAAH station will require a total of six (6) 230 kV bays to enable looping in of the existing transmission line (specific line yet to be determined) and to provide two feeds to both the Funks and TRR Pump Generating Plants (PGPs). The following Table lists all the major equipment associated with the BAAH station.

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3.1 PG&E Cost Estimate

The following table provides a breakdown of the cost estimate for an interconnection with PG&E via the CAISO interconnection study process. The basis for these costs is the CAISO published "Per-Unit Cost Guide" and are inclusive of equipment and labor costs. The cost for land and permitting is not included and costs are based on low impact factors and relatively easy access to site. PG&E apples factors of 1.2 and 1.5 to the total cost when considering medium to high impact factors.

6 Position 230 kV BAAH Switching Station (PG&E)					
Item #	**Description**	**Count**	**Units**	**Unit Cost**	**Total Cost**
1	230 kV SF6 Circuit Breaker	9	each	$ 200,000	$ 1,800,000
2	230 kV switches (motor operated)	18	each	$ 75,000	$ 1,350,000
3	Grounding Switches	9	each	$ 55,000	$ 495,000
4	Surge Arrestors (230 kV, 152 kV MCOV)	6	each	$ 35,000	$ 210,000
5	230 kV CT / VT and Station Protection Relays	6	each	$ 1,000,000	$ 6,000,000
6	230 kV Switching Station Structures / Foundations	1	each	$ 4,000,000	$ 4,000,000
7	Station and Control Building Lighting	1	lot	$ 85,000	$ 85,000
8	Lighting Protection	3	lot	$ 100,000	$ 300,000
9	Control Building, control Panels, HVAC, security	1	each	$ 1,000,000	$ 1,000,000
10	DC Station Service (125 VDC Battery and Chargers)	1	each	$ 250,000	$ 250,000
11	Station AC Main and Back-up Service	1	each	$ 250,000	$ 250,000
12	Perimeter Fence, Gates, and Security Features	1	each	$ 500,000	$ 500,000
13	conductor and Wire	5000	LF	$ 2.50	$ 12,500
14	Ground Grid	1	each	$ 1,500,000	$ 1,500,000
15	Steel Poles	6	each	$ 55,000	$ 330,000
16	Conduit and misc. hardware	1	lot	$ 100,000	$ 100,000
17	PG&E Engineering and	1		$ 500,000	$ 500,000
	Total Cost Estimate				**$ 18,682,500**

Table 1 – Equipment List and PG&E Cost Estimate[1]

3.2 WAPA Cost Estimate

Historically, WAPA cost estimates for similar facilities have been roughly 10% below those of PG&E. PG&E tends to apply a higher overhead than WAPA and PG&E Per-Unit Cost Guide is intended to set a maximum cost exposure, consequently the PG&E Costs are above cost typically seen in practice.

[1] This cost estimate is based on 2020 PG&E per-unit cost guide.
http://www.caiso.com/informed/Pages/StakeholderProcesses/ParticipatingTransmissionOwnerPerUnitCosts.aspx

6 Position 230 kV BAAH Switching Station (WAPA)					
Item #	**Description**	**Count**	**Units**	**Unit Cost**	**Total Cost**
1	230 kV SF6 Circuit Breaker	9	each	$ 180,000	$ 1,620,000
2	230 kV switches (motor operated)	18	each	$ 67,500	$ 1,215,000
3	Grounding Switches	9	each	$ 49,500	$ 445,500
4	Surge Arrestors (230 kV, 152 kV MCOV)	6	each	$ 31,500	$ 189,000
5	230 kV CT / VT and Station Protection Relays	6	each	$ 900,000	$ 5,400,000
6	230 kV Switching Station Structures / Foundations	1	each	$ 3,600,000	$ 3,600,000
7	Station and Control Building Lighting	1	lot	$ 76,500	$ 76,500
8	Lighting Protection	3	lot	$ 90,000	$ 270,000
9	Control Building, control Panels, HVAC, security	1	each	$ 900,000	$ 900,000
10	DC Station Service (125 VDC Battery and Chargers)	1	each	$ 225,000	$ 225,000
11	Station AC Main and Back-up Service	1	each	$ 225,000	$ 225,000
12	Perimeter Fence, Gates, and Security Features	1	each	$ 450,000	$ 450,000
13	conductor and Wire	5000	LF	$ 2	$ 11,250
14	Ground Grid	1	each	$ 1,350,000	$ 1,350,000
15	Steel Poles	6	each	$ 49,500	$ 297,000
16	Conduit and misc. hardware	1	lot	$ 90,000	$ 90,000
17	PG&E Engineering and	1		$ 450,000	$ 450,000
	Total Cost Estimate				**$ 16,814,250**

Table 2 – Equipment List and WAPA Cost Estimate

4. High Level Power Flow Analysis

The following high level power flow analysis was performed on the 230 kV PG&E and WAPA lines near the Sites Reservoir Project to make an initial determination of which line may be the best choice for interconnection.

This area has 4 main PGE lines: Delevan-Vaca 230 kV #1, #2, #3 and Delevan-Cortina 230kV. Next to these lines 3 WAPA lines can be found: Keswick-O'Banion 230kV, Olinda-Obanion 230kV and Olinda-Tracy 500 kV.

Using the CAISO Cluster base case *2024Peak_QC12P2*, 75 MW of generation is added and using the off-peak CAISO Cluster base case *2024_OP_QC12P2*, 170 MW of load is added at different locations. A pre- and post- line rating comparison is done only under normal conditions (N-0).

The only overload detected under normal conditions is on PG&E Delevan-Cortina 230 KV line, all lines flow (MW) and loading (%) are shown in the table below. The other three PG&E lines were found to have roughly the same loading under both the generation and pumping scenarios. There were no overloads observed on any of the WAPA lines under generating or pumping scenarios.

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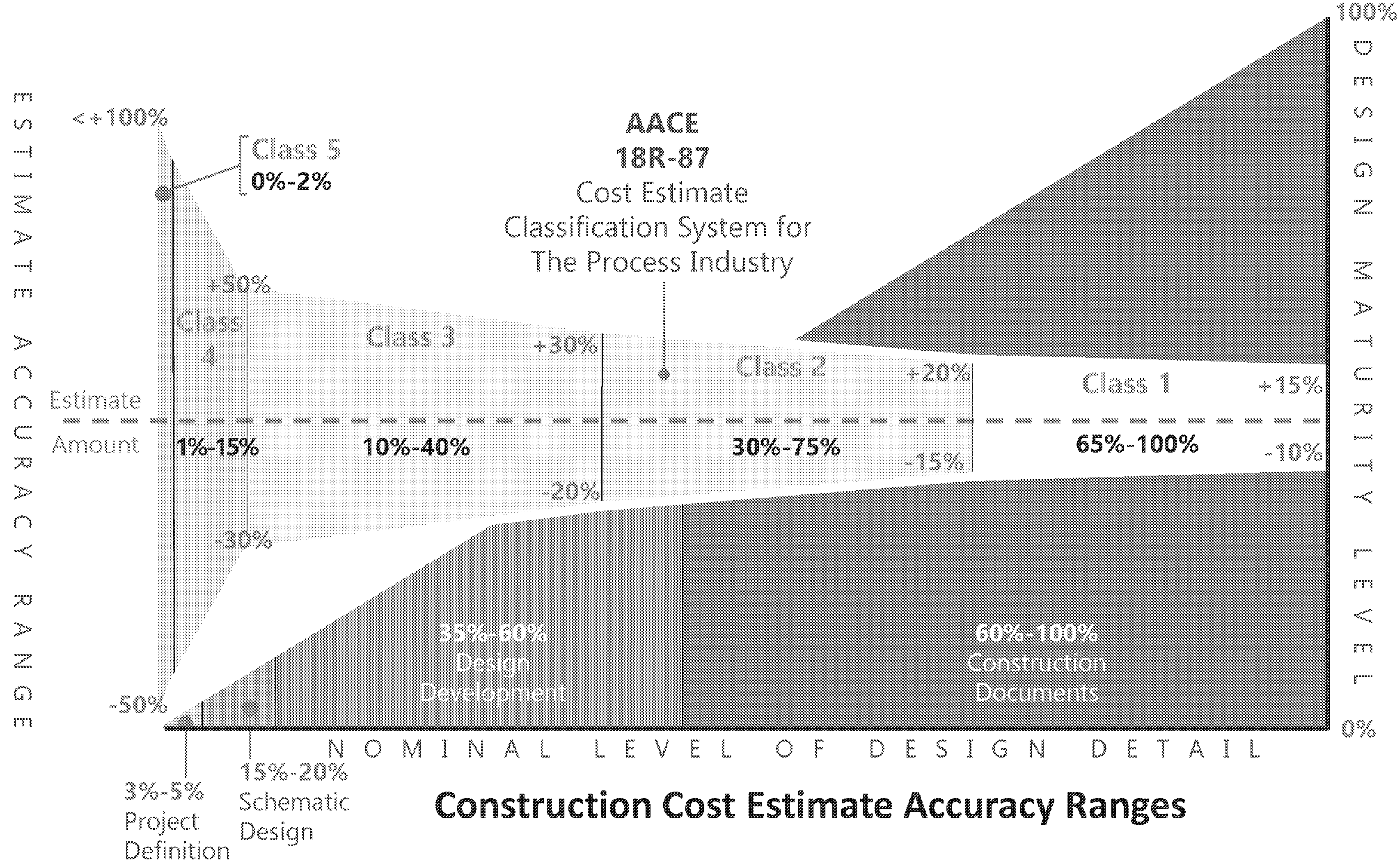
2024peak_QC12P2 Base Case injection of 75 MW GEN													
Lines	KV	LINE RATING MVA	MW/%RATING BEFORE INJECTION	MW/%RATING AFTER INJECTION									
				injection in DELEVN 230kV bus	Injection by tapping DELEVAN-VACA #1	Injection by tapping DELEVAN-VACA #3	Injection by tapping DELEVAN-LOGAN	Injection by tapping DELEVAN-CORTINA	Injection by tapping DELEVAN-GLENN	Injection by tapping DELEVAN-COTTONWOOD E#1	Injection by tapping DELEVAN-COTTONWOOD F#2	Injection by tapping DELEVAN-DELEVANB1
DELEVAN-VACA #1	230	300	152.7/49.7	152.7/49.6	109/36 184/60	146.6/47.6	152.2/49.5	150.9/48.9	151.2/49.1	149.5/48.6	149.5/48.6	152.7/49.6
DELEVAN-VACA #2	230	300	152.7/49.7	152.7/49.6	146.6/47.6	146.6/47.6	152.2/49.5	150.9/48.9	151.2/49.1	149.5/48.6	149.5/48.6	152.7/49.6
DELEVAN-VACA #3	230	300	155.2/50.6	155.3/50.5	149.1/48.5	112/37 187/61	154.8/50.4	153.4/49.8	153.7/50	152/49.5	152/49.5	155.2/50.5
DELEVAN-CORTINA	230	331	259.8/76.8	259.9/76.8	252.6/74.6	252.5/74.6	259.3/76.6	195/57 268/80	258.1/76.2	255.9/75.6	255.9/75.6	259.9/76.8
DELEVAN-GLENN	230	300	5.5/6.7	5.4/7	2.6/7.1	2.5/7.1	4.7/7.0	4.4/7.3	(55/18) 20/12	1/6.8	1/6.8	5.4/7
DELEVAN-COTTONWOOD E#1	230	313	(77/24.8)	(77.1/24.9)	(80.8/26.1)	(80.8/26.1)	(78/25.2)	(76.8/25.9)	(79.8/25.8)	(121/38 47/1	(82.9/26.7)	(77.1/24.9)
DELEVAN-COTTONWOOD F#2	230	300	(75.3/25.3)	(75.5/25.4)	(79.1/26.6)	(79.1/26.6)	(76.4/25.7)	(78.4/25.4)	(78.2/26.3)	(81.1/27.2)	(121/40 46/19)	(75.5/25.4)
DELEVAN-LOGAN CREEK	230	300	(50.7/18.4)	(50.8/18.6)	(54.7/19.9)	(54.7/19.9)	(121/40 46/18)	(52.2/19.2)	(53.8/19.6)	(56.7/20.4)	(56.7/20.4)	(50.9/18.6)
DELEVAN-COLUSAPP (SWING BUS)	230	683	(379/55.2)	(303.8/44.7)	(302.5/44.4)	(302.3/44.4)	(304.1/44.7)	(303.3/44.3)	(303.9/44.6)	(304.8/44.9)	(304.8/44.9)	(378/55 303/45)

Table 2 – Line loading before and after 75 MW of Generation under N-0 (CAISO Peak)

2024peak_QC12P2 Base Case injection of 75 MW GEN													
Lines	KV	LINE RATING MVA	MW/%RATING BEFORE INJECTION	MW/%RATING AFTER INJECTION									
				injection in DELEVN 230kV bus	Injection by tapping DELEVAN-VACA #1	Injection by tapping DELEVAN-VACA #3	Injection by tapping DELEVAN-LOGAN	Injection by tapping DELEVAN-CORTINA	Injection by tapping DELEVAN-GLENN	Injection by tapping DELEVAN-COTTONWOOD E#1	Injection by tapping DELEVAN-COTTONWOOD F#2	Injection by tapping DELEVAN-DELEVANB1
DELEVAN-VACA #1	230	300	152.7/49.7	152.7/49.6	109/36 184/60	146.6/47.6	152.2/49.5	150.9/48.9	151.2/49.1	149.5/48.6	149.5/48.6	152.7/49.6
DELEVAN-VACA #2	230	300	152.7/49.7	152.7/49.6	146.6/47.6	146.6/47.6	152.2/49.5	150.9/48.9	151.2/49.1	149.5/48.6	149.5/48.6	152.7/49.6
DELEVAN-VACA #3	230	300	155.2/50.6	155.3/50.5	149.1/48.5	112/37 187/61	154.8/50.4	153.4/49.8	153.7/50	152/49.5	152/49.5	155.2/50.5
DELEVAN-CORTINA	230	331	259.8/76.8	259.9/76.8	252.6/74.6	252.5/74.6	259.3/76.6	195/57 268/80	258.1/76.2	255.9/75.6	255.9/75.6	259.9/76.8
DELEVAN-GLENN	230	300	5.5/6.7	5.4/7	2.6/7.1	2.5/7.1	4.7/7.0	4.4/7.3	(55/18) 20/12	1/6.8	1/6.8	5.4/7
DELEVAN-COTTONWOOD E#1	230	313	(77/24.8)	(77.1/24.9)	(80.8/26.1)	(80.8/26.1)	(78/25.2)	(76.8/25.9)	(79.8/25.8)	(121/38 47/1	(82.9/26.7)	(77.1/24.9)
DELEVAN-COTTONWOOD F#2	230	300	(75.3/25.3)	(75.5/25.4)	(79.1/26.6)	(79.1/26.6)	(76.4/25.7)	(78.4/25.4)	(78.2/26.3)	(81.1/27.2)	(121/40 46/19)	(75.5/25.4)
DELEVAN-LOGAN CREEK	230	300	(50.7/18.4)	(50.8/18.6)	(54.7/19.9)	(54.7/19.9)	(121/40 46/18)	(52.2/19.2)	(53.8/19.6)	(56.7/20.4)	(56.7/20.4)	(50.9/18.6)
DELEVAN-COLUSAPP (SWING BUS)	230	683	(379/55.2)	(303.8/44.7)	(302.5/44.4)	(302.3/44.4)	(304.1/44.7)	(303.3/44.3)	(303.9/44.6)	(304.8/44.9)	(304.8/44.9)	(378/55 303/45)

Table 3 – Line loading before and after 170 MW of Pumping Demand under N-0 (CAISO Off Peak)

Appendix B:
AACEI Classification



Construction Cost Estimate Accuracy Ranges

Estimate Class	Class 5	Class 4	Class 3	Class 2	Class 1
LEVEL OF PROJECT DEFINITION Expressed as a % of complete definition	0% to 2%	1% to 15%	10% to 40%	30% to 70%	50% to 100%
END USAGE Typical Purpose of Estimate	Concept Screening	Study or Feasibility	Budget Authorization, or Control	Control or Bid / Tender	Check Estimate or Bid / Tender
METHODOLOGY Typical estimating method	Capacity Factored, Parametric Models, Judgment, or Analogy	Equipment Factored or Parametric Models	Semi-Detailed Unit Costs with Assembly Level Line Items	Detailed Unit Cost with Forced Detailed Take-Off	Detailed Unit Cost with Detailed Take-Off
EXPECTED ACCURACY RANGE Typical variation in low and high ranges [a]	L: -20% to -50% H: +30% to +100%	L: -15% to -30% H: +20% to +50%	L: -10% to -20% H: +10% to +30%	L: -5% to -15% H: +5% to +20%	L: -3% to -10% H: +3% to +15%
PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 [b]	1	2 to 4	3 to 10	4 to 20	5 to 100
REFINED CLASS DEFINITION	Class 5 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systematic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with very little effort expended - sometimes requiring less than 1 hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation.	Class 4 estimates are generally prepared based on very limited information, and subsequently have very wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 5% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems and preliminary engineered process and utility equipment lists. Level of Project Definition Required: 1% to 15% of full project definition.	Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineering process and utility equipment lists. Level Of Project Definition Required: 10% to 40% of full project definition.	Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum the following: Process flow diagrams, utility flow diagrams, piping and instrument flow diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc.	Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, engineering is from 50% to 100% complete, and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans. Level for Project Definition Required: 50% to 100% of full project definition.
END USAGE DEFINED	Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.	Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.	Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase "control estimate" against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate may be the last estimate required and could well form the only basis for cost/schedule control.	Class 2 estimates are typically prepared as the detailed control baseline against which all actual costs an resources will now be monitored for variation to the budget, and form a part of the change/variation control program.	Class 1 estimates are typically prepared to form a current control estimate to be used as the final control baseline against which all actual coasts and resources will now be monitored for variations to the budget, and form a part of the change/variation control program. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.
ESTIMATING METHODS USED	Class 5 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques.	Class 4 estimates virtually always use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques.	Class 3 estimates usually involve more deterministic estimating methods that stochastic methods. They usually involve a high degree of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project.	Class 2 estimates always involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detailed takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods.	Class 1 estimates involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities.
EXPECTED ACCURACY RANGE	Typical accuracy ranges for Class 5 estimates are -20% to -50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 2 estimates are -5% to -15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.	Typical accuracy ranges for Class 1 estimates are -3% to -10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances.
EFFORT TO PREPARE (for US$20MM project):	As little as 1 hour or less to prepare to perhaps more than 200 hours, depending on the project and the estimating methodology used.	Typically, as little as 20 hours or less to perhaps more than 300 hours, depending on the project and the estimating methodology used.	Typically, as little as 150 hours or less to perhaps more than 1500 hours, depending on the project and the estimating methodology used.	Typically, as little as 300 hours or less to perhaps more than 3000 hours, depending on the project and the estimating methodology used. Bid Estimates typically require more effort than estimates used for funding or control purposes	Class 1 estimates require the most effort to create, and as such are generally developed for only selected areas of the project, or for bidding purposes. A complete Class 1 estimate may involve as little as 600 hours or less, to perhaps more than 6,000 hours, depending on the project and the estimating methodology used. Bid estimate typically require more effort than estimates used for funding or control purposes.
ANSI Standard Reference Z94.2-1989 name; Alternate Estimate Names, Terms, Expressions, Synonyms:	Order of Magnitude Estimate; Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of-thumb.	Budget Estimate; Screening, top-down, feasibility, authorization, factored, pre-design, pre-study.	Budget Estimate; Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, development, basic engineering phase estimate, target estimate.	Definitive Estimate; Detailed Control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.	Definitive Estimate; Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.

Estimate Class	Class 5	Class 4	Class 3	Class 2	Class 1
Estimate Input Checklist and Maturity Index	Class 5	Class 4	Class 3	Class 2	Class 1
GENERAL PROJECT DATA					
Project Scope Description	General	Preliminary	Defined	Defined	Defined
Plant Production / Facility Capacity	Assumed	Preliminary	Defined	Defined	Defined
Plant Location	General	Approximate	Specific	Specific	Specific
Soils & Hydrology	None	Preliminary	Defined	Defined	Defined
Integrated Project Plan	None	Preliminary	Defined	Defined	Defined
Project Master Schedule	None	Preliminary	Defined	Defined	Defined
Escalation Strategy	None	Preliminary	Defined	Defined	Defined
Work Breakdown Structure	None	Preliminary	Defined	Defined	Defined
Project Code of Accounts	None	Preliminary	Defined	Defined	Defined
Contracting Strategy	Assumed	Assumed	Preliminary	Defined	Defined

ENGINEERING DELIVERABLES	Class 5	Class 4	Class 3	Class 2	Class 1
Block Flow Diagrams	Started / Preliminary	Preliminary / Complete	Complete	Complete	Complete
Plot Plans		Started	Preliminary / Complete	Complete	Complete
Process Flow Diagrams (PFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Flow Diagrams (UFDs)		Started / Preliminary	Preliminary / Complete	Complete	Complete
Piping & Instrument Diagrams (P&IDS)		Started	Preliminary / Complete	Complete	Complete
Heat and Material Balances		Started	Preliminary / Complete	Complete	Complete
Process Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Utility Equipment List		Started / Preliminary	Preliminary / Complete	Complete	Complete
Electrical One Line Drawings		Started / Preliminary	Preliminary / Complete	Complete	Complete
Specifications and Datasheets		Started	Preliminary / Complete	Complete	Complete
General Equipment Arrangement Drawings		Started	Preliminary / Complete	Complete	Complete
Spare Parts Lists			Started / Preliminary	Preliminary	Complete
Architectural Details / Schedules		Started	Preliminary / Complete	Complete	Complete
Structural Details		Started	Preliminary / Complete	Complete	Complete
Mechanical Discipline Drawings			Started	Preliminary	Preliminary / Complete
Electrical Discipline Drawings			Started	Preliminary	Preliminary / Complete
System Discipline Drawings			Started	Preliminary	Preliminary / Complete
Civil/Site Discipline Drawings			Started	Preliminary	Preliminary / Complete
Demolition Details		Started	Preliminary / Complete	Complete	Complete

Draft Cost Estimate Technical Memorandum

To:	Sites Project Authority
CC:	Henry Luu, P.E. (HDR)
Date:	February 3, 2021
From:	Mike Forrest, P.E., G.E; Abrie Horak (AECOM)
Quality Review by:	Peter Morris (AECOM)
Authority Agent Review by:	Henry Luu, P.E. (HDR)
Subject:	Cost Estimate – Draft Task Order No. 2 - Task HR56

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Acronyms and Abbreviations

AACE	Association for the Advancement of Cost Engineering
APS	Alternative Procurement Strategy
Authority	Sites Project Authority
Caltrans	California Department of Transportation
cfs	cubic feet per second
DSOD	State of California Department of Water Resources, Division of Safety of Dams
DWR	California Department of Water Resources
GL	General Liability
I/O	Inlet/Outlet Works
MAF	million-acre-foot
NMWS	normal maximum operating water surface
OPCC	Opinion of Probable Construction Cost
PL/PD	Public Liability/Property Damage
TM	technical memorandum
VE	value engineering

Executive Summary

This technical memorandum presents AECOM's Opinion of Probable Construction Cost (OPCC) for the reservoir facilities contract (HR) that include the main and saddle dams, spillway, inlet/outlet tunnels and tower, construction diversion tunnel and pipelines, reservoir emergency release facilities, and roads and bridges. Cost for the conveyance facilities contract (HC) will be presented in a separate technical memorandum by others. The costs are presented in both 2021 dollars and 2019 dollars (for comparison to previous estimates). The estimate presented herein is a Class 4 cost estimate as defined by the Association for the Advancement of Cost Engineering (AACE) International.

Composition of Costs

Besides the direct construction costs (labor, materials, equipment and subcontractors), the costs include mobilization/demobilization and contractor mark-ups (overhead, profit, insurance and bond). Certain Owner-related costs are also added (design and construction contingencies and allowances, and non-contract costs). Key exclusions from the cost estimate are also discussed. The estimated costs are summarized below.

Table ES-1. Cost Estimate – Executive Summary for HR Facilities

WBS No	Work / Facility Package	Est rev	Estimate Issue	Project Cost Total (July 2019)
20	Site Demolition and Clearing Work	0.04	2/2/2021	**32,943,209**
21	Golden Gate Dam	0.04	2/2/2021	**711,949,061**
22	Sites Dam	0.04	2/2/2021	**355,724,821**
23	Saddle Dam 3 & Emergency Release Structure 1	0.04	2/2/2021	**284,156,532**
24	Saddle Dam 5 & Emergency Release Structure 2	0.04	2/2/2021	**140,257,075**
25	Saddle Dam 1, 2, 6 & 8	0.04	2/2/2021	**142,049,692**
26	Inlet Outlet Facilities	0.01	2/2/2021	**339,263,141**
27	Road Work			
27.01	Public Roadway: Sites Lodoga Road Realignment	0.09	2/2/2021	**247,337,193**
27.02	Public Roadway: Huffmaster Road Realignment	0.09	2/2/2021	**174,815,828**
27.03	Maintenance Roads - North Access Road 69 and Saddle Dam Roads	0.08	2/2/2021	**35,226,274**
27.04	Local Construction Roads - County, Delevan & Maxwell Roads	0.08	2/2/2021	**55,645,019**
27.05	Maintenance Roads - Access Roads A, B, C & Comm Roads	0.08	2/2/2021	**33,266,952**
27.06	Recreation Roads - Peninsula Hills	0.08	2/2/2021	**11,111,790**
27.07	Sites Lodoga Road Realignment Bridges	0.08	2/2/2021	**175,911,444**
Total OPCC (July 2019)				**2,739,658,033**

Notes:
1. Costs in USD
2. Soft cost / non-contract cost allowance of 18% included
3. Cost de-escalated to July 2019 using a 3.0% escalation rate

Total OPCC (July 2019)	2,739,658,033
Estimated Range – Low (-20%)	2,191,726,426
Estimated Range – High (+20%)	3,287,589,639

Value Engineering Ideas to Reduce Construction Cost

We note that the costs presented in this technical memorandum have not been optimized. As such, we have included potential value engineering (VE) ideas for consideration to reduce construction costs of the dams; inlet/outlet tunnels; intake, and the high-level emergency release structures; spillway; and roads. The VE options to be adopted should be made in conjunction with input from the Authority, HDR and Jacobs. Also, the options should be discussed with State of California Department of Water Resources, Division of Safety of Dams (DSOD) to obtain their initial reactions.

1.0 Introduction

1.1 Project Overview and Reservoir Alternatives

The Sites Project Authority (Authority) is preparing a feasibility-level evaluation for a 1.5-million-acre-foot (MAF) reservoir as a preferred alternative for the Sites Reservoir Project. The principal storage feature of Project is Sites Reservoir. Figure 1-1 shows the location of Sites Reservoir, and the various dams to be constructed to form the reservoir. Sites Reservoir would have a nominal storage capacity of 1.5 MAF for Alternative 1, and 1.3 MAF for Alternative 2. Table 1-1 outlines key aspects of the reservoir alternatives for the reservoir engineering (HR) contract.

Table 1-1. Sites Reservoir Alternatives

Alternative Reservoir	1.5 MAF	1.3 MAF
Active Storage Capacity	1.4 MAF	1.2 MAF
Approximate Inundation Area	13,200 acres	12,400 acres
Dam/Saddle Dam Crest Elevation (Without Camber)	517 feet	500 feet
Maximum Operating Water Elevation	498 feet	482 feet
Minimum Operating Water Elevation	340 feet	340 feet
Top of Dead Pool	300 feet	300 feet
Inlet/Outlet Facilities Conveyance Capacity:		
Tehama-Colusa Canal	2,100 cfs	2,100 cfs
Glenn-Colusa Irrigation District Canal	1,800 cfs	900 cfs

cfs = cubic feet per second
MAF = million acre feet

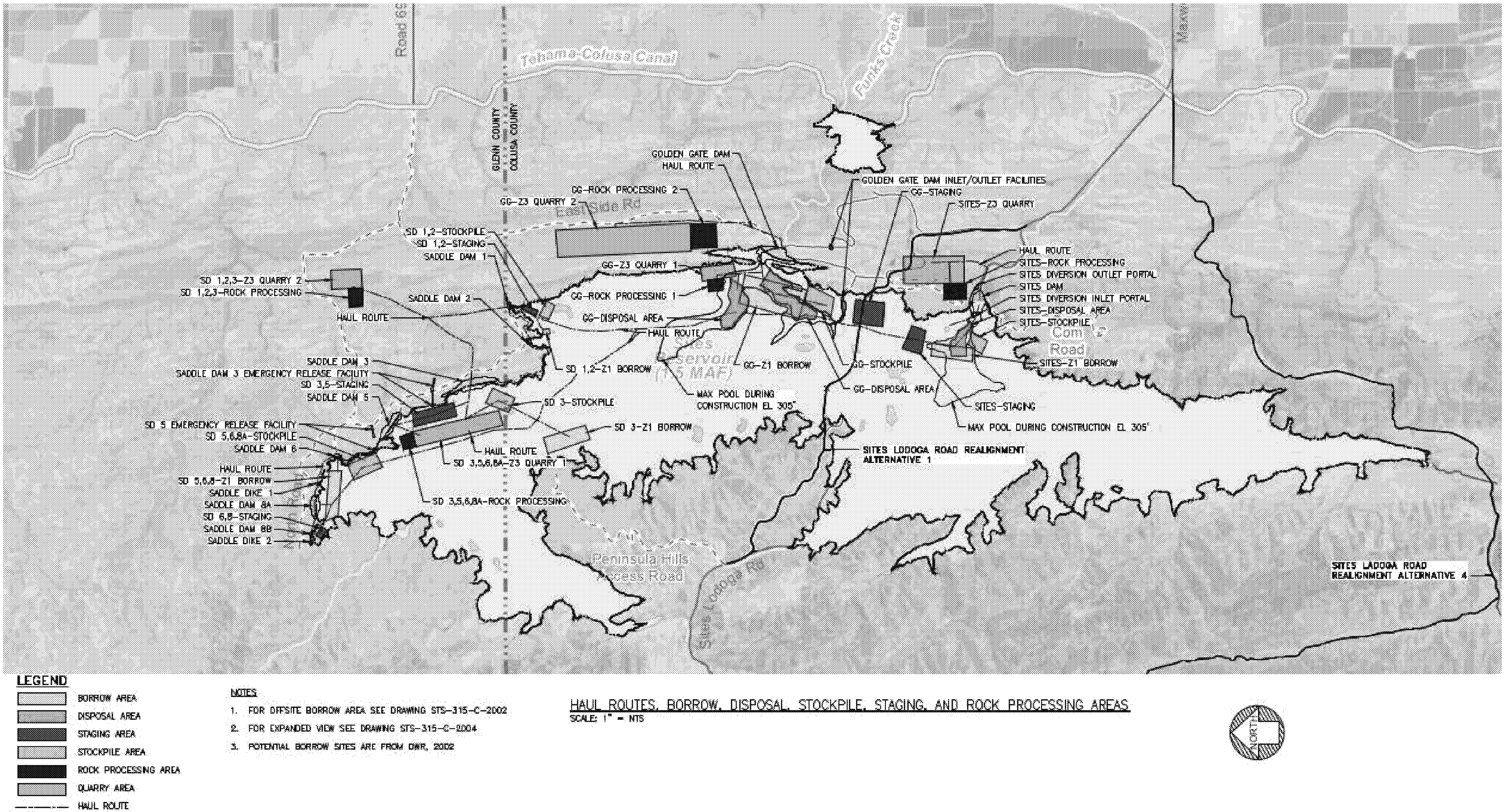

Figure1-1. Haul Routes, Borrow, Disposal, Stockpile, Staging, and Rock Processing Areas

Water in Sites Reservoir would be impounded by the Golden Gate Dam on Funks Creek, the Sites Dam on Stone Corral Creek, and by a series of saddle dams and dikes along the eastern and northern rims of the reservoir. The reservoir would be filled through conveyance facilities from the Glen-Colusa Canal and the Tehama Colusa Canal to the east of the reservoir that connect to the reservoir Inlet/Outlet Works (I/O) situated to the south of Golden Gate Dam. The same I/O works would be used to make releases from Sites Reservoir back to the canals. The I/O works includes two large-diameter tunnels through the ridge, a vertical I/O tower in the reservoir that would control flows, and a system of piping connecting the downstream tunnel portals to the pumping facilities. Releases to or from the reservoir would be made through an array of gated outlet ports on multiple sides of the vertical I/O tower at various elevations to accommodate varying reservoir water levels, and to regulate outlet water temperature. The I/O works concept would be the same for the 1.5-MAF and 1.3-MAF reservoirs; the height of the structure and number of gated ports would be smaller for the smaller reservoir.

Sites Reservoir construction would require relocating Sites-Lodoga Road prior to the Sites Dam construction. Other new paved or unpaved roads would also be provided to access project facilities from existing roads, and for operation and maintenance access between main dam and saddle dam areas.

In the reservoir area, demolition and removal of the town of Sites and other ranch buildings within the reservoir area would be required, along with the removal of metal fencing, asphalt-concrete paving, overhead utilities, and other buildings. Water wells would be closed, septic tanks would be removed, and proper plugging of existing gas exploration wells would be verified. Trees would be removed within one foot of grade in all areas located below the normal maximum operating water surface (NMWS). Stumps will not be removed.

This technical memorandum (TM) reflects the constructability considerations presented in a separate constructability TM for the following reservoir (HR) facilities (Figure1-1). The key dimensions of the facilities are included in Table 1-2.

- Main Dams, Saddle Dams and Dikes, and Reservoir Rim: The Sites Reservoir dams include two main dams, Golden Gate Dam on Funks Creek and Sites Dam on Stone Corral Creek, and saddle dams and dikes on the reservoir rim on tributaries to the Hunters Creek drainage.
- Spillway: This structure is a concrete overflow spillway located at Saddle Dam 8B that would discharge into Hunter's Creek to the north.
- I/O Works: These facilities include a vertical tower with multiple intake levels connected to two inlet/outlet tunnels. These provide for normal reservoir operation and for making the major portion of emergency reservoir releases. The tunnels connect to reservoir conveyance pipelines (HC) at the downstream tunnel portal.
- Sites Dam Outlet Works: This outlet works tunnel would be located in the north abutment of Sites Dam; it would be used initially for construction diversion for both main dams and subsequently for stream maintenance and a portion of the emergency reservoir releases to Stone Corral Creek after construction.
- Emergency Release Structures: These structures provide emergency release capacity to supplement the release capacities at the I/O Works and Sites Dam tunnel. They include intakes and tunnels located at Saddle Dams 3 and 5 for Alternative 1 only; they would discharge to Hunter's Creek on the north side of the reservoir.
- Creek Diversions during Construction: The Sites Dam outlet works (above) would be used for diversion of flows to Stone Corral Creek during construction. A 4-foot diameter steel pipe encased in reinforced concrete in the foundation of Golden Gate Dam would be used to divert flows to Funks Creek; the steel pipe would be plugged with concrete at the completion of construction.
- Roads: Roads include local roads (recreational use and public access), maintenance roads, and construction access roads.
- Bridges: Two bridges crossing the reservoir (lengths of 1,400 feet and 1,633 feet for the west bridge and east bridge, respectively) with fill prisms, providing an east-west connection from rural communities of Maxwell, Lodoga, and Stonyford for Alternative 1 only. For Alternative 2, there will be a southern road alignment around the south end of reservoir, providing an east-west connection from rural communities Maxwell, Lodoga, and Stonyford.

Table 1-2. Alternative 1 & Alternative 2 Reservoirs – Facility Descriptions

Subject	Alternative 1 (1.5 MAF Reservoir)	Alternative 2 (1.3 MAF Reservoir)
Reservoir Elevation at full pool (feet)	498.0	482.0
Reservoir Area at full pool (acres)	13,200	12,600
Dam / Dike Crest Elevation (feet) (without camber)	517.0	500.0
Main Dams	2 main dams – see below	2 main dams – see below
Saddle Dams	7 saddle dams and 2 saddle dikes – see below	4 saddle dams and 3 saddle dikes – see below
Dam / Dike:	Max. Ht. Above Streambed / Crest Length (ft)	Max. Ht. Above Streambed / Crest Length (ft)
Golden Gate Dam	287 / 2,221	270 / 2,063
Sites Dam	267 / 781	250 / 729
Saddle Dam 1	27 / 318	None (see Saddle Dike 1 below)
Saddle Dam 2	57 / 250	None (see Saddle Dike 2 below)
Saddle Dam 3	107 / 3,422	90 / 2,677
Saddle Dam 5	77 / 1,894	60 / 1,747
Saddle Dam 6	47 / 362	None (see Saddle Dike 3 below)
Saddle Dam 8A	82 / 1,300	62 / 1,140
Saddle Dam 8B	37 / 475	20 / 277
Saddle Dike 1	12 / 122	10 (near Saddle Dam 1) / 148
Saddle Dike 2	12 / 198	20 (near Saddle Dam 2) / 79
Saddle Dike 3	Not required	30 (near Saddle Dam 6) / 247
I/O Tower	Top elev. 558 ft. 258 ft high / 7 elevations to draw water from reservoir	Top elev. 543 ft. 243 ft high / 6 elevations to draw water from reservoir
I/O Tunnels	Approx. 3,110 ft long/Dual 23 ft Internal diameter tunnels	Nearly the same as Alt. 1
Sites Diversion/Outlet Tunnels	Approx. 1,590 ft long/12 ft internal diameter tunnel	Nearly the same as Alt. 1
Emergency Release System (on north rim)	Two emergency release systems located at Saddle Dams 3 and 5	No north rim releases
Spillway	Weir crest length = 85.5 feet, crest elevation = 504 feet	Weir crest length = 200 feet, crest elevation = 487 feet

Alt = Alternative
ft = feet
I/O = Inlet/outlet works
MAF = million acre feet

1.2 Purpose and Scope

The purpose of this task is to develop an Association for the Advancement of Cost Engineering (AACE) Class 4 opinion of probable construction cost (OPCC) estimate, as defined by the AACE Recommended Practice No. 12R-97, Cost Estimate Classification System (AACE, 2016). This TM discusses the construction activities and draws upon the schedule, productivities, and labor and equipment crews discussed in the Constructability Analysis TM (HR 53) (AECOM, 2021).

Project costs in this TM include direct construction costs (labor, materials, equipment and subcontractors), mark-up (overhead, profit, insurance and bond), mobilization/demobilization, design and construction contingencies and allowances, and non-contract costs.

1.3 Limitations

The scope of work for this TM was restricted to the development of the construction cost estimate for the Sites Reservoir under the Reservoir (HR) contract. Conveyance facilities are separately considered in a companion TM for the HC contract.

The information presented in this TM was based on topographic contours that originated from California Department of Water Resources (DWR) for their 2003 studies. Updated site-specific topographic maps will be prepared for use in preliminary and final phases of design.

AECOM represents that our services were conducted in a manner consistent with the standard of care ordinarily applied as the state of practice in the profession, within the limits prescribed by our client.

This TM is intended for the sole use of the Sites Project Authority. The scope of services performed may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or of the findings, conclusions, or recommendations presented herein is at the sole risk of said user.

2.0 Cost Estimate Summary

The Estimated Project Cost as of the July 2019 cost data date stands at $2.7B (Table 2-1). This total includes Direct Construction Cost (column a) Indirect Cost and Contractor Markups (column b) Non-Contract Cost (column d) and de-escalation (column f) to the July 2019 base date using an escalation rate of 3% per annum. The Design, Construction and Bidding Contingency totals are included within the Mark-up costs (column b). As shown in Table 2-1, the Opinion of Probable Cost for this project is anticipated to fall between $2.2B to $3.3B considering an expectancy range of +-20% which is applies to an AACE Class 4 estimate. Cost estimate details are included in Appendix A.

Table 2-1. Cost Estimate Summary for HR Facilities

Soft cost / non-contract cost allowance 18.0%

WBS No	Work / Facility Package	Est rev	Estimate Issue	a. Direct Cost	b. Mark-up Costs	c. Field Cost Total	d. Non-Contract Costs	e. Construction Cost Total	f. Escalation to July 2019	g. Project Cost Total (July 2019)	Percentage of Total Project	Design Contingency	Construction Contingency	Bidding Contingency
						c=a+b		e=c+d		g=e+f	g/total			
20	Site Demolition and Clearing Work	0.04	2/2/2021	16,599,710	12,801,000	29,400,710	5,292,128	34,692,838	(1,749,630)	32,943,209	1.20%	15.0%	15.0%	2.0%
21	Golden Gate Dam	0.04	2/2/2021	375,055,695	260,335,000	635,390,695	114,370,325	749,761,020	(37,811,958)	711,949,061	25.99%	10.0%	15.0%	2.0%
22	Sites Dam	0.04	2/2/2021	187,395,490	130,077,000	317,472,490	57,145,048	374,617,538	(18,892,717)	355,724,821	12.98%	10.0%	15.0%	2.0%
23	Saddle Dam 3 & Emergency Release Structure 1	0.04	2/2/2021	149,694,189	103,906,000	253,600,189	45,648,034	299,248,223	(15,091,691)	284,156,532	10.37%	10.0%	15.0%	2.0%
24	Saddle Dam 5 & Emergency Release Structure 2	0.04	2/2/2021	73,887,742	51,287,000	125,174,742	22,531,454	147,706,196	(7,449,121)	140,257,075	5.12%	10.0%	15.0%	2.0%
25	Saddle Dam 1, 2, 6 & 8	0.04	2/2/2021	74,831,593	51,943,000	126,774,593	22,819,427	149,594,020	(7,544,328)	142,049,692	5.18%	10.0%	15.0%	2.0%
26	Inlet Outlet Facilities	0.01	2/2/2021	170,954,991	131,826,000	302,780,991	54,500,578	357,281,570	(18,018,429)	339,263,141	12.38%	15.0%	15.0%	2.0%
27	Road Work													
27.01	Public Roadway: Sites Lodoga Road Realignment	0.09	2/2/2021	132,828,162	87,912,000	220,740,162	39,733,229	260,473,391	(13,136,198)	247,337,193	9.03%	10.0%	15.0%	2.0%
27.02	Public Roadway: Huffmaster Road Realignment	0.09	2/2/2021	93,881,272	62,136,000	156,017,272	28,083,109	184,100,381	(9,284,553)	174,815,828	6.38%	10.0%	15.0%	2.0%
27.03	Maintenance Roads - North Access Road 69 and Saddle Dam Roads	0.08	2/2/2021	18,557,270	12,881,000	31,438,270	5,658,889	37,097,159	(1,870,884)	35,226,274	1.29%	10.0%	15.0%	2.0%
27.04	Local Construction Roads - County, Delevan & Maxwell Roads	0.08	2/2/2021	29,314,316	20,347,000	49,661,316	8,939,037	58,600,353	(2,955,334)	55,645,019	2.03%	10.0%	15.0%	2.0%
27.05	Maintenance Roads - Access Roads A, B, C & Comm Roads	0.08	2/2/2021	17,524,641	12,165,000	29,689,641	5,344,135	35,033,776	(1,766,824)	33,266,952	1.21%	10.0%	15.0%	2.0%
27.06	Recreation Roads - Peninsula Hills	0.08	2/2/2021	5,853,901	4,063,000	9,916,901	1,785,042	11,701,943	(590,153)	11,111,790	0.41%	10.0%	15.0%	2.0%
27.07	Sites Lodoga Road Realignment Bridges	0.10	2/2/2021	88,642,073	68,353,000	156,995,073	28,259,113	185,254,186	(9,342,742)	175,911,444	6.42%	15.0%	15.0%	2.0%
Total				1,435,021,046	1,010,032,000	2,445,053,046	440,109,548	2,885,162,594	(145,504,561)	2,739,658,033				
Percentages of prior subtotal				n/a	70.4%		18.0%		-5.0%					
Percentages of Total Project Cost				52.4%	36.9%	89.2%	16.1%	105.3%	-5.3%					

Total OPCC (July 2019)	2,739,658,033
Estimated Range – Low (-20%)	2,191,726,426
Estimated Range – High (+20%)	3,287,589,639

Notes:

1. Costs in USD
2. Column 'b. Mark-ups' includes Contractor Overhead, Profit, Insurances & Bonds, Mobilization, Design Contingency, APS and Construction Contingency
3. Soft cost / non-contract cost allowance of 18% included
4. Cost de-escalated to July 2019 using a 3.0% escalation rate

3.0 Estimate Methodology

AECOM compiled the feasibility cost estimate for the Sites Reservoir based on an assumed work approach and considering design and quantity information available. We reviewed the labor, material and equipment requirements for each facility and we considered several sources for our costs including, but not limited to active projects, internal historic rate data, contractor's quotes and other sources such as Caltrans (2021) and RS Means.

This cost estimate is based on standard industry practice, professional experience, knowledge of the local construction market costs, and represents AECOM's judgment as professional construction consultant familiar with the construction industry. The intention of this estimate is to reflect fair market value for the construction, and it is not a prediction of the low bid. AECOM have no control over the material and labor costs, contractors' methods of establishing prices or the market and bidding conditions at the time of bid. AECOM does not guarantee that the bids received will not vary from this cost estimate.

Pricing is based upon competitive bidding with a minimum of five qualified General Contractors familiar with the conditions of working on this project. Pricing reflects probable construction costs obtainable in the project locality on the date of this statement of probable costs.

4.0 Estimate Classification

Our OPCC estimate represents an AACE Class 4 estimate that is described by the Association for the Advancement of Cost Engineering International (AACE, 2016). Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 15% complete. Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side (AACE, 2016). For this Sites Class 4 OPCC, the costs are expected to fall within an accuracy range from -20% on the low side to +20% on the high side of the actual construction cost.

5.0 General Approach

Individual bid packages are assumed to be bid separately, so each project carries its own Field and Home Office overhead, insurance, and profit, including any temporary site access. From the Constructability Analysis TM (AECOM, 2021), and considering the site arrangement, contractor resources, and work type, potential contract packages were anticipated as follows:

- Roadway construction contracts and bridge as Design-Build Contracts, possibly numerous contracts grouped logically by road type, location, and overall Sites Reservoir program schedule;
- Golden Gate and Sites Dams, including Golden Gate and Sites Bypass Facilities (Funks Creek and Stone Corral Creek);
- Saddle Dams, including Emergency Release Structures and Spillway Structure 8B (could be grouped with the main dams above); and
- Inlet/Outlet Facilities, including the approach channel.

All projects include mobilization, demobilization and repair and make-good of permanent facilities (public roads, work on other contracts) affected by their operations.

Field and home office overhead are calculated independently for each project based on anticipated method of contracting/procurement/execution.

6.0 Direct Cost

Direct Cost includes Labor, Material, Equipment and Subcontractor costs applied to measured units by Pay Item.

All Direct costs are estimated using a Cost Data Date of March 31, 2021, as a common baseline, with no escalation. Escalation will be handled separately based on approved schedule.

Direct costs are based on reasonable crew mixes and construction approaches, using estimator judgment to establish a basis for a composite assembly cost as defined by AACE Level 4 estimating requirements. It is recognized that, at the feasibility level, the design has not been progressed to identify all components or the optimum method of construction, and that there are many potential alternative approaches to developing crews, equipment and materials that can be further evaluated in the future as the level of design detail increases and contract packaging is further refined.

6.1 Labor

Labor costs include the following:

- Published prevailing wages for the project location
- Labor fringe costs
    - Employee benefits: healthcare, vacations, etc.
    - Dues and fees
    - Personal small tools
- Burden
    - Payroll tax
    - Federal and State Unemployment Insurance
    - Workers' Compensation Insurance.

Overtime and shift pay are included only for specific tasks which require extended working hours, such as mass pours of concrete, etc. The contractor may elect to work crews for extended hours or multiple shifts in order to achieve economies in other areas: these costs are not included since they relate to "means and methods" that are beyond the scope of the cost model.

The site location is assumed to be within normal commute range for construction workers in California, in consequence, workforce housing, per-diem, or other commute incentive is not included.

6.2 Material

Material Costs include the following

- Direct cost of material
- Freight and delivery, FOB jobsite/work location
- Sales Tax. Colusa County Sales tax is 7.75%

Material quotes were obtained where possible considering the current level of design. Generally, given the early stage of design, meaningful quotes are not possible in most cases.

Concrete pricing is based on standard transit mix (ready-mix). Concrete may be procured by the contractor using standard transit mix (ready-mix) delivery or batched on site, at their election.

6.3 Equipment

Equipment Costs include the following:

- Hourly equipment rental rates based on published Caltrans rates
- Equipment maintenance and operation (fuel, lubrication, etc.) are included in the Caltrans rates
- Delivery to and from work location

All equipment is priced using hourly rates following Caltrans guide for equipment ownership (Caltrans, 2021).

6.4 Subcontractors

Subcontractor costs include the selling price to the prime, including all subcontractor overhead, profit, etc.

7.0 Mark-up

7.1 Contractor Overhead

Subcontractor overhead is included in the direct cost lines for subcontractors.

The Contractor Overhead includes the following items:

- Site General Conditions (10%)
  - General and non-working supervision
  - Subcontractor oversight & coordination
  - Field layout and surveying
  - Safety and traffic management
  - Maintenance of temporary facilities and roads
  - Small truck and tools
  - Consumables
  - Miscellaneous materials and supplies
  - Contractor initiated testing (concrete, welding, compaction, etc.)
  - Permit and agency fees that the contractor will need to obtain for construction.

- Field and Home Office Overhead (5%):
  - Site Management and Engineering staff
  - Contractor QA and validation
  - Field offices, supplies and utilities
  - Project accounting & billing, reporting, etc.
  - Direct overhead related to project management and oversight. For this estimate, it is assumed that the majority of engineering, legal and accounting work will be provided in the field. Actual cost distribution will be at the discretion of the contractor.

7.2 Contractor Profit

The profit could range from 3% to 10%, depending on competition at the time of bid. For this OPCC, it is set at 5% across all projects since contract allocation and breakdown is not known at this time. Subcontractor profit is included in the direct cost lines for subcontractors.

7.3 Insurance

Insurance covers Contractor provided insurance, including Public Liability/Property Damage (PL/PD) and General Liability (GL) coverage. Insurance is set at 1.1% for all projects. Insurance carried by the owner, including Property, Fire, and All Risk, is excluded.

7.4 Bonds

Bonds covers contractor provided bonds, including performance and payment bonds. The pricing assumes that bonds will be adjusted to reflect actual value at risk. Bonds are set at 1% for all projects.

8.0 Mobilization/Demobilization

Mobilization/Demobilization is priced separately as a percentage allowance, using 3% to 5% across all projects.

Mobilization (Ranging from 2% to 4%) includes all costs associated with individual project set-up, including:

- Initial site survey and inspection
- Existing condition documentation and site acceptance by contractor and owner.
- Installation of temporary facilities including fencing, temporary erosion and sedimentation control, safety provisions, staging areas, etc.

- Equipment and material staging/move-on

Demobilization (1%) includes all costs associated with individual project clean-up and demobilization, including:

- Final site surveys and inspections
- Work area clean-up, removal of debris
- Demolition of all temporary facilities
- Restoration and rehabilitation of disturbed areas
- Project close-out documentation, warranties, operation manuals, etc.
- Contract Contingencies and Cost Allowances

9.0 Contingencies and Allowances

Contingencies and allowances have been calculated/assessed independently for each project component.

9.1 Line Item Allowances

Line item allowances have been included to address specific and reasonably foreseeable scope items that lack definition for estimating.

9.2 Design Contingencies

Design Contingencies vary from 10% to 15% depending on the level of detail and the potential for additional unforeseen site conditions identified during the design phase. Refer to the cost tables in Appendix A for the design contingency allowances.

The contingences are intended to allow for scope that is inherent in the individual project components, but is not yet identified in the design documentation or confirmed by site-specific geotechnical/geological investigations. This contingency would be fully consumed or released by the completion of the procurement documents.

9.3 Construction Contingencies

The Construction Contingency is intended to cover unforeseen conditions or changes post contract award. It remains under the control of the owner, separate from the bid award. An allowance of 15% has been applied to all projects. Refer to the cost tables in Appendix A for the construction contingency allowances.

9.4 Alternative Procurement Strategy (APS)

It is anticipated that the project will be procured using Best Value selection. While this will result in improved quality and overall project performance, it has a higher first cost than conventional selection using Lowest Responsible Bid. An allowance of 2.0% has been applied based on potential average bid spreads for the assumed contracting methods.

10.0 Non-Contract Costs

Non-contract costs include geotechnical investigation, engineering, construction management, administration, real estate, legal services, permitting costs, environmental monitoring, and other owner costs attributable to the project. These costs are distinguished from Contract Costs (costs to the construction contractor). An estimate for the non-contract cost has been developed, but it has also been applied as a percentage to each of the project facilities for presentation purposes. The non-contract cost estimate is approximately 18% of the construction cost if real estate is included.

11.0 Escalation from Cost Data Date to Report Issue Date

All costs are based on a Cost Data Date of March 31, 2021. An escalation rate of 3% per annum has been applied to escalate costs from the date of estimate to the Report Issue Date. Escalation to the Notice to Proceed date has not been included.

The escalation is based on the following factors:

11.1 Input Cost Inflation

Input cost inflation drives construction inflation by increasing the cost of labor, material equipment and subcontractors to the prime contractor. The extent to which these can be passed through in the bid price depends greatly on Demand Pull inflation noted below.

The majority of the cost in this project is labor and equipment; material and subcontract make up a relatively small portion of the overall cost. Labor escalation has been running at a relatively low rate, typically in the range of 2.5% to 3.5% per annum. Equipment escalation also falls into this range. Material costs are more volatile, with significant fluctuation depending on material and demand: material inflation has ranged from peaks in excess of 10% for materials such as reinforcing steel to deflation in the range of -10% for cement. These peaks and troughs, however, tend to be transient, and the long-term trend for construction materials is in the 3% range.

The long-term trend in Bureau of Labor Statistic Producer Price Index for construction input has been 2.7%

11.2 Demand-Pull Inflation

Demand-Pull inflation drives construction inflation by reducing overall competitiveness and allowing bidders to increase profit and risk premiums. This is the dominant inflation factor in periods of very high or low construction demand.

While much of urban California has been experiencing very strong demand for construction over the past ten years, leading to very high levels of Demand-Pull inflation significantly in excess of Input Cost Inflation, Northern California has experienced very little demand-pull inflation. Construction activity and demand in the region to the north of Sacramento has hardly grown in the past ten years, with annual growth rates averaging less than 1%. We do not see any demand driven escalation at this point.

11.3 Forecast Escalation

The historic escalation trend in the region has been running at around 3% per annum, primarily driven by Cost Push. Economic forecasts for the region do not indicate any appreciable change in the level of economic activity. The proposed project will be one of the largest economic drivers in the region, but it is unlikely to create its own demand led inflation. Peak employment is likely to reach around 1,000 workers, which should be well within the region's absorption capacity.

Based on this, we recommend using the long-term average trend for Cost-Push inflation which is 3% per annum.

12.0 Conditions of Construction

The following key assumptions were used as part of compiling the cost estimate:

- All work, except for tunneling and mass concrete pours, will be performed using five 10-hour work shift per week. Tunneling and mass concrete placements will be performed using double shifts. Overtime and shift premiums are included.
- Contractor will be required to pay prevailing wages at a minimum.
- Sales tax will be paid on all materials incorporated into the project.
- Other than for the town of Sites, no hazmat abatement work or hazardous soil removal work is anticipated.
- The identified work approach has been considered as part of developing this estimate (AECOM, 2021).

- The site and all work areas will have been vacated prior to construction, and all work areas will be under the full control of the contractor at all times. Public rights of way will be maintained at all times.
- Disposal areas nearby will be utilized, no-offsite dumping is required.
- The work will be performed under the standard rules of the Colusa County Air Pollution Control District, with no additional air quality monitoring or management requirements and standard dust management/palliation requirements.
- There will be no noise-related work restrictions.

13.0 Key Exclusions

The following are some of the key exclusions to be noted:

- Utility company charges, including work required off-Site and utilities rates.
- Owner's contingency.
- Maintenance and operational work unless otherwise noted.
- Phasing allowance.
- Escalation beyond the specified reporting period.
- Any unforeseen conditions.
- Restrictive technical specifications or excessive contract conditions.
- Non-competitive bidding conditions.
- Sole source specifications of materials or products.
-

14.0 Value Engineering

We note that the costs presented in this technical memorandum have not been optimized. As such, we have included potential VE ideas for consideration to reduce construction costs of the dams; inlet/outlet tunnels; intake, and the high-level emergency release structures; spillway; and roads. The following are potential VE ideas for consideration to reduce construction cost:

- <u>Dam:</u>
    - It may be possible to produce embankment transition zone materials from on-site quartzite rather than importing them. This would remove the purchase cost and the 35-mile hauling cost of these materials, but would add on-site quarrying and processing costs to produce these materials. The net cost would result in a savings.
    - To make better use of materials availability for the main dams, it may be possible to replace a part (or all) of the upstream shell zone with random Zone 4 to reduce the use of the more expensive Zone 3 rockfill; this would necessitate flattening the upstream slope and increase dam volume. There is an excess of Zone 4 materials and an economical approach would be to place those materials in the upstream shell of the dam. Also, with this approach, the upstream filter and transition may be eliminated. With a flatter upstream slope, more riprap would be required.
    - The width of the dam chimney filter/drain/transition zones, and the thickness of the blanket filter/drain/transition zones could potentially be reduced. However, this is an optimization that should be reserved for the next phase of design, and should not be considered for VE at this time.
- <u>Inlet/Outlet Tunnels, Intake, and High-Level Emergency Release Structures:</u>
    - The current design includes two parallel inlet/out tunnels to provide system redundancy. However, it is typical for dams to operate a single outlet since full shutdowns are rare and inspections/maintenance can be coordinated with operating schedules. This would greatly reduce costs. The single tunnel diameter would be somewhat larger than for two parallel tunnels. The diameters will vary by allowable discharge velocities, which depends on tunnel lining type and requirements from permitting agencies. High velocities are anticipated in the tunnels during the first few days of an emergency drawdown situation.
    - The intake structure is currently an inundated tower accessed by a bridge from the adjacent ridge. A sloping intake founded on the rock surface along the ridge slope would require less seismic reinforcement and be less costly than a tower. The bridge would also be eliminated from the design, but the access road would

still be required. O&M access for the sloping intake would need to be considered and compared with that of the tower.
    - Current design criteria for emergency reservoir drawdown conservatively assumes that the upper 10% of the reservoir head will need to be drawn down in seven days. The permitting agency (DSOD) may allow a 10-day drawdown period. This would significantly reduce the discharge flows, which would reduce the reservoir outlet works infrastructure sizes near Golden Gate Dam, potentially allow for the removal of the two high level emergency release locations at the saddle dams and reduce the size of all downstream infrastructure.

- Spillway:
    - The spillway currently includes a concrete gravity dam structure. It may be possible to use a less expensive emergency spillway conduit depending on DSOD's criteria for required spill capacity after full storage of the PMF. A tradeoff between spillway capacity and freeboard would need to be evaluated.

- Roads:
    - A consideration would be to eliminate west bridge and replace it with an embankment fill. This approach would have to address compressible alluvium beneath the fill and resulting settlement of the embankment.
    - Use of full-depth recycling pavement rehabilitation[1] of County Roads would be a cost saving measure.
    - Instead of replacing the smaller existing bridges to handle construction traffic, temporary bridges could be placed over the existing bridges. Also, shoring up the existing bridges with intermediate supports to shorten spans could be done.

The VE options to be adopted should be made in conjunction with input from the Authority, HDR and Jacobs. Also, the options should be discussed with DSOD to obtain their initial reactions.

15.0 References

AECOM (2021). Constructability Analysis Technical Memorandum, HR 53. Draft.

Association for the Advancement of Cost Engineering (AACE) International (2016). Recommended Practice No. 12R-97, Cost Estimate Classification System. March 1.

California Department of Transportation (Caltrans) (2021). Labor Surcharge and Equipment Rental Rates, Effective April 1, 2020 through March 31, 2021.

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[1] Full depth recycling is a pavement rehabilitation technique in which the full thickness of the asphalt pavement and a portion of the underlying layers, along with a small percentage of added cement, are pulverized to provide a homogeneous pavement material. The stabilized material is then compacted in-place with rollers, resulting in a stiff, stabilized base course ready for a new surface course.

Appendix A

Construction Cost Estimate Tables - HR

Sites Reservoir (Alt 1): Site Demolition and Clearing Work — **Cost Estimate**
Feasibility Report Cost Estimate — **AACEI Class 4**
Sites, CA — **February 2, 2021**

20. Construction Cost Summary - Site Demolition and Clearing Work					
				Unit Cost Rate $/ACRE	**Total Cost ($x 1,000)**
			ACRE:	1,050	
Total Direct Cost				15,809.25	16,600
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				15,809.25	16,600
General Conditions					
Mobilization			5.0%	790.48	830
Site General Conditions & Requirements			10.0%	1,660.00	1,743
Phasing		*Not included*	0.0%	-	-
General Contractor Overhead and Fees					
Insurance			1.1%	200.95	211
Bonds			1.0%	184.76	194
GC Field and Home Office Overhead			5.0%	932.38	979
GC Profit			5.0%	979.05	1,028
Total Contractor Indirect Markups				4,747.62	4,985
TOTAL DIRECT COST BEFORE CONTINGENCIES				20,556.87	21,585
Contingencies					
Design Contingencies			15.0%	3,083.81	3,238
Construction Contingencies			15.0%	3,545.71	3,723
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	543.81	571
Total Contingency Allowance				7,173.33	7,532
TOTAL DIRECT COST BEFORE ESCALATION				27,730.20	29,117
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	270.48	284
Escalation to Mid-point of Construction		*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET				28,000.68	29,401

Cost Work Sheet Summary

Item	Sub-Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	All-in Rate	Total	Comment
1		**General Clearing and Grubbing**									
	1.001	Clearing and Grubbing	289	ACRE	$ 2,460.94	$ 1,484.32	$ -	$ -	$ 3,945.25	$ 1,140,179	Light vegetation clearing work (1050 Acres of clearing work)
2		**Reservoir Clearing and Demolition (Carried over from May 2020 NODOS Estimate)**									Reference Estimate: 2.NODOS_Clear-Grade_2020-04-30
	2.001	Remove and Dispose of Trees - Oak Woodlands	700	ACRE	$ 2,600.00	$ 1,500.00	$ -	$ 6,400.00	$ 10,500.00	$ 7,350,000	Costs as per May 2020 NODOS Estimate
		a. Oak woodland around reservoir									
		b. Remove and dispose off site									
		c. Cut stumps within 12" of ground									
		d. Stump removal not required									
		e. Provide access to tree cutting locations									
	2.002	Vegetation Removal - Occupied Areas	61	ACRE	$ 37,000.00	$ 33,000.00	$ -	$ 10,500.00	$ 80,500.00	$ 4,910,500	
		a. Trees, shrubs									
		b. Town of Sites and homesteads									
		c. Remove and dispose off site									
		d. Cut tree stumps within 12" of ground									
		e. Tree Stump removal not required									
	2.003	Demolish Residential Housing	24	EA	$ -	$ -	$ -	$ 10,000.00	$ 10,000.00	$ 240,000	
		a. Demolish, remove, dispose off site									
		b. Remove concrete foundations and walls in designated borrow areas									
	2.004	Demolish Barns	29	EA	$ -	$ -	$ -	$ 7,900.00	$ 7,900.00	$ 229,100	
		a. Demolish, remove, dispose off site									
	2.005	Demolish Out-buildings - Sheds & Garages	36	EA	$ -	$ -	$ -	$ 8,100.00	$ 8,100.00	$ 291,600	
		a. Demolish, remove, dispose off site									
	2.006	Demolish silos & water towers	12	EA	$ -	$ -	$ -	$ 11,000.00	$ 11,000.00	$ 132,000	
		a. Demolish, remove, dispose off site									
	2.007	Remove Motor Homes	2	EA	$ -	$ -	$ -	$ 5,000.00	$ 5,000.00	$ 10,000	
		a. Demolish, remove, dispose off site									
	2.008	Demolish and clean Septic Systems	28	EA	$ 2,700.00	$ 5,600.00	$ -	$ 3,600.00	$ 11,900.00	$ 333,200	
		a. Pump and dispose of contents									
		b. Remove and dispose of lid, walls, bottom									
		c. Remove any gravel surround									
		d. Backfill excavation with clay soils									
	2.009	Plug Groundwater Wells	38	EA	$ 1,350.00	$ 2,800.00	$ 320.00	$ 2,600.00	$ 7,070.00	$ 268,660	
		a. Follow Colusa or Glenn County standards									
		b. Remove and dispose of pumps, motors, electrical									
	2.010	Remove Underground Fuel Tanks	15	EA	$ 2,700.00	$ 5,600.00	$ -	$ 3,300.00	$ 11,600.00	$ 174,000	
		a. Follow County/State Standards									
		b. Dispose off site									
		c. Remove contaminated soils, backfill excavation with clay soils									
	2.011	Remove Metal Fencing and Posts (No Salvage)	40	MILE	$ -	$ -	$ -	$ 13,500.00	$ 13,500.00	$ 540,000	
		a. Dispose off site									
	2.012	Remove Asphalt Paving (Two-Lane Roads)	73,906	SY	$ 3.10	$ 5.60	$ -	$ 1.05	$ 9.75	$ 720,586	As per Alt 1 roadwork sheet
		a. Dispose off site									
		b. AB removal not required if present									
		c. Does not include removal of temporary north bypass road in reservoir (In road estimates)									
	2.013	Locate Decommissioned Gas Wells, Verify Closure	10	EA	$ -	$ -	$ -	$ 3,000.00	$ 3,000.00	$ 30,000	
		a. Locate wells, excavate top, verify closure									
		b. Wells in reservoir identified as plugged dry gas wells in DOGGR records									
	2.014	Cost escalation on May 2020 NODOS Estimate items carried over	1.51%	LS				$ 15,229,646	$ 15,229,646	$ 229,886	Escalation from May 2020 to Dec 2020 at a rate of 3% per annum
		Total Direct Cost	1,050	ACRE	$ 4,937.83	$ 4,050.52	$ 11.58	$ 6,809.32	$ 15,809.25	$ 16,599,710	

Sites Reservoir (Alt 1): Golden Gate Dam	Cost Estimate
Feasibility Report Cost Estimate	AACEI Class 4
Sites, CA	February 2, 2021

21. Construction Cost Summary: Golden Gate Dam				Total Cost ($x 1,000)
Total Direct Cost				375,056
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				375,056
General Conditions				
Mobilization			5.0%	18,753
Site General Conditions & Requirements			10.0%	39,381
Phasing		*Not included*	0.0%	-
General Contractor Overhead and Fees				
Insurance			1.1%	4,765
Bonds			1.0%	4,380
GC Field & Home Office Overhead			5.0%	22,117
GC Profit			5.0%	23,223
Total Contractor Indirect Markups				112,619
TOTAL DIRECT COST BEFORE CONTINGENCIES				487,675
Contingencies				
Design Contingencies			10.0%	48,767
Construction Contingencies			15.0%	80,466
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	12,338
Total Contingency Allowance				141,571
TOTAL DIRECT COST BEFORE ESCALATION				629,246
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	6,145
Escalation to Mid-point of Construction		*Not included*	0%	-
RECOMMENDED CONSTRUCTION BUDGET				635,391

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
1		**PRECONSTRUCTION ACTIVITIES**									
	1.001	Demolition Work	-	LS	$ -	$ -	$ -	$ -		Elsewhere	
	1.002	Clearing and Grubbing	53	ACRE	$ 3,290.32	$ 6,079.13	$ -	$ -	$ 9,369.45	$ 496,581	Heavy vegetation removal
	1.003	Reservoir Clearing	-	ACRE	$ -	$ -	$ -	$ -	$ -	$ -	Elsewhere costed
	1.004	Erosion and Sediment Control	53	ACRE	$ -	$ -	$ -	$ 3,760.50	$ 3,760.50	$ 199,307	Allowed $0.25/SF to 30% of the total area
2		**Process and Haul Filter Materials to Project**									
	2.001	Process and Stockpile on Project - Zone 2A - Filter	726,000	Tons					$ 42.16	$ 30,604,750	
	2.002	*Purchase processed material from quarry*	*726,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 16,114,659*	*Include 10% waste factor / additional material supply*
	2.003	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*491,118*	*LCY*	*$ 9.61*	*$ 19.89*	*$ -*	*$ -*	*$ 29.50*	*$ 14,490,091*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.004	Process and Stockpile on Project - Zone 2A - Drain	803,000	Tons					$ 42.16	$ 33,852,212	
	2.005	*Purchase processed material from quarry*	*803,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 17,823,790*	*Include 10% waste factor / additional material supply*
	2.006	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*543,206*	*LCY*	*$ 9.61*	*$ 19.90*	*$ -*	*$ -*	*$ 29.51*	*$ 16,028,423*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.007	Process and Stockpile on Project - Zone 2A - Transition	107,800	Tons					$ 42.22	$ 4,551,409	
	2.008	*Purchase processed material from quarry*	*107,800*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 2,392,783*	*Include 10% waste factor / additional material supply*
	2.009	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*72,924*	*LCY*	*$ 9.64*	*$ 19.96*	*$ -*	*$ -*	*$ 29.60*	*$ 2,158,627*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.010	Process and Stockpile on Project - Zone 2B - Filter	451,000	Tons					$ 42.17	$ 19,017,305	
	2.011	*Purchase processed material from quarry*	*451,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 10,010,622*	*Include 10% waste factor / additional material supply*
	2.012	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*305,088*	*LCY*	*$ 9.62*	*$ 19.91*	*$ -*	*$ -*	*$ 29.52*	*$ 9,006,684*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.013	Process and Stockpile on Project - Zone 2B - Transition	473,000	Tons					$ 42.18	$ 19,952,240	
	2.014	*Purchase processed material from quarry*	*473,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 10,498,945*	*Include 10% waste factor / additional material supply*
	2.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*319,971*	*LCY*	*$ 9.62*	*$ 19.92*	*$ -*	*$ -*	*$ 29.54*	*$ 9,453,296*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
		Foundation Preparation and Grouting									
3		**Foundation Excavation**									
	3.001	Topsoil Salvage	125,000	BCY					$ 9.28	$ 1,160,522	
	3.002	*Excavations - remove top soil layer*	*137,500*	*LCY*	*$ 1.61*	*$ 2.39*	*$ -*	*$ -*	*$ 4.00*	*$ 549,422*	*Include 10% swell factor*
	3.003	*Load and haul to disposal site, 0.5 mile haul*	*137,500*	*LCY*	*$ 1.18*	*$ 3.26*	*$ -*	*$ -*	*$ 4.44*	*$ 611,100*	
	3.004	Dam Foundation Excavation - Common	325,000	BCY					$ 9.32	$ 3,028,041	
	3.005	*Excavations - remove top soil layer*	*357,500*	*LCY*	*$ 1.63*	*$ 2.45*	*$ -*	*$ -*	*$ 4.08*	*$ 1,459,935*	*Include 10% swell factor*
	3.006	*Load and haul to disposal site, 0.5 mile haul*	*357,500*	*LCY*	*$ 1.17*	*$ 3.21*	*$ -*	*$ -*	*$ 4.39*	*$ 1,568,106*	
	3.007	Dam Foundation Rock Exc - Rippable Rock	991,000	BCY					$ 12.76	$ 12,641,317	
	3.008	*Rock excavations, no blasting*	*1,139,650*	*LCY*	*$ 2.63*	*$ 4.08*	*$ -*	*$ -*	*$ 6.71*	*$ 7,648,743*	*Include 15% swell factor*
	3.009	*Load and haul to stockpile, 0.5 mile haul*	*1,139,650*	*LCY*	*$ 1.17*	*$ 3.21*	*$ -*	*$ -*	*$ 4.38*	*$ 4,992,574*	
	3.010	Dam Foundation Rock Ex - Drill and Shoot	159,000	BCY					$ 25.72	$ 4,088,825	
	3.011	*Blasting operations*	*190,800*	*LCY*	*$ 4.37*	*$ 6.32*	*$ 4.85*	*$ -*	*$ 15.54*	*$ 2,983,695*	*Include 20% swell factor*
	3.012	*Load and haul to stockpile, 1 mile haul*	*190,800*	*LCY*	*$ 1.57*	*$ 4.23*	*$ -*	*$ -*	*$ 5.79*	*$ 1,105,130*	
	3.013	*Crush and screen material*	*190,800*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
4		**Foundation Preparation and Grouting**								Included below	
		Foundation Preparation - Beneath Core									
	4.001	Initial Foundation Cleaning - Core	65,000	SY					$ 21.50	$ 1,397,427	
	4.002	*Initial foundation core cleanup*	*65,000*	*SY*	*$ 12.03*	*$ 6.13*	*$ -*	*$ -*	*$ 18.16*	*$ 1,180,458*	
	4.003	*Load and haul to disposal area, 0.5 mile haul*	*17,875*	*CY*	*$ 3.92*	*$ 8.22*	*$ -*	*$ -*	*$ 12.14*	*$ 216,969*	*Assume removal of top layer, 0.75' thick*
	4.004	Final Foundation Cleaning - Core	65,000	SY					$ 18.16	$ 1,180,458	
	4.005	*Final foundation core cleanup*	*65,000*	*SY*	*$ 12.03*	*$ 6.13*	*$ -*	*$ -*	*$ 18.16*	*$ 1,180,458*	
	4.006	*Load and haul to disposal area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*
	4.007	Dental Excavation	3,700	CY					$ 128.44	$ 475,217	
	4.008	*Dental excavations*	*4,070*	*LCY*	*$ 71.28*	*$ 34.13*	*$ -*	*$ -*	*$ 105.41*	*$ 429,010*	*Include 10% swell factor*
	4.009	*Load and haul to site stockpile, 0.5 mile haul*	*4,070*	*LCY*	*$ 4.02*	*$ 7.53*	*$ -*	*$ -*	*$ 11.55*	*$ 46,207*	
	4.010	Dental Concrete	3,700	CY	$ 46.48	$ 22.41	$ 183.12	$ -	$ 252.01	$ 932,434	
	4.011	Grout Cap with Anchors	9,900	CY	$ 82.15	$ 25.21	$ 519.68	$ 4.07	$ 631.11	$ 6,247,968	3' x 40' cap, includes formwork and reinforcement (50lbs/cy)
	4.012	Curtain Grouting	96,100	LF					$ 83.65	$ 8,039,078	
	4.013	*Drill setup for all holes*	*1,281*	*ea.*	*$ 200.36*	*$ 355.33*	*$ -*	*$ -*	*$ 555.69*	*$ 712,038*	*Assume 75' drilling lengths*
	4.014	*Drill curtain grout holes*	*96,100*	*ft*	*$ 10.84*	*$ 12.38*	*$ -*	*$ -*	*$ 23.22*	*$ 2,231,695*	
	4.015	*Redrill grout holes*	*9,610*	*ft*	*$ 10.93*	*$ 12.49*	*$ -*	*$ -*	*$ 23.42*	*$ 225,045*	*Assume 10% to be redrilled*
	4.016	*Hookup to grout holes and grout nipples*	*4,805*	*ea.*	*$ 95.72*	*$*	*$ -*	*$ -*	*$ 95.72*	*$ 459,918*	*1 x hookup every 20'*
	4.017	*Inject portland cement grout*	*6,407*	*hr*	*$ 507.81*	*$ 111.13*	*$ -*	*$ -*	*$ 618.95*	*$ 3,965,386*	*Allow 5 hours per hole*
	4.018	*Perform hydraulic conductivity tests*	*1,281*	*ea.*	*$ -*	*$*	*$*	*$ 347.30*	*$ 347.30*	*$ 445,097*	
	4.019	Consolidation Grouting	40,000	LF					$ 83.67	$ 3,346,610	
	4.020	*Drill setup for all holes*	*533*	*ea.*	*$ 200.37*	*$ 355.90*	*$ -*	*$ -*	*$ 556.27*	*$ 296,678*	*Assume 75' drilling lengths*
	4.021	*Drill curtain grout holes*	*40,000*	*ft*	*$ 10.83*	*$ 12.38*	*$ -*	*$ -*	*$ 23.21*	*$ 928,310*	
	4.022	*Redrill grout holes*	*4,000*	*ft*	*$ 10.94*	*$ 12.50*	*$ -*	*$ -*	*$ 23.44*	*$ 93,769*	*Assume 10% to be redrilled*
	4.023	*Hookup to grout holes and grout nipples*	*2,000*	*ea.*	*$ 95.68*	*$*	*$ -*	*$ -*	*$ 95.68*	*$ 191,350*	*1 x hookup every 20'*
	4.024	*Inject portland cement grout*	*2,667*	*hr*	*$ 508.06*	*$ 111.19*	*$ -*	*$ -*	*$ 619.24*	*$ 1,651,316*	*Allow 5 hours per hole*
	4.025	*Perform hydraulic conductivity tests*	*533*	*ea.*	*$ -*	*$*	*$*	*$ 347.30*	*$ 347.30*	*$ 185,237*	

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	4.026	Type III Cement	4,800	Tons	$ 185.01	$ 81.11	$ 113.14	$ -	$ 379.26	$ 1,820,442	
	4.027	Backfill Concrete	-	CY	$ -	$ -	$ -	$ -		Elsewhere	
5		**Foundation Preparation - Beneath Shell**									
	5.001	Initial Foundation Cleaning - Shell	152,000	SY					$ 4.86	$ 738,384	
	5.002	*Initial dam shell cleanup*	*152,000*	*SY*	*$ 1.30*	*$ 0.55*	*$ -*	*$ -*	*$ 1.85*	*$ 281,445*	
	5.003	*Load and haul to disposal area, 0.5 mile haul*	*27,867*	*LCY*	*$ 5.81*	*$ 10.59*	*$ -*	*$ -*	*$ 16.40*	*$ 456,939*	*Assume removal of top layer, 0.5' thick*
6		**Foundation Drainage**									
	6.001	Furnish and Install Foundation Drain Pipe	500	LF	$ 50.03	$ 32.89	$ 35.56	$ -	$ 118.48	$ 59,238	
	6.002	Furnish and Install Foundation Drain Manholes	3	EA	$ 1,750.96	$ 1,130.05	$ 3,070.88	$ -	$ 5,951.89	$ 17,856	
	6.003	Seepage Partition Walls	700	CY	$ 548.26	$ 129.43	$ 465.37	$ -	$ 1,143.06	$ 800,143	3' x 6' high concrete seepage walls including formwork and reinforcement (100lbs/cy)
7		**Embankment**									
	7.001	Develop Burrow Areas	1	LS						Included below	
	7.002	Z1 Strip/Overburden/Waste to Stockpile	1,150,000	BCY					$ 9.45	$ 10,862,690	Assumed common earth, 3000' haul w/ scraper
	7.003	*Embankment excavations*	*1,265,000*	*LCY*	*$ 1.02*	*$ 2.98*	*$ -*	*$ -*	*$ 4.00*	*$ 5,060,639*	*Include 10% swell factor*
	7.004	*Load and haul to site stockpile, 1 mile haul*	*1,265,000*	*LCY*	*$ 1.08*	*$ 3.50*	*$ -*	*$ -*	*$ 4.59*	*$ 5,803,061*	
	7.005	Z3 Strip/Overburden/Waste to Stockpile-Q1	499,000	BCY					$ 10.41	$ 5,195,205	
	7.006	*Embankment excavations*	*548,900*	*LCY*	*$ 1.50*	*$ 3.37*	*$ -*	*$ -*	*$ 4.87*	*$ 2,673,570*	*Include 10% swell factor*
	7.007	*Load and haul to site stockpile, 1 mile haul*	*548,900*	*LCY*	*$ 1.09*	*$ 3.51*	*$ -*	*$ -*	*$ 4.60*	*$ 2,523,635*	
	7.008	Z3 Strip/Overburden/Waste to Stockpile-Q2	3,849,000	BCY					$ 9.02	$ 34,736,604	
	7.009	*Embankment excavations*	*4,233,900*	*LCY*	*$ 1.50*	*$ 3.36*	*$ -*	*$ -*	*$ 4.86*	*$ 20,571,937*	*Include 10% swell factor*
	7.010	*Load and haul to site stockpile, 0.25 mile haul*	*4,233,900*	*LCY*	*$ 0.96*	*$ 2.38*	*$ -*	*$ -*	*$ 3.35*	*$ 14,164,667*	
	7.011	Z4 Strip/Overburden/Waste to Stockpile	-	BCY					$ -	$ -	
	7.012	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.013	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Restore Burrow Areas									
	7.014	Replace Overburden from Stockpile	1,374,500	ECY					$ 8.46	$ 11,627,434	Backfill burrow area using material from stockpile, allow 25% of stripping material
	7.015	*Load and haul to site stockpile, 1 mile haul*	*1,511,950*	*LCY*	*$ 1.49*	*$ 3.98*	*$ -*	*$ -*	*$ 5.47*	*$ 8,271,906*	
	7.016	*Spread and compact*	*1,511,950*	*LCY*	*$ 1.19*	*$ 1.03*	*$ -*	*$ -*	*$ 2.22*	*$ 3,355,528*	
	7.017	Topsoil Replacement	125,000	ECY					$ 10.71	$ 1,338,903	Backfill burrow area using material from stockpile
	7.018	*Excavate, Load and haul excavated backfill material to fill location, 1 mile*	*137,500*	*LCY*	*$ 1.84*	*$ 5.61*	*$ -*	*$ -*	*$ 7.45*	*$ 1,024,693*	
	7.019	*Spread and compact*	*137,500*	*LCY*	*$ 1.23*	*$ 1.06*	*$ -*	*$ -*	*$ 2.29*	*$ 314,210*	
	7.020	Furnish and Install Zone 1 - Core	2,400,000	ECY					$ 14.78	$ 35,476,843	
	7.021	*Excavate from burrow area*	*2,640,000*	*LCY*	*$ 1.50*	*$ 3.36*	*$ -*	*$ -*	*$ 4.86*	*$ 12,828,336*	*Include 10% swell factor*
	7.022	*Load and haul to zone-1 fill location, 0.5 mile haul*	*2,640,000*	*LCY*	*$ 1.34*	*$ 3.20*	*$ -*	*$ -*	*$ 4.54*	*$ 11,993,460*	*No stockpiling required*
	7.023	*Spread and compact*	*2,640,000*	*LCY*	*$ 1.58*	*$ 2.46*	*$ -*	*$ -*	*$ 4.04*	*$ 10,665,046*	
	7.024	Load, Haul and Place - Zone 2A - Filter	726,000	Tons					$ 3.47	$ 2,521,434	
	7.025	*Load at stockpile and haul to fill location, 0.5 mile haul*	*147,335*	*LCY*	*$ 0.97*	*$ 2.80*	*$ -*	*$ -*	*$ 3.77*	*$ 555,118*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0251	*Direct hauling from quarry*	*343,782*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.026	*Spread and compact*	*491,118*	*LCY*	*$ 1.53*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 1,966,317*	*Include 15% swell factor*
	7.027	Load, Haul and Place - Zone 2A - Drain	803,000	Tons					$ 3.48	$ 2,797,805	
	7.028	*Load at stockpile and haul to fill location, 0.5 mile haul*	*162,962*	*LCY*	*$ 0.98*	*$ 2.85*	*$ -*	*$ -*	*$ 3.83*	*$ 624,507*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0281	*Direct hauling from quarry*	*380,244*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.029	*Spread and compact*	*543,206*	*LCY*	*$ 1.52*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 2,173,297*	*Include 15% swell factor*
	7.030	Load, Haul and Place - Zone 2A - Transition	451,000	Tons					$ 3.49	$ 1,574,048	
	7.031	*Load at stockpile and haul to fill location, 0.5 mile haul*	*91,526*	*LCY*	*$ 0.97*	*$ 2.82*	*$ -*	*$ -*	*$ 3.79*	*$ 346,949*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0311	*Direct hauling from quarry*	*213,562*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.032	*Spread and compact*	*305,088*	*LCY*	*$ 1.53*	*$ 2.49*	*$ -*	*$ -*	*$ 4.02*	*$ 1,227,100*	*Include 15% swell factor*
	7.033	Load, Haul and Place - Zone 2B - Filter	107,800	Tons					$ 3.52	$ 378,954	
	7.034	*Load at stockpile and haul to fill location, 0.5 mile haul*	*21,877*	*LCY*	*$ 0.98*	*$ 2.83*	*$ -*	*$ -*	*$ 3.81*	*$ 83,268*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0341	*Direct hauling from quarry*	*51,046*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.035	*Spread and compact*	*72,924*	*LCY*	*$ 1.54*	*$ 2.51*	*$ -*	*$ -*	*$ 4.05*	*$ 295,687*	*Include 15% swell factor*
	7.036	Load, Haul and Place - Zone 2B - Transition	473,000	Tons					$ 3.48	$ 1,647,064	
	7.037	*Load at stockpile and haul to fill location, 0.5 mile haul*	*95,991*	*LCY*	*$ 0.97*	*$ 2.79*	*$ -*	*$ -*	*$ 3.76*	*$ 360,836*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0371	*Direct hauling from quarry*	*223,979*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.038	*Spread and compact*	*319,971*	*LCY*	*$ 1.53*	*$ 2.49*	*$ -*	*$ -*	*$ 4.02*	*$ 1,286,237*	*Include 15% swell factor*
	7.039	Furnish and Install Zone 3 - Rockfill	2,600,000	ECY					$ 28.07	$ 72,993,882	
	7.040	*Blasting operations*	*3,120,000*	*LCY*	*$ 4.37*	*$ 8.33*	*$ [illegible]*	*$ -*	*$ 15.64*	*$ 48,803,931*	*Include 20% swell factor*
	7.041	*Excavate, load and haul to stockpile, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No stockpiling required, material to be hauled to fill location directly*
	7.042	*Crush and screen material*	*3,120,000*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
	7.043	*Load and haul to zone-3, 0.5 mile haul*	*3,120,000*	*LCY*	*$ 0.96*	*$ 2.79*	*$ -*	*$ -*	*$ 3.75*	*$ 11,713,982*	*No stockpiling required, direct haul*
	7.044	*Spread and compact*	*3,120,000*	*LCY*	*$ 1.52*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 12,477,979*	
	7.045	Furnish and Install Zone 4 - Random	2,200,000	ECY					$ 7.75	$ 17,054,054	
	7.046	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No blasting required*
	7.047	*Load and haul to processing area, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.048	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	7.049	*Load and haul to fill location, 0.5 mile haul*	*2,200,000*	*LCY*	*$ 0.96*	*$ 2.79*	*$ -*	*$ -*	*$ 3.75*	*$ 8,257,374*	*Include 15% swell factor, no stockpiling required, direct haul*
	7.050	*Spread and compact*	*2,200,000*	*LCY*	*$ 1.52*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 8,796,680*	
	7.051	Furnish and Install Riprap	98,000	ECY					$ 43.12	$ 4,225,333	
	7.052	*Blasting operations*	*117,600*	*LCY*	*$ 4.31*	*$ 6.89*	*$ 4.55*	*$ -*	*$ 15.75*	*$ 1,851,934*	*Include 20% swell factor*
	7.053	*Load and haul to processing area, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.054	*Crush and screen material*	*-*	*LCY*	*$*	*$*	*$ -*	*$*	*$ -*	*Not required*	*No crushing and screening required*
	7.055	*Load and haul to fill location, 0.5 mile haul*	*117,600*	*LCY*	*$ 0.97*	*$ 2.81*	*$ -*	*$ -*	*$ 3.78*	*$ 444,094*	
	7.056	*Riprap placement*	*117,600*	*LCY*	*$ 6.30*	*$ 10.11*	*$ -*	*$ -*	*$ 16.41*	*$ 1,929,285*	
8		**Other Work**									
	8.001	GG Dam - Bypass Pipeline and U/S Cofferdam								Elsewhere	
	8.002	Instrumentation/Telemetry: Instrumentation/Telemetry (piezometers, settlement monitors (survey monuments), seismographs, and slope indicators)	1	LS	$ -	$ -	$ -	$ 2,300,000.00	$ 2,300,000.00	$ 2,300,000	Allowance
	8.003	Seeding and Mulching	261,360	SF	$ -	$ -	$ -	$ 0.69	$ 0.69	$ 180,338	
	8.004	Restoration								Elsewhere	
	8.005	Gravel Surfacing Roads and Crests / Production and Placement of Dam Crest Gravel (No AC required)	2,500	CY					$ 96.54	$ 241,347	
	8.006	*Purchase and Import gravel to fill location and stockpile, 40 mi haul*	*2,875*	*LCY*	*$ 9.73*	*$ 19.60*	*$ 37.79*	*$ -*	*$ 67.12*	*$ 192,979*	*Include 15% swell factor*
	8.007	*Place and compact*	*2,875*	*LCY*	*$ 5.27*	*$ 11.56*	*$ -*	*$ -*	*$ 16.82*	*$ 48,368*	
	8.008	Developing haul routes - Haul routes inside reservoir	12	ACRES					$ 30,376.98	$ 364,524	Clear, grade, provide gravel fill layer and compact
	8.009	*Clear and grub*	*522,720*	*SF*	*$ 0.08*	*$ 0.14*	*$ -*	*$ -*	*$ 0.22*	*$ 115,732*	
	8.0091	*Load and haul earth fill*	*9,680*	*CY*	*$ 1.83*	*$ 5.27*	*$ -*	*$ -*	*$ 7.10*	*$ 68,696*	*Use existing earth fill material from stockpile*
	8.010	*Grade and Compact surface for earthen road*	*522,720*	*SF*	*$ 0.15*	*$ 0.20*	*$ -*	*$ -*	*$ 0.35*	*$ 182,093*	
	8.011	Developing haul routes - Haul routes outside reservoir	25	ACRES					$ 29,358.18	$ 733,955	Clear, grade, provide gravel fill layer and compact
	8.012	*Clear and grub*	*1,089,000*	*SF*	*$ 0.08*	*$ 0.13*	*$ -*	*$ -*	*$ 0.21*	*$ 227,465*	
	8.0111	*Load and haul earth fill*	*20,167*	*CY*	*$ 1.82*	*$ 5.24*	*$ -*	*$ -*	*$ 7.06*	*$ 142,300*	*Use existing earth fill material from stockpile*
	8.013	*Grade and Compact surface for earthen road*	*1,089,000*	*SF*	*$ 0.14*	*$ 0.19*	*$ -*	*$ -*	*$ 0.33*	*$ 364,190*	
	8.014	Rock processing areas								Not required	
	8.015	Mass Concrete / Backfill Concrete	8,700	CY	$ 99.19	$ 55.93	$ 233.06	$ -	$ 388.19	$ 3,377,229	
	8.016	Mass Concrete for spillway	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.017	Concrete Gravity Dam	-	CY					$ -	$ -	Not required
	8.018	Clay Backfill	-	CY					$ -	$ -	Not required
	8.019	*Clay excavations from burrow area*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.020	*Load and haul from stockpile to fill location, 1 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.021	*Place clay backfill material*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.022	Riprap and Drain	-	CY					$ -	$ -	Not required
	8.023	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.024	*Load and haul to processing area, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.025	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.026	*Load and haul from stockpile to fill location, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.027	*Spread riprap*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.028	Rim Grouting	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.029	Bridge	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.030	Dewatering allowance	1	LS	$ -	$ -	$ -	$ 1,150,000.00	$ 1,150,000.00	$ 1,150,000	Allowance
9		**Golden Gate Dam Bypass Pipeline Facilities**									
	9.001	Upstream Cofferdam	-	CY						Included above	Earth fill coffer dam; included within zone 4 fill work
	9.002	*Sheet pile cofferdams*	*-*	*SF*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required; Earth fill coffer dam*
	9.003	*Excavations - remove top soil layer and stockpile*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	9.004	*Load and haul to disposal site, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	9.005	*Purchase processed material from quarry*	*-*	*Ton*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	9.006	*Haul material from quarry to site stockpile, 40 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	9.007	*Load at stockpile and haul to fill location, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	9.008	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	9.009	Install 48-Inch Steel Pipe and Encasement	2,100	LF					$ 1,928.67	$ 4,050,210	
	9.010	*Excavate trench in bedrock*	*4,107*	*LCY*	*$ 74.93*	*$ 57.63*	*$ -*	*$ -*	*$ 132.56*	*$ 544,365*	
	9.011	*Load and haul material to disposal site, 0.5 mile haul*	*4,107*	*LCY*	*$ 3.26*	*$ 8.65*	*$ -*	*$ -*	*$ 11.91*	*$ 48,912*	
	9.012	*48" steel pipe placement*	*2,100*	*LF*	*$ 63.83*	*$ 30.51*	*$ 845.31*	*$ -*	*$ 939.65*	*$ 1,973,288*	
	9.013	*Concrete backfill for pipe trench (dam footprint)*	*2,200*	*CY*	*$ 87.19*	*$ 23.34*	*$ 194.22*	*$ -*	*$ 304.75*	*$ 670,325*	
	9.014	*Reinforcement for concrete backfill*	*132*	*TON*	*$ 141.64*	*$ 10.39*	*$ 2,663.58*	*$ -*	*$ 2,815.61*	*$ 371,596*	*Allow 60lbs/CY for reinforcement*
	9.015	*48" fixed cone valve for controlled release (baffled hood, no energy dissipation chamber)*	*1*	*LS*	*$ 22,746.46*	*$ 6,986.00*	*$ 161,625.00*	*$ -*	*$ 191,357.46*	*$ 191,357*	
	9.016	*Concrete manhole intake, 10' high (assume precast) reinforcement for concrete manhole (833 lbs)*	*10*	*LF*	*$ -*	*$*	*$*	*$ 3,450.00*	*$ 3,450.00*	*$ 34,500*	
	9.017	*Install 48"x45" debris rack on conc. Manhole*	*1*	*LS*	*$*	*$*	*$ -*	*$ 5,865.00*	*$ 5,865.00*	*$ 5,865*	
	9.018	*Grout pipe*	*1,050*	*CY*	*$ 37.52*	*$ 5.84*	*$ 141.73*	*$ -*	*$ 185.09*	*$ 194,348*	*Allow 0.5CY of grout/lf of pipe*
	9.019	*Field Survey*	*1*	*LS*	*$ -*	*$*	*$ -*	*$ 15,735.00*	*$ 15,735.00*	*$ 15,735*	
	9.020	Riprap Discharge Channel	75	CY					$ 498.39	$ 37,379	
	9.021	*Blasting operations*	*90*	*LCY*	*$ 89.31*	*$ 126.42*	*$ 4.90*	*$ -*	*$ 220.63*	*$ 19,857*	*Include 20% swell factor*
	9.022	*Excavate*	*90*	*LCY*	*$ 23.25*	*$ 46.81*	*$ -*	*$ -*	*$ 70.05*	*$ 6,305*	
	9.023	*Crush and screen material*			*$ -*	*$ -*	*$ -*	*$ -*		*Not required*	
	9.024	*Load and haul to stockpile, 0.5 mile haul*	*90*	*LCY*	*$ 19.80*	*$ 36.51*	*$ -*	*$ -*	*$ 56.31*	*$ 5,068*	
	9.025	*Place at the channel*	*90*	*LCY*	*$ 39.74*	*$ 28.58*	*$ -*	*$ -*	*$ 68.32*	*$ 6,149*	
10		Misc allowance for small items, allow 1.5%	1.5%	%				369,513,000	$ 369,513,000	$ 5,542,695	
		Total Direct Cost	53	Acre	$ 1,885,761.50	$ 3,392,783.70	$ 1,607,431.23	$ 190,546.11	$ 7,076,522.54	$ 375,055,694	

22. Construction Cost Summary: Sites Dam (Including Dam Diversion Facilities)

				Total Cost ($x 1,000)
Total Direct Cost				187,395
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				187,395
General Conditions				
Mobilization			5.0%	9,370
Site General Conditions & Requirements			10.0%	19,677
Phasing		*Not included*	0.0%	-
General Contractor Overhead and Fees				
Insurance			1.1%	2,381
Bonds			1.0%	2,188
GC Field & Home Office Overhead			5.0%	11,051
GC Profit			5.0%	11,603
Total Contractor Indirect Markups				56,270
TOTAL DIRECT COST BEFORE CONTINGENCIES				243,665
Contingencies				
Design Contingencies			10.0%	24,367
Construction Contingencies			15.0%	40,205
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	6,165
Total Contingency Allowance				70,737
TOTAL DIRECT COST BEFORE ESCALATION				314,402
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	3,070
Escalation to Mid-point of Construction		*Not included*	0%	-
RECOMMENDED CONSTRUCTION BUDGET				317,472

Sites Reservoir (Alt 1): Sites Dam (Including Dam Diversion Facilities)
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
1		**PRECONSTRUCTION ACTIVITIES**									
	1.001	Demolition Work	-	LS	$ -	$ -	$ -	$ -		Elsewhere	
	1.002	Clearing and Grubbing	27	ACRE	$ 3,229.39	$ 5,966.56	$ -	$ -	$ 9,195.95	$ 248,291	Heavy vegetation removal
	1.003	Reservoir Clearing	-	ACRE	$ -	$ -	$ -	$ -	$ -	$ -	Elsewhere costed
	1.004	Erosion and Sediment Control	27	ACRE	$ -	$ -	$ -	$ 3,760.50	$ 3,760.50	$ 101,534	Allowed $0.25/SF to 30% of the total area
2		**Process and Haul Filter Materials to Project**									
	2.001	Process and Stockpile on Project - Zone 2A - Filter	242,000	Tons					$ 42.19	$ 10,209,854	
	2.002	*Purchase processed material from quarry*	*242,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 5,371,553*	*Include 10% waste factor / additional material supply*
	2.003	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*163,706*	*LCY*	*$ 9.63*	*$ 19.93*	*$ -*	*$ -*	*$ 29.55*	*$ 4,838,301*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.004	Process and Stockpile on Project - Zone 2A - Drain	297,000	Tons					$ 42.16	$ 12,522,381	
	2.005	*Purchase processed material from quarry*	*297,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 6,593,361*	*Include 10% waste factor / additional material supply*
	2.006	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*200,912*	*LCY*	*$ 9.61*	*$ 19.90*	*$ -*	*$ -*	*$ 29.52*	*$ 5,930,020*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.007	Process and Stockpile on Project - Zone 2A - Transition	42,900	Tons					$ 42.44	$ 1,820,643	
	2.008	*Purchase processed material from quarry*	*42,900*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 952,230*	*Include 10% waste factor / additional material supply*
	2.009	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*29,021*	*LCY*	*$ 9.73*	*$ 20.18*	*$ -*	*$ -*	*$ 29.92*	*$ 868,413*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.010	Process and Stockpile on Project - Zone 2B - Filter	148,500	Tons					$ 42.25	$ 6,273,596	
	2.011	*Purchase processed material from quarry*	*148,500*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 3,296,180*	*Include 10% waste factor / additional material supply*
	2.012	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*100,456*	*LCY*	*$ 9.65*	*$ 19.93*	*$ -*	*$ -*	*$ 29.64*	*$ 2,977,416*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.013	Process and Stockpile on Project - Zone 2B - Transition	159,500	Tons					$ 42.26	$ 6,741,064	
	2.014	*Purchase processed material from quarry*	*159,500*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 3,540,342*	*Include 10% waste factor / additional material supply*
	2.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*107,897*	*LCY*	*$ 9.66*	*$ 20.00*	*$ -*	*$ -*	*$ 29.66*	*$ 3,200,722*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
		Foundation Preparation and Grouting									
3		**Foundation Excavation**									
	3.001	Topsoil Salvage	58,000	BCY					$ 9.44	$ 547,416	
	3.002	*Excavations - remove top soil layer*	*63,800*	*LCY*	*$ 1.54*	*$ 2.53*	*$ -*	*$ -*	*$ 4.06*	*$ 259,161*	*Include 10% swell factor*
	3.003	*Load and haul to disposal site, 0.5 mile haul*	*63,800*	*LCY*	*$ 1.21*	*$ 3.31*	*$ -*	*$ -*	*$ 4.52*	*$ 288,255*	
	3.004	Dam Foundation Excavation - Common	121,000	BCY					$ 9.38	$ 1,135,516	
	3.005	*Excavations - remove top soil layer*	*133,100*	*LCY*	*$ 1.64*	*$ 2.47*	*$ -*	*$ -*	*$ 4.11*	*$ 547,476*	*Include 10% swell factor*
	3.006	*Load and haul to disposal site, 0.5 mile haul*	*133,100*	*LCY*	*$ 1.18*	*$ 3.24*	*$ -*	*$ -*	*$ 4.42*	*$ 588,040*	
	3.007	Dam Foundation Rock Exc - Rippable Rock	344,000	BCY					$ 12.81	$ 4,406,254	
	3.008	*Rock excavations, no blasting*	*395,600*	*LCY*	*$ 2.64*	*$ 3.10*	*$ -*	*$ -*	*$ 6.74*	*$ 2,665,195*	*Include 15% swell factor*
	3.009	*Load and haul to stockpile, 0.5 mile haul*	*395,600*	*LCY*	*$ 1.18*	*$ 3.23*	*$ -*	*$ -*	*$ 4.40*	*$ 1,741,059*	
	3.010	Dam Foundation Rock Ex - Drill and Shoot	47,000	BCY					$ 26.16	$ 1,229,295	
	3.011	*Blasting operations*	*56,400*	*LCY*	*$ 4.56*	*$ 5.36*	*$ 5.85*	*$ -*	*$ 15.87*	*$ 894,919*	*Include 20% swell factor*
	3.012	*Load and haul to stockpile, 0.5 mile haul*	*56,400*	*LCY*	*$ 1.58*	*$ 4.35*	*$ -*	*$ -*	*$ 5.93*	*$ 334,376*	
	3.013	*Crush and screen material*	*56,400*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
4		**Foundation Preparation and Grouting**								Included below	
		Foundation Preparation - Beneath Core									
	4.001	Initial Foundation Cleaning - Core	20,000	SY					$ 21.74	$ 434,784	
	4.002	*Initial foundation core cleanup*	*20,000*	*SY*	*$ 12.15*	*$ 6.19*	*$ -*	*$ -*	*$ 18.35*	*$ 366,982*	
	4.003	*Load and haul to disposal area, 0.5 mile haul*	*5,500*	*CY*	*$ 3.98*	*$ 8.55*	*$ -*	*$ -*	*$ 12.53*	*$ 67,803*	*Assume removal of top layer, 0.75' thick*
	4.004	Final Foundation Cleaning - Core	20,000	SY					$ 18.35	$ 366,982	
	4.005	*Final foundation core cleanup*	*20,000*	*SY*	*$ 12.15*	*$ 6.19*	*$ -*	*$ -*	*$ 18.35*	*$ 366,982*	
	4.006	*Load and haul to disposal area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*
	4.007	Dental Excavation	800	CY					$ 130.70	$ 104,556	
	4.008	*Dental excavations*	*880*	*LCY*	*$ 72.43*	*$ 34.71*	*$ -*	*$ -*	*$ 107.15*	*$ 94,288*	*Include 10% swell factor*
	4.009	*Load and haul to site stockpile, 0.5 mile haul*	*880*	*LCY*	*$ 4.33*	*$ 7.33*	*$ -*	*$ -*	*$ 11.67*	*$ 10,268*	
	4.010	Dental Concrete	800	CY	$ 46.62	$ 22.47	$ 183.12	$ -	$ 252.22	$ 201,773	
	4.011	Grout Cap with Anchors	3,500	CY	$ 84.50	$ 25.93	$ 519.68	$ 11.50	$ 641.61	$ 2,245,634	3' x 40' cap, includes formwork and reinforcement (50lbs/cy)
	4.012	Curtain Grouting	31,800	LF					$ 83.88	$ 2,667,417	
	4.013	*Drill setup for all holes*	*424*	*ea.*	*$ 201.83*	*$ 357.94*	*$ -*	*$ -*	*$ 559.77*	*$ 237,343*	*Assume 75' drilling lengths*
	4.014	*Drill curtain grout holes*	*31,800*	*ft.*	*$ 10.87*	*$ 12.42*	*$ -*	*$ -*	*$ 23.29*	*$ 740,773*	
	4.015	*Redrill grout holes*	*3,180*	*ft.*	*$ 11.01*	*$ 12.50*	*$ -*	*$ -*	*$ 23.59*	*$ 75,015*	*Assume 10% to be redrilled*
	4.016	*Hookup to grout holes and grout nipples*	*1,590*	*ea.*	*$ 96.01*	*$ -*	*$ -*	*$ -*	*$ 96.01*	*$ 152,662*	*1 x hookup every 20'*
	4.017	*Inject portland cement grout*	*2,120*	*hr*	*$ 508.66*	*$ 111.32*	*$ -*	*$ -*	*$ 619.99*	*$ 1,314,369*	*Allow 5 hours per hole*
	4.018	*Perform hydraulic conductivity tests*	*424*	*ea.*	*$ -*	*$ -*	*$ -*	*$ 347.30*	*$ 347.30*	*$ 147,255*	
	4.019	Consolidation Grouting	13,900	LF					$ 84.90	$ 1,180,125	
	4.020	*Drill setup for all holes*	*185*	*ea.*	*$ 211.63*	*$ 375.32*	*$ -*	*$ -*	*$ 586.95*	*$ 108,782*	*Assume 75' drilling lengths*
	4.021	*Drill curtain grout holes*	*13,900*	*ft.*	*$ 11.02*	*$ 12.59*	*$ -*	*$ -*	*$ 23.61*	*$ 328,190*	
	4.022	*Redrill grout holes*	*1,390*	*ft.*	*$ 12.60*	*$ 14.39*	*$ -*	*$ -*	*$ 26.98*	*$ 37,507*	*Assume 10% to be redrilled*
	4.023	*Hookup to grout holes and grout nipples*	*695*	*ea.*	*$ 97.32*	*$ -*	*$ -*	*$ -*	*$ 97.32*	*$ 67,633*	*1 x hookup every 20'*
	4.024	*Inject portland cement grout*	*927*	*hr*	*$ 507.89*	*$ 111.15*	*$ -*	*$ -*	*$ 619.04*	*$ 573,844*	*Allow 5 hours per hole*

Sites Reservoir (Alt 1): Sites Dam (Including Dam Diversion Facilities)
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

	4.025	*Perform hydraulic conductivity tests*	*185*	*ea.*	*$ -*	*$ -*	*$ -*	*$ 347.30*	*$ 347.30*	*$ 64,386*	
	4.026	Type III Cement	1,600	Tons	$ 185.67	$ 81.40	$ 113.14	$ -	$ 380.21	$ 608,329	
	4.027	Backfill Concrete	-	CY	$ -	$ -	$ -	$ -		Elsewhere	
5		**Foundation Preparation - Beneath Shell**									
	5.001	Initial Foundation Cleaning - Shell	69,100	SY					$ 3.97	$ 274,661	
	5.002	*Initial dam shell cleanup*	*69,100*	*SY*	*$ 1.43*	*$ 0.46*	*$ -*	*$ -*	*$ 1.89*	*$ 130,903*	
	5.003	*Load and haul to disposal area, 0.5 mile haul*	*12,668*	*LCY*	*$ 4.02*	*$ 7.33*	*$ -*	*$ -*	*$ 11.35*	*$ 143,758*	*Assume removal of top layer, 0.5' thick*
6		**Foundation Drainage**									
	6.001	Furnish and Install Foundation Drain Pipe	500	LF	$ 45.48	$ 29.90	$ 35.56	$ -	$ 110.94	$ 55,469	
	6.002	Furnish and Install Foundation Drain Manholes	1	EA	$ 1,750.96	$ 1,130.05	$ 3,070.88	$ -	$ 5,951.89	$ 5,952	
	6.003	Seepage Partition Walls	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
7		**Embankment**									
	7.001	Develop Burrow Areas	1	LS						Included below	
	7.002	Z1 Strip/Overburden/Waste to Stockpile	339,000	BCY					$ 9.47	$ 3,211,578	Assumed common earth, 3000' haul w/ scraper
	7.003	*Embankment excavations*	*372,900*	*LCY*	*$ 1.03*	*$ 2.98*	*$ -*	*$ -*	*$ 4.01*	*$ 1,495,186*	*Include 10% swell factor*
	7.004	*Load and haul to site stockpile, 1 mile haul*	*372,900*	*LCY*	*$ 1.09*	*$ 3.51*	*$ -*	*$ -*	*$ 4.60*	*$ 1,715,392*	
	7.005	Z3 Strip/Overburden/Waste to Stockpile-Q1	1,768,000	BCY					$ 10.40	$ 18,386,915	
	7.006	*Embankment excavations*	*1,944,800*	*LCY*	*$ 1.50*	*$ 3.36*	*$ -*	*$ -*	*$ 4.86*	*$ 9,456,787*	*Include 10% swell factor*
	7.007	*Load and haul to site stockpile, 1 mile haul*	*1,944,800*	*LCY*	*$ 1.09*	*$ 3.51*	*$ -*	*$ -*	*$ 4.59*	*$ 8,930,128*	
	7.008	Z3 Strip/Overburden/Waste to Stockpile-Q2	-	BCY					$ -	$ -	
	7.009	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Include 10% swell factor*
	7.010	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.011	Z4 Strip/Overburden/Waste to Stockpile	-	BCY					$ -	$ -	
	7.012	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.013	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Restore Burrow Areas									
	7.014	Replace Overburden from Stockpile	526,750	ECY					$ 7.40	$ 3,895,858	Backfill burrow area using material from stockpile, allow 25% of stripping material
	7.015	*Load and haul to site stockpile, 0.5 mile haul*	*579,425*	*LCY*	*$ 1.17*	*$ 3.33*	*$ -*	*$ -*	*$ 4.50*	*$ 2,609,374*	
	7.016	*Spread and compact*	*579,425*	*LCY*	*$ 1.19*	*$ 1.03*	*$ -*	*$ -*	*$ 2.22*	*$ 1,286,483*	
	7.017	Topsoil Replacement	58,000	ECY					$ 13.57	$ 787,146	Backfill burrow area using material from stockpile
	7.018	*Excavate, Load and haul excavated backfill material to fill location, 1 mile*	*63,800*	*LCY*	*$ 1.83*	*$ 5.58*	*$ -*	*$ -*	*$ 7.41*	*$ 472,935*	
	7.019	*Spread and compact*	*137,500*	*LCY*	*$ 1.23*	*$ 1.06*	*$ -*	*$ -*	*$ 2.29*	*$ 314,210*	
	7.020	Furnish and Install Zone 1 - Core	710,000	ECY					$ 14.73	$ 10,458,800	
	7.021	*Excavate from burrow area*	*781,000*	*LCY*	*$ 1.50*	*$ 3.36*	*$ -*	*$ -*	*$ 4.86*	*$ 3,796,430*	*Include 10% swell factor*
	7.022	*Load and haul to zone 1 fill location, 0.5 mile haul*	*781,000*	*LCY*	*$ 1.20*	*$ 3.29*	*$ -*	*$ -*	*$ 4.49*	*$ 3,505,179*	*No stockpiling required*
	7.023	*Spread and compact*	*781,000*	*LCY*	*$ 1.58*	*$ 2.47*	*$ -*	*$ -*	*$ 4.04*	*$ 3,157,201*	
	7.024	Load, Haul and Place - Zone 2A - Filter	242,000	Tons					$ 3.52	$ 852,259	
	7.025	*Load at stockpile and haul to fill location, 0.5 mile haul*	*49,112*	*LCY*	*$ 0.97*	*$ 2.94*	*$ -*	*$ -*	*$ 3.91*	*$ 191,963*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0251	*Direct hauling from quarry*	*114,594*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.026	*Spread and compact*	*163,706*	*LCY*	*$ 1.55*	*$ 2.52*	*$ -*	*$ -*	*$ 4.06*	*$ 665,295*	*Include 15% swell factor*
	7.027	Load, Haul and Place - Zone 2A - Drain	297,000	Tons					$ 3.50	$ 1,040,165	
	7.028	*Load at stockpile and haul to fill location, 0.5 mile haul*	*60,274*	*LCY*	*$ 0.86*	*$ 2.91*	*$ -*	*$ -*	*$ 3.77*	*$ 227,027*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0281	*Direct hauling from quarry*	*140,638*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.029	*Spread and compact*	*200,912*	*LCY*	*$ 1.54*	*$ 2.51*	*$ -*	*$ -*	*$ 4.05*	*$ 813,138*	*Include 15% swell factor*
	7.030	Load, Haul and Place - Zone 2A - Transition	42,900	Tons					$ 3.69	$ 158,338	
	7.031	*Load at stockpile and haul to fill location, 0.5 mile haul*	*8,706*	*LCY*	*$ 1.05*	*$ 3.55*	*$ -*	*$ -*	*$ 4.60*	*$ 40,064*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0311	*Direct hauling from quarry*	*20,314*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.032	*Spread and compact*	*29,021*	*LCY*	*$ 1.55*	*$ 2.52*	*$ -*	*$ -*	*$ 4.09*	*$ 118,275*	*Include 15% swell factor*
	7.033	Load, Haul and Place - Zone 2B - Filter	148,500	Tons					$ 3.76	$ 557,703	
	7.034	*Load at stockpile and haul to fill location, 0.5 mile haul*	*30,137*	*LCY*	*$ 1.17*	*$ 3.60*	*$ -*	*$ -*	*$ 4.77*	*$ 143,742*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0341	*Direct hauling from quarry*	*70,319*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.035	*Spread and compact*	*109,456*	*LCY*	*$ 1.57*	*$ 2.55*	*$ -*	*$ -*	*$ 4.12*	*$ 453,961*	*Include 15% swell factor*
	7.036	Load, Haul and Place - Zone 2B - Transition	159,500	Tons					$ 3.53	$ 563,721	
	7.037	*Load at stockpile and haul to fill location, 0.5 mile haul*	*32,369*	*LCY*	*$ 0.85*	*$ 2.87*	*$ -*	*$ -*	*$ 3.71*	*$ 120,191*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0371	*Direct hauling from quarry*	*75,528*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.038	*Spread and compact*	*107,897*	*LCY*	*$ 1.57*	*$ 2.54*	*$ -*	*$ -*	*$ 4.11*	*$ 443,530*	*Include 15% swell factor*
	7.039	Furnish and Install Zone 3 - Rockfill	1,050,000	ECY					$ 27.90	$ 29,298,997	
	7.040	*Blasting operations*	*1,260,000*	*LCY*	*$ 4.47*	*$ 6.33*	*$ 4.85*	*$ -*	*$ 15.64*	*$ 19,703,645*	*Include 20% swell factor*
	7.041	*Excavate, load and haul to stockpile, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No stockpiling required, material to be hauled to fill location directly*
	7.042	*Crush and screen material*	*1,260,000*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
	7.043	*Load and haul to zone 3, 0.5 mile haul*	*1,260,000*	*LCY*	*$ 0.82*	*$ 2.79*	*$ -*	*$ -*	*$ 3.61*	*$ 4,553,895*	*No stockpiling required, direct haul*
	7.044	*Spread and compact*	*1,260,000*	*LCY*	*$ 1.52*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 5,041,458*	
	7.045	Furnish and Install Zone 4 - Random	660,000	ECY					$ 7.63	$ 5,036,857	
	7.046	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No blasting required*
	7.047	*Load and haul to processing area, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.048	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	7.049	*Load and haul to fill location, 0.5 mile haul*	660,000	LCY	$ 0.93	$ 2.30	$ -	$ -	$ 3.62	$ 2,390,481	*Include 15% swell factor, no stockpiling required, direct haul*
	7.050	*Spread and compact*	660,000	LCY	$ 1.53	$ 2.48	$ -	$ -	$ 4.01	$ 2,646,398	
	7.051	Furnish and Install Riprap	40,000	ECY					$ 43.11	$ 1,724,460	
	7.052	*Blasting operations*	48,000	LCY	$ 4.52	$ 6.40	$ 4.85	$ -	$ 15.77	$ 757,088	*Include 20% swell factor*
	7.053	*Load and haul to processing area, 1 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	7.054	*Crush and screen material*	-	LCY	$ -	$ -	$ -	$ -	$ -	*Not required*	*No crushing and screening required*
	7.055	*Load and haul to fill location, 0.5 mile haul*	48,000	LCY	$ 0.83	$ 2.79	$ -	$ -	$ 3.62	$ 173,609	
	7.056	*Riprap placement*	48,000	LCY	$ 6.35	$ 10.19	$ -	$ -	$ 16.54	$ 793,763	
8		**Other Work**									
	8.001	GG Dam - Bypass Pipeline and U/S Cofferdam								Elsewhere	
	8.002	Instrumentation/Telemetry: Instrumentation/Telemetry (piezometers, settlement monitors (survey monuments), seismographs, and slope indicators)	1	LS	$ -	$ -	$ -	$ 2,300,000.00	$ 2,300,000.00	$ 2,300,000	Allowance
	8.003	Seeding and Mulching	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	
	8.004	Restoration								Elsewhere	
	8.005	Gravel Surfacing Roads and Crests / Production and Placement of Dam Crest Gravel (No AC required)	870	CY					$ 119.75	$ 104,184	
	8.006	*Purchase and transit gravel to fill location and stockpile, 40 mi haul*	1,001	LCY	$ 13.85	$ 28.38	$ 37.73	$ -	$ 79.96	$ 80,000	*Include 15% swell factor*
	8.007	*Place and compact*	1,001	LCY	$ 7.57	$ 16.61	$ -	$ -	$ 24.17	$ 24,184	
	8.008	Developing haul routes - Haul routes inside reservoir	22	ACRES					$ 29,337.65	$ 645,428	Clear, grade, provide gravel fill layer and compact
	8.009	*Clear and grub*	958,320	SF	$ 0.08	$ 0.13	$ -	$ -	$ 0.21	$ 199,032	
	8.0091	*Load and haul earth fill*	17,747	CY	$ 1.77	$ 5.14	$ -	$ -	$ 6.91	$ 122,672	*Use existing earth fill material from stockpile*
	8.010	*Grade and Compact surface for earthen road*	958,320	SF	$ 0.14	$ 0.20	$ -	$ -	$ 0.34	$ 323,724	
	8.011	Developing haul routes - Haul routes outside reservoir	15	ACRES					$ 30,203.33	$ 453,050	Clear, grade, provide gravel fill layer and compact
	8.012	*Clear and grub*	653,400	SF	$ 0.08	$ 0.14	$ -	$ -	$ 0.22	$ 142,165	
	8.0121	*Load and haul earth fill*	12,100	CY	$ 1.87	$ 5.43	$ -	$ -	$ 7.30	$ 88,324	*Use existing earth fill material from stockpile*
	8.013	*Grade and Compact surface for earthen road*	653,400	SF	$ 0.14	$ 0.20	$ -	$ -	$ 0.34	$ 222,361	
	8.014	Rock processing areas								Not required	
	8.015	Mass Concrete / Backfill Concrete	2,700	CY	$ 99.10	$ 55.89	$ 233.06	$ -	$ 388.05	$ 1,047,745	
	8.016	Mass Concrete for spillway	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.017	Concrete Gravity Dam	-	CY					$ -	$ -	Not required
	8.018	Clay Backfill	-	CY					$ -	$ -	Not required
	8.019	*Clay excavations from burrow area*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.02	*Load and haul from stockpile to fill location, 1 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.021	*Place clay backfill material*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.022	Riprap and Drain	-	CY					$ -	$ -	Not required
	8.023	*Blasting operations*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.024	*Load and haul to processing area, 1 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.025	*Crush and screen material*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.026	*Load and haul from stockpile to fill location, 1 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.027	*Spread riprap*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.028	Rim Grouting	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.029	Bridge	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.030	Dewatering allowance	1	LS	$ -	$ -	$ -	$ 575,000.00	$ 575,000.00	$ 575,000	Allowance
9		**Golden Gate Dam Bypass Pipeline Facilities**									Included within Golden Gate Dam Estimate
	9.001	Upstream Cofferdam	-	CY					$ -	$ -	
	9.002	*Sheet pile cofferdams*	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	
	9.003	*Excavations - remove top soil layer and stockpile*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.004	*Load and haul to disposal site, 0.5 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.005	*Purchase processed material from quarry*	-	Ton	$ -	$ -	$ -	$ -	$ -	$ -	
	9.006	*Haul material from quarry to site stockpile, 40 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.007	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.008	*Spread and compact*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.009	Install 48-Inch Steel Pipe and Encasement	-	LF					$ -	$ -	
	9.010	*Excavate trench in bedrock*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.011	*Load and haul material to disposal site, 0.5 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.012	*48" steel pipe placement*	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	9.013	*Concrete backfill for pipe trench (dam footprint)*	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.014	*Reinforcement for concrete backfill*	-	TON	$ -	$ -	$ -	$ -	$ -	$ -	
	9.015	*48" fixed cone valve for controlled release (baffled hood, no energy dissipation chamber)*	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	9.016	*Concrete manhole intake, 10' high (assume precast) reinforcement for concrete manhole (633 lbs)*	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	9.017	*Install 48"x48" debris rack on conc. Manhole*	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	9.018	*Grout pipe*	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.019	*Field Survey*	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	9.020	Riprap Discharge Channel	-	CY					$ -	$ -	
	9.021	*Blasting operations*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.022	*Excavate*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.023	*Crush and screen material*			$ -	$ -	$ -	$ -		*Not required*	
	9.024	*Load and haul to stockpile, 0.5 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.025	*Place at the channel*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
10		**Sites Dam Diversion Facilities**									
	10.001	Upstream Cofferdam	-	CY					$ -	Included above	Earth fill coffer dam; included within zone 4 fill work
	10.002	*Sheet pile cofferdams*	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	*Not required; Earth fill coffer dam*
	10.003	*Excavations - remove top soil layer and stockpile*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.004	*Load and haul to disposal site, 1 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.005	*Purchase processed material from quarry*	-	Ton	$ -	$ -	$ -	$ -	$ -	$ -	
	10.006	*Import material to site stockpile, 40 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.007	*Load at stockpile and haul to fill location, 1 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.008	*Spread and compact*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	

Cost Work Sheet Summary

Item	Sub-Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	10.009	Upstream Portal Excavation and Rock Bolts	15,800	CY					$ 46.43	$ 733,551	
	10.010	*Excavate and load material*	*17,380*	*LCY*	*$ 1.45*	*$ 2.69*	*$ -*	*$ -*	*$ 4.14*	*$ 72,015*	*Assumed excavating material is either common earth, loam, sand, clay or loose material.*
	10.011	*Haul to disposal site, 0.5 mile haul*	*17,380*	*LCY*	*$ 1.91*	*$ 4.85*	*$ -*	*$ -*	*$ 6.76*	*$ 117,572*	
	10.012	*Shotcrete portal face*	*948*	*CY*	*$ 91.13*	*$ 45.60*	*$ 321.97*	*$ -*	*$ 358.69*	*$ 340,040*	
	10.013	*Steel fiber for shotcrete*	*17*	*TON*	*$ -*	*$ -*	*$ 2,478.25*	*$ -*	*$ 2,478.25*	*$ 41,314*	*Allow 35lbs/CY of concrete*
	10.014	*20 ft rock bolts, 5 ft on center - Drilling*	*790*	*EA*	*$ 53.19*	*$ 23.03*	*$ -*	*$ -*	*$ 76.22*	*$ 60,214*	
	10.015	*3.5" diam grouted hole with #10 bar*	*36*	*CY*	*$ 276.16*	*$ 87.11*	*$ 1,522.70*	*$ -*	*$ 2,885.97*	*$ 102,596*	
	10.016	Upstream Portal Backfill	24,500	CY					$ 11.50	$ 281,779	
	10.017	*Load at stockpile and haul to fill location, 0.5 mile haul*	*26,950*	*LCY*	*$ 1.04*	*$ 4.82*	*$ -*	*$ -*	*$ 5.86*	*$ 157,851*	
	10.018	*Spread and compact*	*26,950*	*LCY*	*$ 2.21*	*$ 2.39*	*$ -*	*$ -*	*$ 4.60*	*$ 123,928*	
	10.019	Inlet and Valve Structures	2,200	CY					$ 1,092.50	$ 2,403,500	
	10.020	*Pour inlet and valve structures*	*2,200*	*CY*	*$ -*	*$ -*	*$ -*	*$ 1,092.50*	*$ 1,092.50*	*$ 2,403,500*	
	10.021	Downstream Portal Excavation and Rock Bolts	12,500	CY					$ 47.28	$ 590,940	
	10.022	*Excavate and load material*	*13,750*	*LCY*	*$ 1.55*	*$ 2.88*	*$ -*	*$ -*	*$ 4.43*	*$ 60,936*	
	10.023	*Haul to disposal site, 0.5 mile haul*	*13,750*	*LCY*	*$ 2.04*	*$ 5.06*	*$ -*	*$ -*	*$ 7.11*	*$ 97,749*	
	10.024	*Shotcrete portal face*	*750*	*CY*	*$ 92.16*	*$ 46.51*	*$ 321.97*	*$ -*	*$ 360.32*	*$ 270,167*	
	10.025	*Steel fiber for shotcrete*	*13*	*TON*	*$ -*	*$ -*	*$ 2,478.25*	*$ -*	*$ 2,478.25*	*$ 32,537*	*Allow 35lbs/CY of concrete*
	10.026	*20 ft rock bolts, 5 ft on center - Drilling*	*625*	*EA*	*$ 54.65*	*$ 23.63*	*$ -*	*$ -*	*$ 78.28*	*$ 48,924*	
	10.027	*3.5" diam grouted hole with #10 bar*	*28*	*CY*	*$ 381.90*	*$ 82.58*	*$ 2,332.70*	*$ -*	*$ 2,867.08*	*$ 80,637*	
	10.028	Downstream Portal Backfill	34,400	CY					$ 11.15	$ 383,461	
	10.029	*Load at stockpile and haul to fill location, 0.5 mile haul*	*37,840*	*BCY*	*$ 0.97*	*$ 3.39*	*$ -*	*$ -*	*$ 5.46*	*$ 206,421*	
	10.030	*Spread and compact*	*37,840*	*LCY*	*$ 2.25*	*$ 2.43*	*$ -*	*$ -*	*$ 4.68*	*$ 177,040*	
	10.031	Tunnel Excavation and Initial Support (Double Shift)	1,590	LF	$ -	$ -	$ -	$ 7,304.42	$ 7,304.42	$ 11,614,023	Second shift work will apply
	10.032	Tunnel Concrete Lining	1,590	LF	$ -	$ -	$ -	$ 7,205.71	$ 7,205.71	$ 11,457,076	Second shift work will apply
	10.033	10-Ft Steel Pipe Cut and Cover Section	1,590	LF	$ -	$ -	$ -	$ 8,094.08	$ 8,094.08	$ 12,869,593	Second shift work will apply
	10.034	Mechanical, Valves, Trash rack, and Metals	1	LS	$ -	$ -	$ -	$ 9,775,000	$ 9,775,000	$ 9,775,000	Allowance
	10.035	Riprap Discharge Channel	75	CY					$ 499.29	$ 37,447	
	10.036	*Blasting operations*	*90*	*LCY*	*$ 62.95*	*$ 71.57*	*$ 4.85*	*$ -*	*$ 138.87*	*$ 12,498*	
	10.037	*Excavate, load and haul to stockpile/processing area, 0.5 mile haul*	*90*	*LCY*	*$ 23.90*	*$ 75.75*	*$ -*	*$ -*	*$ 99.65*	*$ 8,968*	
	10.038	*Crush and screen material*			*$ -*	*$ -*	*$ -*	*$ -*			
	10.039	*Load and haul to stockpile, 1 mile haul*	*90*	*LCY*	*$ 14.06*	*$ 65.03*	*$ -*	*$ -*	*$ 79.09*	*$ 7,118*	
	10.040	*Place at the channel*	*90*	*LCY*	*$ 37.31*	*$ 61.16*	*$ -*	*$ -*	*$ 98.47*	*$ 8,863*	
11		Misc allowance for small items, allow 1.5%	1.5%	%				184,626,098	$ 184,626,098	$ 2,769,391	
		Total Direct Cost	27	Acre	$ 1,333,938.83	$ 2,498,073.44	$ 1,104,228.55	$ 2,004,332.88	$ 6,940,573.70	$ 187,395,489	

23. Construction Cost Summary: Saddle Dam 3 & Emergency Release Structure 1				
				Total Cost ($x 1,000)
Total Direct Cost				149,694
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				149,694
General Conditions				
Mobilization			5.0%	7,485
Site General Conditions & Requirements			10.0%	15,718
Phasing		*Not included*	0.0%	-
General Contractor Overhead and Fees				
Insurance			1.1%	1,902
Bonds			1.0%	1,748
GC Field & Home Office Overhead			5.0%	8,827
GC Profit			5.0%	9,269
Total Contractor Indirect Markups				44,949
TOTAL DIRECT COST BEFORE CONTINGENCIES				194,643
Contingencies				
Design Contingencies			10.0%	19,464
Construction Contingencies			15.0%	32,116
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	4,924
Total Contingency Allowance				56,504
TOTAL DIRECT COST BEFORE ESCALATION				251,147
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	2,453
Escalation to Mid-point of Construction		*Not included*	0%	-
RECOMMENDED CONSTRUCTION BUDGET				253,600

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
1		**PRECONSTRUCTION ACTIVITIES**									
	1.001	Demolition Work	-	LS	$ -	$ -	$ -	$ -		Elsewhere	
	1.002	Clearing and Grubbing	63	ACRE	$ 3,229.39	$ 5,966.56	$ -	$ -	$ 9,195.95	$ 579,345	Heavy vegetation removal
	1.003	Reservoir Clearing	-	ACRE	$ -	$ -	$ -	$ -	$ -	$ -	Elsewhere costed
	1.004	Erosion and Sediment Control	63	ACRE	$ -	$ -	$ -	$ 3,760.50	$ 3,760.50	$ 236,912	Allowed $0.25/SF to 30% of the total area
2		**Process and Haul Filter Materials to Project**									
	2.001	Process and Stockpile on Project - Zone 2A - Filter	319,000	Tons					$ 42.19	$ 13,457,316	
	2.002	*Purchase processed material from quarry*	*319,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 7,080,684*	*Include 10% waste factor / additional material supply*
	2.003	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*215,794*	*LCY*	*$ 9.63*	*$ 19.92*	*$ -*	*$ -*	*$ 29.55*	*$ 6,376,633*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.004	Process and Stockpile on Project - Zone 2A - Drain	319,000	Tons					$ 42.19	$ 13,457,316	
	2.005	*Purchase processed material from quarry*	*319,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 7,080,684*	*Include 10% waste factor / additional material supply*
	2.006	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*215,794*	*LCY*	*$ 9.63*	*$ 19.92*	*$ -*	*$ -*	*$ 29.55*	*$ 6,376,633*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.007	Process and Stockpile on Project - Zone 2A - Transition	92,400	Tons					$ 42.34	$ 3,911,842	
	2.008	*Purchase processed material from quarry*	*92,400*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 2,050,957*	*Include 10% waste factor / additional material supply*
	2.009	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*62,506*	*LCY*	*$ 9.70*	*$ 20.07*	*$ -*	*$ -*	*$ 29.77*	*$ 1,860,885*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.010	Process and Stockpile on Project - Zone 2B - Filter	-	Tons					$ -	$ -	Not required
	2.011	*Purchase processed material from quarry*	*-*	*Tons*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.012	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.013	Process and Stockpile on Project - Zone 2B - Transition	-	Tons					$ -	$ -	Not required
	2.014	*Purchase processed material from quarry*	*-*	*Tons*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Foundation Preparation and Grouting									
3		**Foundation Excavation**									
	3.001	Topsoil Salvage	106,000	BCY					$ 8.86	$ 939,228	
	3.002	*Excavations - remove top soil layer*	*116,600*	*LCY*	*$ 1.61*	*$ 2.39*	*$ -*	*$ -*	*$ 4.00*	*$ 466,490*	*Include 10% swell factor*
	3.003	*Load and haul to disposal site, 0.5 mile haul*	*116,600*	*LCY*	*$ 1.08*	*$ 2.97*	*$ -*	*$ -*	*$ 4.05*	*$ 472,738*	
	3.004	Dam Foundation Excavation - Common	81,000	BCY					$ 8.92	$ 722,420	
	3.005	*Excavations - remove top soil layer*	*89,100*	*LCY*	*$ 1.74*	*$ 2.36*	*$ -*	*$ -*	*$ 4.10*	*$ 364,984*	*Include 10% swell factor*
	3.006	*Load and haul to disposal site, 0.5 mile haul*	*89,100*	*LCY*	*$ 1.07*	*$ 2.94*	*$ -*	*$ -*	*$ 4.01*	*$ 357,436*	
	3.007	Dam Foundation Rock Exc - Rippable Rock	565,000	BCY					$ 12.33	$ 6,968,711	
	3.008	*Rock excavations, no blasting*	*649,750*	*LCY*	*$ 2.63*	*$ 4.08*	*$ -*	*$ -*	*$ 6.71*	*$ 4,362,887*	*Include 15% swell factor*
	3.009	*Load and haul to stockpile, 0.5 mile haul*	*649,750*	*LCY*	*$ 1.07*	*$ 2.94*	*$ -*	*$ -*	*$ 4.01*	*$ 2,605,824*	
	3.010	Dam Foundation Rock Ex - Drill and Shoot	-	BCY					$ -	$ -	
	3.011	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Include 20% swell factor*
	3.012	*Excavate, load and haul to stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	3.013	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
4		**Foundation Preparation and Grouting**								Included below	
		Foundation Preparation - Beneath Core									
	4.001	Initial Foundation Cleaning - Core	48,000	SY					$ 20.62	$ 989,904	
	4.002	*Initial foundation core cleanup*	*48,000*	*SY*	*$ 12.07*	*$ 6.15*	*$ -*	*$ -*	*$ 18.22*	*$ 874,640*	
	4.003	*Load and haul to disposal area, 0.5 mile haul*	*13,200*	*CY*	*$ 2.82*	*$ 5.91*	*$ -*	*$ -*	*$ 8.73*	*$ 115,265*	*Assume removal of top layer, 0.75' thick*
	4.004	Final Foundation Cleaning - Core	48,000	SY					$ 18.22	$ 874,640	
	4.005	*Final foundation core cleanup*	*48,000*	*SY*	*$ 12.07*	*$ 6.15*	*$ -*	*$ -*	*$ 18.22*	*$ 874,640*	
	4.006	*Load and haul to disposal area, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*
	4.007	Dental Excavation	2,300	CY					$ 130.23	$ 299,525	
	4.008	*Dental excavations*	*2,530*	*LCY*	*$ 71.81*	*$ 34.41*	*$ -*	*$ -*	*$ 106.21*	*$ 268,720*	*Include 10% swell factor*
	4.009	*Load and haul to site stockpile, 0.5 mile haul*	*2,530*	*LCY*	*$ 4.31*	*$ 7.86*	*$ -*	*$ -*	*$ 12.18*	*$ 30,805*	
	4.010	Dental Concrete	2,300	CY	$ 46.85	$ 22.58	$ 183.12	$ -	$ 252.55	$ 580,866	
	4.011	Grout Cap with Anchors	7,600	CY	$ 82.69	$ 25.38	$ 519.68	$ 5.30	$ 633.04	$ 4,811,139	3' x 40' cap, includes formwork and reinforcement (50lbs/cy)
	4.012	Curtain Grouting	36,700	LF					$ 96.78	$ 3,551,976	
	4.013	*Drill setup for all holes*	*489*	*ea.*	*$ 204.05*	*$ 361.83*	*$ -*	*$ -*	*$ 565.87*	*$ 276,900*	*Assume 75' drilling lengths*
	4.014	*Drill curtain grout holes*	*36,700*	*lft*	*$ 10.85*	*$ 12.40*	*$ -*	*$ -*	*$ 23.25*	*$ 853,295*	
	4.015	*Redrill grout holes*	*3,670*	*lft*	*$ 11.93*	*$ 13.62*	*$ -*	*$ -*	*$ 25.55*	*$ 93,769*	*Assume 10% to be redrilled*
	4.016	*Hookup to grout holes and grout nipples*	*1,835*	*ea.*	*$ 95.53*	*$ -*	*$ -*	*$ -*	*$ 95.53*	*$ 175,251*	
	4.017	*Inject portland cement grout*	*2,447*	*hr*	*$ 507.99*	*$ 111.17*	*$ -*	*$ -*	*$ 619.16*	*$ 1,514,866*	*Allow 5 hours per hole*
	4.018	*Perform hydraulic conductivity tests*	*1,835*	*ea.*	*$ -*	*$ -*	*$ -*	*$ 347.30*	*$ 347.30*	*$ 637,296*	
	4.019	Consolidation Grouting	-	LF					$ -	$ -	Not required
	4.020	*Drill setup for all holes*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.021	*Drill curtain grout holes*	*-*	*lft*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.022	*Redrill grout holes*	*-*	*lft*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.023	*Hookup to grout holes and grout nipples*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.024	*Inject portland cement grout*	*-*	*hr*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.025	*Perform hydraulic conductivity tests*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	Type III Cement	1,300	Tons	$ 185.97	$ 81.53	$ 113.14	$ -	$ 380.64	$ 494,836	
	4.027	Backfill Concrete	-	CY	$ -	$ -	$ -	$ -		Elsewhere	
5		**Foundation Preparation - Beneath Shell**									
	5.001	Initial Foundation Cleaning - Shell	172,000	SY					$ 5.17	$ 889,196	
	5.002	*Initial dam shell cleanup*	*172,000*	*SY*	*$ 1.38*	*$ 0.45*	*$ -*	*$ -*	*$ 1.83*	*$ 314,171*	
	5.003	*Load and haul to disposal area, 0.5 mile haul*	*47,300*	*LCY*	*$ 4.33*	*$ 7.85*	*$ -*	*$ -*	*$ 12.18*	*$ 575,925*	*Assume removal of top layer, 0.75' thick*

Sites Reservoir (Alt 1): Saddle Dam 3 & Emergency Release Structure 1
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
6		**Foundation Drainage**									
	6.001	Furnish and Install Foundation Drain Pipe	1,000	LF	$ 47.75	$ 31.40	$ 35.56	$ -	$ 114.71	$ 114,708	
	6.002	Furnish and Install Foundation Drain Manholes	3	EA	$ 1,750.96	$ 1,130.05	$ 3,070.88	$ -	$ 5,951.89	$ 17,856	
	6.003	Seepage Partition Walls	600	CY	$ 549.43	$ 129.71	$ 465.37	$ -	$ 1,144.51	$ 686,706	3' x 6' high concrete seepage walls including formwork and reinforcement (100lbs/cy)
7		**Embankment**									
	7.001	Develop Burrow Areas	1	LS						Included below	
	7.002	Z1 Strip/Overburden/Waste to Stockpile	431,000	BCY					$ 9.53	$ 4,108,930	Assumed common earth, 3000' haul w/ scraper
	7.003	*Embankment excavations*	*474,100*	*LCY*	*$ 1.03*	*$ 3.00*	*$ -*	*$ -*	*$ 4.04*	*$ 1,914,338*	*Include 10% swell factor*
	7.004	*Load and haul to site stockpile, 0.5 mile haul*	*474,100*	*LCY*	*$ 1.09*	*$ 3.53*	*$ -*	*$ -*	*$ 4.63*	*$ 2,194,692*	
	7.005	Z3 Strip/Overburden/Waste to Stockpile-Q1	304,000	BCY					$ 10.43	$ 3,169,760	
	7.006	*Embankment excavations*	*334,400*	*LCY*	*$ 1.53*	*$ 3.37*	*$ -*	*$ -*	*$ 4.58*	*$ 1,530,953*	*Include 10% swell factor*
	7.007	*Load and haul to site stockpile, 1 mile haul*	*334,400*	*LCY*	*$ 1.09*	*$ 3.51*	*$ -*	*$ -*	*$ 4.60*	*$ 1,538,807*	
	7.008	Z3 Strip/Overburden/Waste to Stockpile-Q2	195,000	BCY					$ 10.46	$ 2,039,150	
	7.009	*Embankment excavations*	*214,500*	*LCY*	*$ 1.52*	*$ 3.40*	*$ -*	*$ -*	*$ 4.92*	*$ 1,055,323*	*Include 10% swell factor*
	7.010	*Load and haul to site stockpile, 1 mile haul*	*214,500*	*LCY*	*$ 1.08*	*$ 3.50*	*$ -*	*$ -*	*$ 4.59*	*$ 983,828*	
	7.011	Z4 Strip/Overburden/Waste to Stockpile	-	BCY					$ -	$ -	Not required
	7.012	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.013	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Restore Burrow Areas									
	7.014	Replace Overburden from Stockpile	232,500	ECY					$ 8.48	$ 1,972,144	Backfill burrow area using material from stockpile, allow 25% of stripping material
	7.015	*Load and haul to site stockpile, 1 mile haul*	*255,750*	*LCY*	*$ 1.49*	*$ 4.00*	*$ -*	*$ -*	*$ 5.49*	*$ 1,403,009*	
	7.016	*Spread and compact*	*255,750*	*LCY*	*$ 1.20*	*$ 1.03*	*$ -*	*$ -*	*$ 2.23*	*$ 569,135*	
	7.017	Topsoil Replacement	106,000	ECY					$ 11.14	$ 1,181,258	Backfill burrow area using material from stockpile
	7.018	*Excavate, Load and haul excavated backfill material to fill location, 1 mile*	*116,600*	*LCY*	*$ 1.83*	*$ 5.60*	*$ -*	*$ -*	*$ 7.43*	*$ 867,048*	
	7.019	*Spread and compact*	*137,500*	*LCY*	*$ 1.23*	*$ 1.06*	*$ -*	*$ -*	*$ 2.29*	*$ 314,210*	
	7.020	Furnish and Install Zone 1 - Core	900,000	ECY					$ 14.52	$ 13,068,728	
	7.021	*Excavate from burrow area*	*990,000*	*LCY*	*$ 1.50*	*$ 3.36*	*$ -*	*$ -*	*$ 4.86*	*$ 4,810,626*	*Include 10% swell factor*
	7.022	*Load and haul to zone-1 fill location, 0.5 mile haul*	*990,000*	*LCY*	*$ 1.15*	*$ 3.15*	*$ -*	*$ -*	*$ 4.30*	*$ 4,254,641*	*No stockpiling required*
	7.023	*Spread and compact*	*990,000*	*LCY*	*$ 1.58*	*$ 2.47*	*$ -*	*$ -*	*$ 4.04*	*$ 4,003,461*	
	7.024	Load, Haul and Place - Zone 2A - Filter	319,000	Tons					$ 3.48	$ 1,110,190	
	7.025	*Load at stockpile and haul to fill location, 0.5 mile haul*	*64,738*	*LCY*	*$ 0.85*	*$ 2.83*	*$ -*	*$ -*	*$ 3.68*	*$ 237,914*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0251	*Direct hauling from quarry*	*151,056*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.026	*Spread and compact*	*215,794*	*LCY*	*$ 1.54*	*$ 2.50*	*$ -*	*$ -*	*$ 4.04*	*$ 872,276*	*Include 15% swell factor*
	7.027	Load, Haul and Place - Zone 2A - Drain	319,000	Tons					$ 3.48	$ 1,110,190	
	7.028	*Load at stockpile and haul to fill location, 0.5 mile haul*	*64,738*	*LCY*	*$ 0.85*	*$ 2.83*	*$ -*	*$ -*	*$ 3.68*	*$ 237,914*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0281	*Direct hauling from quarry*	*151,056*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.029	*Spread and compact*	*215,794*	*LCY*	*$ 1.54*	*$ 2.50*	*$ -*	*$ -*	*$ 4.04*	*$ 872,276*	*Include 15% swell factor*
	7.030	Load, Haul and Place - Zone 2A - Transition	92,400	Tons					$ 3.58	$ 330,638	
	7.031	*Load at stockpile and haul to fill location, 0.5 mile haul*	*18,752*	*LCY*	*$ 0.97*	*$ 3.26*	*$ -*	*$ -*	*$ 4.23*	*$ 79,305*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0311	*Direct hauling from quarry*	*43,754*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.032	*Spread and compact*	*62,506*	*LCY*	*$ 1.53*	*$ 2.49*	*$ -*	*$ -*	*$ 4.02*	*$ 251,334*	*Include 15% swell factor*
	7.033	Load, Haul and Place - Zone 2B - Filter	-	Tons					$ -	$ -	Not required
	7.034	*Load at stockpile and haul to fill location, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.0341	*Direct hauling from quarry*	*-*	*LCY*						*Elsewhere*	
	7.035	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.036	Load, Haul and Place - Zone 2B - Transition	-	Tons					$ -	$ -	Not required
	7.037	*Load at stockpile and haul to fill location, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.0371	*Direct hauling from quarry*	*-*	*LCY*						*Elsewhere*	
	7.038	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.039	Furnish and Install Zone 3 - Rockfill	610,000	ECY					$ 28.76	$ 17,542,970	
	7.040	*Blasting operations*	*732,000*	*LCY*	*$ 4.37*	*$ 6.33*	*$ 4.85*	*$ -*	*$ 15.65*	*$ 11,453,352*	*Include 20% swell factor*
	7.041	*Excavate, load and haul to stockpile, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No stockpiling required, material to be hauled to fill location directly*
	7.042	*Crush and screen material*	*732,000*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
	7.043	*Load and haul to zone-3, 1 mile haul*	*732,000*	*LCY*	*$ 1.06*	*$ 3.26*	*$ -*	*$ -*	*$ 4.32*	*$ 3,162,320*	*No stockpiling required, direct haul*
	7.044	*Spread and compact*	*732,000*	*LCY*	*$ 1.52*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 2,927,298*	
	7.045	Furnish and Install Zone 4 - Random	1,663,000	ECY					$ 7.58	$ 12,600,795	
	7.046	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No blasting required*
	7.047	*Load and haul to processing area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.048	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.049	*Load and haul to fill location, 0.5 mile haul*	*1,663,000*	*LCY*	*$ 0.82*	*$ 2.75*	*$ -*	*$ -*	*$ 3.58*	*$ 5,947,844*	*Include 15% swell factor, no stockpiling required, direct haul*
	7.050	*Spread and compact*	*1,663,000*	*LCY*	*$ 1.52*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 6,652,951*	
	7.051	Furnish and Install Riprap	130,000	ECY					$ 42.86	$ 5,572,003	
	7.052	*Blasting operations*	*156,000*	*LCY*	*$ 4.48*	*$ 6.35*	*$ 4.85*	*$ -*	*$ 15.68*	*$ 2,445,972*	*Include 20% swell factor*
	7.053	*Load and haul to processing area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.054	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
	7.055	*Load and haul to fill location, 0.5 mile haul*	*156,000*	*LCY*	*$ 0.84*	*$ 2.80*	*$ -*	*$ -*	*$ 3.64*	*$ 568,350*	
	7.056	*Riprap placement*	*156,000*	*LCY*	*$ 6.10*	*$ 10.30*	*$ -*	*$ -*	*$ 16.40*	*$ 2,557,681*	
8		**Other Work**									
	8.001	GG Dam - Bypass Pipeline and U/S Cofferdam								Elsewhere	

Sites Reservoir (Alt 1): Saddle Dam 3 & Emergency Release Structure 1
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Sites, CA

Cost Estimate
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Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	8.002	Instrumentation/Telemetry: Instrumentation/Telemetry (piezometers, settlement monitors (survey monuments), seismographs, and slope indicators)	1	LS	$ -	$ -	$ -	$ 402,500.00	$ 402,500.00	$ 402,500	Allowance
	8.003	Seeding and Mulching	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	
	8.004	Restoration								Elsewhere	
	8.005	Gravel Surfacing Roads and Crests / Production and Placement of Dam Crest Gravel (No AC required)	3,800	CY					$ 95.84	$ 364,191	
	8.006	Purchase and transport gravel to fill location and stockpile, 40 mi haul	4,370	LCY	$ 9.55	$ 19.42	$ 37.78	$ -	$ 66.74	$ 291,638	Include 15% swell factor
	8.007	Place and compact	4,370	LCY	$ 5.20	$ 11.41	$ -	$ -	$ 16.60	$ 72,553	
	8.008	Developing haul routes - Haul routes inside reservoir	51	ACRES					$ 29,275.46	$ 1,493,049	Clear, grade, provide gravel fill layer and compact
	8.009	Clear and grub	2,221,560	SF	$ 0.08	$ 0.13	$ -	$ -	$ 0.20	$ 454,929	
	8.0091	Load and haul earth fill, 0.5 mile haul	41,140	CY	$ 1.81	$ 5.23	$ -	$ -	$ 7.04	$ 289,507	Use existing earth fill material from stockpile
	8.010	Grade and Compact surface for earthen road	2,221,560	SF	$ 0.13	$ 0.20	$ -	$ -	$ 0.34	$ 748,613	
	8.011	Developing haul routes - Haul routes outside reservoir	12	ACRES					$ 30,376.98	$ 364,524	Clear, grade, provide gravel fill layer and compact
	8.012	Clear and grub	522,720	SF	$ 0.08	$ 0.14	$ -	$ -	$ 0.22	$ 113,732	
	8.0121	Load and haul earth fill, 0.5 mile haul	9,680	CY	$ 1.82	$ 5.27	$ -	$ -	$ 7.10	$ 68,696	Use existing earth fill material from stockpile
	8.013	Grade and Compact surface for earthen road	522,720	SF	$ 0.15	$ 0.20	$ -	$ -	$ 0.35	$ 182,095	
	8.014	Rock processing areas								Not required	
	8.015	Mass Concrete / Backfill Concrete	6,400	CY	$ 99.30	$ 56.00	$ 233.06	$ -	$ 388.36	$ 2,485,481	
	8.016	Mass Concrete for spillway	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.017	Concrete Gravity Dam	-	CY					$ -	$ -	Not required
	8.018	Clay Backfill	-	CY					$ -	$ -	Not required
	8.019	Clay excavations from borrow area	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.02	Load and haul from stockpile to fill location, 1 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.021	Place clay backfill material	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.022	Riprap and Drain	-	CY					$ -	$ -	Not required
	8.023	Blasting operations	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.024	Load and haul to processing area, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.025	Crush and screen material	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.026	Load and haul from stockpile to fill location, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.027	Spread riprap	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.028	Rim Grouting	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.029	Bridge	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.030	Dewatering allowance	1	LS	$ -	$ -	$ -	$ 287,500.00	$ 287,500.00	$ 287,500	
9		**Golden Gate Dam Bypass Pipeline Facilities**									Included with Golden Gate Dam Estimate
	9.001	Upstream Cofferdam	-	CY					$ -	$ -	
	9.002	Sheet pile cofferdams	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	
	9.003	Excavations - remove top soil layer and stockpile	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.004	Load and haul to disposal site, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.005	Purchase processed material from quarry	-	Ton	$ -	$ -	$ -	$ -	$ -	$ -	
	9.006	Haul material from quarry to site stockpile, 40 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.007	Load at stockpile and haul to fill location, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.008	Spread and compact	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.009	Install 48-Inch Steel Pipe and Encasement	-	LF					$ -	$ -	
	9.010	Excavate trench in bedrock	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.011	Load and haul material to disposal site, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.012	48" steel pipe placement	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	9.013	Concrete backfill for pipe trench (dam footprint)	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.014	Reinforcement for concrete backfill	-	TON	$ -	$ -	$ -	$ -	$ -	$ -	
	9.015	48" fixed cone valve for controlled release (baffled hood, no energy dissipation chamber)	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	9.016	Concrete manhole intake, 10' high (assume precast) reinforcement for concrete manhole (633 lbs)	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	9.017	Install 48"x48" debris rack on conc. Manhole	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	9.018	Grout pipe	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.019	Field Survey	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	9.020	Riprap Discharge Channel	-	CY					$ -	$ -	
	9.021	Blasting operations	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.022	Excavate	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.023	Crush and screen material			$	$	$	$		Not required	
	9.024	Load and haul to stockpile, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	9.025	Place at the channel	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
10		**Sites Dam Diversion Facilities**									Included with Sites Dam Estimate
	10.001	Upstream Cofferdam	-	CY					$ -	Included above	
	10.002	Sheet pile cofferdams	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	
	10.003	Excavations - remove top soil layer and stockpile	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.004	Load and haul to disposal site, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.005	Purchase processed material from quarry	-	Ton	$ -	$ -	$ -	$ -	$ -	$ -	
	10.006	Import material to site stockpile, 40 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.007	Load at stockpile and haul to fill location, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.008	Spread and compact	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.009	Upstream Portal Excavation and Rock Bolts	-	CY					$ -	$ -	
	10.010	Excavate and load material	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.011	Haul to disposal site, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.012	Shotcrete portal face	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.013	Steel fiber for shotcrete	-	TON	$ -	$ -	$ -	$ -	$ -	$ -	
	10.014	20 ft rock bolts, 5 ft on center - Drilling	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	
	10.015	3.5" diam grouted hole with #10 bar	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.016	Upstream Portal Backfill	-	CY					$ -	$ -	
	10.017	Load at stockpile and haul to fill location, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.018	Spread and compact	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.019	Inlet and Valve Structures	-	CY					$ -	$ -	
	10.020	Pour inlet and valve structures	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.021	Downstream Portal Excavation and Rock Bolts	-	CY					$ -	$ -	
	10.022	Excavate and load material	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.023	Haul to disposal site, 0.5 mile haul	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.024	Shotcrete portal face	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	

Sites Reservoir (Alt 1): Saddle Dam 3 & Emergency Release Structure 1
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Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	10.025	*Steel fiber for shotcrete*	-	*TON*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.026	*20 ft rock bolts, 5 ft on center - Drilling*	-	*EA*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.027	*3.5" diam grouted hole with #10 bar*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.028	Downstream Portal Backfill	-	CY					$ -	$ -	
	10.029	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*BCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.030	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.031	Tunnel Excavation and Initial Support (Double Shift)	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	10.032	Tunnel Concrete Lining	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	10.033	10-Ft Steel Pipe Cut and Cover Section	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	10.034	Mechanical, Valves, Trash rack, and Metals	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	10.035	Riprap Discharge Channel	-	CY					$ -	$ -	
	10.036	*Blasting operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.037	*Excavate, load and haul to stockpile/processing area, 1 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.038	*Crush and screen material*			$ -	$ -	$ -	$ -			
	10.039	*Load and haul to stockpile, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.040	*Place at the channel*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
11		**ERS Facility**									
	11.001	Upstream Portal Excavation and Rock Bolts	27,500	CY					$ 18.59	$ 511,292	
	11.002	*Excavate and load material*	*30,250*	*LCY*	$ *1.48*	$ *2.73*	$	$	$ *4.21*	$ *127,413*	*Assumed excavating material is either common earth, loam, sand, clay or loose material.*
	11.003	*Haul to disposal site, 0.5 mile haul*	*30,250*	*LCY*	$ *1.55*	$ *4.00*	$ -	$ -	$ *5.55*	$ *167,754*	
	11.004	*Shotcrete portal face*	*369*	*CY*	$ *93.54*	$ *46.80*	$ *221.97*	$ -	$ *362.30*	$ *133,851*	
	11.005	*Steel fiber for shotcrete*	*6*	*TON*	$ -	$ -	$ *2,478.25*	$ -	$ *2,478.25*	$ *13,734*	
	11.006	*20 ft rock bolts, 8 ft on center - Drilling*	*312*	*EA*	$ *58.98*	$ *25.53*	$ -	$ -	$ *84.51*	$ *26,344*	
	11.007	*3.5" diam grouted hole with #9 bar*	*14*	*CY*	$ *348.46*	$ *109.29*	$ *2,520.70*	$ -	$ *2,978.45*	$ *42,193*	
	11.008	Upstream Portal Backfill	24,800	CY					$ 10.62	$ 263,396	
	11.009	*Load and haul material from stockpile, 0.5 mi assumed*	*27,280*	*LCY*	$ *0.87*	$ *4.03*	$ -	$ -	$ *4.90*	$ *133,567*	
	11.010	*Backfill: Compact and grade*	*27,280*	*LCY*	$ *2.29*	$ *2.47*	$ -	$ -	$ *4.76*	$ *129,829*	
	11.011	Inlet and Valve Structures	2,250	CY					$ 1,092.50	$ 2,458,125	
	11.012	*Pour inlet and valve structures*	*2,250*	*CY*	$ -	$ -	$ -	$ *1,092.50*	$ *1,092.50*	$ *2,458,125*	
	11.013	Downstream Portal Excavation and Rock Bolts	35,100	CY					$ 20.25	$ 710,791	
	11.014	*Excavate and load material*	*38,610*	*LCY*	$ *1.46*	$ *2.70*	$ -	$ -	$ *4.16*	$ *160,649*	
	11.015	*Haul to disposal site, 1 mile haul*	*38,610*	*LCY*	$ *1.53*	$ *3.95*	$ -	$ -	$ *5.48*	$ *211,516*	
	11.016	*Shotcrete portal face*	*589*	*CY*	$ *87.94*	$ *44.00*	$ *221.97*	$ -	$ *353.90*	$ *208,606*	
	11.017	*Steel fiber for shotcrete*	*9*	*TON*	$ -	$ -	$ *2,478.25*	$ -	$ *2,478.25*	$ *21,912*	
	11.018	*20 ft rock bolts, 8 ft on center - Drilling*	*497*	*EA*	$ *58.09*	$ *25.15*	$ -	$ -	$ *83.24*	$ *41,397*	
	11.019	*3.5" diam grouted hole with #9 bar*	*23*	*CY*	$ *325.72*	$ *102.75*	$ *2,522.70*	$ -	$ *2,951.17*	$ *66,711*	
	11.020	Downstream Portal Backfill	37,900	CY					$ 10.58	$ 401,165	
	11.021	*Haul excavated material and stockpile, 1 mi assumed*	*41,690*	*LCY*	$ *0.88*	$ *4.07*	$ -	$ -	$ *4.95*	$ *206,421*	
	11.022	*Backfill: Compact and grade*	*41,690*	*LCY*	$ *2.24*	$ *2.43*	$ -	$ -	$ *4.67*	$ *194,744*	
	11.023	Tunnel Excavation and Initial Support (Double Shift)	828	LF	$ -	$ -	$ -	$ 7,304.42	$ 7,304.42	$ 6,048,057	Second shift work will apply
	11.024	Tunnel Concrete Lining	828	LF	$ -	$ -	$ -	$ 7,205.71	$ 7,205.71	$ 5,966,327	Second shift work will apply
	11.025	10-Ft Steel Pipe Cut and Cover Section	388	LF	$ -	$ -	$ -	$ 8,094.08	$ 8,094.08	$ 3,140,504	Second shift work will apply
	11.026	Mechanical, Valves, Trash rack, and Metals	1	LS	$ -	$ -	$ -	$ 4,887,500	$ 4,887,500	$ 4,887,500	Allowance
	11.027	Riprap Discharge Channel	5,000	CY					$ 61.27	$ 306,361	
	11.028	*Blasting operations*	*6,000*	*LCY*	$ *5.16*	$ *7.59*	$ *4.85*	$ -	$ *17.60*	$ *106,774*	
	11.029	*Excavate, load and haul to stockpile/processing area, 1 mile haul*	*6,000*	*LCY*	$ *2.61*	$ *8.04*	$ -	$ -	$ *10.65*	$ *63,940*	
	11.030	*Crush and screen material*		*LCY*	$ -	$ -	$ -	$ -			
	11.031	*Load and haul to stockpile, 0.5 mile haul*	*6,000*	*LCY*	$ *1.08*	$ *5.00*	$ -	$ -	$ *6.07*	$ *36,427*	
	11.032	*Place at the channel*	*6,000*	*LCY*	$ *6.35*	$ *10.19*	$ -	$ -	$ *16.54*	$ *99,220*	
12		Misc allowance for small items, allow 1.5%	1.5%	%				147,481,959	$ 147,481,959	$ 2,212,229	
		Total Direct Cost	63	Acre	$ 548,858.14	$ 974,797.78	$ 434,708.99	$ 417,733.32	$ 2,376,098.23	$ 149,694,188	

24. Construction Cost Summary: Saddle Dam 5 & Emergency Release Structure 2				Total Cost ($x 1,000)
Total Direct Cost				73,888
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				73,888
General Conditions				
Mobilization			5.0%	3,694
Site General Conditions & Requirements			10.0%	7,758
Phasing		*Not included*	0.0%	-
General Contractor Overhead and Fees				
Insurance			1.1%	939
Bonds			1.0%	863
GC Field & Home Office Overhead			5.0%	4,357
GC Profit			5.0%	4,575
Total Contractor Indirect Markups				22,186
TOTAL DIRECT COST BEFORE CONTINGENCIES				96,074
Contingencies				
Design Contingencies			10.0%	9,607
Construction Contingencies			15.0%	15,852
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	2,431
Total Contingency Allowance				27,890
TOTAL DIRECT COST BEFORE ESCALATION				123,964
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	1,211
Escalation to Mid-point of Construction		*Not included*	0%	-
RECOMMENDED CONSTRUCTION BUDGET				125,175

Sites Reservoir (Alt 1): Saddle Dam 5 & Emergency Release Structure 2
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Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
1		**PRECONSTRUCTION ACTIVITIES**									
	1.001	Demolition Work	-	LS	$ -	$ -	$ -	$ -		Elsewhere	
	1.002	Clearing and Grubbing	42	ACRE	$ 3,321.66	$ 6,137.03	$ -	$ -	$ 9,458.69	$ 397,265	Heavy vegetation removal
	1.003	Reservoir Clearing	-	ACRE	$ -	$ -	$ -	$ -	$ -	$ -	Elsewhere costed
	1.004	Erosion and Sediment Control	42	ACRE	$ -	$ -	$ -	$ 3,760.50	$ 3,760.50	$ 157,941	Allowed $0.25/SF to 30% of the total area
2		**Process and Haul Filter Materials to Project**									
	2.001	Process and Stockpile on Project - Zone 2A - Filter	121,000	Tons					$ 42.29	$ 5,117,333	
	2.002	*Purchase processed material from quarry*	*121,000*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 2,685,777*	*Include 10% waste factor / additional material supply*
	2.003	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*81,853*	*LCY*	*$ 9.68*	*$ 20.03*	*$ -*	*$ -*	*$ 29.71*	*$ 2,431,556*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.004	Process and Stockpile on Project - Zone 2A - Drain	126,500	Tons					$ 42.20	$ 5,338,661	
	2.005	*Purchase processed material from quarry*	*126,500*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 2,807,857*	*Include 10% waste factor / additional material supply*
	2.006	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*85,574*	*LCY*	*$ 9.63*	*$ 19.94*	*$ -*	*$ -*	*$ 29.57*	*$ 2,530,804*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.007	Process and Stockpile on Project - Zone 2A - Transition	36,300	Tons					$ 42.70	$ 1,550,087	
	2.008	*Purchase processed material from quarry*	*36,300*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 805,733*	*Include 10% waste factor / additional material supply*
	2.009	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*24,556*	*LCY*	*$ 9.87*	*$ 20.44*	*$ -*	*$ -*	*$ 30.31*	*$ 744,354*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.010	Process and Stockpile on Project - Zone 2B - Filter	-	Tons					$ -	$ -	Not required
	2.011	*Purchase processed material from quarry*	*-*	*Tons*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.012	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.013	Process and Stockpile on Project - Zone 2B - Transition	-	Tons					$ -	$ -	Not required
	2.014	*Purchase processed material from quarry*	*-*	*Tons*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Foundation Preparation and Grouting									
3		**Foundation Excavation**									
	3.001	Topsoil Salvage	58,000	BCY					$ 9.44	$ 547,416	
	3.002	*Excavations - remove top soil layer*	*63,800*	*LCY*	*$ 1.54*	*$ 2.53*	*$ -*	*$ -*	*$ 4.06*	*$ 259,161*	*Include 10% swell factor*
	3.003	*Load and haul to disposal site, 0.5 mile haul*	*63,800*	*LCY*	*$ 1.21*	*$ 3.31*	*$ -*	*$ -*	*$ 4.52*	*$ 288,255*	
	3.004	Dam Foundation Excavation - Common	24,000	BCY					$ 10.20	$ 244,915	
	3.005	*Excavations - remove top soil layer*	*26,400*	*LCY*	*$ 1.78*	*$ 2.69*	*$ -*	*$ -*	*$ 4.47*	*$ 118,083*	*Include 10% swell factor*
	3.006	*Load and haul to disposal site, 0.5 mile haul*	*26,400*	*LCY*	*$ 1.28*	*$ 3.52*	*$ -*	*$ -*	*$ 4.80*	*$ 126,832*	
	3.007	Dam Foundation Rock Exc - Rippable Rock	256,000	BCY					$ 12.82	$ 3,281,150	
	3.008	*Rock excavations, no blasting*	*294,400*	*LCY*	*$ 2.65*	*$ 4.11*	*$ -*	*$ -*	*$ 6.76*	*$ 1,989,769*	*Include 15% swell factor*
	3.009	*Load and haul to stockpile, 0.5 mile haul*	*294,400*	*LCY*	*$ 1.17*	*$ 3.22*	*$ -*	*$ -*	*$ 4.39*	*$ 1,291,382*	
	3.010	Dam Foundation Rock Ex - Drill and Shoot	-	BCY					$ -	$ -	
	3.011	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Include 20% swell factor*
	3.012	*Load and haul to stockpile, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	3.013	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
4		**Foundation Preparation and Grouting**								Included below	
		Foundation Preparation - Beneath Core									
	4.001	Initial Foundation Cleaning - Core	23,000	SY					$ 21.00	$ 483,051	
	4.002	*Initial foundation core cleanup*	*23,000*	*SY*	*$ 12.16*	*$ 6.19*	*$ -*	*$ -*	*$ 18.35*	*$ 422,029*	
	4.003	*Load and haul to disposal area, 0.5 mile haul*	*6,325*	*CY*	*$ 3.11*	*$ 6.54*	*$ -*	*$ -*	*$ 9.65*	*$ 61,022*	*Assume removal of top layer, 0.75' thick*
	4.004	Final Foundation Cleaning - Core	23,000	SY					$ 18.35	$ 422,029	
	4.005	*Final foundation core cleanup*	*23,000*	*SY*	*$ 12.16*	*$ 6.19*	*$ -*	*$ -*	*$ 18.35*	*$ 422,029*	
	4.006	*Load and haul to disposal area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*
	4.007	Dental Excavation	1,300	CY					$ 131.84	$ 171,397	
	4.008	*Dental excavations*	*1,430*	*LCY*	*$ 71.32*	*$ 34.18*	*$ -*	*$ -*	*$ 105.50*	*$ 150,861*	*Include 10% swell factor*
	4.009	*Load and haul to site stockpile, 0.5 mile haul*	*1,430*	*LCY*	*$ 5.09*	*$ 9.27*	*$ -*	*$ -*	*$ 14.36*	*$ 20,537*	
	4.010	Dental Concrete	1,300	CY	$ 46.22	$ 22.28	$ 183.12	$ -	$ 251.63	$ 327,114	
	4.011	Grout Cap with Anchors	4,200	CY	$ 82.74	$ 25.39	$ 519.68	$ 9.58	$ 637.39	$ 2,677,048	3' x 40' cap, includes formwork and reinforcement (50lbs/cy)
	4.012	Curtain Grouting	14,600	LF					$ 84.70	$ 1,236,617	
	4.013	*Drill setup for all holes*	*195*	*ea.*	*$ 201.49*	*$ 357.33*	*$ -*	*$ -*	*$ 558.81*	*$ 108,782*	*Assume 75' drilling lengths*
	4.014	*Drill curtain grout holes*	*14,600*	*lft*	*$ 11.09*	*$ 12.67*	*$ -*	*$ -*	*$ 23.76*	*$ 346,944*	
	4.015	*Redrill grout holes*	*1,460*	*lft*	*$ 11.99*	*$ 13.70*	*$ -*	*$ -*	*$ 25.69*	*$ 37,507*	*Assume 10% to be redrilled*
	4.016	*Hookup to grout holes and grout nipples*	*730*	*ea.*	*$ 97.93*	*$ -*	*$ -*	*$ -*	*$ 97.93*	*$ 71,500*	*1 x hookup every 20'*
	4.017	*Inject portland cement grout*	*973*	*hr*	*$ 503.36*	*$ 117.47*	*$ -*	*$ -*	*$ 620.83*	*$ 604,276*	*Allow 5 hours per hole*
	4.018	*Perform hydraulic conductivity tests*	*195*	*ea.*	*$ -*	*$ -*	*$ -*	*$ 347.30*	*$ 347.30*	*$ 67,698*	
	4.019	Consolidation Grouting	-	LF					$ -	$ -	Not required
	4.020	*Drill setup for all holes*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.021	*Drill curtain grout holes*	*-*	*lft*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.022	*Redrill grout holes*	*-*	*lft*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.023	*Hookup to grout holes and grout nipples*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.024	*Inject portland cement grout*	*-*	*hr*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.025	*Perform hydraulic conductivity tests*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	Type III Cement	520	Tons	$ 185.37	$ 81.26	$ 113.14	$ -	$ 379.77	$ 197,480	
	4.027	Backfill Concrete	-	CY	$ -	$ -	$ -	$ -		Elsewhere	
5		**Foundation Preparation - Beneath Shell**									
	5.001	Initial Foundation Cleaning - Shell	73,000	SY					$ 5.26	$ 383,889	
	5.002	*Initial dam shell cleanup*	*73,000*	*SY*	*$ 1.42*	*$ 0.46*	*$ -*	*$ -*	*$ 1.88*	*$ 137,450*	
	5.003	*Load and haul to disposal area, 0.5 mile haul*	*20,075*	*LCY*	*$ 4.35*	*$ 7.93*	*$ -*	*$ -*	*$ 12.28*	*$ 246,439*	*Assume removal of top layer, 0.75' thick*

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
6		**Foundation Drainage**									
	6.001	Furnish and Install Foundation Drain Pipe	300	LF	$ 53.06	$ 34.88	$ 35.56	$ -	$ 123.50	$ 37,051	
	6.002	Furnish and Install Foundation Drain Manholes	2	EA	$ 1,750.96	$ 1,130.05	$ 3,070.88	$ -	$ 5,951.89	$ 11,904	
	6.003	Seepage Partition Walls	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
7		**Embankment**									
	7.001	Develop burrow Areas	1	LS						Included below	
	7.002	Z1 Strip/Overburden/Waste to Stockpile	180,000	BCY					$ 9.45	$ 1,700,247	Assumed common earth, 3000' haul w/ scraper
	7.003	*Embankment excavations*	*198,000*	*LCY*	*$ 1.02*	*$ 2.98*	*$ -*	*$ -*	*$ 4.00*	*$ 792,098*	*Include 10% swell factor*
	7.004	*Load and haul to site stockpile, 1 mile haul*	*198,000*	*LCY*	*$ 1.09*	*$ 3.50*	*$ -*	*$ -*	*$ 4.59*	*$ 908,149*	
	7.005	Z3 Strip/Overburden/Waste to Stockpile-Q1	130,000	BCY					$ 10.42	$ 1,354,865	
	7.006	*Embankment excavations*	*143,000*	*LCY*	*$ 1.51*	*$ 3.38*	*$ -*	*$ -*	*$ 4.89*	*$ 699,980*	*Include 10% swell factor*
	7.007	*Load and haul to site stockpile, 1 mile haul*	*143,000*	*LCY*	*$ 1.09*	*$ 3.50*	*$ -*	*$ -*	*$ 4.59*	*$ 655,885*	
	7.008	Z3 Strip/Overburden/Waste to Stockpile-Q2	-	BCY					$ -	$ -	Not required
	7.009	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.010	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.011	Z4 Strip/Overburden/Waste to Stockpile	-	BCY					$ -	$ -	Not required
	7.012	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.013	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Restore Burrow Areas									
	7.014	Replace Overburden from Stockpile	77,500	ECY					$ 7.35	$ 569,257	Backfill burrow area using material from stockpile, allow 25% of stripping material
	7.015	*Load and haul to site stockpile, 1 mile haul*	*85,250*	*LCY*	*$ 1.15*	*$ 3.30*	*$ -*	*$ -*	*$ 4.45*	*$ 379,545*	
	7.016	*Spread and compact*	*85,250*	*LCY*	*$ 1.20*	*$ 1.03*	*$ -*	*$ -*	*$ 2.23*	*$ 189,712*	
	7.017	Topsoil Replacement	58,000	ECY					$ 13.57	$ 787,146	Backfill burrow area using material from stockpile
	7.018	*Excavate, Load and haul excavated backfill material to fill location, 1 mile*	*63,800*	*LCY*	*$ 1.83*	*$ 5.58*	*$ -*	*$ -*	*$ 7.41*	*$ 472,935*	
	7.019	*Spread and compact*	*137,500*	*LCY*	*$ 1.23*	*$ 1.06*	*$ -*	*$ -*	*$ 2.29*	*$ 314,210*	
	7.020	Furnish and Install Zone 1 - Core	369,000	ECY					$ 14.57	$ 5,375,302	
	7.021	*Excavate from burrow area*	*405,900*	*LCY*	*$ 1.50*	*$ 3.36*	*$ -*	*$ -*	*$ 4.86*	*$ 1,973,590*	*Include 10% swell factor*
	7.022	*Load and haul to zone 1 fill location, 0.5 mile haul*	*405,900*	*LCY*	*$ 1.15*	*$ 3.16*	*$ -*	*$ -*	*$ 4.32*	*$ 1,752,589*	*No stockpiling required*
	7.023	*Spread and compact*	*405,900*	*LCY*	*$ 1.59*	*$ 2.48*	*$ -*	*$ -*	*$ 4.08*	*$ 1,649,123*	
	7.024	Load, Haul and Place - Zone 2A - Filter	121,000	Tons					$ 3.58	$ 433,521	
	7.025	*Load at stockpile and haul to fill location, 0.5 mile haul*	*24,556*	*LCY*	*$ 0.97*	*$ 2.94*	*$ -*	*$ -*	*$ 3.91*	*$ 93,483*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0251	*Direct hauling from quarry*	*57,297*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.026	*Spread and compact*	*81,853*	*LCY*	*$ 1.58*	*$ 2.57*	*$ -*	*$ -*	*$ 4.15*	*$ 340,040*	*Include 15% swell factor*
	7.027	Load, Haul and Place - Zone 2A - Drain	126,500	Tons					$ 3.54	$ 448,306	
	7.028	*Load at stockpile and haul to fill location, 0.5 mile haul*	*25,672*	*LCY*	*$ 0.83*	*$ 2.81*	*$ -*	*$ -*	*$ 3.64*	*$ 93,482*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0281	*Direct hauling from quarry*	*59,901*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.029	*Spread and compact*	*85,574*	*LCY*	*$ 1.58*	*$ 2.57*	*$ -*	*$ -*	*$ 4.15*	*$ 354,824*	*Include 15% swell factor*
	7.030	Load, Haul and Place - Zone 2A - Transition	36,300	Tons					$ 3.62	$ 131,246	
	7.031	*Load at stockpile and haul to fill location, 0.5 mile haul*	*7,367*	*LCY*	*$ 0.97*	*$ 2.80*	*$ -*	*$ -*	*$ 3.77*	*$ 27,756*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0311	*Direct hauling from quarry*	*17,189*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.032	*Spread and compact*	*24,556*	*LCY*	*$ 1.61*	*$ 2.61*	*$ -*	*$ -*	*$ 4.21*	*$ 103,490*	*Include 15% swell factor*
	7.033	Load, Haul and Place - Zone 2B - Filter	-	Tons					$ -	$ -	Not required
	7.034	*Load at stockpile and haul to fill location, 0.5 mile haul*	*-*	*LCY*	*$*	*$*	*$*	*$*	*$ -*	*$ -*	
	7.0341	*Direct hauling from quarry*	*-*	*LCY*						*Elsewhere*	
	7.035	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.036	Load, Haul and Place - Zone 2B - Transition	-	Tons					$ -	$ -	Not required
	7.037	*Load at stockpile and haul to fill location, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.0371	*Direct hauling from quarry*	*-*	*LCY*						*Elsewhere*	
	7.038	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.039	Furnish and Install Zone 3 - Rockfill	190,000	ECY					$ 27.94	$ 5,308,004	
	7.040	*Blasting operations*	*228,000*	*LCY*	*$ 3.48*	*$ 6.34*	*$ 4.85*	*$ -*	*$ 15.67*	*$ 3,571,895*	*Include 20% swell factor*
	7.041	*Excavate, load and haul to stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No stockpiling required, material to be hauled to fill location directly*
	7.042	*Crush and screen material*	*228,000*	*LCY*	*$*	*$*	*$*	*$*	*$ -*	*Not required*	*No crushing and screening required*
	7.043	*Load and haul to zone 3, 0.5 mile haul*	*228,000*	*LCY*	*$ 0.83*	*$ 2.77*	*$ -*	*$ -*	*$ 3.59*	*$ 819,481*	*No stockpiling required, direct haul*
	7.044	*Spread and compact*	*228,000*	*LCY*	*$ 1.53*	*$ 2.49*	*$ -*	*$ -*	*$ 4.02*	*$ 916,639*	
	7.045	Furnish and Install Zone 4 - Random	470,000	ECY					$ 7.63	$ 3,584,226	
	7.046	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No blasting required*
	7.047	*Load and haul to processing area, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.048	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.049	*Load and haul to fill location, 0.5 mile haul*	*470,000*	*LCY*	*$ 0.83*	*$ 2.77*	*$ -*	*$ -*	*$ 3.60*	*$ 1,691,831*	*Include 15% swell factor, no stockpiling required, direct haul*
	7.050	*Spread and compact*	*470,000*	*LCY*	*$ 1.53*	*$ 2.49*	*$ -*	*$ -*	*$ 4.03*	*$ 1,893,395*	
	7.051	Furnish and Install Riprap	47,000	ECY					$ 43.24	$ 2,032,455	
	7.052	*Blasting operations*	*56,400*	*LCY*	*$ 4.56*	*$ 6.46*	*$ 4.85*	*$ -*	*$ 15.87*	*$ 894,919*	*Include 20% swell factor*
	7.053	*Load and haul to processing area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.054	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
	7.055	*Load and haul to fill location, 0.5 mile haul*	*56,400*	*LCY*	*$ 0.86*	*$ 2.89*	*$ -*	*$ -*	*$ 3.75*	*$ 211,479*	
	7.056	*Riprap placement*	*56,400*	*LCY*	*$ 6.30*	*$ 10.13*	*$ -*	*$ -*	*$ 16.43*	*$ 926,057*	
8		**Other Work**									
	8.001	GG Dam - Bypass Pipeline and U/S Cofferdam								Elsewhere	
	8.002	Instrumentation/Telemetry: Instrumentation/Telemetry (piezometers, settlement monitors (survey monuments), seismographs, and slope indicators)	1	LS	$ -	$ -	$ -	$ 402,500.00	$ 402,500.00	$ 402,500	Allowance

Sites Reservoir (Alt 1): Saddle Dam 5 & Emergency Release Structure 2
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	8.003	Seeding and Mulching	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	
	8.004	Restoration								Elsewhere	
	8.005	Gravel Surfacing Roads and Crests / Production and Placement of Dam Crest Gravel (No AC required)	2,100	CY					$ 106.66	$ 223,990	
	8.006	*Purchase and import gravel to fill location and stockpile, 40 mi haul*	*2,415*	*LCY*	*$ 13.56*	*$ 23.93*	*$ 37.73*	*$ -*	*$ 72.72*	*$ 175,623*	*Include 15% swell factor*
	8.007	*Place and compact*	*2,415*	*LCY*	*$ 5.27*	*$ 15.76*	*$ -*	*$ -*	*$ 20.03*	*$ 48,368*	
	8.008	Developing haul routes - Haul routes inside reservoir	32	ACRES					$ 30,481.30	$ 975,402	Clear, grade, provide gravel fill layer and compact
	8.009	*Clear and grub*	*1,393,920*	*SF*	*$ 0.08*	*$ 0.13*	*$ -*	*$ -*	*$ 0.20*	*$ 284,331*	
	8.0091	*Load and haul earth fill, 0.5 mile haul*	*25,813*	*CY*	*$ 2.24*	*$ 6.50*	*$ -*	*$ -*	*$ 8.74*	*$ 225,717*	*Use existing earth fill material from stockpile*
	8.010	*Grade and Compact surface for earthen road*	*1,393,920*	*SF*	*$ 0.34*	*$ 0.19*	*$ -*	*$ -*	*$ 0.53*	*$ 465,354*	
	8.011	Developing haul routes - Haul routes outside reservoir	21	ACRES					$ 30,977.94	$ 650,537	Clear, grade, provide gravel fill layer and compact
	8.012	*Clear and grub*	*914,760*	*SF*	*$ 0.08*	*$ 0.13*	*$ -*	*$ -*	*$ 0.20*	*$ 184,815*	
	8.0111	*Load and haul earth fill, 0.5 mile haul*	*16,940*	*CY*	*$ 2.31*	*$ 6.67*	*$ -*	*$ -*	*$ 8.98*	*$ 152,114*	*Use existing earth fill material from stockpile*
	8.013	*Grade and Compact surface for earthen road*	*914,760*	*SF*	*$ 0.14*	*$ 0.20*	*$ -*	*$ -*	*$ 0.34*	*$ 313,608*	
	8.014	Rock processing areas								Not required	
	8.015	Mass Concrete / Backfill Concrete	3,000	CY	$ 100.34	$ 56.58	$ 233.06	$ -	$ 389.99	$ 1,169,973	
	8.016	Mass Concrete for spillway	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.017	Concrete Gravity Dam	-	CY					$ -	$ -	Not required
	8.018	Clay Backfill	-	CY					$ -	$ -	Not required
	8.019	*Clay excavations from borrow area*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.02	*Load and haul from stockpile to fill location, 0.5 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.021	*Place clay backfill material*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	8.022	Riprap and Drain	-	CY					$ -	$ -	Not required
	8.023	*Blasting operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	8.024	*Load and haul to processing area, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	8.025	*Crush and screen material*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	8.026	*Load and haul from stockpile to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	8.027	*Spread riprap*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	8.028	Rim Grouting	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.029	Bridge	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	8.030	Dewatering allowance	1	LS	$ -	$ -	$ -	$ 287,500.00	$ 287,500.00	$ 287,500	
9		**Golden Gate Dam Bypass Pipeline Facilities**									Included with Golden Gate Dam Estimate
	9.001	Upstream Cofferdam	-	CY					$ -	$ -	
	9.002	*Sheet pile cofferdams*	-	*SF*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.003	*Excavations - remove top soil layer and stockpile*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.004	*Load and haul to disposal site, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.005	*Purchase processed material from quarry*	-	*Ton*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.006	*Haul material from quarry to site stockpile, 40 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.007	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.008	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.009	Install 48-Inch Steel Pipe and Encasement	-	LF					$ -	$ -	
	9.010	*Excavate trench in bedrock*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.011	*Load and haul material to disposal site, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.012	*48" steel pipe placement*	-	*LF*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.013	*Concrete backfill for pipe trench (dam footprint)*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.014	*Reinforcement for concrete backfill*	-	*TON*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.015	*48" fixed cone valve for controlled release (baffled hood, no energy dissipation chamber)*	-	*LS*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.016	*Concrete manhole intake, 10' high (assume precast) reinforcement for concrete manhole (633 lbs)*	-	*LF*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.017	*Install 48"x48" debris rack on conc. Manhole*	-	*LS*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.018	*Grout pipe*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.019	*Field Survey*	-	*LS*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.020	Riprap Discharge Channel	-	CY					$ -	$ -	
	9.021	*Blasting operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.022	*Excavate*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.023	*Crush and screen material*			$ -	$ -	$ -	$ -		*Not required*	
	9.024	*Load and haul to stockpile, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	9.025	*Place at the channel*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
10		**Sites Dam Diversion Facilities**									Included with Sites Dam Estimate
	10.001	Upstream Cofferdam	-	CY					$ -	Included above	
	10.002	*Sheet pile cofferdams*	-	*SF*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.003	*Excavations - remove top soil layer and stockpile*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.004	*Load and haul to disposal site, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.005	*Purchase processed material from quarry*	-	*Ton*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.006	*Import material to site stockpile, 40 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.007	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.008	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.009	Upstream Portal Excavation and Rock Bolts	-	CY					$ -	$ -	
	10.010	*Excavate and load material*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.011	*Haul to disposal site, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.012	*Shotcrete portal face*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.013	*Steel fiber for shotcrete*	-	*TON*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.014	*20 ft rock bolts, 5 ft on center - Drilling*	-	*EA*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.015	*3.5" diam grouted hole with #10 bar*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.016	Upstream Portal Backfill	-	CY					$ -	$ -	
	10.017	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.018	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.019	Inlet and Valve Structures	-	CY					$ -	$ -	
	10.020	*Pour inlet and valve structures*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.021	Downstream Portal Excavation and Rock Bolts	-	CY					$ -	$ -	
	10.022	*Excavate and load material*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.023	*Haul to disposal site, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.024	*Shotcrete portal face*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.025	*Steel fiber for shotcrete*	-	*TON*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.026	*20 ft rock bolts, 5 ft on center - Drilling*	-	*EA*	$ -	$ -	$ -	$ -	$ -	$ -	
	10.027	*3.5" diam grouted hole with #10 bar*	-	*CY*	$ -	$ -	$ -	$ -	$ -	$ -	

Cost Work Sheet Summary

Item	Sub-Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	10.028	Downstream Portal Backfill	-	CY					$ -	$ -	
	10.029	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	BCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.030	*Spread and compact*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.031	Tunnel Excavation and Initial Support (Double Shift)	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	10.032	Tunnel Concrete Lining	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	10.033	10-Ft Steel Pipe Cut and Cover Section	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	
	10.034	Mechanical, Valves, Trash rack, and Metals	-	LS	$ -	$ -	$ -	$ -	$ -	$ -	
	10.035	Riprap Discharge Channel	-	CY					$ -	$ -	
	10.036	*Blasting operations*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.037	*Excavate, load and haul to stockpile/processing area, 0.5 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.038	*Crush and screen material*			$ -	$ -	$ -	$ -			
	10.039	*Load and haul to stockpile, 0.5 mile haul*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
	10.040	*Place at the channel*	-	LCY	$ -	$ -	$ -	$ -	$ -	$ -	
11		**ERS Facility**									
	11.001	Upstream Portal Excavation and Rock Bolts	27,215	CY					$ 18.79	$ 511,479	
	11.002	*Excavate and load material*	29,937	LCY	$ 1.49	$ 2.76	$ -	$ -	$ 4.26	$ 127,411	*Assumed excavating material is either common earth, loam, sand, clay or loose material.*
	11.003	*Haul to disposal site, 0.5 mile haul*	29,937	LCY	$ 1.56	$ 4.15	$ -	$ -	$ 5.71	$ 170,907	
	11.004	*Shotcrete portal face*	361	CY	$ 85.69	$ 47.88	$ 231.97	$ -	$ 365.54	$ 132,001	
	11.005	*Steel fiber for shotcrete*	5	TON	$ -	$ -	$ 2,478.25	$ -	$ 2,478.25	$ 13,424	
	11.006	*20 ft rock bolts, 5 ft on center - Drilling*	305	EA	$ 60.34	$ 26.12	$ -	$ -	$ 86.46	$ 26,349	
	11.007	*3.5" diam grouted hole with #8 bar*	14	CY	$ 334.36	$ 131.81	$ 2,522.70	$ -	$ 2,988.97	$ 41,393	
	11.008	Upstream Portal Backfill	24,500	CY					$ 10.75	$ 263,455	
	11.009	*Haul excavated material and stockpile, 0.5 mi assumed*	26,950	LCY	$ 1.04	$ 4.15	$ -	$ -	$ 5.19	$ 139,527	
	11.010	*Backfill: Compact and grade*	26,950	LCY	$ 2.21	$ 2.39	$ -	$ -	$ 4.60	$ 123,928	
	11.011	Inlet and Valve Structures	2,200	CY					$ 1,092.50	$ 2,403,500	
	11.012	*Pour inlet and valve structures*	2,200	CY	$ -	$ -	$ -	$ 1,092.50	$ 1,092.50	$ 2,403,500	
	11.013	Downstream Portal Excavation and Rock Bolts	31,867	CY					$ 23.50	$ 748,760	
	11.014	*Excavate and load material*	35,054	LCY	$ 1.44	$ 2.67	$ -	$ -	$ 4.11	$ 144,080	
	11.015	*Haul to disposal site, 0.5 mile haul*	35,054	LCY	$ 1.51	$ 4.00	$ -	$ -	$ 5.51	$ 193,193	
	11.016	*Shotcrete portal face*	719	CY	$ 90.18	$ 45.11	$ 221.97	$ -	$ 357.26	$ 256,699	
	11.017	*Steel fiber for shotcrete*	11	TON	$ -	$ -	$ 2,478.25	$ -	$ 2,478.25	$ 26,710	
	11.018	*20 ft rock bolts, 5 ft on center - Drilling*	606	EA	$ 56.32	$ 24.38	$ -	$ -	$ 80.70	$ 48,904	
	11.019	*3.5" diam grouted hole with #8 bar*	28	CY	$ 262.31	$ 94.33	$ 2,523.70	$ -	$ 2,874.20	$ 79,198	
	11.020	Downstream Portal Backfill	34,400	CY					$ 11.41	$ 392,672	
	11.021	*Haul excavated material and stockpile, 0.5 mi assumed*	37,840	LCY	$ 1.35	$ 4.35	$ -	$ -	$ 5.70	$ 215,682	
	11.022	*Backfill: Compact and grade*	37,840	LCY	$ 2.26	$ 2.43	$ -	$ -	$ 4.69	$ 177,040	
	11.023	Tunnel Excavation and Initial Support (Double Shift)	832	LF	$ -	$ -	$ -	$ 7,304.42	$ 7,304.42	$ 6,077,275	Second shift work will apply
	11.024	Tunnel Concrete Lining	832	LF	$ -	$ -	$ -	$ 7,205.71	$ 7,205.71	$ 5,995,149	Second shift work will apply
	11.025	10-Ft Steel Pipe Cut and Cover Section	400	LF	$ -	$ -	$ -	$ 8,094.08	$ 8,094.08	$ 3,237,633	Second shift work will apply
	11.026	Mechanical, Valves, Trash rack, and Metals	1	LS	$ -	$ -	$ -	$ 4,887,500	$ 4,887,500	$ 4,887,500	Allowance
	11.027	Riprap Discharge Channel	4,200	CY					$ 62.28	$ 261,557	
	11.028	*Blasting operations*	5,040	LCY	$ 4.74	$ 6.72	$ 4.95	$ -	$ 16.41	$ 82,699	
	11.029	*Excavate, load and haul to stockpile/processing area, 0.5 mile haul*	5,040	LCY	$ 2.33	$ 7.18	$ -	$ -	$ 9.51	$ 47,955	
	11.030	*Crush and screen material*		LCY	$ -	$ -	$ -	$ -			
	11.031	*Load and haul to stockpile, 1 mile haul*	5,040	LCY	$ 1.60	$ 6.87	$ -	$ -	$ 8.47	$ 42,707	
	11.032	*Place at the channel*	5,040	LCY	$ 6.72	$ 10.78	$ -	$ -	$ 17.50	$ 88,196	
12		Misc allowance for small items, allow 1.5%	1.5%	%				72,795,805	$ 72,795,805	$ 1,091,937	
		Total Direct Cost	42	Acre	$ 329,580.80	$ 571,973.36	$ 270,801.78	$ 586,876.03	$ 1,759,231.96	$ 73,887,742	

25. Construction Cost Summary: Saddle Dam 1, 2, 6 & 8

				Total Cost ($x 1,000)
Total Direct Cost				74,832
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				74,832
General Conditions				
Mobilization			5.0%	3,742
Site General Conditions & Requirements			10.0%	7,857
Phasing		*Not included*	0.0%	-
General Contractor Overhead and Fees				
Insurance			1.1%	951
Bonds			1.0%	874
GC Field & Home Office Overhead			5.0%	4,413
GC Profit			5.0%	4,633
Total Contractor Indirect Markups				22,470
TOTAL DIRECT COST BEFORE CONTINGENCIES				97,302
Contingencies				
Design Contingencies			10.0%	9,730
Construction Contingencies			15.0%	16,055
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	2,462
Total Contingency Allowance				28,247
TOTAL DIRECT COST BEFORE ESCALATION				125,549
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	1,226
Escalation to Mid-point of Construction		*Not included*	0%	-
RECOMMENDED CONSTRUCTION BUDGET				126,775

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
1		**PRECONSTRUCTION ACTIVITIES**									
	1.001	Demolition Work	-	LS	$ -	$ -	$ -	$ -		Elsewhere	
	1.002	Clearing and Grubbing	49	ACRE	$ 3,321.66	$ 6,137.03	$ -	$ -	$ 9,458.69	$ 463,476	Heavy vegetation removal
	1.003	Reservoir Clearing	-	ACRE	$ -	$ -	$ -	$ -	$ -	$ -	Elsewhere costed
	1.004	Erosion and Sediment Control	49	ACRE	$ -	$ -	$ -	$ 3,760.50	$ 3,760.50	$ 184,265	Allowed $0.25/SF to 30% of the total area
2		**Process and Haul Filter Materials to Project**									
	2.001	Process and Stockpile on Project - Zone 2A - Filter	173,800	Tons					$ 42.18	$ 7,331,404	
	2.002	*Purchase processed material from quarry*	*173,800*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 3,857,752*	*Include 10% waste factor / additional material supply*
	2.003	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*117,571*	*LCY*	*$ 9.63*	*$ 19.93*	*$ -*	*$ -*	*$ 29.55*	*$ 3,473,652*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.004	Process and Stockpile on Project - Zone 2A - Drain	177,606	Tons					$ 42.17	$ 7,490,319	
	2.005	*Purchase processed material from quarry*	*177,606*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 3,942,232*	*Include 10% waste factor / additional material supply*
	2.006	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*120,145*	*LCY*	*$ 9.62*	*$ 19.91*	*$ -*	*$ -*	*$ 29.53*	*$ 3,548,087*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.007	Process and Stockpile on Project - Zone 2A - Transition	48,400	Tons					$ 42.19	$ 2,041,971	
	2.008	*Purchase processed material from quarry*	*48,400*	*Tons*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 1,074,311*	*Include 10% waste factor / additional material supply*
	2.009	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*32,741*	*LCY*	*$ 9.63*	*$ 19.93*	*$ -*	*$ -*	*$ 29.55*	*$ 967,660*	*1.7ton/ECY and 1.15 swell factor (ECY to LCY); 30% of material to be delivered to stockpile, 70% of material to be directly hauled to fill location (Double handling included with fill work below)*
	2.010	Process and Stockpile on Project - Zone 2B - Filter	-	Tons					$ -	$ -	Not required
	2.011	*Purchase processed material from quarry*	*-*	*Tons*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.012	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.013	Process and Stockpile on Project - Zone 2B - Transition	-	Tons					$ -	$ -	Not required
	2.014	*Purchase processed material from quarry*	*-*	*Tons*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	2.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Foundation Preparation and Grouting									
3		**Foundation Excavation**									
	3.001	Topsoil Salvage	74,000	BCY					$ 9.17	$ 678,796	
	3.002	*Excavations - remove top soil layer*	*81,400*	*LCY*	*$ 1.59*	*$ 2.36*	*$ -*	*$ -*	*$ 3.95*	*$ 321,360*	*Include 10% swell factor*
	3.003	*Load and haul to disposal site, 0.5 mile haul*	*81,400*	*LCY*	*$ 1.17*	*$ 3.21*	*$ -*	*$ -*	*$ 4.39*	*$ 357,436*	
	3.004	Dam Foundation Excavation - Common	33,500	BCY					$ 9.30	$ 311,710	
	3.005	*Excavations - remove top soil layer*	*36,850*	*LCY*	*$ 1.63*	*$ 2.35*	*$ -*	*$ -*	*$ 4.08*	*$ 150,287*	*Include 10% swell factor*
	3.006	*Load and haul to disposal site, 0.5 mile haul*	*36,850*	*LCY*	*$ 1.17*	*$ 3.21*	*$ -*	*$ -*	*$ 4.38*	*$ 161,423*	
	3.007	Dam Foundation Rock Exc - Rippable Rock	302,500	BCY					$ 12.76	$ 3,858,594	
	3.008	*Rock excavations, no blasting*	*347,875*	*LCY*	*$ 2.63*	*$ 3.09*	*$ -*	*$ -*	*$ 6.72*	*$ 2,336,609*	*Include 15% swell factor*
	3.009	*Load and haul to stockpile, 0.5 mile haul*	*347,875*	*LCY*	*$ 1.17*	*$ 3.21*	*$ -*	*$ -*	*$ 4.38*	*$ 1,521,985*	
	3.010	Dam Foundation Rock Ex - Drill and Shoot	-	BCY					$ -	$ -	Not required
	3.011	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	3.012	*Excavate, load and haul to stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	3.013	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	
4		**Foundation Preparation and Grouting**								Included below	
		Foundation Preparation - Beneath Core									
	4.001	Initial Foundation Cleaning - Core	16,400	SY					$ 12.94	$ 212,266	
	4.002	*Initial foundation core cleanup*	*16,400*	*SY*	*$ 7.98*	*$ 2.50*	*$ -*	*$ -*	*$ 10.48*	*$ 171,584*	
	4.003	*Load and haul to disposal area, 0.5 mile haul*	*4,510*	*CY*	*$ 2.91*	*$ 6.11*	*$ -*	*$ -*	*$ 9.02*	*$ 40,682*	*Assume removal of top layer, 0.75' thick*
	4.004	Final Foundation Cleaning - Core	16,400	SY					$ 10.46	$ 171,584	
	4.005	*Final foundation core cleanup*	*16,400*	*SY*	*$ 7.98*	*$ 2.50*	*$ -*	*$ -*	*$ 10.48*	*$ 171,584*	
	4.006	*Load and haul to disposal area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*
	4.007	Dental Excavation	1,500	CY					$ 129.98	$ 194,969	
	4.008	*Dental excavations*	*1,650*	*LCY*	*$ 71.47*	*$ 34.25*	*$ -*	*$ -*	*$ 105.72*	*$ 174,433*	*Include 10% swell factor*
	4.009	*Load and haul to site stockpile, 0.5 mile haul*	*1,650*	*LCY*	*$ 4.41*	*$ 8.03*	*$ -*	*$ -*	*$ 12.45*	*$ 20,537*	
	4.010	Dental Concrete	1,500	CY	$ 46.97	$ 22.64	$ 183.12	$ -	$ 252.73	$ 379,093	
	4.011	Grout Cap with Anchors	4,900	CY	$ 82.99	$ 25.47	$ 519.68	$ 8.21	$ 636.35	$ 3,118,125	3' x 40' cap, includes formwork and reinforcement (50lbs/cy)
	4.012	Curtain Grouting	16,200	LF					$ 83.45	$ 1,351,891	
	4.013	*Drill setup for all holes*	*216*	*ea.*	*$ 198.09*	*$ 351.31*	*$ -*	*$ -*	*$ 549.40*	*$ 118,671*	*Assume 75' drilling lengths*
	4.014	*Drill curtain grout holes*	*16,200*	*lft*	*$ 10.81*	*$ 12.35*	*$ -*	*$ -*	*$ 23.15*	*$ 375,075*	
	4.015	*Redrill grout holes*	*1,620*	*lft*	*$ 10.81*	*$ 12.35*	*$ -*	*$ -*	*$ 23.15*	*$ 37,507*	*Assume 10% to be redrilled*
	4.016	*Hookup to grout holes and grout nipples*	*810*	*ea.*	*$ 95.43*	*$*	*$ -*	*$ -*	*$ 95.43*	*$ 77,297*	
	4.017	*Inject portland cement grout*	*1,080*	*hr*	*$ 502.71*	*$ 111.11*	*$ -*	*$ -*	*$ 613.82*	*$ 668,323*	*Allow 5 hours per hole*
	4.018	*Perform hydraulic conductivity tests*	*216*	*ea.*	*$ -*	*$*	*$*	*$ 347.30*	*$ 347.30*	*$ 75,017*	
	4.019	Consolidation Grouting	-	LF					$ -	$ -	Not required
	4.020	*Drill setup for all holes*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.021	*Drill curtain grout holes*	*-*	*lft*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.022	*Redrill grout holes*	*-*	*lft*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.023	*Hookup to grout holes and grout nipples*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.024	*Inject portland cement grout*	*-*	*hr*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.025	*Perform hydraulic conductivity tests*	*-*	*ea.*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	Type III Cement	571	Tons	$ 185.41	$ 81.29	$ 113.14	$ -	$ 379.84	$ 216,887	
	4.027	Backfill Concrete	-	CY	$ -	$ -	$ -	$ -		Elsewhere	
5		**Foundation Preparation - Beneath Shell**									
	5.001	Initial Foundation Cleaning - Shell	38,400	SY					$ 4.15	$ 159,278	
	5.002	*Initial dam shell cleanup*	*38,400*	*SY*	*$ 1.43*	*$ 0.46*	*$ -*	*$ -*	*$ 1.87*	*$ 71,997*	
	5.003	*Load and haul to disposal area, 0.5 mile haul*	*7,040*	*LCY*	*$ 4.39*	*$ 8.00*	*$ -*	*$ -*	*$ 12.40*	*$ 87,281*	*Assume removal of top layer, 0.5' thick*

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
6		**Foundation Drainage**									
	6.001	Furnish and Install Foundation Drain Pipe	1,200	LF	$ 47.38	$ 31.15	$ 35.56	$ -	$ 114.08	$ 136,896	
	6.002	Furnish and Install Foundation Drain Manholes	4	EA	$ 1,313.22	$ 847.54	$ 3,070.88	$ -	$ 5,231.64	$ 20,927	
	6.003	Seepage Partition Walls	-	CY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
7		**Embankment**									
	7.001	Develop Burrow Areas	1	LS						Included below	
	7.002	Z1 Strip/Overburden/Waste to Stockpile	212,000	BCY					$ 9.58	$ 2,030,851	Assumed common earth, 3000' haul w/ scraper
	7.003	*Embankment excavations*	*233,200*	*LCY*	*$ 1.04*	*$ 3.02*	*$ -*	*$ -*	*$ 4.06*	*$ 946,118*	*Include 10% swell factor*
	7.004	*Load and haul to site stockpile, 1 mile haul*	*233,200*	*LCY*	*$ 1.10*	*$ 3.55*	*$ -*	*$ -*	*$ 4.65*	*$ 1,084,733*	
	7.005	Z3 Strip/Overburden/Waste to Stockpile-Q1	174,000	BCY					$ 10.43	$ 1,814,895	
	7.006	*Embankment excavations*	*191,400*	*LCY*	*$ 1.50*	*$ 3.37*	*$ -*	*$ -*	*$ 4.87*	*$ 931,973*	*Include 10% swell factor*
	7.007	*Load and haul to site stockpile, 1 mile haul*	*191,400*	*LCY*	*$ 1.09*	*$ 3.52*	*$ -*	*$ -*	*$ 4.61*	*$ 882,922*	
	7.008	Z3 Strip/Overburden/Waste to Stockpile-Q2	-	BCY					$ -	$ -	Not required
	7.009	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.010	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.011	Z4 Strip/Overburden/Waste to Stockpile	-	BCY					$ -	$ -	Not required
	7.012	*Embankment excavations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.013	*Load and haul to site stockpile, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Restore Burrow Areas									
	7.014	Replace Overburden from Stockpile	96,500	ECY					$ 8.52	$ 821,727	Backfill burrow area using material from stockpile, allow 25% of stripping material
	7.015	*Load and haul to site stockpile, 1 mile haul*	*106,150*	*LCY*	*$ 1.50*	*$ 4.01*	*$ -*	*$ -*	*$ 5.51*	*$ 584,587*	
	7.016	*Spread and compact*	*106,150*	*LCY*	*$ 1.20*	*$ 1.03*	*$ -*	*$ -*	*$ 2.23*	*$ 237,140*	
	7.017	Topsoil Replacement	58,000	ECY					$ 13.57	$ 787,146	Backfill burrow area using material from stockpile
	7.018	*Excavate, Load and haul excavated backfill material to fill location, 1 mile*	*63,800*	*LCY*	*$ 1.83*	*$ 5.58*	*$ -*	*$ -*	*$ 7.41*	*$ 472,935*	
	7.019	*Spread and compact*	*137,500*	*LCY*	*$ 1.23*	*$ 1.06*	*$ -*	*$ -*	*$ 2.29*	*$ 314,210*	
	7.020	Furnish and Install Zone 1 - Core	450,000	ECY					$ 14.83	$ 6,674,601	
	7.021	*Excavate from burrow area*	*495,000*	*LCY*	*$ 1.51*	*$ 3.37*	*$ -*	*$ -*	*$ 4.87*	*$ 2,411,166*	*Include 10% swell factor*
	7.022	*Load and haul to zone-1 fill location, 0.5 mile haul*	*495,000*	*LCY*	*$ 1.33*	*$ 3.23*	*$ -*	*$ -*	*$ 4.56*	*$ 2,255,380*	*No stockpiling required*
	7.023	*Spread and compact*	*495,000*	*LCY*	*$ 1.58*	*$ 2.47*	*$ -*	*$ -*	*$ 4.05*	*$ 2,007,155*	
	7.024	Load, Haul and Place - Zone 2A - Filter	173,800	Tons					$ 3.52	$ 611,878	
	7.025	*Load at stockpile and haul to fill location, 0.5 mile haul*	*35,271*	*LCY*	*$ 1.01*	*$ 2.92*	*$ -*	*$ -*	*$ 3.93*	*$ 138,779*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0251	*Direct hauling from quarry*	*82,299*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.026	*Spread and compact*	*117,571*	*LCY*	*$ 1.53*	*$ 2.49*	*$ -*	*$ -*	*$ 4.02*	*$ 473,099*	*Include 15% swell factor*
	7.027	Load, Haul and Place - Zone 2A - Drain	177,606	Tons					$ 3.53	$ 626,662	
	7.028	*Load at stockpile and haul to fill location, 0.5 mile haul*	*36,044*	*LCY*	*$ 0.99*	*$ 2.86*	*$ -*	*$ -*	*$ 3.85*	*$ 138,779*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0281	*Direct hauling from quarry*	*84,102*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.029	*Spread and compact*	*120,145*	*LCY*	*$ 1.55*	*$ 2.51*	*$ -*	*$ -*	*$ 4.06*	*$ 487,883*	*Include 15% swell factor*
	7.030	Load, Haul and Place - Zone 2A - Transition	48,400	Tons					$ 3.61	$ 174,693	
	7.031	*Load at stockpile and haul to fill location, 0.5 mile haul*	*9,822*	*LCY*	*$ 1.09*	*$ 3.15*	*$ -*	*$ -*	*$ 4.24*	*$ 41,634*	*Assume 1.7ton/cy, included a 15% swell factor; only 30% of material to be hauled from stockpile to fill location*
	7.0311	*Direct hauling from quarry*	*22,919*	*LCY*						*Elsewhere*	*Assume 1.7ton/cy, included a 15% swell factor; 70% of material will be hauled directly*
	7.032	*Spread and compact*	*32,741*	*LCY*	*$ 1.55*	*$ 2.52*	*$ -*	*$ -*	*$ 4.06*	*$ 133,059*	*Include 15% swell factor*
	7.033	Load, Haul and Place - Zone 2B - Filter	-	Tons					$ -	$ -	Not required
	7.034	*Load at stockpile and haul to fill location, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.0341	*Direct hauling from quarry*	*-*	*LCY*						*Elsewhere*	
	7.035	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.036	Load, Haul and Place - Zone 2B - Transition	-	Tons					$ -	$ -	Not required
	7.037	*Load at stockpile and haul to fill location, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.0371	*Direct hauling from quarry*	*-*	*LCY*						*Elsewhere*	
	7.038	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.039	Furnish and Install Zone 3 - Rockfill	224,000	ECY					$ 28.16	$ 6,308,737	
	7.040	*Blasting operations*	*268,800*	*LCY*	*$ 4.99*	*$ 5.35*	*$ 4.85*	*$ -*	*$ 15.69*	*$ 4,216,391*	*Include 20% swell factor*
	7.041	*Excavate, load and haul to stockpile, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No stockpiling required, material to be hauled to fill location directly*
	7.042	*Crush and screen material*	*268,800*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
	7.043	*Load and haul to zone-3, 0.5 mile haul*	*268,800*	*LCY*	*$ 0.97*	*$ 2.80*	*$ -*	*$ -*	*$ 3.77*	*$ 1,013,090*	*No stockpiling required, direct haul*
	7.044	*Spread and compact*	*268,800*	*LCY*	*$ 1.53*	*$ 2.49*	*$ -*	*$ -*	*$ 4.02*	*$ 1,079,256*	
	7.045	Furnish and Install Zone 4 - Random	606,000	ECY					$ 7.76	$ 4,700,613	
	7.046	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No blasting required*
	7.047	*Load and haul to processing area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.048	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*No crushing and screening required*
	7.049	*Load and haul to fill location, 0.5 mile haul*	*606,000*	*LCY*	*$ 0.97*	*$ 2.79*	*$ -*	*$ -*	*$ 3.76*	*$ 2,275,982*	*Include 15% swell factor, no stockpiling required, direct haul*
	7.050	*Spread and compact*	*606,000*	*LCY*	*$ 1.52*	*$ 2.48*	*$ -*	*$ -*	*$ 4.00*	*$ 2,424,631*	
	7.051	Furnish and Install Riprap	55,000	ECY					$ 43.07	$ 2,368,772	
	7.052	*Blasting operations*	*66,000*	*LCY*	*$ 4.51*	*$ 6.38*	*$ 4.85*	*$ -*	*$ 15.74*	*$ 1,036,569*	*Include 20% swell factor*
	7.053	*Load and haul to processing area, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	7.054	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*	*No crushing and screening required*
	7.055	*Load and haul to fill location, 0.5 mile haul*	*66,000*	*LCY*	*$ 0.97*	*$ 2.81*	*$ -*	*$ -*	*$ 3.78*	*$ 245,803*	
	7.056	*Riprap placement*	*66,000*	*LCY*	*$ 6.29*	*$ 10.08*	*$ -*	*$ -*	*$ 16.37*	*$ 1,090,400*	
8		**Other Work**									
	8.001	GG Dam - Bypass Pipeline and U/S Cofferdam								Elsewhere	
	8.002	Instrumentation/Telemetry: Instrumentation/Telemetry (piezometers, settlement monitors (survey monuments), seismographs, and slope indicators)	1	LS	$ -	$ -	$ -	$ 517,500.00	$ 517,500.00	$ 517,500	Allowance
	8.003	Seeding and Mulching	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	

Sites Reservoir (Alt 1): Saddle Dam 1, 2, 6 & 8
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	8.004	Restoration								Elsewhere	
	8.005	Gravel Surfacing Roads and Crests / Production and Placement of Dam Crest Gravel (No AC required)	3,300	CY					$ 93.72	$ 309,278	
	8.006	*Purchase and Import gravel to fill location and stockpile, 40 mi haul*	*3,795*	*LCY*	*$ 9.19*	*$ 18.64*	*$ 37.73*	*$ -*	*$ 65.56*	*$ 248,818*	*Include 15% swell factor*
	8.007	*Place and compact*	*3,795*	*LCY*	*$ 4.99*	*$ 10.94*	*$*	*$*	*$ 15.93*	*$ 60,460*	
	8.008	Developing haul routes - Haul routes inside reservoir	48	ACRES					$ 30,481.30	$ 1,463,103	Clear, grade, provide gravel fill layer and compact
	8.009	*Clear and grub*	*2,090,880*	*SF*	*$ 0.08*	*$ 0.13*	*$*	*$*	*$ 0.20*	*$ 426,496*	
	8.0091	*Load and haul earth fill*	*38,720*	*CY*	*$ 2.24*	*$ 6.50*	*$ -*	*$ -*	*$ 8.74*	*$ 338,576*	*Use existing earth fill material from stockpile*
	8.010	*Grade and Compact surface for earthen road*	*2,090,880*	*SF*	*$ 0.14*	*$ 0.19*	*$ -*	*$ -*	*$ 0.33*	*$ 698,031*	
	8.011	Developing haul routes - Haul routes outside reservoir	32	ACRES					$ 32,847.61	$ 1,051,123	Clear, grade, provide gravel fill layer and compact
	8.012	*Clear and grub*	*1,393,920*	*SF*	*$ 0.08*	*$ 0.13*	*$*	*$*	*$ 0.20*	*$ 284,331*	
	8.0121	*Load and haul earth fill*	*25,813*	*CY*	*$ 2.90*	*$ 8.78*	*$ -*	*$ -*	*$ 11.68*	*$ 301,439*	*Use existing earth fill material from stockpile*
	8.013	*Grade and Compact surface for earthen road*	*1,393,920*	*SF*	*$ 0.14*	*$ 0.19*	*$ -*	*$ -*	*$ 0.33*	*$ 465,354*	
	8.014	Rock processing areas								Not required	
	8.015	Mass Concrete / Backfill Concrete	2,200	CY	$ 94.26	$ 53.16	$ 174.80	$ -	$ 322.21	$ 708,872	
	8.016	Concrete for spillway	19,500	CY							
	8.017	Spillway walls, reinforced concrete	273	CY					$ 1,271.39	$ 347,090	
	8.018	*Formwork*	*2,600*	*SF*	*$ 20.79*	*$ 0.42*	*$ 5.24*	*$ -*	*$ 26.46*	*$ 68,785*	
	8.019	*Concrete*	*420*	*CY*	*$ 45.95*	*$ 13.72*	*$ 231.06*	*$ -*	*$ 290.73*	*$ 122,107*	
	8.02	*Reinforcement*	*52.50*	*TON*	*$ 61.90*	*$ -*	*$ 2,913.29*	*$ -*	*$ 2,975.19*	*$ 156,198*	*Allow reinforcement of 250 lbs/cy*
	8.021	Spillway slab concrete, reinforced concrete	500	CY					$ 651.10	$ 325,548	
	8.022	*Formwork*	*2,500*	*SF*	*$ 21.62*	*$ 0.43*	*$ 5.24*	*$ -*	*$ 27.30*	*$ 68,260*	*Allow formwork of 5SF/CY*
	8.023	*Concrete*	*500*	*CY*	*$ 45.01*	*$ 13.48*	*$ 231.06*	*$ -*	*$ 289.55*	*$ 144,789*	
	8.024	*Reinforcement*	*37.50*	*TON*	*$ 86.66*	*$ -*	*$ 2,913.29*	*$ -*	*$ 2,999.95*	*$ 112,498*	*Allow reinforcement of 150 lbs/cy*
	8.025	Spillway mass concrete	18,727	CY					$ 320.61	$ 6,003,975	
	8.026	*Formwork*	*-*	*SF*						*Not required*	
	8.027	*Concrete*	*18,727*	*CY*	*$ 93.23*	*$ 52.37*	*$ 174.80*	*$ -*	*$ 320.61*	*$ 6,003,975*	
	8.028	*Reinforcement*	*-*	*TON*						*Not required*	
	8.029	Bridge	1,700	SF	$ -	$ -	$ -	$ 492.86	*$ 492.86*	*$ 837,857*	
	8.030	Concrete Gravity Dam	-	CY					$ -	$ -	Not required
	8.031	Clay Backfill	20,000	CY					$ 21.82	$ 436,363	
	8.032	*Clay excavations from borrow area*	*24,000*	*LCY*	*$ 1.79*	*$ 2.69*	*$*	*$*	*$ 4.47*	*$ 107,348*	
	8.033	*Load and haul from stockpile to fill location, 1 mile haul*	*24,000*	*LCY*	*$ 1.28*	*$ 3.52*	*$ -*	*$ -*	*$ 4.80*	*$ 115,302*	
	8.034	*Place clay backfill material*	*24,000*	*LCY*	*$ 3.43*	*$ 5.46*	*$ -*	*$ -*	*$ 8.90*	*$ 213,733*	
	8.035	Riprap and Drain	-	CY					$ -	$ -	Not required
	8.036	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.037	*Load and haul to processing area, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.038	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.039	*Load and haul from stockpile to fill location, 1 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.040	*Rip rap placement*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	8.041	Rim Grouting	51,300	LF	$ -	$ -	$ -	$ 120.75	*$ 120.75*	*$ 6,194,475*	Includes clearing & grubbing, furnishing cement material, drill setup for holes, soil drilling to rock, drill curtain holes in rock, grout backfill, hydroseed area.
	8.042	Dewatering allowance	1	LS	$ -	$ -	$ -	$ 287,500.00	$ 287,500.00	$ 287,500	Allowance
9		Misc allowance for small items, allow 1.5%	1.5%	%				73,725,708	$ 73,725,708	$ 1,105,886	
		Total Direct Cost	49	Acre	$ 368,471.76	$ 607,976.90	$ 362,099.17	$ 188,627.53	$ 1,527,175.37	$ 74,831,593	

26. Construction Cost Summary: Inlet/Outlet Facility Works				Total Cost ($x 1,000)
Total Direct Cost				170,955
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				170,955
General Conditions				
Mobilization			5.0%	8,548
Site General Conditions & Requirements			10.0%	17,950
Phasing		*Not included*	0.0%	-
General Contractor Overhead and Fees				
Insurance			1.1%	2,172
Bonds			1.0%	1,996
GC Field & Home Office Overhead			5.0%	10,081
GC Profit			5.0%	10,585
Total Contractor Indirect Markups				51,332
TOTAL DIRECT COST BEFORE CONTINGENCIES				222,287
Contingencies				
Design Contingencies			15.0%	33,343
Construction Contingencies			15.0%	38,344
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	5,879
Total Contingency Allowance				77,566
TOTAL DIRECT COST BEFORE ESCALATION				299,853
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	2,928
Escalation to Mid-point of Construction		*Not included*	0%	-
RECOMMENDED CONSTRUCTION BUDGET				302,781

Sites Reservoir (Alt 1): Inlet/Outlet Facility Works
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
1		**PRECONSTRUCTION ACTIVITIES**									
	1.100	**Clearing Work**									
	1.101	Demolition Work	-	LS	$ -	$ -	$ -	$ -		Not required	
	1.102	Clearing and Grubbing	9	ACRE	$ 1,291.76	$ 2,386.62	$ -	$ -	$ 3,678.38	$ 33,105	Light vegetation removal
	1.103	Erosion and Sediment Control	9	ACRE	$ 1,137.57	$ 1,982.84	$ -	$ -	$ 3,120.41	$ 28,084	Allowed $0.25/SF to 30% of the total area
	1.200	**Access Roads**									
	1.201	Develop temporary access roads								Elsewhere	Included within dam and roadwork estimates
2		**Tower**									
	2.100	**Foundations**									
		Foundation piling	540.00	LF					$ 450.72	$ 243,388	4' dia, 60' deep, 9 piles - drilled piers/piles
		Drilling rig mobilization/Demobilization allowance	*2.00*	*EA*	*$ 15,000.00*	*$ 10,000.00*	*$ -*	*$ -*	*$ 25,000.00*	*$ 50,000*	
		Foundation piles - drilled piers	*540.00*	*LF*	*$ 48.30*	*$ 43.33*	*$ 73.37*	*$ -*	*$ 165.00*	*$ 89,100*	
		Concrete in piles							*$ -*	*Included above*	
		Pile reinforcement allowance	*41*	*TON*	*$ 772.50*	*$ 257.50*	*$ 1,545.00*	*$ -*	*$ 2,575.00*	*$ 104,288*	*Allow 150lbs/cy*
		Pile testing allowance	15.0%	%	$ -	$ -	$ -	$ 243,387.50	$ 243,387.50	$ 36,508	
		Pile cap / base slab	489	CY					$ 652.70	$ 319,186	5' thick base slab
		Cast in place concrete	*489*	*CY*	*$ 65.37*	*$ 32.68*	*$ 228.78*	*$ -*	*$ 326.83*	*$ 159,828*	*36" thick slab*
		Formwork	*991*	*SF*	*$ 15.23*	*$ 2.34*	*$ 7.81*	*$ -*	*$ 25.38*	*$ 25,106*	*Formwork to sides*
		Concrete reinforcement	*37*	*TON*	*$ 742.98*	*$ 371.49*	*$ 2,600.43*	*$ -*	*$ 3,714.90*	*$ 136,251*	*Allow 150lbs/cy*
	2.300	**Intake and Outlet Structures**									
		Multi-Level Inlet/Outlet Tower Cast In Place Concrete	8,369	CY							
		Walls	7,535	CY					$ 1,133.76	$ 8,542,844	
		Cast in place concrete	*7,535*	*CY*	*$ 65.37*	*$ 32.68*	*$ 228.78*	*$ -*	*$ 326.83*	*$ 2,462,664*	*Average 4' thick*
		Formwork	*101,723*	*SF*	*$ 15.23*	*$ 2.34*	*$ 7.81*	*$ -*	*$ 25.38*	*$ 2,581,208*	
		Concrete reinforcement	*942*	*TON*	*$ 742.98*	*$ 371.49*	*$ 2,600.43*	*$ -*	*$ 3,714.90*	*$ 3,498,971*	*Allow 250lbs/cy*
		Slabs - elevated decks	722	CY					$ 833.82	$ 602,020	Three slabs, assume 3 ft thick each, cross section from CAD, which is in inches.
		Cast in place concrete	*722*	*CY*	*$ 65.37*	*$ 32.68*	*$ 228.78*	*$ -*	*$ 326.83*	*$ 235,971*	*36" thick slab*
		Formwork	*6,493*	*SF*	*$ 15.23*	*$ 2.34*	*$ 7.81*	*$ -*	*$ 25.38*	*$ 164,887*	
		Concrete reinforcement	*54*	*TON*	*$ 742.98*	*$ 371.49*	*$ 2,600.43*	*$ -*	*$ 3,714.90*	*$ 201,162*	*Allow 150lbs/cy*
		Piers/Piles	-	CY					$ -	$ -	Included above
		Cast in place concrete	*-*	*CY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Formwork	*-*	*SF*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Allow 30sf/cy*
		Concrete reinforcement	*-*	*TON*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Allow 200lbs/cy*
		Plug at base	-	CY					$ -	$ -	Included above
		Cast in place concrete	*-*	*CY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Formwork	*-*	*SF*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
		Concrete reinforcement	*-*	*TON*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*
		Bridge Piers	112	CY					$ 1,459.57	$ 163,472	Assume 4 piers with a 4 ft diameter, 60 ft deep
		Cast in place concrete	*112*	*CY*	*$ 65.37*	*$ 32.68*	*$ 228.78*	*$ -*	*$ 326.83*	*$ 36,605*	
		Formwork	*3,360*	*SF*	*$ 15.23*	*$ 2.34*	*$ 7.81*	*$ -*	*$ 25.38*	*$ 85,280*	*Allow 30sf/cy*
		Concrete reinforcement	*11*	*TON*	*$ 742.98*	*$ 371.49*	*$ 2,600.43*	*$ -*	*$ 3,714.90*	*$ 41,607*	*Allow 200lbs/cy*
	2.400	**Mechanical Work**									
		Gates, Mechanical, and Appurtenances	1	LS						Included below	
		Trash Racks, Miscellaneous Metals and Equipment	1	LS						Included below	
		Metal ladders	270	LF	$ -	$ -	$ -	$ 3,552.50	$ 3,552.50	$ 959,175	
		Metal Platforms Intake Tower	-	EA	$ -	$ -	$ -	$ 507.50	$ 507.50	$ -	Not required
		Roller Gates with hydraulic cylinders and lines	24	EA	$ -	$ -	$ -	$ 384,583.50	$ 384,583.50	$ 9,230,004	
		Moveable screens and hoists	6	EA	$ -	$ -	$ -	$ 76,125.00	$ 76,125.00	$ 456,750	
		Sliding steel plates and hoists	6	EA	$ -	$ -	$ -	$ 101,500.00	$ 101,500.00	$ 609,000	
		8 ton jib crane	1	EA	$ -	$ -	$ -	$ 121,800.00	$ 121,800.00	$ 121,800	
		12 ft x 30 ft inlet tunnel roller gate	2	EA	$ -	$ -	$ -	$ 1,888,915.00	$ 1,888,915.00	$ 3,777,830	
		12 ft x 25 ft outlet tunnel roller gates	4	EA	$ -	$ -	$ -	$ 1,609,790.00	$ 1,609,790.00	$ 6,439,160	
		Other Metals Intake Tower	1	LS	$ -	$ -	$ -	$ 253,750.00	$ 253,750.00	$ 253,750	
		Painting	1	LS	$ -	$ -	$ -	$ 50,750.00	$ 50,750.00	$ 50,750	
	2.400	**Access bridge**									
		Access bridge	10,000	LS	$ -	$ -	$ -	$ 500.00	$ 500.00	$ 5,000,000	Assume 500' x 20' wide bridge
	2.500	**Electrical Power and Controls**									
		Power for gate hoists, hydraulic system, lighting	1	LS	$ -	$ -	$ -	$ 253,750.00	$ 253,750.00	$ 253,750	
4		**North & South Tunnels**									
		Excavation	6,222	LF	$ -	$ -	$ -	$ 8,491.49	$ 8,491.49	$ 52,834,051	
		Concrete Liner	5,712	LF	$ -	$ -	$ -	$ 9,083.24	$ 9,083.24	$ 51,883,438	
		Steel Liner	510	LF	$ -	$ -	$ -	$ 10,327.63	$ 10,327.63	$ 5,267,089	

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
5		**Lower Intake Channel**	475,000	CY					$ 38.28	$ 18,180,797	
		Excavations in common material	432,250	LCY	$ 6.00	$ 9.00	$ -	$ -	$ 15.00	$ 6,483,750	Assume 70% in common earth and 30% rock; include a 30% swell factor
		Excavations in rock	185,250	LCY	$ 10.50	$ 24.50	$ -	$ -	$ 35.00	$ 6,483,750	
		Haul to disposal site, 0.5 mile haul	617,500	LCY	$ 1.75	$ 5.25	$ -	$ -	$ 7.00	$ 4,322,500	
		Shotcrete portal face	1,387	CY	$ 64.00	$ 32.00	$ 224.00	$ -	$ 320.00	$ 443,760	
		Steel fiber for shotcrete	21	TON	$ 260.00	$ -	$ 1,040.00	$ -	$ 1,300.00	$ 27,042	
		20 ft rock bolts, 8 ft on center - Drilling	880	EA	$ 187.50	$ 62.50	$ -	$ -	$ 250.00	$ 220,000	
		3.5" diam grouted hole with #8 bar	40	CY	$ 1,000.00	$ 500.00	$ 3,500.00	$ -	$ 5,000.00	$ 199,986	
6		**Downstream Portal**									
		Downstream Portal Excavation and Rock Bolts	63,000	CY					$ 49.88	$ 3,142,613	
		Excavate and load material	81,900	LCY	$ 10.00	$ 15.00	$ -	$ -	$ 25.00	$ 2,047,500	
		Haul to disposal site, 0.5 mile haul	81,900	LCY	$ 1.75	$ 5.25	$ -	$ -	$ 7.00	$ 573,300	
		Shotcrete portal face	813	CY	$ 64.00	$ 32.00	$ 224.00	$ -	$ 320.00	$ 260,172	
		Steel fiber for shotcrete	12	TON	$ 260.00	$ -	$ 1,040.00	$ -	$ 1,300.00	$ 15,854	
		20 ft rock bolts, 8 ft on center - Drilling	515	EA	$ 187.50	$ 62.50	$ -	$ -	$ 250.00	$ 128,750	
		3.5" diam grouted hole with #8 bar	23	CY	$ 1,000.00	$ 500.00	$ 3,500.00	$ -	$ 5,000.00	$ 117,037	
		Downstream Portal Backfill	-	CY					$ -	Not required	
		Riprap	-	CY					$ -	Not required	
7		Misc allowance for small items, allow 1.5%	1.5%	%	$ -	$ -	$ -	168,428,563	$ 168,428,563	$ 2,526,428	
		Total Direct Cost	1	EA	$ 10,233,079	$ 14,573,290	$ 6,449,139	$ 139,699,483	$ 170,954,991	$ 170,954,991	

Sites Reservoir (Alt 1): Sites Lodoga Road Realignment | **Cost Estimate**
Feasibility Report Cost Estimate | **AACEI Class 4**
Sites, CA | **February 2, 2021**

27.01. Construction Cost Summary - Sites Lodoga Road Realignment				
			Unit Cost Rate $/LF	**Total Cost ($x 1,000)**
		LF:	28,972	
Total Direct Cost			4,584.71	132,828
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS			4,584.71	132,828
General Conditions				
Mobilization		3.0%	137.55	3,985
Site General Conditions & Requirements		10.0%	472.21	13,681
Phasing	*Not included*	0.0%	-	-
General Contractor Overhead and Fees				
Insurance		1.1%	57.12	1,655
Bonds		1.0%	52.50	1,521
GC Field and Home Office Overhead		5.0%	265.22	7,684
GC Profit		5.0%	278.48	8,068
Total Contractor Indirect Markups			1,263.08	36,594
TOTAL DIRECT COST BEFORE CONTINGENCIES			5,847.79	169,422
Contingencies				
Design Contingencies		10.0%	584.77	16,942
Construction Contingencies		15.0%	964.90	27,955
Bidding Contingencies / Alternative Procurement Strategy (APS)		2.0%	147.94	4,286
Total Contingency Allowance			1,697.60	49,183
TOTAL DIRECT COST BEFORE ESCALATION			7,545.39	218,605
Escalation to Report Date	3/31/2021 @ 3.00% p.a.	0.977%	73.69	2,135
Escalation to Mid-point of Construction	*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET			7,619.09	220,740

Cost Work Sheet Summary

Item	Ref Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	U/P Rate	Total	Comment
		Sites Lodoga Road Realignment									
		Road length (LF)	28,972	LF							
		Road length (Miles)	6	MILES							
		Road Area (SF)	985,048	SF							
		Road Area (SY)	109,450	SY							
		Road Area (Acre)	23	ACRE							
1		**Clearing and Demolition Work**									
	1.001	Demolition Work	-	SY						Elsewhere	
	1.002	*Asphalt removal work*	-	*SY*	$ -	$ -	$ -	$ -	$ -	$ -	*Included elsewhere*
	1.003	*Load and haul to disposal site, 3 mile haul*	-	*LCY*	$	$ -	$ -	$ -	$ -	$ -	
	1.004	Clearing and Grubbing	70	ACRE	$ 1,170.07	$ 2,039.50	$ -	$ -	$ 3,209.57	$ 224,670	Light vegetation clearing work
		Roads and Road Structures									
2		**Road Excavations**									
	2.001	Temporary Silt Fence	21,600	LF					$ 4.32	$ 93,318	
	2.002	*Setup temporary silt fence*	*21,600*	*LF*	$ 1.86	$ 0.80	$ 0.44	$ -	$ 3.11	$ 67,073	
	2.003	*Silt fence removal*	*21,600*	*LF*	$ 0.65	$ 0.30	$ -	$ 0.27	$ 1.22	$ 26,245	*Include allowance for dump charges*
	2.004	Roadway Excavation (Cut for re-use) including AB & AC Material	-	CY					$ -	$ -	Not required
	2.005	*Roadway excavations including existing asphalt layer removal*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.006	*Load and haul to processing area, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.007	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.008	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.009	*Load and haul to stockpile, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.010	Roadway Excavation (Cut for re-use) including common earth material, no AB & AC Material	-	CY					$ -	$ -	Not required
	2.011	*Roadway excavations, common earth*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.012	*Load and haul to stockpile/fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.013	Roadway Excavation (Cut to Waste Disposal Area)	165,900	CY					$ 12.82	$ 2,126,343	Includes organic stripping material, rocks and cobbles removal, haul to waste area in reservoir, average 0.5 mile haul
	2.014	*Roadway excavations*	*190,785*	*LCY*	$ 2.54	$ 3.08	$ -	$ -	$ 5.62	$ 1,071,632	*Include a 15% swell factor*
	2.015	*Load and haul to disposal site, 0.5 mile haul*	*190,785*	*LCY*	$ 1.55	$ 3.97	$ -	$ -	$ 5.53	$ 1,054,712	*Haul to disposal area, no provision for processing rubble material or dumping off-site, assumed 0.5 mile hauling distance*
	2.016	Roadway Excavation (Rock Cut)	75,400	CY					$ 22.01	$ 1,659,263	Excavated material to be stockpiled for re-use, average 2 mile haul
	2.017	*Blasting operations*	*27,144*	*LCY*	$ 3.74	$ 4.80	$ 5.82	$ -	$ 14.35	$ 390,449	*Assume 30% of volume will require blasting, assume rock blasting productivity rate of 100CY/hr*
	2.018	*Rock breaking operation*	*63,336*	*LCY*	$ 3.11	$ 4.35	$ -	$ -	$ 7.36	$ 466,206	*Assume 70% of volume will be excavated with ripper*
	2.019	*Load and haul to processing area, 2 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing and screening required*
	2.020	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing required*
	2.021	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No screening required*
	2.022	*Load and haul to stockpile location, 2 mile haul*	*90,480*	*LCY*	$ 2.34	$ 6.53	$ -	$ -	$ 8.87	$ 802,607	*Haul to stockpile location, 2 mile hauling distance assumed*
	2.023	Stripping Excavation for Embankment fill (Cut and Direct Haul)	1,492,700	CY					$ 12.28	$ 18,327,055	Excavate common earth and direct haul to fill location
	2.024	*Roadway excavations*	*1,641,970*	*LCY*	$ 2.54	$ 3.08	$ -	$ -	$ 5.63	$ 9,236,443	*Include 10% swell factor*
	2.025	*Load and haul to fill location, 0.5 mile haul*	*1,641,970*	*LCY*	$ 1.55	$ 3.98	$ -	$ -	$ 5.54	$ 9,090,612	*Assumed 0.5 mile hauling distance*
	2.026	Crushing operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
	2.027	Screening operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
3		**Road Fill and Layer Work**									
	3.001	Roadway Embankment (from road excavation sources)	6,189,400	CY					$ 8.11	$ 50,175,146	From excavated suitable material, assume available on-site excavation
	3.002	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No double handling and stockpiling required; all material to be hauled directly to fill location*
	3.003	*Load and haul from excavation site to fill location, 0.5 mile haul*	*6,189,400*	*LCY*						*Included above*	*Swell factor of 10% included, Direct hauling work included elsewhere*
	3.004	*Spread and compact*	*6,189,400*	*LCY*	$ 3.87	$ 4.23	$ -	$ -	$ 8.11	$ 50,175,146	*Swell factor of 10% included*
	3.005	Roadway Embankment (from on-site Borrow Area)	-	CY						Not required	Backfill material to be sourced from road excavations cut
	3.006	*Load at stockpile and haul to fill location, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.007	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.008	Class 4 Aggregate subbase	17,200	CY					$ 71.14	$ 1,223,541	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.009	*Purchase processed material from quarry*	*29,240*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 442,960	*Purchase from commercial quarry, 1.7ton/cy*
	3.010	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*19,780*	*LCY*	$ 9.72	$ 20.87	$ -	$ -	$ 30.59	$ 605,037	*Haul to fill location, no stockpiling needed*
	3.011	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.012	*Spread and compact*	*19,780*	*LCY*	$ 4.44	$ 4.43	$ -	$ -	$ 8.87	$ 175,543	
	3.013	Class 2 Aggregate base	17,200	CY					$ 71.14	$ 1,223,541	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.014	*Purchase processed material from quarry*	*29,240*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 442,960	*Purchase from commercial quarry, 1.7ton/cy*
	3.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*19,780*	*LCY*	$ 9.72	$ 20.87	$ -	$ -	$ 30.59	$ 605,037	*Haul to fill location, no stockpiling needed*
	3.016	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.017	*Spread and compact*	*19,780*	*LCY*	$ 4.43	$ 4.44	$ -	$ -	$ 8.87	$ 175,543	
	3.018	Asphalt concrete	22,950	TON	$ 9.21	$ 5.39	$ 102.88	$ -	$ 117.48	$ 2,696,190	Assume HMA (Type A), 150lbs/cy
	3.019	Tack Coat	17	TON	$ 1,043.02	$ 555.09	$ 2,664.86	$ -	$ 4,262.97	$ 72,897	Assume 2 application between layers/lifts, Application rate 0.02 gal/sy, Gal of Emulsion for Tack Coat 240 gal/ton
4		**Other Roadwork**									
	4.001	Bridge Replacement	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.002	Midwest Guardrail System	2,897	LF	$ 6.10	$ 2.87	$ 43.54	$ -	$ 52.51	$ 152,145	Allow guardrails for 5% of road length on 2 sides, assume wood posts and MGS at edge of shoulder with fill heights <10'
	4.003	Transition Railing (Type WB-31)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.004	End Anchor Assembly (Type SFT)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required

Sites Reservoir (Alt 1): Sites Lodoga Road Realignment
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub-Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	4.005	24" Dia. Pipe culvert, galvanized, corrugated metal	2,860	LF					$ 103.08	$ 294,814	Galvanized Corrugated Metal, includes bedding, backfill, and compaction, includes flared end sections
	4.006	*Culvert pipe excavations*	*2,132*	*LCY*	*$ 4.97*	*$ 5.12*	*$ -*	*$ -*	*$ 10.09*	*$ 21,512*	
	4.007	*Load and haul material to disposal site, 0.5 mile haul*	*2,132*	*LCY*	*$ 4.17*	*$ 8.17*	*$ -*	*$ -*	*$ 12.34*	*$ 26,308*	
	4.008	*24" Dia pipe, galvanized corrugated metal*	*2,860*	*LF*	*$ 36.78*	*$ 7.72*	*$ 33.11*	*$ -*	*$ 77.61*	*$ 221,964*	
	4.009	*Load at stockpile and haul to fill location, 0.5 mile haul*	*2,132*	*LCY*	*$ 1.78*	*$ 5.57*	*$ -*	*$ -*	*$ 7.35*	*$ 15,664*	
	4.010	*Sand Bedding*	*185*	*LCY*	*$ -*	*$ -*	*$ -*	*$ 49.45*	*$ 49.45*	*$ 9,167*	
	4.011	Box culvert single cell	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.012	Paint Traffic Stripe - 6" Yellow	57,944	LF	$ 0.27	$ 0.17	$ 0.70	$ -	$ 1.14	$ 66,084	Includes 2 yellow stripes
	4.013	Paint Traffic Stripe - 6" White	57,944	LF	$ 0.27	$ 0.17	$ 0.70	$ -	$ 1.14	$ 66,084	Assume 2 edge of traveled way stripes
	4.014	Roadside Signs	29	EA	$ 309.83	$ 140.15	$ 562.46	$ -	$ 1,012.43	$ 29,361	Includes steel posts, Includes furnish aluminum sign panels, Assume 1 sign every 2000' in 2 directions
	4.015	Permanent Erosion Control (Hydroseed)	565,000	SF	$ 0.06	$ 0.02	$ 0.07	$ -	$ 0.15	$ 84,718	Includes seed mix, wood fiber
	4.016	Rock Slope Protection Pad Energy Dissipator (18" D x 2' W x 6' L)	33.33	CY	$ -	$ -	$ 210.81	$ -	$ 210.81	$ 7,027	Assume 2' W x 6' L x 18" D, Assume Rock Slope Protection, Light, Assume Method B placement, Includes excavation, compaction, RSP fabric
	4.017	Temporary Inlet/Outlet Protection	100	EA	$ 47.41	$ 19.56	$ 71.96	$ -	$ 138.92	$ 13,892	Includes install and removal, sandbag barriers, fiber rolls and stakes
	4.018	Rock Anchor Assembly		LF						Not required	
	4.019	Erosion Control (Blanket) / Fiber roll	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Install slope protection matting, includes steel staples and blanket fabric
	4.020	Retaining walls (Allowance)	66,400	SF					$ 74.35	$ 4,937,054	
	4.021	*Setting and removing formwork*	*132,800*	*SF*	*$ 10.02*	*$ 0.20*	*$ 2.29*	*$ -*	*$ 12.51*	*$ 1,660,698*	
	4.022	*Concrete fill work*	*4,919*	*CY*	*$ 33.03*	*$ 8.17*	*$ 224.18*	*$ -*	*$ 264.40*	*$ 1,300,459*	*Assume wall 24" thick, 5000psi concrete*
	4.023	*Provide/Install Reinforcing*	*492*	*TON*	*$ 1,145.19*	*$ 67.73*	*$ 2,802.31*	*$ -*	*$ 4,015.23*	*$ 1,974,898*	*Allow 200lbs/cy*
	4.024	Rock Slope Protection using rip rap	905,000	CY					$ 40.45	$ 36,611,614	
	4.025	*Blasting operations*	*1,086,000*	*LCY*	*$ 4.33*	*$ 4.45*	*$ -*	*$ 5.18*	*$ 13.95*	*$ 15,150,193*	
	4.026	*Load and haul to processing area, 2 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.027	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Not required*
	4.028	*Load and haul to stockpile location, 2 mile haul*	*434,400*	*LCY*	*$ 2.25*	*$ 6.34*	*$ -*	*$ -*	*$ 8.59*	*$ 3,732,337*	*Assume 40% of material to be stockpiled (double handling allowance)*
	4.029	*Load and haul from stockpile to fill location, 0.5 mile haul*	*434,400*	*LCY*	*$ 2.13*	*$ 2.19*	*$ -*	*$ -*	*$ 4.32*	*$ 1,876,956*	*40% of material to be double handled*
	4.030	*Load and direct haul from excavations to fill location, 2 mile haul*	*651,600*	*LCY*	*$ 2.25*	*$ 6.33*	*$ -*	*$ -*	*$ 8.58*	*$ 5,587,718*	*Direct haul to fill location, 60% of material to be hauled directly*
	4.031	*Rip rap placement*	*651,600*	*LCY*	*$ 5.89*	*$ 9.86*	*$ -*	*$ -*	*$ 15.75*	*$ 10,264,810*	
	4.032	RSP backing	493,600	CY					$ 14.35	$ 7,085,415	
	4.033	*Load and haul material from stockpile to fill location, 2 mile haul*	*542,960*	*LCY*	*$ 2.25*	*$ 6.33*	*$ -*	*$ -*	*$ 8.58*	*$ 4,660,028*	
	4.034	*Spread and compact*	*542,960*	*LCY*	*$ 1.72*	*$ 2.75*	*$ -*	*$ -*	*$ 4.47*	*$ 2,425,357*	
	4.035	RSP Fabric backing material	839,200	SY	$ -	$ -	$ -	$ 5.18	$ 5.18	$ 4,342,860	
	4.036	Road piling work								Not required	
5		**Maintenance Work**									
	5.001	Public Road Maintenance Work (Roads identified within project boundary)	-	MILE	$ -	$ -	$ -	$ -	$ -	$ -	Not required
6		**Temporary Work**									
	6.001	General traffic management		MO	$ -	$ -	$ -	$ -		Elsewhere	Included within general conditions and requirements
	6.002	Temporary road surfaces including removal work								Not required	
	6.003	Temporary Traffic Handling	-	DAYS	$ -	$ -	$ -	$ -		Not required	
		Includes temporary cones, barricades, and portable delineators. Includes temporary crash cushions.									
		Bidirectional sand-filled module									
		Temporary K-railing pinned to pavement									
		Temporary traffic striping									
7		**Highway and Other Road Connection Work**									
	7.001	Highway and other road connections			$ -	$ -	$ -	$ -		Not required	
8		**Misc Allowance**									
	8.001	Misc allowance for small items, allow 1%	1.0%	%				$ 131,513,031	$ 131,513,031	$ 1,315,130	
		Total Direct Cost	28,872	LF	$ 1,685.77	$ 2,281.77	$ 227.38	$ 389.79	$ 4,584.71	$ 132,828,161	

27.02. Construction Cost Summary - Huffmaster Road Realignment					
				Unit Cost Rate	**Total Cost**
				$/LF	**($x 1,000)**
			LF:	47,200	
Total Direct Cost				1,989.01	93,881
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				1,989.01	93,881
General Conditions					
Mobilization			3.0%	59.66	2,816
Site General Conditions & Requirements			10.0%	204.87	9,670
Phasing		*Not included*	0.0%	-	-
General Contractor Overhead and Fees					
Insurance			1.1%	24.79	1,170
Bonds			1.0%	22.78	1,075
GC Field and Home Office Overhead			5.0%	115.06	5,431
GC Profit			5.0%	120.81	5,702
Total Contractor Indirect Markups				547.97	25,864
TOTAL DIRECT COST BEFORE CONTINGENCIES				2,536.98	119,745
Contingencies					
Design Contingencies			10.0%	253.71	11,975
Construction Contingencies			15.0%	418.60	19,758
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	64.19	3,030
Total Contingency Allowance				736.50	34,763
TOTAL DIRECT COST BEFORE ESCALATION				3,273.48	154,508
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	31.97	1,509
Escalation to Mid-point of Construction		*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET				3,305.45	156,017

Sites Reservoir (Alt 1): Huffmaster Road Realignment
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
		Huffmaster Road Realignment									
		Road length (LF)	47,200	LF							
		Road length (Miles)	9	MILES							
		Road Area (SF)	1,132,800	SF							
		Road Area (SY)	125,867	SY							
		Road Area (Acre)	27	ACRE							
1		**Clearing and Demolition Work**									
	1.001	Demolition Work	-	SY						Elsewhere	
	1.002	*Asphalt removal work*	-	*SY*	$ -	$ -	$ -	$ -	$ -	$ -	*Included elsewhere*
	1.003	*Load and haul to disposal site, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.004	Clearing and Grubbing	60	ACRE	$ 1,194.45	$ 2,081.99	$ -	$ -	$ 3,276.43	$ 196,586	Light vegetation clearing work
		Roads and Road Structures									
2		**Road Excavations**									
	2.001	Temporary Silt Fence	5,600	LF					$ 6.36	$ 35,595	
	2.002	*Setup temporary silt fence*	*5,600*	*LF*	$ 2.39	$ 1.03	$ 0.44	$ -	$ 3.87	$ 21,647	
	2.003	*Silt fence removal*	*5,600*	*LF*	$ 1.01	$ 0.46	$ -	$ 1.03	$ 2.49	$ 13,948	*Include allowance for dump charges*
	2.004	Roadway Excavation (Cut for re-use) including AB & AC Material	-	CY					$ -	$ -	Not required, assume 0% of total roadway stockpile cut include for AB & AC excavations
	2.005	*Roadway excavations including existing asphalt layer removal*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.006	*Load and haul to processing area, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.007	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.008	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.009	*Load and haul to stockpile, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.010	Roadway Excavation (Cut for re-use) including common earth material, no AB & AC Material	3,627,800	CY					$ 12.82	$ 46,509,542	Includes hauling to stockpile within 0.5 miles, assume usable fill material, assume 100% of total roadway stockpile cut in common earth excavations, no AB & AC material
	2.011	*Roadway excavations, common earth*	*4,171,970*	*LCY*	$ 2.54	$ 3.08	$ -	$ -	$ 5.62	$ 23,439,813	*Common excavations: include a 15% swell factor*
	2.012	*Load and haul to stockpile/fill location, 0.5 mile haul*	*4,171,970*	*LCY*	$ 1.56	$ 3.97	$ -	$ -	$ 5.53	$ 23,069,729	*Haul to stockpile/fill location, 0.5 mile hauling distance assumed*
	2.013	Roadway Excavation (Cut to Waste Disposal Area)	500,900	CY					$ 12.87	$ 6,446,533	Includes organic stripping material, rocks and cobbles removal, haul to waste area in reservoir, average 0.5 mile haul
	2.014	*Roadway excavations*	*576,035*	*LCY*	$ 2.25	$ 3.39	$ -	$ -	$ 5.64	$ 3,248,915	*Include a 15% swell factor*
	2.015	*Load and haul to disposal site, 0.5 mile haul*	*576,035*	*LCY*	$ 1.56	$ 3.99	$ -	$ -	$ 5.55	$ 3,197,618	*Haul to disposal area, no provision for processing rubble material or dumping off-site, assumed 0.5 mile hauling distance*
	2.016	Roadway Excavation (Rock Cut)	195,100	CY					$ 38.49	$ 7,508,830	Excavated material to be stockpiled for re-use, average 8 mile haul
	2.017	*Blasting operations*	*70,236*	*LCY*	$ 4.58	$ 4.63	$ 3.88	$ -	$ 14.06	$ 987,644	*Assume 30% of volume will require blasting, assume rock blasting productivity rate of 100CY/hr*
	2.018	*Rock breaking operation*	*163,884*	*LCY*	$ 3.05	$ 4.18	$ -	$ -	$ 7.23	$ 1,184,942	*Assume 70% of volume will be excavated with ripper*
	2.019	*Load and haul to processing area, 2 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing and screening required*
	2.020	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing required*
	2.021	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No screening required*
	2.022	*Load and haul to stockpile location, 8 mile haul*	*234,120*	*LCY*	$ 5.42	$ 17.37	$ -	$ -	$ 22.79	$ 5,336,244	*Haul to stockpile location, 8 mile hauling distance assumed*
	2.023	Stripping Excavation for Embankment fill (Cut and Direct Haul)	880,000	CY					$ 12.27	$ 10,800,474	Excavate common earth and direct haul to fill location
	2.024	*Roadway excavations*	*968,000*	*LCY*	$ 2.54	$ 3.08	$ -	$ -	$ 5.62	$ 5,443,208	*Include 10% swell factor*
	2.025	*Load and haul to fill location, 0.5 mile haul*	*968,000*	*LCY*	$ 1.55	$ 3.98	$ -	$ -	$ 5.53	$ 5,357,267	*Assumed 0.5 mile hauling distance*
	2.026	Crushing operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
	2.027	Screening operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
3		**Road Fill and Layer Work**									
	3.001	Roadway Embankment (from road excavation sources)	880,000	CY					$ 9.04	$ 7,953,824	From excavated suitable material, assume available on-site excavation
	3.002	*Load at stockpile and haul to fill location, 0.5 mile haul*	*132,000*	*LCY*	$ 1.75	$ 4.47	$ -	$ -	$ 6.21	$ 820,331	*Swell factor of 10% included; Assume 15% of material to be stockpiled first and then hauled to fill location (double handling); 85% of useable backfill to be direct hauled (direct hauling allowance included above)*
	3.003	*Load and haul from excavation site to fill location, 0.5 mile haul*	*748,000*	*LCY*						*Included above*	*Swell factor of 10% included; Direct hauling work included elsewhere*
	3.004	*Spread and compact*	*880,000*	*LCY*	$ 3.78	$ 4.33	$ -	$ -	$ 8.11	$ 7,139,492	*Swell factor of 10% included*
	3.005	Roadway Embankment (from on-site Borrow Area)	-	CY						Not required	Backfill material to be sourced from road excavations cut
	3.006	*Load at stockpile and haul to fill location, 2 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.007	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.008	Class 4 Aggregate subbase	21,000	CY					$ 70.36	$ 1,477,520	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.009	*Purchase processed material from quarry*	*35,700*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 540,823	*Purchase from commercial quarry, 1.7ton/cy*
	3.010	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*24,150*	*LCY*	$ 9.53	$ 20.53	$ -	$ -	$ 30.06	$ 726,045	*Haul to fill location, no stockpiling needed*
	3.011	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.012	*Spread and compact*	*24,150*	*LCY*	$ 4.36	$ 4.36	$ -	$ -	$ 8.72	$ 210,588	
	3.013	Class 2 Aggregate base	42,000	CY					$ 70.36	$ 2,955,040	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.014	*Purchase processed material from quarry*	*71,400*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 1,081,647	*Purchase from commercial quarry, 1.7ton/cy*
	3.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*48,300*	*LCY*	$ 9.55	$ 20.51	$ -	$ -	$ 30.06	$ 1,452,090	*Haul to fill location, no stockpiling needed*
	3.016	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.017	*Spread and compact*	*48,300*	*LCY*	$ 4.36	$ 4.36	$ -	$ -	$ 8.72	$ 421,176	
	3.018	Asphalt concrete	-	TON	$ -	$ -	$ -	$ -	$ -	$ -	Not Required
	3.019	Tack Coat	-	TON	$ -	$ -	$ -	$ -	$ -	$ -	Not Required
4		**Other Roadwork**									
	4.001	Bridge Replacement	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.002	Midwest Guardrail System	4,720	LF	$ 5.62	$ 2.64	$ 43.54	$ -	$ 51.80	$ 244,487	Allow guardrails for 5% of road length on 2 sides, assume wood posts and MGS at edge of shoulder with fill heights <10'

Cost Work Sheet Summary

	4.003	Transition Railing (Type WB-31)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.004	End Anchor Assembly (Type SFT)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.005	24" Dia. Pipe culvert, galvanized, corrugated metal	5,550	LF					$ 101.42	$ 562,876	Galvanized Corrugated Metal, includes bedding, backfill, and compaction, includes flared end sections
	4.006	*Culvert pipe excavations*	*4,137*	*LCY*	*$ 4.61*	*$ 4.75*	*$ -*	*$ -*	*$ 9.36*	*$ 38,721*	
	4.007	*Load and haul material to disposal site, 0.5 mile haul*	*4,137*	*LCY*	*$ 3.95*	*$ 7.58*	*$ -*	*$ -*	*$ 11.53*	*$ 47,715*	
	4.008	*24" Dia pipe, galvanized corrugated metal*	*5,550*	*LF*	*$ 36.05*	*$ 7.78*	*$ 33.11*	*$ -*	*$ 77.94*	*$ 432,545*	
	4.009	*Load at stockpile and haul to fill location, 0.5 mile haul*	*4,137*	*LCY*	*$ 1.52*	*$ 4.79*	*$ -*	*$ -*	*$ 6.31*	*$ 26,106*	
	4.010	*Sand Bedding*	*360*	*LCY*	*$ -*	*$ -*	*$ -*	*$ 49.45*	*$ 49.45*	*$ 17,785*	
	4.011	Box culvert single cell	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.012	Paint Traffic Stripe - 6" Yellow	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.013	Paint Traffic Stripe - 6" White	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.014	Roadside Signs	48	EA	$ 280.78	$ 127.01	$ 562.46	$ -	$ 970.25	$ 46,572	Includes steel posts, Includes furnish aluminum sign panels, Assume 1 sign every 2000' in 2 directions
	4.015	Permanent Erosion Control (Hydroseed)	521,200	SF	$ 0.05	$ 0.02	$ 0.07	$ -	$ 0.15	$ 77,546	Includes seed mix, wood fiber
	4.016	Rock Slope Protection Pad Energy Dissipator (18" D x 2' W x 6' L)	65.33	CY	$ -	$ -	$ 210.81	$ -	$ 210.81	$ 13,773	Assume 2' W x 6' L x 18" D, Assume Rock Slope Protection, Light, Assume Method B placement, Includes excavation, compaction, RSP fabric
	4.017	Temporary Inlet/Outlet Protection	196	EA	$ 40.31	$ 16.64	$ 71.96	$ -	$ 128.90	$ 25,265	Includes install and removal, sandbag barriers, fiber rolls and stakes
	4.018	Rock Anchor Assembly		LF						Not required	
	4.019	Erosion Control (Blanket) / Fiber roll	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Install slope protection matting, includes steel staples and blanket fabric
	4.020	Retaining walls (Allowance)	102,700	SF					$ 74.39	$ 7,639,402	
	4.021	*Setting and removing formwork*	*205,400*	*SF*	*$ 10.03*	*$ 0.30*	*$ 2.29*	*$ -*	*$ 12.52*	*$ 2,572,213*	
	4.022	*Concrete fill work*	*7,607*	*CY*	*$ 33.33*	*$ 8.13*	*$ 223.05*	*$ -*	*$ 264.51*	*$ 2,012,260*	*Assume wall 24" thick, 5000psi concrete*
	4.023	*Provide/Install Reinforcing*	*761*	*TON*	*$ 1,145.66*	*$ 67.76*	*$ 2,802.31*	*$ -*	*$ 4,015.73*	*$ 3,054,929*	*Allow 200lbs/cy*
	4.024	Rock Slope Protection using rip rap	-	CY					$ -	$ -	Not required
	4.025	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	*Load and haul to processing area, 2 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.027	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.028	*Load and haul to stockpile location, 2 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.029	*Load and haul from stockpile to fill location, 0.5 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.030	*Load and direct haul from excavations to fill location, 2 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.031	*Rip rap placement*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.032	RSP backing	-	CY					$ -	$ -	Not required
	4.033	*Load and haul material from stockpile to fill location, 2 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.034	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.035	RSP Fabric backing material	-	SY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.036	Road piling work								Not required	
5		**Maintenance Work**									
	5.001	Public Road Maintenance Work (Roads identified within project boundary)	-	MILE	$ -	$ -	$ -	$ -	$ -	$ -	Not required
6		**Temporary Work**									
	6.001	General traffic management		MO	$ -	$ -	$ -	$ -		Elsewhere	Included within general conditions and requirements
	6.002	Temporary road surfaces including removal work								Not required	
	6.003	Temporary Traffic Handling	-	DAYS	$ -	$ -	$ -	$ -		Not required	
		Includes temporary cones, barricades, and portable delineators. Includes temporary crash cushions.									
		Bidirectional sand-filled module									
		Temporary K-railing pinned to pavement									
		Temporary traffic striping									
7		**Highway and Other Road Connection Work**									
	7.001	Highway and other road connections			$ -	$ -	$ -	$ -		Not required	
8		**Misc Allowance**									
	8.001	Misc allowance for small items, allow 1.5%	1.5%	%				$ 92,493,864	$ 92,493,864	$ 1,387,408	
		Total Direct Cost	47,200	LF	$ 715.44	$ 1,100.72	$ 142.95	$ 29.89	$ 1,989.01	$ 93,881,272	

Sites Reservoir (Alt 1): North Access Road 69 and Saddle Dam Roads | **Cost Estimate**
Feasibility Report Cost Estimate | **AACEI Class 4**
Sites, CA | **February 2, 2021**

27.03. Construction Cost Summary - North Access Road 69 and Saddle Dam Roads				
			Unit Cost Rate $/LF	**Total Cost ($x 1,000)**
		LF:	56,623	
Total Direct Cost			327.73	18,557
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS			327.73	18,557
General Conditions				
Mobilization		5.0%	16.39	928
Site General Conditions & Requirements		10.0%	34.42	1,949
Phasing	*Not included*	0.0%	-	-
General Contractor Overhead and Fees				
Insurance		1.1%	4.17	236
Bonds		1.0%	3.83	217
GC Field and Home Office Overhead		5.0%	19.32	1,094
GC Profit		5.0%	20.29	1,149
Total Contractor Indirect Markups			98.42	5,573
TOTAL DIRECT COST BEFORE CONTINGENCIES			426.16	24,130
Contingencies				
Design Contingencies		10.0%	42.62	2,413
Construction Contingencies		15.0%	70.31	3,981
Bidding Contingencies / Alternative Procurement Strategy (APS)		2.0%	10.77	610
Total Contingency Allowance			123.70	7,004
TOTAL DIRECT COST BEFORE ESCALATION			549.85	31,134
Escalation to Report Date	3/31/2021 @ 3.00% p.a.	0.977%	5.37	304
Escalation to Mid-point of Construction	*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET			555.22	31,438

		North Access Road 69 and Saddle Dam Roads									
		Road length (LF)	56,623	LF							
		Road length (Miles)	11	MILES							
		Road Area (SF)	1,019,214	SF							
		Road Area (SY)	113,246	SY							
		Road Area (Acre)	24	ACRE							
1		**Clearing and Demolition Work**									
	1.001	Demolition Work	-	SY						Included below	
	1.002	*Asphalt removal work*	-	*SY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.003	*Load and haul to disposal site, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.004	Clearing and Grubbing	76	ACRE	$ 1,145.05	$ 1,995.89	$ -	$ -	$ 3,140.94	$ 238,712	Light vegetation clearing work
		Roads and Road Structures									
2		**Road Excavations**									
	2.001	Temporary Silt Fence	14,000	LF					$ 4.76	$ 66,684	
	2.002	*Setup temporary silt fence*	*14,000*	*LF*	$ 1.91	$ 0.83	$ 0.44	$ -	$ 3.19	$ 44,538	
	2.003	*Silt fence removal*	*14,000*	*LF*	$ 0.91	$ 0.36	$ -	$ 0.31	$ 1.58	$ 22,146	*Include allowance for dump charges*
	2.004	Roadway Excavation (Cut for re-use) including AB & AC Material	-	CY					$ -	$ -	Not required, assume 0% of total roadway stockpile cut include for AB & AC excavations
	2.005	*Roadway excavations including existing asphalt layer removal*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.006	*Load and haul to processing area, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.007	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.008	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.009	*Load and haul to stockpile, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.010	Roadway Excavation (Cut for re-use) including common earth material, no AB & AC Material	383,400	CY					$ 12.85	$ 4,927,716	Includes hauling to stockpile within 0.5 miles, assume usable fill material, assume 100% of total roadway stockpile cut in common earth excavations, no AB & AC material
	2.011	*Roadway excavations, common earth*	*440,910*	*LCY*	$ 3.54	$ 2.09	$ -	$ -	$ 5.63	$ 2,483,464	*Common excavations; include a 15% swell factor*
	2.012	*Load and haul to stockpile/fill location, 0.5 mile haul*	*440,910*	*LCY*	$ 1.56	$ 3.98	$ -	$ -	$ 5.54	$ 2,444,253	*Haul to stockpile/fill location, 0.5 mile hauling distance assumed*
	2.013	Roadway Excavation (Cut to Waste Disposal Area)	72,200	CY					$ 13.09	$ 945,042	Includes organic stripping material, rocks and cobbles removal, haul to waste area in reservoir, average 0.5 mile haul
	2.014	*Roadway excavations*	*83,030*	*LCY*	$ 2.39	$ 3.35	$ -	$ -	$ 5.74	$ 476,251	*Include a 15% swell factor*
	2.015	*Load and haul to disposal site, 0.5 mile haul*	*83,030*	*LCY*	$ 1.59	$ 4.06	$ -	$ -	$ 5.65	$ 468,761	*Haul to disposal area, no provision for processing rubble material or dumping off-site; assumed 0.5 mile hauling distance*
	2.016	Roadway Excavation (Rock Cut)	35,400	CY					$ 23.34	$ 826,257	Excavated material to be stockpiled for re-use, average 2 mile haul
	2.017	*Blasting operations*	*12,744*	*LCY*	$ 5.08	$ 5.07	$ 4.85	$ -	$ 15.00	$ 191,210	*Assume 30% of volume will require blasting, assume rock blasting productivity rate of 100CY/hr*
	2.018	*Rock breaking operation*	*29,736*	*LCY*	$ 3.04	$ 4.15	$ -	$ -	$ 7.19	$ 213,678	*Assume 70% of volume will be excavated with ripper*
	2.019	*Load and haul to processing area, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing and screening required*
	2.020	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing required*
	2.021	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No screening required*
	2.022	*Load and haul to stockpile location, 2 mile haul*	*42,480*	*LCY*	$ 2.62	$ 7.30	$ -	$ -	$ 9.92	$ 421,369	*Haul to stockpile location, 2 mile hauling distance assumed*
	2.023	Stripping Excavation for Embankment fill (Cut and Direct Haul)	266,000	CY					$ 12.31	$ 3,273,894	Excavate common earth and direct haul to fill location
	2.024	*Roadway excavations*	*292,600*	*LCY*	$ 2.55	$ 3.09	$ -	$ -	$ 5.64	$ 1,649,972	*Include 10% swell factor*
	2.025	*Load and haul to fill location, 0.5 mile haul*	*292,600*	*LCY*	$ 1.56	$ 3.99	$ -	$ -	$ 5.55	$ 1,623,921	*Assumed 0.5 mile hauling distance*
	2.026	Crushing operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
	2.027	Screening operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
3		**Road Fill and Layer Work**									
	3.001	Roadway Embankment (Stockpile to Fill)	266,000	CY					$ 8.55	$ 2,273,577	From excavated suitable material, assume available on-site excavation
	3.002	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No double handling and stockpiling required; all material to be hauled directly to fill location*
	3.003	*Load and haul from excavation site to fill location. 0.5 mile haul*	*266,000*	*LCY*						*Included above*	*Swell factor of 10% included; Direct hauling work included elsewhere*
	3.004	*Spread and compact*	*266,000*	*LCY*	$ 4.23	$ 4.32	$ -	$ -	$ 8.55	$ 2,273,577	*Swell factor of 10% included*
	3.005	Roadway Embankment (from on-site Borrow Area)	-	CY						Not required	Backfill material to be sourced from road excavations cut
	3.006	*Load at stockpile and haul to fill location, 2 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.007	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.008	Class 4 Aggregate subbase	12,100	CY					$ 73.06	$ 884,043	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.009	*Purchase processed material from quarry*	*20,570*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 311,617	*Purchase from commercial quarry, 1.7ton/cy*
	3.010	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*13,915*	*LCY*	$ 10.13	$ 21.76	$ -	$ -	$ 31.89	$ 443,694	*Haul to fill location, no stockpiling needed*
	3.011	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.012	*Spread and compact*	*13,915*	*LCY*	$ 4.63	$ 4.63	$ -	$ -	$ 9.25	$ 128,732	
	3.013	Class 2 Aggregate base	48,700	CY					$ 69.80	$ 3,399,485	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.014	*Purchase processed material from quarry*	*82,790*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 1,254,395	*Purchase from commercial quarry, 1.7ton/cy*
	3.015	*Haul material from quarry to site stockpile/fill location. 40 mile haul*	*56,005*	*LCY*	$ 9.38	$ 20.15	$ -	$ -	$ 29.53	$ 1,653,769	*Haul to fill location, no stockpiling needed*
	3.016	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.017	*Spread and compact*	*56,005*	*LCY*	$ 4.39	$ 4.39	$ -	$ -	$ 8.78	$ 491,521	
	3.018	Asphalt concrete	-	TON	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	3.019	Tack Coat	-	TON	$ -	$ -	$ -	$ -	$ -	$ -	Not required
4		**Other Roadwork**									
	4.001	Bridge Replacement	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.002	Midwest Guardrail System	5,662	LF	$ 5.62	$ 2.64	$ 43.53	$ -	$ 51.79	$ 293,272	Allow guardrails for 5% of road length on 2 sides, assume wood posts and MGS at edge of shoulder with fill heights <10'

Sites Reservoir (Alt 1): North Access Road 69 and Saddle Dam Roads
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

	4.003	Transition Railing (Type WB-31)	8	EA	$ 1,321.19	$ 1,246.48	$ 2,693.75	$ -	$ 5,261.42	$ 42,091	Assume 4 at each culvert crossing, assume wood posts
	4.004	End Anchor Assembly (Type SFT)	8	EA	$ 1,321.19	$ 1,246.48	$ 592.63	$ -	$ 3,160.29	$ 25,282	Assume 4 at each culvert crossing, assume wood posts
	4.005	24" Dia. Pipe culvert, galvanized, corrugated metal	2,080	LF					$ 109.32	$ 227,393	Galvanized Corrugated Metal, includes bedding, backfill, and compaction, includes flared end sections
	4.006	*Culvert pipe excavations*	*1,550*	*LCY*	*$ 5.47*	*$ 5.63*	*$ -*	*$ -*	*$ 11.10*	*$ 17,210*	
	4.007	*Load and haul material to disposal site, 3 mile haul*	*1,550*	*LCY*	*$ 3.68*	*$ 12.59*	*$ -*	*$ -*	*$ 16.33*	*$ 25,320*	
	4.008	*24" Dia pipe, galvanized corrugated metal*	*2,080*	*LF*	*$ 37.78*	*$ 7.72*	*$ 32.11*	*$ -*	*$ 77.61*	*$ 161,425*	
	4.009	*Load at stockpile and haul to fill location, 0.5 mile haul*	*1,550*	*LCY*	*$ 2.30*	*$ 6.52*	*$ -*	*$ -*	*$ 8.82*	*$ 13,672*	
	4.010	*Sand Bedding*	*135*	*LCY*	*$ -*	*$ -*	*$ -*	*$ 49.45*	*$ 49.45*	*$ 6,667*	
	4.011	Box culvert single cell	2	EA	$ 1,302.35	$ 543.55	$ 10,020.75	$ -	$ 11,866.65	$ 23,733	Assume 8' long, 12' x 8'
	4.012	Paint Traffic Stripe - 6" Yellow	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.013	Paint Traffic Stripe - 6" White	-	LF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.014	Roadside Signs	57	EA	$ 315.26	$ 142.61	$ 562.46	$ -	$ 1,020.33	$ 58,159	Includes steel posts, Includes furnish aluminum sign panels, Assume 1 sign every 2000' in 2 directions
	4.015	Permanent Erosion Control (Hydroseed)	172,800	SF	$ 0.07	$ 0.03	$ 0.07	$ -	$ 0.17	$ 28,519	Includes seed mix, wood fiber
	4.016	Rock Slope Protection Pad Energy Dissipator (18" D x 2' W x 6' L)	29.33	CY	$ -	$ -	$ 210.81	$ -	$ 210.81	$ 6,184	Assume 2' W x 6' L x 18" D, Assume Rock Slope Protection, Light, Assume Method B placement, Includes excavation, compaction, RSP fabric
	4.017	Temporary Inlet/Outlet Protection	110	EA	$ 43.10	$ 17.78	$ 71.96	$ -	$ 132.84	$ 14,612	Includes install and removal, sandbag barriers, fiber rolls and stakes
	4.018	Rock Anchor Assembly		LF						Not required	
	4.019	Erosion Control (Blanket) / Fiber roll	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.020	Retaining walls (Allowance)	-	SF					$ -	$ -	Not required
	4.021	*Setting and removing formwork*	*-*	*SF*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.022	*Concrete fill work*	*-*	*CY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.023	*Provide/Install Reinforcing*	*-*	*TON*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.024	Rock Slope Protection using rip rap	-	CY					$ -	$ -	Not required
	4.025	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	*Load and haul to processing area, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.027	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.028	*Load and haul to fill location, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.029	*Rip rap placement*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.030	RSP backing	-	CY					$ -	$ -	Not required
	4.031	*Load and haul material from stockpile to fill location, 2 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.032	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.033	RSP Fabric backing material	-	SY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.034	Road piling work								Not required	
5		**Maintenance Work**									
	5.001	Public Road Maintenance Work (Roads identified within project boundary)	11	MILE	$ -	$ -	$ -	$ 50,000.00	$ 50,000.00	$ 550,000	Not required
6		**Temporary Work**									
	6.001	General traffic management		MO	$ -	$ -	$ -	$ -		Elsewhere	Included within general conditions and requirements
	6.002	Temporary road surfaces including removal work								Not required	
	6.003	Temporary Traffic Handling	-	DAYS	$ -	$ -	$ -	$ -		Not required	
		Includes temporary cones, barricades, and portable delineators. Includes temporary crash cushions.									
		Bidirectional sand-filled module									
		Temporary K-railing pinned to pavement									
		Temporary traffic striping									
7		**Highway and Other Road Connection Work**									
	7.001	Highway and other road connections			$ -	$ -	$ -	$ -		Not required	
8		**Misc Allowance**									
	8.001	Misc allowance for small items, allow 2.5%	2.5%	%				$ 18,104,654	$ 18,104,654	$ 452,616	
		Total Direct Cost	55,523	LF	$ 106.64	$ 166.93	$ 36.23	$ 17.93	$ 327.73	$ 18,557,270	

27.04. Construction Cost Summary - County, Delevan & Maxwell Roads					
				Unit Cost Rate $/LF	**Total Cost ($x 1,000)**
			LF:	112,356	
Total Direct Cost				260.91	29,314
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				260.91	29,314
General Conditions					
Mobilization			5.0%	13.05	1,466
Site General Conditions & Requirements			10.0%	27.40	3,078
Phasing		*Not included*	0.0%	-	-
General Contractor Overhead and Fees					
Insurance			1.1%	3.31	372
Bonds			1.0%	3.04	342
GC Field and Home Office Overhead			5.0%	15.39	1,729
GC Profit			5.0%	16.15	1,815
Total Contractor Indirect Markups				78.34	8,802
TOTAL DIRECT COST BEFORE CONTINGENCIES				339.25	38,116
Contingencies					
Design Contingencies			10.0%	33.93	3,812
Construction Contingencies			15.0%	55.97	6,289
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	8.58	964
Total Contingency Allowance				98.48	11,065
TOTAL DIRECT COST BEFORE ESCALATION				437.73	49,181
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	4.27	480
Escalation to Mid-point of Construction		*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET				442.00	49,661

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	All-in Rate	Total	Comment
		County, Delevan & Maxwell Roads									
		Road length (LF)	112,356	LF							
		Road length (Miles)	22	MILES							
		Road Area (SF)	3,145,968	SF							
		Road Area (SY)	349,552	SY							
		Road Area (Acre)	73	ACRE							
1		**Clearing and Demolition Work**									
	1.001	Demolition Work	-	SY						Included below	
	1.002	*Asphalt removal work*	-	*SY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.003	*Load and haul to disposal site, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.004	Clearing and Grubbing	38	ACRE	$ 1,212.41	$ 2,113.29	$ -	$ -	$ 3,325.70	$ 126,377	Light vegetation clearing work
		Roads and Road Structures									
2		**Road Excavations**									
	2.001	Temporary Silt Fence	18,310	LF					$ 4.76	$ 87,067	
	2.002	*Setup temporary silt fence*	*18,310*	*LF*	$ 2.01	$ 0.87	$ 0.44	$ -	$ 3.32	$ 60,822	
	2.003	*Silt fence removal*	*18,310*	*LF*	$ 0.77	$ 0.35	$ -	$ 0.23	$ 1.43	$ 26,245	*Include allowance for dump charges*
	2.004	Roadway Excavation (Cut for re-use) including AB & AC Material	138,060	CY					$ 14.42	$ 1,991,337	Includes AB & AC material which needs to be crushed and screened for potential re-use, includes hauling to stockpile within 0.5 miles, assume 90% of total roadway excavations include for AB & AC excavations
	2.005	*Roadway excavations including existing asphalt layer removal*	*155,769*	*LCY*	$ 2.86	$ 3.47	$ -	$ -	$ 6.32	$ 1,003,591	*Includes removal of asphalt top layer, include a 15% swell factor*
	2.006	*Load and haul to processing area, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*Not required*
	2.007	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing required*
	2.008	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No screening required*
	2.009	*Load and haul to stockpile, 0.5 mile haul*	*155,769*	*LCY*	$ 1.75	$ 4.47	$ -	$ -	$ 6.22	$ 987,746	*Haul to stockpile location, 0.5 mile hauling distance assumed*
	2.010	Roadway Excavation (Cut for re-use) including common earth material, no AB & AC Material	15,340	CY					$ 13.20	$ 202,509	Includes hauling to stockpile within 0.5 miles, assume usable fill material, assume 10% of total roadway stockpile cut in common earth excavations, no AB & AC material
	2.011	*Roadway excavations, common earth*	*17,641*	*LCY*	$ 2.62	$ 3.17	$ -	$ -	$ 5.79	$ 102,060	*Common excavations; include a 15% swell factor*
	2.012	*Load and haul to stockpile/fill location, 0.5 mile haul*	*17,641*	*LCY*	$ 1.60	$ 4.09	$ -	$ -	$ 5.69	$ 100,449	*Haul to stockpile/fill location, 0.5 mile hauling distance assumed*
	2.013	Roadway Excavation (Cut to Waste Disposal Area)	17,400	CY					$ 20.20	$ 351,489	Includes organic stripping material, rocks and cobbles removal, haul to waste area in reservoir, average 3 mile haul
	2.014	*Roadway excavations*	*20,010*	*LCY*	$ 2.69	$ 3.26	$ -	$ -	$ 5.95	$ 119,070	*Include a 15% swell factor*
	2.015	*Load and haul to disposal site, 3 mile haul*	*20,010*	*LCY*	$ 2.98	$ 8.64	$ -	$ -	$ 11.62	$ 232,419	*Haul to disposal area, no provision for processing rubble material or dumping off-site; assumed 3 mile hauling distance*
	2.016	Roadway Excavation (Rock Cut)	-	CY					$ -	$ -	Not required
	2.017	*Blasting operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.018	*Rock breaking operation*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.019	*Load and haul to processing area, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.020	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.021	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.022	*Load and haul to stockpile location, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.023	Stripping Excavation for Embankment fill (Cut and Direct Haul)	3,880	CY					$ 17.40	$ 67,503	Excavate common earth and direct haul to fill location
	2.024	*Roadway excavations*	*4,268*	*LCY*	$ 3.60	$ 4.37	$ -	$ -	$ 7.97	$ 34,020	*Include 10% swell factor*
	2.025	*Load and haul to fill location, 0.5 mile haul*	*4,268*	*LCY*	$ 2.21	$ 5.34	$ -	$ -	$ 7.55	$ 33,483	*Assumed 0.5 mile hauling distance*
	2.026	Crushing operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
	2.027	Screening operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
3		**Road Fill and Layer Work**									
	3.001	Roadway Embankment (Stockpile to Fill)	3,880	CY					$ 8.88	$ 34,448	From excavated suitable material, assume available on-site excavation
	3.002	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No double handling and stockpiling required; all material to be hauled directly to fill location*
	3.003	*Load and haul from excavation site to fill location, 0.5 mile haul*	*3,880*	*LCY*						*Included above*	*Swell factor of 10% included, Direct hauling work included elsewhere*
	3.004	*Spread and compact*	*3,880*	*LCY*	$ 4.19	$ 4.39	$ -	$ -	$ 8.58	$ 34,445	*Swell factor of 10% included*
	3.005	Roadway Embankment (from on-site Borrow Area)	-	CY						Not required	Backfill material to be sourced from road excavations cut
	3.006	*Load at stockpile and haul to fill location, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.007	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.008	Class 4 Aggregate subbase	58,330	CY					$ 69.67	$ 4,063,800	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.009	*Purchase processed material from quarry*	*99,161*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 1,502,201	*Purchase from commercial quarry, 1.7ton/cy*
	3.010	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*67,080*	*LCY*	$ 9.36	$ 20.10	$ -	$ -	$ 29.46	$ 1,976,455	*Haul to fill location, no stockpiling needed*
	3.011	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.012	*Spread and compact*	*67,080*	*LCY*	$ 4.36	$ 4.36	$ -	$ -	$ 8.72	$ 585,144	
	3.013	Class 2 Aggregate base	58,330	CY					$ 69.67	$ 4,063,800	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.014	*Purchase processed material from quarry*	*99,161*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 1,502,201	*Purchase from commercial quarry, 1.7ton/cy*
	3.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*67,080*	*LCY*	$ 9.36	$ 20.10	$ -	$ -	$ 29.46	$ 1,976,455	*Haul to fill location, no stockpiling needed*
	3.016	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.017	*Spread and compact*	*67,080*	*LCY*	$ 4.36	$ 4.36	$ -	$ -	$ 8.72	$ 585,144	
	3.018	Asphalt concrete	78,680	TON	$ 8.96	$ 5.24	$ 102.88	$ -	$ 117.08	$ 9,211,473	Assume HMA (Type A), 150lbs/cy
	3.019	Tack Coat	59	TON	$ 955.48	$ 508.50	$ 2,475.08	$ -	$ 3,939.06	$ 231,617	Assume 2 application between layers/lifts, Application rate 0.02 gal/sy, Gal of Emulsion for Tack Coat 240 gal/ton
4		**Other Roadwork**									
	4.001	Bridge Replacement	10,705	SF	$ -	$ -	$ -	$ 492.86	$ 492.86	$ 5,276,036	Includes provision for breaking down existing bridge including new construction

	4.002	Midwest Guardrail System	11,236	LF	$ 5.66	$ 2.67	$ 43.53	$ -	$ 51.86	$ 582,666	Allow guardrails for 5% of road length on 2 sides, assume wood posts and MGS at edge of shoulder with fill heights <10'
	4.003	Transition Railing (Type WB-31)	28	EA	$ 1,226.82	$ 1,157.44	$ 2,693.75	$ -	$ 5,078.01	$ 142,184	Assume 4 at each culvert crossing, assume wood posts
	4.004	End Anchor Assembly (Type SFT)	28	EA	$ 1,226.82	$ 1,157.44	$ 592.63	$ -	$ 2,976.89	$ 83,353	Assume 4 at each culvert crossing, assume wood posts
	4.005	24" Dia. Pipe culvert, galvanized, corrugated metal	1,384	LF					$ 114.46	$ 158,416	Galvanized Corrugated Metal, includes bedding, backfill, and compaction, includes flared end sections
	4.006	*Culvert pipe excavations*	*1,032*	*LCY*	*$ 6.16*	*$ 6.35*	*$ -*	*$ -*	*$ 12.51*	*$ 12,907*	
	4.007	*Load and haul material to disposal site, 3 mile haul*	*1,032*	*LCY*	*$ 6.36*	*$ 14.30*	*$ -*	*$ -*	*$ 20.66*	*$ 21,315*	
	4.008	*24" Dia pipe, galvanized corrugated metal*	*1,384*	*LF*	*$ 39.03*	*$ 7.98*	*$ 32.11*	*$ -*	*$ 79.12*	*$ 109,504*	
	4.009	*Load at stockpile and haul to fill location, 0.5 mile haul*	*1,032*	*LCY*	*$ 2.59*	*$ 7.35*	*$ -*	*$ -*	*$ 9.94*	*$ 10,254*	
	4.010	*Sand Bedding*	*90*	*LCY*	*$ -*	*$ -*	*$ -*	*$ 49.45*	*$ 49.45*	*$ 4,450*	
	4.011	Box culvert single cell	7	EA	$ 744.20	$ 310.60	$ 10,020.75	$ -	$ 11,075.55	$ 77,529	Assume 8' long, 12' x 8'
	4.012	Paint Traffic Stripe - 6" Yellow	224,712	LF	$ 0.25	$ 0.16	$ 0.70	$ -	$ 1.11	$ 249,827	Includes 2 yellow stripes
	4.013	Paint Traffic Stripe - 6" White	224,712	LF	$ 0.25	$ 0.16	$ 0.70	$ -	$ 1.11	$ 249,827	Assume 2 edge of traveled way stripes
	4.014	Roadside Signs	113	EA	$ 278.29	$ 125.89	$ 562.46	$ -	$ 966.64	$ 109,230	Includes steel posts, Includes furnish aluminum sign panels, Assume 1 sign every 2000' in 2 directions
	4.015	Permanent Erosion Control (Hydroseed)	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.016	Rock Slope Protection Pad Energy Dissipator (18" D x 2' W x 6' L)	52.00	CY	$ -	$ -	$ 210.81	$ -	$ 210.81	$ 10,962	Assume 2' W x 6' L x 18" D, Assume Rock Slope Protection, Light, Assume Method B placement, Includes excavation, compaction, RSP fabric
	4.017	Temporary Inlet/Outlet Protection	156	EA	$ 40.52	$ 16.72	$ 71.96	$ -	$ 129.19	$ 20,154	Includes install and removal, sandbag barriers, fiber rolls and stakes
	4.018	Rock Anchor Assembly		LF						Not required	
	4.019	Erosion Control (Blanket) / Fiber roll	374,710	SF	$ -	$ -	$ -	$ 0.29	$ 0.29	$ 107,729	Install slope protection matting, includes steel staples and blanket fabric
	4.020	Retaining walls (Allowance)	-	SF					$ -	$ -	Not required
	4.021	*Setting and removing formwork*	*-*	*SF*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.022	*Concrete fill work*	*-*	*CY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.023	*Provide/Install Reinforcing*	*-*	*TON*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.024	Rock Slope Protection using rip rap	-	CY					$ -	$ -	Not required
	4.025	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	*Load and haul to processing area, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.027	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.028	*Load and haul to fill location, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.029	*Rip rap placement*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.030	RSP backing	-	CY					$ -	$ -	Not required
	4.031	*Load and haul material from stockpile to fill location, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.032	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.033	RSP Fabric backing material	-	SY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.034	Road piling work								Not required	
5		**Maintenance Work**									
	5.001	Public Road Maintenance Work (Roads identified within project boundary)	22	MILE	$ -	$ -	$ -	$ 50,000.00	$ 50,000.00	$ 1,100,000	Include maintenance allowance for road repair during construction, provision for patching work as needed - Allow $50,000/mile for road patching and repair
6		**Temporary Work**									
	6.001	General traffic management		MO	$ -	$ -	$ -	$ -		Elsewhere	Included within general conditions and requirements
	6.002	Temporary road surfaces including removal work								Not required	
	6.003	Temporary Traffic Handling	-	DAYS	$ -	$ -	$ -	$ -		Not required	
		Includes temporary cones, barricades, and portable delineators. Includes temporary crash cushions.									
		Bidirectional sand-filled module									
		Temporary K-railing pinned to pavement									
		Temporary traffic striping									
7		**Highway and Other Road Connection Work**									
	7.001	Highway and other road connections			$ -	$ -	$ -	$ -		Not required	
8		**Misc Allowance**									
	8.001	Misc allowance for small items, allow 2.5%	2.5%	%				$ 28,599,333	$ 28,599,333	$ 714,983	
		Total Direct Cost	112,356	LF	$ 35.75	$ 51.09	$ 109.91	$ 64.16	$ 260.91	$ 29,314,316	

27.05. Construction Cost Summary - Access Roads A, B, C & Comm Roads					
				Unit Cost Rate	**Total Cost**
				$/LF	**($x 1,000)**
			LF:	26,766	
Total Direct Cost				654.74	17,525
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				654.74	17,525
General Conditions					
Mobilization			5.0%	32.73	876
Site General Conditions & Requirements			10.0%	68.74	1,840
Phasing		*Not included*	0.0%	-	-
General Contractor Overhead and Fees					
Insurance			1.1%	8.33	223
Bonds			1.0%	7.66	205
GC Field and Home Office Overhead			5.0%	38.59	1,033
GC Profit			5.0%	40.54	1,085
Total Contractor Indirect Markups				196.59	5,262
TOTAL DIRECT COST BEFORE CONTINGENCIES				851.33	22,787
Contingencies					
Design Contingencies			10.0%	85.15	2,279
Construction Contingencies			15.0%	140.48	3,760
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	21.56	577
Total Contingency Allowance				247.18	6,616
TOTAL DIRECT COST BEFORE ESCALATION				1,098.51	29,403
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	10.72	287
Escalation to Mid-point of Construction		*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET				1,109.23	29,690

Sites Reservoir (Alt 1): Access Roads A, B, C & Comm Roads
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

		Access Roads A, B, C & Comm Roads									
		Road length (LF)	26,766	LF							
		Road length (Miles)	6	MILES							
		Road Area (SF)	401,490	SF							
		Road Area (SY)	44,610	SY							
		Road Area (Acre)	10	ACRE							
1		**Clearing and Demolition Work**									
	1.001	Demolition Work	-	SY						Included below	
	1.002	*Asphalt removal work*	-	*SY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.003	*Load and haul to disposal site, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.004	Clearing and Grubbing	24	ACRE	$ 1,279.77	$ 2,230.70	$ -	$ -	$ 3,510.47	$ 84,251	Light vegetation clearing work
		Roads and Road Structures									
2		**Road Excavations**									
	2.001	Temporary Silt Fence	4,800	LF					$ 6.34	$ 30,450	
	2.002	*Setup temporary silt fence*	*4,800*	*LF*	$ 3.09	$ 0.90	$ 0.44	$ -	$ 3.44	$ 16,502	
	2.003	*Silt fence removal*	*4,800*	*LF*	$ 1.18	$ 0.53	$ -	$ 1.20	$ 2.91	$ 13,948	*Include allowance for dump charges*
	2.004	Roadway Excavation (Cut for re-use) including AB & AC Material	-	CY					$ -	$ -	Not required, assume 0% of total roadway stockpile cut include for AB & AC excavations
	2.005	*Roadway excavations including existing asphalt layer removal*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.006	*Load and haul to processing area, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.007	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.008	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.009	*Load and haul to stockpile, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.010	Roadway Excavation (Cut for re-use) including common earth material, no AB & AC Material	344,800	CY					$ 12.82	$ 4,421,444	Includes hauling to stockpile within 0.5 miles, assume usable fill material, assume 100% of total roadway stockpile cut in common earth excavations, no AB & AC material
	2.011	*Roadway excavations, common earth*	*396,520*	*LCY*	$ 3.54	$ 3.08	$ -	$ -	$ 5.62	$ 2,228,313	*Common excavations; include a 15% swell factor*
	2.012	*Load and haul to stockpile/fill location, 0.5 mile haul*	*396,520*	*LCY*	$ 1.56	$ 3.98	$ -	$ -	$ 5.53	$ 2,193,131	*Haul to stockpile/fill location, 0.5 mile hauling distance assumed*
	2.013	Roadway Excavation (Cut to Waste Disposal Area)	63,500	CY					$ 13.29	$ 843,787	Includes organic stripping material, rocks and cobbles removal, haul to waste area in reservoir, average 0.5 mile haul
	2.014	*Roadway excavations*	*73,025*	*LCY*	$ 2.63	$ 3.19	$ -	$ -	$ 5.82	$ 425,251	*Include a 15% swell factor*
	2.015	*Load and haul to disposal site, 0.5 mile haul*	*73,025*	*LCY*	$ 1.61	$ 4.12	$ -	$ -	$ 5.73	$ 418,536	*Haul to disposal area, no provision for processing rubble material or dumping off-site; assumed 0.5 mile hauling distance*
	2.016	Roadway Excavation (Rock Cut)	9,300	CY					$ 20.19	$ 187,748	Excavated material to be stockpiled for re-use, average 0.5 mile haul
	2.017	*Blasting operations*	*3,348*	*LCY*	$ 4.80	$ 4.86	$ 4.85	$ -	$ 14.51	$ 48,585	*Assume 30% of volume will require blasting, assume rock blasting productivity rate of 100CY/hr*
	2.018	*Rock breaking operation*	*7,812*	*LCY*	$ 3.15	$ 4.31	$ -	$ -	$ 7.46	$ 58,276	*Assume 70% of volume will be excavated with ripper*
	2.019	*Load and haul to processing area, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing and screening required*
	2.020	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing required*
	2.021	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No screening required*
	2.022	*Load and haul to stockpile location, 0.5 mile haul*	*11,160*	*LCY*	$ 3.05	$ 4.20	$ -	$ -	$ 7.25	$ 80,894	*Haul to stockpile location, 0.5 mile hauling distance assumed*
	2.023	Stripping Excavation for Embankment fill (Cut and Direct Haul)	226,300	CY					$ 12.38	$ 2,801,373	Excavate common earth and direct haul to fill location
	2.024	*Roadway excavations*	*248,930*	*LCY*	$ 2.56	$ 3.11	$ -	$ -	$ 5.67	$ 1,411,832	*Include 10% swell factor*
	2.025	*Load and haul to fill location, 0.5 mile haul*	*248,930*	*LCY*	$ 1.57	$ 4.01	$ -	$ -	$ 5.58	$ 1,389,541	*Assumed 0.5 mile hauling distance*
	2.026	Crushing operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
	2.027	Screening operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
3		**Road Fill and Layer Work**									
	3.001	Roadway Embankment (Stockpile to Fill)	226,300	CY					$ 8.52	$ 1,929,095	From excavated suitable material, assume available on-site excavation
	3.002	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No double handling and stockpiling required; all material to be hauled directly to fill location*
	3.003	*Load and haul from excavation site to fill location. 0.5 mile haul*	*226,300*	*LCY*						*Included above*	*Swell factor of 10% included; Direct hauling work included elsewhere*
	3.004	*Spread and compact*	*226,300*	*LCY*	$ 4.21	$ 4.31	$ -	$ -	$ 8.52	$ 1,929,095	*Swell factor of 10% included*
	3.005	Roadway Embankment (from on-site Borrow Area)	-	CY						Not required	Backfill material to be sourced from road excavations cut
	3.006	*Load at stockpile and haul to fill location, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.007	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.008	Class 4 Aggregate subbase	2,900	CY					$ 79.59	$ 230,801	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.009	*Purchase processed material from quarry*	*4,930*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 74,695	*Purchase from commercial quarry, 1.7ton/cy*
	3.010	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*3,335*	*LCY*	$ 11.50	$ 24.78	$ -	$ -	$ 36.28	$ 121,007	*Haul to fill location, no stockpiling needed*
	3.011	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.012	*Spread and compact*	*3,335*	*LCY*	$ 5.28	$ 5.25	$ -	$ -	$ 10.53	$ 35,109	
	3.013	Class 2 Aggregate base	20,900	CY					$ 70.57	$ 1,474,945	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.014	*Purchase processed material from quarry*	*35,530*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 538,248	*Purchase from commercial quarry, 1.7ton/cy*
	3.015	*Haul material from quarry to site stockpile/fill location. 40 mile haul*	*24,035*	*LCY*	$ 9.59	$ 20.62	$ -	$ -	$ 30.21	$ 726,045	*Haul to fill location, no stockpiling needed*
	3.016	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.017	*Spread and compact*	*24,035*	*LCY*	$ 4.38	$ 4.38	$ -	$ -	$ 8.76	$ 210,552	
	3.018	Asphalt concrete	3,900	TON	$ 10.32	$ 6.04	$ 102.88	$ -	$ 119.24	$ 465,049	Not required
	3.019	Tack Coat	3	TON	$ 2,378.08	$ 1,265.60	$ 6,191.07	$ -	$ 9,834.75	$ 29,504	Not required
4		**Other Roadwork**									
	4.001	Bridge Replacement	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.002	Midwest Guardrail System	2,677	LF	$ 5.94	$ 2.80	$ 43.54	$ -	$ 52.28	$ 139,934	Allow guardrails for 5% of road length on 2 sides, assume wood posts and MGS at edge of shoulder with fill heights <10'

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	All-in Rate	Total	Comment
	4.003	Transition Railing (Type WB-31)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.004	End Anchor Assembly (Type SFT)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.005	24" Dia. Pipe culvert, galvanized, corrugated metal	973	LF					$ 111.39	$ 108,379	Galvanized Corrugated Metal, includes bedding, backfill, and compaction, includes flared end sections
	4.006	*Culvert pipe excavations*	*725*	*LCY*	*$ 5.53*	*$ 6.03*	*$ -*	*$ -*	*$ 11.56*	*$ 5,605*	
	4.007	*Load and haul material to disposal site, 2 mile haul*	*725*	*LCY*	*$ 6.03*	*$ 13.56*	*$ -*	*$ -*	*$ 19.59*	*$ 14,210*	
	4.008	*24" Dia pipe, galvanized corrugated metal*	*972*	*LF*	*$ 37.86*	*$ 7.74*	*$ 32.11*	*$ -*	*$ 77.71*	*$ 75,609*	
	4.009	*Load at stockpile and haul to fill location, 0.5 mile haul*	*725*	*LCY*	*$ 2.46*	*$ 6.97*	*$ -*	*$ -*	*$ 9.43*	*$ 6,836*	
	4.010	*Sand Bedding*	*63*	*LCY*	*$ -*	*$ -*	*$ -*	*$ 49.45*	*$ 49.45*	*$ 3,119*	
	4.011	Box culvert single cell	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.012	Paint Traffic Stripe - 6" Yellow	10,382	LF	$ 0.38	$ 0.24	$ 0.70	$ -	$ 1.31	$ 13,647	Includes 2 yellow stripes for road for C1 only
	4.013	Paint Traffic Stripe - 6" White	692	LF	$ 2.82	$ 1.79	$ 0.70	$ -	$ 5.31	$ 3,672	Assume 2 edge of traveled way stripes for road for C1 only
	4.014	Roadside Signs	27	EA	$ 332.78	$ 150.53	$ 562.46	$ -	$ 1,045.76	$ 28,236	Includes steel posts, Includes furnish aluminum sign panels, Assume 1 sign every 2000' in 2 directions
	4.015	Permanent Erosion Control (Hydroseed)	80,300	SF	$ 0.07	$ 0.03	$ 0.07	$ -	$ 0.17	$ 13,832	Includes seed mix, wood fiber
	4.016	Rock Slope Protection Pad Energy Dissipator (18" D x 2' W x 6' L)	16.00	CY	$ -	$ -	$ 210.81	$ -	$ 210.81	$ 3,373	Assume 2' W x 6' L x 18" D, Assume Rock Slope Protection, Light, Assume Method B placement, Includes excavation, compaction, RSP fabric
	4.017	Temporary Inlet/Outlet Protection	24	EA	$ 65.84	$ 27.17	$ 71.96	$ -	$ 164.97	$ 3,959	Includes install and removal, sandbag barriers, fiber rolls and stakes
	4.018	Rock Anchor Assembly		LF						Not required	
	4.019	Erosion Control (Blanket) / Fiber roll	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.020	Retaining walls (Allowance)	53,532	SF					$ 74.42	$ 3,983,730	Allow 10' high on both sides for 10% of the road length. Includes excavation, backfill & reinforcement.
	4.021	*Setting and removing formwork*	*107,064*	*SF*	*$ 10.03*	*$ 0.20*	*$ 2.29*	*$ -*	*$ 12.52*	*$ 1,340,893*	
	4.022	*Concrete fill work*	*3,963*	*CY*	*$ 32.45*	*$ 8.37*	*$ 224.09*	*$ -*	*$ 264.91*	*$ 1,050,438*	
	4.023	*Provide/Install Reinforcing*	*397*	*TON*	*$ 1,135.73*	*$ 67.77*	*$ 2,812.31*	*$ -*	*$ 4,015.80*	*$ 1,592,399*	
	4.024	Rock Slope Protection using rip rap	-	CY					$ -	$ -	Not required
	4.025	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	*Load and haul to processing area, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.027	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.028	*Load and haul to fill location, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.029	*Rip rap placement*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.030	RSP backing	-	CY					$ -	$ -	Not required
	4.031	*Load and haul material from stockpile to fill location, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.032	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.033	RSP Fabric backing material	-	SY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.034	Road piling work								Not required	
5		**Maintenance Work**									
	5.001	Public Road Maintenance Work (Roads identified within project boundary)	6	MILE	$ -	$ -	$ -	$ 50,000.00	$ 50,000.00	$ 300,000	Include maintenance allowance for road repair during construction, provision for patching work as needed - Allow $50,000/mile for road patching and repair
6		**Temporary Work**									
	6.001	General traffic management		MO	$ -	$ -	$ -	$ -		Elsewhere	Included within general conditions and requirements
	6.002	Temporary road surfaces including removal work								Not required	
	6.003	Temporary Traffic Handling	-	DAYS	$ -	$ -	$ -	$ -		Not required	
		Includes temporary cones, barricades, and portable delineators. Includes temporary crash cushions.									
		Bidirectional sand-filled module									
		Temporary K-railing pinned to pavement									
		Temporary traffic striping									
7		**Highway and Other Road Connection Work**									
	7.001	Highway and other road connections			$ -	$ -	$ -	$ -		Not required	
8		**Misc Allowance**									
	8.001	Misc allowance for small items, allow 2.5%	2.5%	%				$ 17,097,211	$ 17,097,211	$ 427,430	
		Total Direct Cost	26,766	LF	$ 231.91	$ 265.39	$ 129.92	$ 27.51	$ 654.74	$ 17,524,640	

27.06. Construction Cost Summary - Peninsula Hills Recreation Roads					
				Unit Cost Rate $/LF	**Total Cost ($x 1,000)**
			LF:	10,841	
Total Direct Cost				539.98	5,854
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS				539.98	5,854
General Conditions					
Mobilization			5.0%	27.03	293
Site General Conditions & Requirements			10.0%	56.73	615
Phasing		*Not included*	0.0%	-	-
General Contractor Overhead and Fees					
Insurance			1.1%	6.83	74
Bonds			1.0%	6.27	68
GC Field and Home Office Overhead			5.0%	31.82	345
GC Profit			5.0%	33.39	362
Total Contractor Indirect Markups				162.07	1,757
TOTAL DIRECT COST BEFORE CONTINGENCIES				702.04	7,611
Contingencies					
Design Contingencies			10.0%	70.20	761
Construction Contingencies			15.0%	115.86	1,256
Bidding Contingencies / Alternative Procurement Strategy (APS)			2.0%	17.80	193
Total Contingency Allowance				203.85	2,210
TOTAL DIRECT COST BEFORE ESCALATION				905.90	9,821
Escalation to Report Date	3/31/2021	@ 3.00% p.a.	0.977%	8.86	96
Escalation to Mid-point of Construction		*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET				914.75	9,917

		Peninsula Hills Recreation Roads									
		Road length (LF)	10,841	LF							
		Road length (Miles)	3	MILES							
		Road Area (SF)	325,232	SF							
		Road Area (SY)	36,137	SY							
		Road Area (Acre)	8	ACRE							
1		**Clearing and Demolition Work**									
	1.001	Demolition Work	-	SY						Included below	
	1.002	*Asphalt removal work*	-	*SY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.003	*Load and haul to disposal site, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	1.004	Clearing and Grubbing	10	ACRE	$ 1,551.23	$ 2,703.88	$ -	$ -	$ 4,255.11	$ 42,126	Light vegetation clearing work
		Roads and Road Structures									
2		**Road Excavations**									
	2.001	Temporary Silt Fence	1,760	LF					$ 8.76	$ 15,421	
	2.002	*Setup temporary silt fence*	*1,760*	*LF*	$ 1.90	$ 0.83	$ 0.44	$ -	$ 3.17	$ 5,572	
	2.003	*Silt fence removal*	*1,760*	*LF*	$ 1.60	$ 0.72	$ -	$ 3.27	$ 5.60	$ 9,849	*Include allowance for dump charges*
	2.004	Roadway Excavation (Cut for re-use) including AB & AC Material	-	CY					$ -	$ -	Not required, assume 0% of total roadway stockpile cut include for AB & AC excavations
	2.005	*Roadway excavations including existing asphalt layer removal*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.006	*Load and haul to processing area, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.007	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.008	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.009	*Load and haul to stockpile, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	2.010	Roadway Excavation (Cut for re-use) including common earth material, no AB & AC Material	108,460	CY					$ 13.07	$ 1,417,562	Includes hauling to stockpile within 0.5 miles, assume usable fill material, assume 100% of total roadway stockpile cut in common earth excavations, no AB & AC material
	2.011	*Roadway excavations, common earth*	*124,729*	*LCY*	$ 2.59	$ 3.13	$ -	$ -	$ 5.73	$ 714,421	*Common excavations: include a 15% swell factor*
	2.012	*Load and haul to stockpile/fill location, 0.5 mile haul*	*124,729*	*LCY*	$ 1.59	$ 4.05	$ -	$ -	$ 5.64	$ 703,141	*Haul to stockpile/fill location, 0.5 mile hauling distance assumed*
	2.013	Roadway Excavation (Cut to Waste Disposal Area)	19,965	CY					$ 13.52	$ 270,012	Includes organic stripping material, rocks and cobbles removal, haul to waste area in reservoir, average 0.5 mile haul
	2.014	*Roadway excavations*	*22,960*	*LCY*	$ 2.58	$ 3.35	$ -	$ -	$ 5.93	$ 136,080	*Include a 15% swell factor*
	2.015	*Load and haul to disposal site, 0.5 mile haul*	*22,960*	*LCY*	$ 1.63	$ 4.29	$ -	$ -	$ 5.93	$ 135,932	*Haul to disposal area, no provision for processing rubble material or dumping off-site, assumed 0.5 mile hauling distance*
	2.016	Roadway Excavation (Rock Cut)	3,025	CY					$ 25.69	$ 77,721	Excavated material to be stockpiled for re-use, average 3 mile haul
	2.017	*Blasting operations*	*1,089*	*LCY*	$ 7.38	$ 7.47	$ 3.85	$ -	$ 18.70	$ 21,457	*Assume 30% of volume will require blasting, assume rock blasting productivity rate of 100CY/hr*
	2.018	*Rock breaking operation*	*2,541*	*LCY*	$ 3.23	$ 4.43	$ -	$ -	$ 7.64	$ 19,425	*Assume 70% of volume will be excavated with ripper*
	2.019	*Load and haul to processing area, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing and screening required*
	2.020	*Crushing Operations*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No crushing required*
	2.021	*Screening Operations (Post-crushing)*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No screening required*
	2.022	*Load and haul to stockpile location, 1.5 mile haul*	*3,630*	*LCY*	$ 2.71	$ 7.43	$ -	$ -	$ 10.15	$ 36,838	*Haul to stockpile location, 1.5 mile hauling distance assumed*
	2.023	Stripping Excavation for Embankment fill (Cut and Direct Haul)	71,225	CY					$ 12.32	$ 877,539	Excavate common earth and direct haul to fill location
	2.024	*Roadway excavations*	*78,348*	*LCY*	$ 2.55	$ 3.09	$ -	$ -	$ 5.64	$ 442,261	*Include 10% swell factor*
	2.025	*Load and haul to fill location, 0.5 mile haul*	*78,348*	*LCY*	$ 1.58	$ 3.99	$ -	$ -	$ 5.56	$ 435,275	*Assumed 0.5 mile hauling distance*
	2.026	Crushing operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
	2.027	Screening operations	-	CY	$ -	$ -	$ -	$ -		Not required	No crushing work required
3		**Road Fill and Layer Work**									
	3.001	Roadway Embankment (Stockpile to Fill)	71,225	CY					$ 8.71	$ 620,066	From excavated suitable material, assume available on-site excavation
	3.002	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No double handling and stockpiling required; all material to be hauled directly to fill location*
	3.003	*Load and haul from excavation site to fill location, 0.5 mile haul*	*71,225*	*LCY*						*Included above*	*Swell factor of 10% included, Direct hauling work included elsewhere*
	3.004	*Spread and compact*	*71,225*	*LCY*	$ 4.30	$ 4.41	$ -	$ -	$ 8.71	$ 620,066	*Swell factor of 10% included*
	3.005	Roadway Embankment (from on-site Borrow Area)	-	CY						Not required	Backfill material to be sourced from road excavations cut
	3.006	*Load at stockpile and haul to fill location, 3 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.007	*Spread and compact*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	
	3.008	Class 4 Aggregate subbase	6,050	CY					$ 77.36	$ 468,041	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.009	*Purchase processed material from quarry*	*10,285*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 155,809	*Purchase from commercial quarry, 1.7ton/cy*
	3.010	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*6,958*	*LCY*	$ 11.05	$ 22.74	$ -	$ -	$ 34.78	$ 242,015	*Haul to fill location, no stockpiling needed*
	3.011	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.012	*Spread and compact*	*6,958*	*LCY*	$ 5.05	$ 5.03	$ -	$ -	$ 10.09	$ 70,217	
	3.013	Class 2 Aggregate base	6,050	CY					$ 77.36	$ 468,041	Purchase from commercial quarry, includes placing, compaction, and spreading, Assume 1.7 ton / cy
	3.014	*Purchase processed material from quarry*	*10,285*	*TON*	$ -	$ -	$ 15.15	$ -	$ 15.15	$ 155,809	*Purchase from commercial quarry, 1.7ton/cy*
	3.015	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*6,958*	*LCY*	$ 11.05	$ 23.74	$ -	$ -	$ 34.78	$ 242,015	*Haul to fill location, no stockpiling needed*
	3.016	*Load at stockpile and haul to fill location, 0.5 mile haul*	-	*LCY*	$ -	$ -	$ -	$ -	$ -	$ -	*No stockpiling needed*
	3.017	*Spread and compact*	*6,958*	*LCY*	$ 5.05	$ 5.03	$ -	$ -	$ 10.09	$ 70,217	
	3.018	Asphalt concrete	8,129	TON	$ 9.91	$ 5.79	$ 102.88	$ -	$ 118.58	$ 963,960	Assume HMA (Type A), 150lbs/cy
	3.019	Tack Coat	6	TON	$ 1,031.81	$ 549.12	$ 2,486.86	$ -	$ 4,067.80	$ 24,610	Assume 2 application between layers/lifts, Application rate 0.02 gal/sy, Gal of Emulsion for Tack Coat 240 gal/ton
4		**Other Roadwork**									
	4.00	Bridge Replacement	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Not required

Cost Work Sheet Summary

Item	Ref Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	Unit Rate	Total	Comment
	4.002	Midwest Guardrail System	1,084	LF	$ 6.52	$ 3.07	$ 43.53	$ -	$ 53.12	$ 57,591	Allow guardrails for 5% of road length on 2 sides, assume wood posts and MGS at edge of shoulder with fill heights <10'
	4.003	Transition Railing (Type WB-31)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.004	End Anchor Assembly (Type SFT)	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.005	24" Dia. Pipe culvert, galvanized, corrugated metal	402	LF					$ 123.84	$ 49,720	Galvanized Corrugated Metal, includes bedding, backfill, and compaction, includes flared end sections
	4.006	*Culvert pipe excavations*	*299*	*LCY*	*$ 7.08*	*$ 7.29*	*$ -*	*$ -*	*$ 14.38*	*$ 4,302*	
	4.007	*Load and haul material to disposal site, 2 mile haul*	*299*	*LCY*	*$ 7.31*	*$ 16.43*	*$ -*	*$ -*	*$ 23.74*	*$ 7,105*	
	4.008	*24" Dia pipe, galvanized corrugated metal*	*402*	*LF*	*$ 42.33*	*$ 8.75*	*$ 32.58*	*$ -*	*$ 83.71*	*$ 33,603*	
	4.009	*Load at stockpile and haul to fill location, 0.5 mile haul*	*299*	*LCY*	*$ 3.98*	*$ 8.44*	*$ -*	*$ -*	*$ 11.42*	*$ 3,415*	
	4.010	*Sand Bedding*	*26*	*LCY*	*$ -*	*$ -*	*$ -*	*$ 49.45*	*$ 49.45*	*$ 1,287*	
	4.011	Box culvert single cell	-	EA	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.012	Paint Traffic Stripe - 6" Yellow	21,682	LF	$ 0.27	$ 0.17	$ 0.70	$ -	$ 1.14	$ 24,749	Includes 2 yellow stripes
	4.013	Paint Traffic Stripe - 6" White	21,682	LF	$ 0.27	$ 0.17	$ 0.70	$ -	$ 1.14	$ 24,749	Assume 2 edge of traveled way stripes
	4.014	Roadside Signs	11	EA	$ 408.41	$ 184.75	$ 562.46	$ -	$ 1,155.61	$ 12,712	Includes steel posts, Includes furnish aluminum sign panels, Assume 1 sign every 2000' in 2 directions
	4.015	Permanent Erosion Control (Hydroseed)	33,110	SF	$ 0.09	$ 0.04	$ 0.07	$ -	$ 0.19	$ 6,423	Includes seed mix, wood fiber
	4.016	Rock Slope Protection Pad Energy Dissipator (18" D x 2' W x 6' L)	5.87	CY	$ -	$ -	$ 210.81	$ -	$ 210.81	$ 1,237	Assume 2' W x 6' L x 18" D, Assume Rock Slope Protection, Light, Assume Method B placement, Includes excavation, compaction, RSP fabric
	4.017	Temporary Inlet/Outlet Protection	9	EA	$ 179.57	$ 74.10	$ 71.96	$ -	$ 325.62	$ 2,865	Includes install and removal, sandbag barriers, fiber rolls and stakes
	4.018	Rock Anchor Assembly		LF						Not required	
	4.019	Erosion Control (Blanket) / Fiber roll	-	SF	$ -	$ -	$ -	$ -	$ -	$ -	Install slope protection matting, includes steel staples and blanket fabric
	4.020	Retaining walls (Allowance)	-	SF					$ -	$ -	Not required
	4.021	*Setting and removing formwork*	*-*	*SF*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.022	*Concrete fill work*	*-*	*CY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.023	*Provide/Install Reinforcing*	*-*	*TON*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.024	Rock Slope Protection using rip rap	-	CY					$ -	$ -	Not required
	4.025	*Blasting operations*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.026	*Load and haul to processing area, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.027	*Crush and screen material*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.028	*Load and haul to fill location, 2 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.029	*Rip rap placement*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.030	RSP backing	-	CY					$ -	$ -	Not required
	4.031	*Load and haul material from stockpile to fill location, 3 mile haul*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.032	*Spread and compact*	*-*	*LCY*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
	4.033	RSP Fabric backing material	-	SY	$ -	$ -	$ -	$ -	$ -	$ -	Not required
	4.034	Road piling work								Not required	
5		**Maintenance Work**									
	5.001	Public Road Maintenance Work (Roads identified within project boundary)	3	MILE	$ -	$ -	$ -	$ 50,000.00	$ 50,000.00	$ 150,000	Include maintenance allowance for road repair during construction, provision for patching work as needed - Allow $50,000/mile for road patching and repair
6		**Temporary Work**									
	6.001	General traffic management		MO	$ -	$ -	$ -	$ -		Elsewhere	Included within general conditions and requirements
	6.002	Temporary road surfaces including removal work								Not required	
	6.003	Temporary Traffic Handling	-	DAYS	$ -	$ -	$ -	$ -		Not required	
		Includes temporary cones, barricades, and portable delineators. Includes temporary crash cushions.									
		Bidirectional sand-filled module									
		Temporary K-railing pinned to pavement									
		Temporary traffic striping									
7		**Highway and Other Road Connection Work**									
	7.001	Highway and other road connections			$ -	$ -	$ -	$ -		Not required	
8		**Misc Allowance**									
	8.001	Misc allowance for small items, allow 5%	5.0%	%				$ 5,575,144	$ 5,575,144	$ 278,757	
		Total Direct Cost	13,841	LF	$ 152.83	$ 229.31	$ 117.14	$ 40.20	$ 539.98	$ 5,853,900	

27.07. Construction Cost Summary - Sites Lodoga Road Realignment Bridges				
			Unit Cost Rate $/SF	**Total Cost ($x 1,000)**
		SF:	107,672	
Total Direct Cost			823.26	88,642
TOTAL DIRECT COST BEFORE CONTRACTOR INDIRECT MARKUPS			823.26	88,642
General Conditions				
Mobilization		5.0%	41.16	4,432
Site General Conditions & Requirements		10.0%	86.44	9,307
Phasing	*Not included*	0.0%	-	-
General Contractor Overhead and Fees				
Insurance		1.1%	10.46	1,126
Bonds		1.0%	9.61	1,035
GC Field & Home Office Overhead		5.0%	48.55	5,227
GC Profit		5.0%	50.97	5,488
Total Contractor Indirect Markups			247.19	26,615
TOTAL DIRECT COST BEFORE CONTINGENCIES			1,070.45	115,257
Contingencies				
Design Contingencies		15.0%	160.57	17,289
Construction Contingencies		15.0%	184.65	19,882
Bidding Contingencies / Alternative Procurement Strategy (APS)		2.0%	28.32	3,049
Total Contingency Allowance			373.54	40,220
TOTAL DIRECT COST BEFORE ESCALATION			1,443.99	155,477
Escalation to Report Date	3/31/2021 @ 3.00% p.a.	0.977%	14.10	1,518
Escalation to Mid-point of Construction	*Not included*	0%	-	-
RECOMMENDED CONSTRUCTION BUDGET			1,458.09	156,995

Sites Reservoir (Alt 1): South Bridges and Abutments (South Lodoga Road, Option 1B)
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Sub Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	All Rate	Total	Comment
		South Bridges and Abutments (South Lodoga Road, Option 1B)									
		Bridge length (LF)	3,033.00	LF							Bridge 1: 1400', Bridge 2: 1633'
		Bridge width (LF)	35.50	LF							
		Bridge Area (SF)	107,671.50	SF							
1		**Clearing and Demolition Work**									
	1.001	Demolition Work	-	SY							Assume no demolition work required
	1.002	Clearing and Grubbing	-	ACRE	$ -	$ -	$ -	$ -	$ -	$ -	Not required, Included elsewhere
2		**Temporary Access Road Development**									
	2.001	Develop Access Road to Abutments	3,033.00	LF					$ 217.17	$ 658,670	Cut-fill balance on hillsides - Assumed 10 ft average cut/fill depth for earthwork; AB surfacing - Assumed 12" thick aggregate surfacing; Assume average road width of 25'; Assume 1 x the bridge total bridge length
	2.002	*Clear and grub*	*2.00*	*ACRE*	*$ 3,005.24*	*$ 5,369.90*	*$ -*	*$ -*	*$ 8,375.14*	*$ 16,750*	*Clear, grade, provide gravel fill layer and compact*
	2.003	*Road excavation work (earth cutting allowance)*	*30,891.67*	*LCY*	*$ 1.71*	*$ 3.33*	*$ -*	*$ -*	*$ 5.04*	*$ 155,540*	*Assume average cut of say 10', average width of 25', include 10% swell factor, assume common earth*
	2.004	*Load and haul to fill location, 0.5 mile haul*	*30,891.67*	*LCY*	*$ 0.54*	*$ 2.09*	*$ -*	*$ -*	*$ 2.63*	*$ 81,150*	*Assume 0.5 mile haul, no stockpiling needed, direct filling*
	2.005	*Place and compact using excavated material (earth filling allowance)*	*30,891.67*	*LCY*	*$ 1.86*	*$ 3.89*	*$ -*	*$ -*	*$ 4.76*	*$ 147,340*	*Assume average fill of say 10', average width of 25', include 10% swell factor*
	2.006	*Purchase processed material from quarry*	*5,252.00*	*TON*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 116,576*	*12' thick aggregate base layer, assume average width of 25' assume 1.7Ton/CY, purchase material from commercial quarry*
	2.007	*Haul material from quarry to site stockpile/fill location, 40 mile haul*	*3,399.00*	*LCY*	*$ 11.12*	*$ 24.61*	*$ -*	*$ -*	*$ 35.73*	*$ 121,442*	*40 mile haul distance assumed*
	2.008	*Place and compact road base*	*3,399.00*	*LCY*	*$ 2.28*	*$ 3.50*	*$ -*	*$ -*	*$ 5.79*	*$ 19,672*	
	2.009	*Remove temp access road*	*1.00*	*LCY*					*$ -*	*$ -*	*Not required*
3		**Foundation Excavations**									
	3.001	Surveying allowance, survey access, pier, and abutment locations	150.00	DAYS	$ 3,199.74	$ 822.60	$ -	$ -	$ 4,022.34	$ 603,351	150 day surveying allowance
	3.002	Structure Excavation	24,360.00	CY					$ 11.34	$ 276,245	Excavations for pier caps
	3.003	*Bridge foundation excavations in soft rock / common soil*	*18,757.20*	*LCY*	*$ 1.58*	*$ 3.10*	*$ -*	*$ -*	*$ 4.68*	*$ 87,873*	*Assume 70% of excavations in common earth*
	3.004	*Bridge foundation excavations in hard rock*	*8,038.80*	*LCY*	*$ 3.53*	*$ 3.20*	*$ -*	*$ -*	*$ 6.73*	*$ 54,135*	*Assume 30% in weathered rock, provision for blasting and ripping*
	3.005	*Load and haul to disposal site, 1 mile haul*	*26,796.00*	*LCY*	*$ 2.16*	*$ 2.84*	*$ -*	*$ -*	*$ 5.01*	*$ 134,234*	*Assume 1 mile haul*
	3.006	Footing Foundation Cleanup	107,671.50	SF					$ 1.39	$ 149,627	Assume bridge footprint for cleaning work
	3.007	*Foundation cleaning*	*11,963.50*	*SY*	*$ 7.98*	*$ 3.43*	*$ -*	*$ -*	*$ 11.41*	*$ 136,484*	
	3.008	*Load and haul to disposal site, 1 mile haul*	*2,193.31*	*CY*	*$ 1.52*	*$ 4.47*	*$ -*	*$ -*	*$ 5.99*	*$ 13,143*	*Assume removal of top layer, 0.5' thick*
4		**Foundation Piling**									
	4.001	48" Cast-In-Drilled-Hole Concrete Piling	23,760.00	LF					$ 676.59	$ 16,075,740	CIDH piles, assume average 60' deep, 35' to rock, 5' rock socketing
	4.002	*Drilling rig and support crane mobilization/Demobilization allowance*	*2.00*	*EA*	*$ 28,370.52*	*$ 23,168.48*	*$ -*	*$ -*	*$ 51,538.99*	*$ 103,078*	*Mobilize piling rig, support crane, piling material and related equipment for operation.*
	4.003	*Drill, 48" Dia. Caltrans CIDH Piling*	*23,760.00*	*LF*	*$ 145.03*	*$ 66.83*	*$ -*	*$ -*	*$ 211.86*	*$ 5,033,810*	*Assume 60' deep piles, 396 piles; Assumed 40% soft to medium rock and 60% hard rock, include temporary steel casing to be used, permanent casing not required*
	4.004	*Remove/excavate soil*								*Included above*	
	4.005	*Load and haul to disposal site, 1 mile haul*	*12,164.35*	*LCY*	*$ 1.18*	*$ 3.91*	*$ -*	*$ -*	*$ 5.09*	*$ 61,954*	
	4.006	*Place Concrete Fill, 48" Dia. Caltrans CIDH Piling*	*11,881.76*	*CY*	*$ 57.44*	*$ 16.31*	*$ 328.22*	*$ -*	*$ 401.96*	*$ 4,776,020*	*Include rock socket, temporary steel casing to be used for 30% of the total pile length, permanent casing not required*
	4.007	*Provide/Install Reinforcing for CIDH Piles*	*1,485*	*TON*	*$ 618.48*	*$ 12.36*	*$ 3,237.62*	*$ -*	*$ 3,868.56*	*$ 5,745,665*	*Allow 250 lb/cy reinforcement, include epoxy coating*
	4.008	*CIDH Observation Tubes*	*2,376.00*	*EA*	*$ -*	*$ -*	*$ -*	*$ 149.50*	*$ 149.50*	*$ 355,212*	*Allow 6 per pile*
	4.009	24" Cast-In-Drilled-Hole Concrete Piling	2,880.00	LF					$ 254.82	$ 733,874	CIDH piles, assume average 60' deep, 35' to rock, 5' rock socketing
	4.010	*Drilling rig and support crane mobilization/Demobilization allowance*	*-*	*EA*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*Include above*
	4.011	*Drill, 24" Dia. Caltrans CIDH Piling*	*2,880.00*	*LF*	*$ 90.65*	*$ 40.98*	*$ -*	*$ -*	*$ 131.63*	*$ 379,101*	*Assume 60' deep piles, 48 piles; Assumed 40% common earth and 60% rock, include temporary steel casing to be used, permanent casing not required*
	4.012	*Remove/excavate soil*								*Included above*	
	4.013	*Load and haul to disposal site, 1 mile haul*	*368.61*	*LCY*	*$ 4.52*	*$ 13.31*	*$ -*	*$ -*	*$ 17.83*	*$ 6,572*	
	4.014	*Place Concrete Fill, 24" Dia. Caltrans CIDH Piling*	*360.05*	*CY*	*$ 49.15*	*$ 18.15*	*$ 379.32*	*$ -*	*$ 446.62*	*$ 160,805*	*Include rock socket, temporary steel casing to be used for 30% of the total pile length, permanent casing not required*
	4.015	*Provide/Install Reinforcing for CIDH Piles*	*36.01*	*TON*	*$ 755.92*	*$ 15.23*	*$ 3,237.62*	*$ -*	*$ 4,008.77*	*$ 144,357*	*Allow 200 lb/cy reinforcement, include epoxy coating*
	4.016	*CIDH Observation Tubes*	*288.00*	*EA*	*$ -*	*$ -*	*$ -*	*$ 149.50*	*$ 149.50*	*$ 43,056*	*Allow 6 per pile*
	4.017	Pile testing allowance	1.5%	%				$ 16,809,613	$ 16,809,613	$ 252,144	Pile testing allowance
	4.018	Inspection/observation tubes needed	1.00	LS						Included above	
	4.019	Pile caps	-	CY						Included below	
5		**Bridge Foundation Footings**									
	5.001	Structural Concrete, Bridge Footing	19,040.00	CY					$ 651.94	$ 12,412,988	Assume 1750CY per footing, Include setting/removing formwork, 2,800 sf per footing; 250 lb/cy reinforcement
	5.002	*Footing excavations*	*-*	*LCY*						*Included above*	*Included within foundation excavations*
	5.003	*Load and haul to disposal site, 5 mile haul*	*-*	*LCY*						*Included above*	*Included above*
	5.004	*Setup and removing formwork*	*31,132.00*	*SF*	*$ 13.08*	*$ 1.05*	*$ 5.34*	*$ -*	*$ 19.47*	*$ 606,142*	*Steel framed plywood*
	5.005	*Concrete fill work*	*19,040.00*	*CY*	*$ 34.13*	*$ 8.70*	*$ 228.62*	*$ -*	*$ 271.45*	*$ 5,168,431*	*Concrete to be poured by 28M concrete pump truck*
	5.006	*Provide/Install Reinforcing*	*2,380*	*TON*	*$ 975.29*	*$ 33.55*	*$ 1,780.40*	*$ -*	*$ 2,789.25*	*$ 6,638,414*	*Allow 250 lb/cy reinforcement, include epoxy coating*
6		**Bridge Structure**									
	6.001	Concrete pier / column	-	LF						Included below	Cast in place columns, included elsewhere
	6.002	*Placement of precast concrete rings*	*-*	*LF*							
	6.003	*Fill concrete shaft with concrete*	*-*	*CY*							
	6.004	*Provide/Install Reinforcing*	*-*	*LB*							
	6.005	Pier cap at top	-	CY						Included below	Included elsewhere

Sites Reservoir (Alt 1): South Bridges and Abutments (South Lodoga Road, Option 1B)
Feasibility Report Cost Estimate
Sites, CA

Cost Estimate
AACEI Class 4
February 2, 2021

Cost Work Sheet Summary

Item	Act. Item	Description	Quantity	Unit	Labor Rate	Equipment Rate	Material Rate	Subcontractor Rate	UP Rate	Total	Comment
	6.006	Bridge bearing / bearing pad	15.00	EA	$ -	$ -	$ -	$ 9,660.00	$ 9,660.00	$ 144,900	1 x bearing per bridge column
	6.007	Structural Concrete, Bridge Columns	20,650.00	CY					$ 1,501.71	$ 31,010,293	Include piers/columns and pier/column cap, bridge deck included elsewhere, cast in place
	6.008	*Setting and removing formwork*	*135,220.00*	*SF*	*$ 22.25*	*$ 21.50*	*$ 5.06*	*$ -*	*$ 48.80*	*$ 6,599,033*	*Allowance for climbing forms*
	6.009	*Concrete fill work*	*20,650.00*	*CY*	*$ 37.75*	*$ 25.32*	*$ 233.06*	*$ -*	*$ 296.13*	*$ 6,115,005*	*Concrete to be poured by crane and the same crane to be used to pull formwork upwards for piers. Allowance for (2) cranes for both bridges*
	6.0091	*Standing time*	*20,650.00*	*CY*	*$ -*	*$ 18.00*	*$ -*	*$ -*	*$ 18.00*	*$ 371,700*	*Standing time for concrete crew equipment in between concrete pours*
	6.010	*Provide/Install Reinforcing*	*4,646.25*	*TON*	*$ 520.39*	*$ 44.38*	*$ 3,293.11*	*$ -*	*$ 3,857.58*	*$ 17,924,665*	*Allow 450 lb/cy reinforcement, include epoxy coating*
	6.011	Bridge deck system		SF						Included below	Cast in place bridge deck structure, included elsewhere
	6.012	Structural Concrete, Bridge	10,920.00	CY					$ 1,964.17	$ 21,448,683	Deck concrete, cast in place
	6.013	*Allowance for incremental bridge construction system*	*1.00*	*LS*	*$ -*	*$ -*	*$ -*	*$ 10,065,054*	*$ 10,065,054*	*$ 10,065,054*	*Two bridges to be poured separately using the same assembly*
	6.014	*Setting and removing formwork*	*44,460.00*	*SF*	*$ 15.56*	*$ 0.77*	*$ 6.94*	*$ -*	*$ 23.27*	*$ 1,034,537*	*Job built plywood formwork, 4 use. Formwork to be built for two spans and used multiple times.*
	6.015	*Concrete fill work*	*10,920.00*	*CY*	*$ 25.14*	*$ 8.01*	*$ 248.50*	*$ -*	*$ 281.65*	*$ 3,075,879*	*Concrete to be poured by 28M concrete pump truck at casting base.*
	6.0151	*Standing time*	*10,920.00*	*CY*	*$ -*	*$ 70.20*	*$ -*	*$ -*	*$ 70.20*	*$ 766,575*	*Standing time for concrete crew equipment in between concrete pours*
	6.016	*Provide/Install Reinforcing*	*2,457*	*TON*	*$ 1,021.01*	*$ 102.13*	*$ 1,371.74*	*$ -*	*$ 2,494.87*	*$ 6,129,898*	*Allow 450 lb/cy reinforcement*
	6.0161	*Monitoring allowance for incremental launching*	*13*	*EA*	*$ -*	*$ -*	*$ -*	*$ 28,750.00*	*$ 28,750.00*	*$ 373,750*	*Allowance for monitoring work during deck launching*
	6.017	Prestressing Cast-In-Place Concrete	493,520.00	LB	$ -	$ -	$ -	$ 2.49	$ 2.49	$ 1,227,606	
	6.018	Bar Reinforcing Steel	8,449	TON						Included above	
7		**Approach work**									
	7.001	Structural Fill	5,030.00	CY					$ 83.95	$ 422,287	
	7.002	*Purchase processed material from quarry*	*9,406.10*	*TON*	*$ -*	*$ -*	*$ 22.20*	*$ -*	*$ 22.20*	*$ 208,813*	*Allow 1.7ton/CY, include 10% waste factor*
	7.003	*Haul material from quarry to site stockpile/fill location, 30 mile haul*	*6,086.30*	*LCY*	*$ 9.65*	*$ 19.73*	*$ -*	*$ -*	*$ 29.38*	*$ 178,823*	*Include 15% swell factor*
	7.004	*Place and compact*	*6,086.30*	*LCY*	*$ 3.62*	*$ 2.08*	*$ -*	*$ -*	*$ 5.70*	*$ 34,681*	
	7.005	Structural Concrete, Approach Slab	60.00	CY					$ 593.76	$ 35,625	
	7.006	*Approach slab excavations*	*30.00*	*LCY*	*$ 58.74*	*$ 38.52*	*$ -*	*$ -*	*$ 97.26*	*$ 2,918*	*Assume 50% of approach slab quantity*
	7.007	*Load and haul to disposal site, 1 mile haul*	*30.00*	*LCY*	*$ 77.05*	*$ 71.53*	*$ -*	*$ -*	*$ 148.58*	*$ 4,467*	*Included above*
	7.008	*Place Structural Approach Slab*	*60.00*	*CY*	*$ 53.63*	*$ 13.67*	*$ 228.62*	*$ -*	*$ 295.90*	*$ 17,754*	
	7.009	*Provide/Install Reinforcing*	*3.60*	*TON*	*$ 1,287.75*	*$ 76.17*	*$ 1,632.41*	*$ -*	*$ 2,996.33*	*$ 10,787*	*Allow 120 lb/cy reinforcement*
8		**Bridge General Work**									
	8.001	Concrete Barrier (Type 842)	6,150.00	LF	$ -	$ -	$ -	$ 103.50	$ 103.50	$ 636,525	
	8.002	Abutment wall allowance	1,420.00	SF						Included above	
	8.003	Setting and removing formwork	2,840.00	SF							
	8.004	Concrete fill work	2,130.00	CY							
	8.005	Provide/Install Reinforcing	745,500.00	LB							
	8.006	Abutment seat allowance	142.00	CY						Included above	
	8.007	Setting and removing formwork	21,300.00	SF							
	8.008	Concrete fill work	142.00	CY							
	8.009	Provide/Install Reinforcing	42,600.00	LB							
	8.010	Abutment expansion joint	142.00	LF	$ 14.07	$ -	$ 7.33	$ -	$ 21.40	$ 3,039	
	8.011	Allowance for inspection vault	4.00	LS						Not required	
	8.012	Asphalt concrete, 4" thick	107,671.50	SF						Not required	Not required, Polymer Fiber deck
	8.013	Paint Traffic Stripe - 6" Yellow	6,066.00	LF	$ 0.32	$ 0.20	$ 0.70	$ -	$ 1.23	$ 7,436	
	8.014	Paint Traffic Stripe - 6" White	6,066.00	LF	$ 0.32	$ 0.20	$ 0.70	$ -	$ 1.23	$ 7,436	
	8.015	Roadside Signs	8.00	EA	$ 280.78	$ 127.01	$ 131.46	$ -	$ 539.25	$ 4,314	Includes steel posts, Includes furnish aluminum sign panels, allow 4 signs per bridge
	8.016	Joint Seal Assembly (Mr 4")	290.00	LF	$ -	$ -	$ -	$ 3,220.00	$ 3,220.00	$ 933,800	
	8.017	Lighting	1.00	LS	$ -	$ -	$ 7.33	$ 287,500.00	$ 287,507.33	$ 287,507	Allowance
9		**Misc Allowance**									
	9.001	Misc allowance for small items, allow 1.5%	1.5%	%				$ 87,332,092	$ 87,332,092	$ 1,309,981	
		- Bridge deck access hatches									
		- Access ladders and platforms									
		- Other misc. items									
		Total Direct Cost	107,672	SF	$ 182.31	$ 75.43	$ 420.35	$ 145.16	$ 823.26	$ 88,642,072	

From: Heydinger, Erin [Erin.Heydinger@hdrinc.com]
Sent: 2/18/2021 9:20:24 AM
To: Alicia Forsythe [aforsythe@sitesproject.org]
Subject: FW: Delta study examines climate change effect; Millions of steelhead released; Bay Area reps call for protection of Redwood City salt ponds; and more ...

FYI – as we start talking more about real-time operations after construction, the item on Maven today on Forecast-Informed Reservoir Operations (FIRO) was developed in part by HDR in the Sacramento office. This might be a tool we can look at implementing when thinking about our Ops Plan.

Erin

Erin Heydinger PE, PMP
D 916.679.8863 M 651.307.9758

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From: Maven <maven@mavensnotebook.com>
Sent: Thursday, February 18, 2021 9:09 AM
To: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Subject: Delta study examines climate change effect; Millions of steelhead released; Bay Area reps call for protection of Redwood City salt ponds; and more ...

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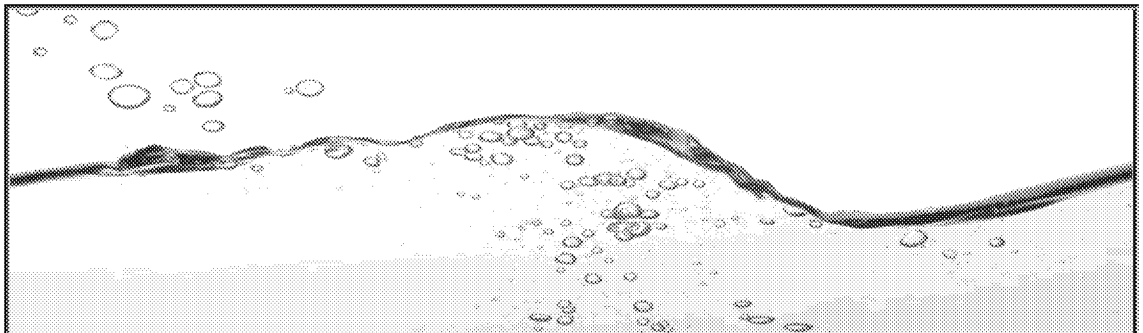
- Millions of steelhead to be released throughout Central Valley
- Column: California's climate change future is being written – in its waterways
- Water market could spell higher costs for local agencies
- Expert panel: Food grown with produced water safe for human consumption
- The 20 best places to tackle U.S. farm nitrogen pollution
- Climate change and fire suppression
- Forest Service predicted devastation of Sierra's Creek Fire — but solution came too late
- California lawmakers propose ban on fracking by 2027
- New report confirms benefits of forecast-informed reservoir operations at Lake Mendocino
- Tuolumne Utilities District board gridlocks on water supply, future availability
- Calistoga to increase Kimball reservoir capacity, relocate water treatment plant
- Speier, Feinstein, Padilla, and Bay Area members call for protection of Redwood City salt ponds
- State, Boeing mediating cleanup dispute at former nuke site near Simi, worrying activists

- Texas winter storm cripples power, water systems
- NASA Snow-Water Equivalent (SWE) Report
- And more ...

Click here to read today's Daily Digest.



WATER LAW SYMPOSIUM: Climate change adaptation, equity, and water

State Water Board member Laurel Firestone talks about the need to bring equity into our climate adaptation actions; Professor Karrigan Bork looks at temperature projections for California

The California Water Law Symposium is an annual collaborative student-run event that brings together leading minds in water law to discuss California's critical water issues. Led this year by UC Davis School of Law, participant schools included USF School of Law; UC Hastings College of the Law; UC Berkeley School of Law; Golden Gate University School of Law; and University of the Pacific, McGeorge School of Law.

The theme of this year's conference focused on climate change and adaptation. Professor Karrigan Bork, a UC Davis King Hall's environmental law faculty member, gave the introductory presentation to set the stage for the rest of the conference that highlighted the heat impacts that are projected for California over the next century. Then, State Water Board member Laurel Firestone gave the keynote address, focusing on the climate change impacts that are disproportionately impacting frontline communities and the need to bring equity into how we adapt to these impacts.

Here's what they had to say.

Click here to read this article.

Also on Maven's Notebook today:

- **ANNOUNCEMENT:** Join the Delta Adapts Climate Resilience Scavenger Hunt and Adaptation Scoping Meetings

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To:	Sites Authority
From:	ICF
Date:	October 21, 2020
Re:	**WORKING DRAFT – For Internal Review – Predecisional: California Fish and Game Code 5937 and Funks and Stone Corral Creeks**

Key Points

1. The purpose of this memorandum is to recommend to the Sites Authority and its engineering team release parameters for flows into Stone Corral and Funks creeks for design purposes that would likely comply with California Fish and Game Code section 5937[1]. Our recommendation is to evaluate the technological and economic feasibility of a scenario that preserves 80 percent of the historical hydrograph for these streams based on a US Geological Survey (USGS) stream gage data for Stone Corral Creek that operated from 1958 to 1985 and to include design elements into the project that would allow the release of that flow as seasonally appropriate.

2. Sites Dam and Golden Gate Dam will be impassable barriers, designed to store diversions from the Sacramento River and retain flows from Stone Corral and Funks creeks. The alternatives in the 2017 Draft Environmental Impact Report/Statement (Draft EIR/EIS) proposed "releasing stream maintenance flows of up to 10 cubic feet per second (cfs) from October through May into Stone Corral and Funks creeks after construction is completed to mimic the ephemeral[2] nature of these streams."

3. In their comments on the Sites Reservoir Project DEIR/EIS, the California Department of Fish and Wildlife (CDFW) and the State Water Resources Control Board (SWRCB) questioned the basis for and adequacy of a 10 cfs base flow for maintaining fish below Sites Dam and Golden Gate Dam in good condition.

[1] California Fish and Game Code requires the owner of any dam to allow sufficient water to pass over, around, or through the dam to keep any fish that may exist below the dam in good condition

[2] These streams are referred to as ephemeral in the Draft EIR/EIS. However, based on the hydrological record for Stone Corral Creek they flow persistently during the winter-months in most years and should be considered intermittent.

4. Based on CDFW surveys conducted in these streams in 1998 and 1999, there is a community of 10 warm water species of fish in Stone Corral and Funks creeks, which may persist after construction. None are listed as threatened or endangered, or are considered species of special concern, but they are subject to the requirements of California Fish and Game Code section 5937. This list of fishes, recommended flow scenarios, and an adaptive management approach for maintaining fish in good condition should be confirmed with CDFW *before* it is incorporated in the revised project description for the Sites Reservoir Project.

Background

The two major dams of the Sites Reservoir Project, Sites Dam and Golden Gate Dam, will impound Stone Corral and Funks creeks. The project description in the Draft EIR/EIS (USBR and Sites Project Authority, 2017) includes a provision to release stream maintenance flows of up to 10 cfs from October through May into Stone Corral and Funks creeks after construction is completed to mimic the ephemeral nature of those streams. In their comments on the Draft EIR/EIS, CDFW and the SWRCB questioned the rationale for and adequacy of that provision.

CDFW commented that maintaining flows of up to 10 cfs from October through May, as proposed in the Draft EIR/EIS, will not sufficiently mimic the variability of the current hydrograph for Stone Corral and Funks creeks and will not provide the same amount of aquatic habitat to maintain fish in good condition. CDFW also suggested base flows outside of the "October through May" period below the reservoirs may need to have a perennial regime to support fishes downstream of the dams, and that the impacts of the dams on fluvial geomorphology and riparian habitat in the streams affected by the project should be addressed.

Similarly, the SWRCB questioned the rationale for a 10 cfs base flow and pointed out inconsistencies in the description of how releases to Stone Corral and Funks creeks would be managed:

- The Draft EIR/EIS states that the base flows would be provided from October to May. Elsewhere, it states that base flows would be provided year-round.
- The Draft EIR/EIS state that the base flows would be limited to 10 cfs, but also states that the dams would be operated to match pre-project flows (other than flood flows), which can be higher than 10 cfs.

The SWRCB also commented that the impacts of dam operations on fluvial geomorphological process below the dams should be analyzed.

Environmental Setting for Stone Corral and Funks Creeks

Both Stone Corral and Funks creeks are small watersheds originating in the eastside foothills of the California Coast Range at elevations of 700 to 850 feet and flow intermittently, mostly in winter and early spring months. From their origins, both creeks flow through low foothills, across Antelope Valley (the site of the Proposed Sites Reservoir), through a series of ridges, and onto the Sacramento Valley floor (Figure 1). For much of their course on the valley floor, they are confined to narrow channels between berms along agricultural fields and road prisms[3]. While the stream channels of these creeks are not actively managed, their straight channels and angular turns around some agricultural fields and along some roads indicate that they were modified from their natural channels at some point in the past. In the upper parts of the watersheds just below the dam locations, these streams are largely devoid of riparian cover due to cattle grazing activity (USBR and DWR 2008). In the lower reaches where the streams run through and around agricultural fields, riparian habitat is sparse and consists mostly of low shrubs, grasses, and occasional oak and cottonwood trees.

Stone Corral Creek

Stone Corral Creek has a drainage area of 32.8 square miles. From the proposed location of the Sites Dam, Stone Corral Creek meanders through a shallow canyon onto the valley floor, where it flows through an incised channel across grazing lands. At 4.6 miles from the Sites Dam location, Stone Corral Creek crosses over a siphon in the Tehama-Colusa Canal Authority (TCCA) canal and begins to travel through agricultural lands. About 3 miles below the TCCA canal siphon, Stone Corral Creek crosses the Glenn-Colusa Irrigation District (GCID) canal siphon. Although most of the water in the canal passes under Stone Corral Creek in the siphon, GCID releases water from the canal to Stone Corral Creek for delivery to agricultural fields downstream. About 5.5 miles below GCID, Stone Corral Creek merges with Funks Creek and then flows an additional 5.7 miles to the Colusa Basin Drain (CBD).

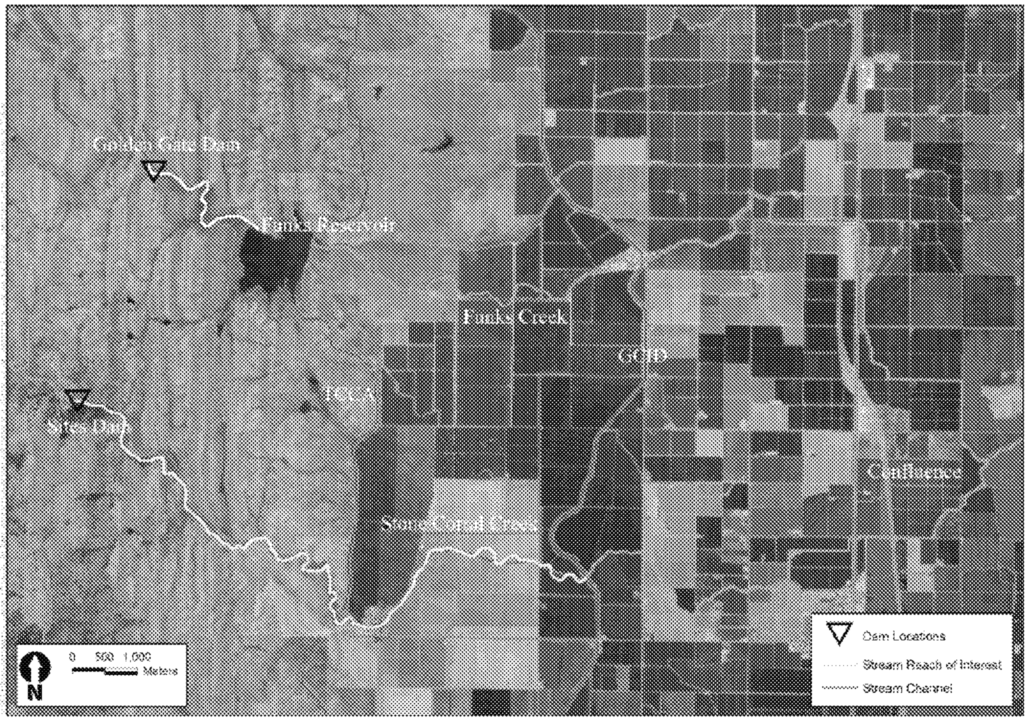
Funks Creek

Funks Creek, a tributary to Stone Corral Creek, has a drainage area of 43 square miles. From the proposed location of Golden Gate Dam, Funks Creek meanders through a series of low ridges and grazing lands for about 1.8 miles to Funks Reservoir. Funks Reservoir is a re-regulating reservoir on the TCCA canal and is created by a low dam on Funks Creek. Funks Dam is operated by TCCA mostly for flood control purposes. The Funks Dam gates are opened during large storm events to pass flood waters through the reservoir and downstream to avoid compromising the TCCA canal and its operations. There are no requirements to maintain flows in Funks Creek below Funks Reservoir, but seepage through the dam gates allow a few cfs, which maintains flow in Funks Creek.

Below Funks Dam, Funks Creek travels 3.9 miles through agricultural fields in a combination of natural and straightened channels to where it crosses the GCID canal. While the GCID canal passes

[3] Characterization of stream channels is based on desktop review of streams using Google Earth.

under Funks Creek in a siphon, GCID releases water from the canal to Funks Creek, and like Stone Corral Creek, GCID uses the downstream portions of Funks Creek as part of its conveyance system to deliver water to agricultural fields. Approximately 2 miles northeast of Maxwell and 1 mile east of Interstate 5, Funks Creek flows into Stone Corral Creek.



ICF

Figure 1. Stone Corral and Funks Creeks

Water Quality

Stone Corral Creek is listed under section 303(d) as an impaired water body for low dissolved oxygen levels (SWRCB 2017). The creek was originally listed in 2010 and is scheduled to have a Total Maximum Daily Load plan by 2027. This designation is based on samples collected at a sampling site located where Stone Corral Creek crosses 4-mile Road. This location is downstream of the confluence between Funks and Stone Corral creeks, at the western edge of the Delevan National Wildlife Refuge. The source of the oxygen depletion is listed as unknown (SWRCB 2017) but, given the amount of algae visible in Google Earth photos, nutrient loading from the cattle grazing lands and agricultural fields is a likely source in both watersheds. During fish surveys in 1998 and 1999, CDFW noted that water quality was poor and high in dissolved minerals. They reported that the total dissolved solids in the water were so high that it precluded electrofishing as a means of sampling (CDFG 2003).

SWRCB (2017) did not report on water quality in Funks Creek but given similar size, geology, and land use between the two watersheds, the water quality in Funks Creek is likely comparable to Stone Corral Creek.

Hydrology

Both streams originate at low elevations below the snow line of the Coast Range and consequently do not receive cold snowmelt water. Rather, they respond rapidly to significant rainfall events and flash flooding and substantial overland flow has been observed (USBR and DWR 2013).

The USGS collected 25 years of discharge measurements in Stone Corral Creek near the town of Sites from 1958 through 1985. During that time, there were 3 years of zero flow: 1972, 1976, and 1977. Yates (1989) estimated the recurrence interval of a winter without flow at 12 to 14 years. The maximum mean daily flow of 2,230 cfs occurred on December 24, 1983. The instantaneous peak flow was 5,700 cfs on January 26, 1983. The 100-year discharge was established in a 1987 Colusa Basin flood flow frequency analysis as 7,870 cfs (DWR 1987, cited in USBR and DWR 2008).

There is no comparable data set for Funks Creek. However, given the comparable size, geology, and topography of the two watersheds and their proximity to each other upstream of their confluence, Stone Corral Creek hydrology is likely representative of Funks Creek hydrology in terms of amount and seasonality of flow. The daily mean hydrology for Stone Corral Creek was presented in the Draft EIR/EIS and is included in Table 1. It shows the variability of flow over the period of record differs considerably from a static flow of 10 cfs.

Table 1. Stone Corral Creek Daily and Monthly Flows Near Sites, USGS 11390672

Period of Record 4/1/1958 – 9/30/1964 and 10/1/1965 – 9/30/1985
Drainage Area = 38.2 Square Miles

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Daily Flows (cfs) for Period of Record												
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	74	2,230	1,910	2,150	1,980	619	45	9	1	0	0
Avg	0	1	11	32	39	21	8	1	0	0	0	0
Monthly Flows (AF) for Period of Record												
Min	0	0	0	0	0	0	0	0	0	0	0	0
Max	0	427	11,432	8,825	11,137	15,227	4,451	740	146	19	0	0
Avg	0	37	660	1,946	2,190	1,300	484	83	13	1	0	0

Source: Sites Authority and USBR 2017.

Fishery Resources

As part of the CALFED North of Delta Offstream Storage Investigations, CDFW conducted fish surveys in the Sites Reservoir inundation area in 1998 and 1999 (CDFG 2003). Ten species of fishes were caught in the Sites and Colusa study areas; six were native and four were introduced, of which, three are considered game fish (Table 2). Sacramento hitch (hitch) was the most common species sampled during these studies. Hitch were found in all the creeks in the Sites and Colusa study area. Hitch were also present in the greatest numbers. Stone Corral Creek had the greatest diversity of fish throughout the year in the Sites and Colusa study areas. However, fish densities were lower in Stone Corral Creek, particularly for hitch, than in other creeks. Funks Creek was the next most diverse creek with five species of fish. These surveys also documented all these species downstream in the CBD, so they are likely present throughout these watersheds.

Table 2. Fishes Caught in the Sites Study Area in 1998 and 1999

Common Name	Scientific Name	Stream	Native (N) or Introduced (I)
California roach	*Hesperoleucus symmetricus*	Stone Corral	N
Sacramento hitch	*Lavinia exilicauda*	Funks, Stone Corral	N
Sacramento blackfish	*Orthodon microlepidotus*	Stone Corral	N
Sacramento pikeminnow	*Ptychocheilus grandis*	Funks, Stone Corral	N
Sacramento sucker	*Catostomus occidentalis*	Funks, Stone Corral	N
Sculpin	*Cottus sp.*	Funks	N
Bluegill*	*Lepomis macrochirus*	Stone Corral	I
Green sunfish*	*Lepomis cyanellus*	Stone Corral	I
Largemouth bass*	*Micropterus salmoides*	Funks	I
Mosquitofish	*Gambusia affinis*	Stone Coral	I

* game fish

Below is a summary of the life history and habitat preferences for each of these species. These summaries are taken from "California Fish Website" maintained by University at California Davis[4]. Table 3 presents a summary of temperature tolerances, spawning seasons, and spawning substrates used by each species. This information demonstrates that this is a complex of warm water species that spawn in the spring and summer months over a diversity of substrates.

California Roach are a small fish usually less than 100 mm long. They can adapt to varying habitats from coastal streams to mountain foothill streams. They are predominately found in small warm streams but can thrive in larger colder streams with diverse conditions. They may occupy several different habitat types within a single drainage. Extreme tolerance includes temperatures ranging from 30-35ºC and dissolved oxygen levels as low as 1-2 ppm. In-stream location may vary depending on geography and predators. California Roach are omnivorous, and diet may depend on stream size and food availability. In smaller rivers Roach feed mostly on filamentous algae, supplementing their diet with crustaceans and insects. Generally, California roach reach sexual maturity at age 2-3 and rarely live beyond three years total. Spawning occurs in March through early July, and timing is temperature dependent. California Roach breed in gravel beds or riffles where

[4] http://calfish.ucdavis.edu/species/

groups of females lay eggs on and into the substrate. Eggs hatch in 2-3 days after spawning. Larvae remain in the protection of the gravel substrate before emerging to swim.

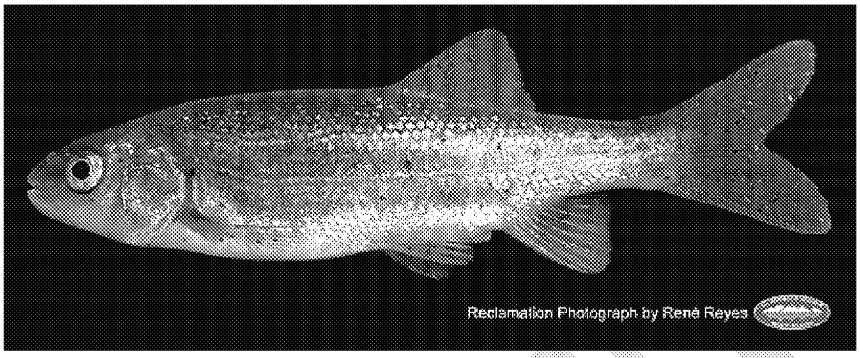


Figure 2. California Roach, *Hesperoleucus symmetricus* (Source R. Reyes, US Bureau of Reclamation).

Hitch grow to about 35 cm in length. Hitch are most often found in slow warm water, including lakes and quiet stretches of rivers. They are the most heat tolerant of the native Central Valley fishes and can withstand water temperatures greater than 30°C under some conditions. They have also been found living in brackish water with salinities as high as 9 ppt. Generally, females reach sexual maturity in 2-3 years, while males may reach sexual maturity in years 1-3. Spawning may begin as early as February and end as late as July. Females release their eggs into the current and the males immediately fertilize the eggs. The eggs then settle into the gravel substrate where the size of the ova will increase and help lodge it into the rock particles. In 3-7 days, the embryos hatch, and 3-4 days after the hatch the embryos begin to swim freely. The young Hitch may swim downstream to a lake or slough or reside within the stream under the cover of aquatic plants. Hitch generally live for a total of 4-6 years.

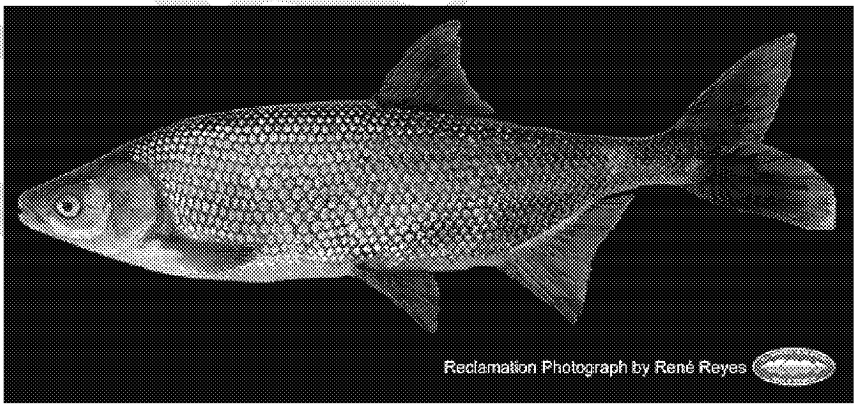


Figure 3. Hitch, *Lavinia exilicauda* (Source R. Reyes, US Bureau of Reclamation).

Sacramento Blackfish grow up to 50 cm in length. They are native to the Sacramento and San Joaquin drainages as well as to Clear Lake. Sacramento Blackfish prefer warm turbid waters in small to large streams, and often share habitat with an array of non-natives. Sacramento Blackfish prefer water temperatures in the range of 22-28°C. They have shown a great ability to adapt to extreme environments including water temperatures exceeding 30°C and salinities in excess of 9 ppt. Blackfish are typically suspension feeders with a diet of planktonic algae and zooplankton, including copepods, insect larvae, rotifers, cladocerans, and detritus. Sacramento Blackfish may become sexually mature from ages 1 to 4 years, depending upon their growth rate. Spawning generally occurs in spring but may happen anytime between March and July when water temperatures are in the range of 12-24°C. Spawning beds are usually found in areas of thick vegetation and shallow water. The eggs will cling to the local substrate till the larvae emerge and begin foraging in the same region.

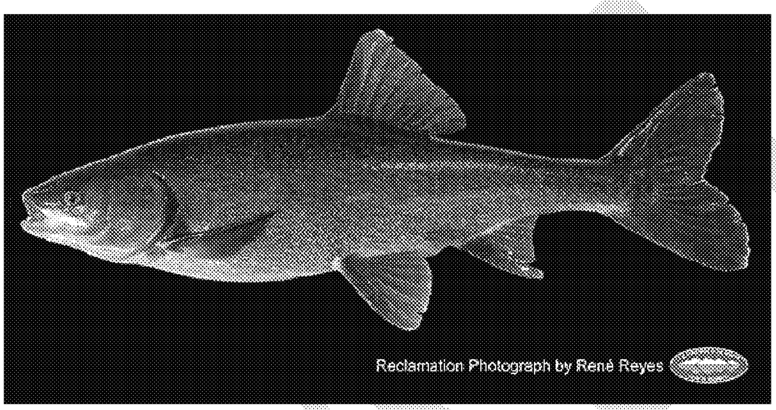


Figure 4. Sacramento Blackfish, *Orthodon microlepidotus* (Source R. Reyes, US Bureau of Reclamation).

Sacramento Pikeminnow are a lager fish growing to 115 cm in length. They are typically found in clear low to mid-elevation streams and rivers. Pikeminnows favor streams with deep pools and slow runs that have cover in the form of undercut banks or aquatic vegetation. They are found where water temperatures are usually in the range of 18-28°C, although they are capable of withstanding extremes up to 38°C and salinities as high as 8 ppt. Juveniles may feed on aquatic insects and change the focus of their diet to crustaceans and fish as they grow bigger. Large adults are voracious opportunistic predators. Pikeminnow become sexually mature at age 3-4 and begin spawning in April – May. Ideal spawning grounds are riffles and pool tails with gravel substrate. Pikeminnow may live up to 16 years.

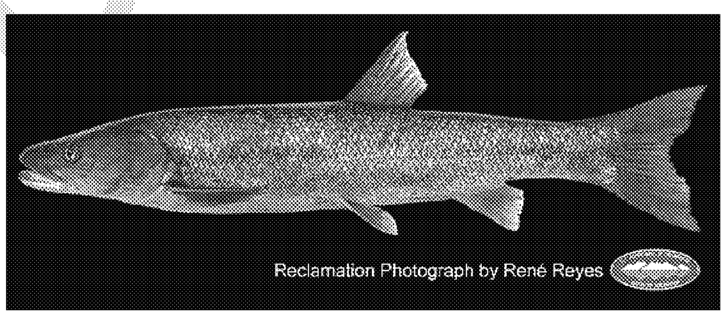


Figure 5. Sacramento Pikeminnow, *Ptychocheilus grandis* (Source R. Reyes, US Bureau of Reclamation).

Sacramento Suckers grow up to 56 cm in length. They live and forage in warm protected streams and forage on algae, invertebrates, and detritus. Young fish may stay in this warm water for several years before moving into lakes or larger rivers. Adult fish typically rest or hold in the deeper water during the day and feed during the first and last hours of the day. The larger fish may occupy pools, runs, or riffles in area where vegetation or rocks provide cover from birds and other predators. At age 4-6 Sacramento Suckers become sexually mature and begin a spawning ritual that may involve a migration to a warmer and smaller stream. Spawning is triggered by the onset of warmer water temperatures and usually occurs between February and June. Suckers spawn in groups, sending fertilized eggs down into the substrate and out into the current. The eggs settle in gravel and slackwater areas, hatching after 2-4 weeks.

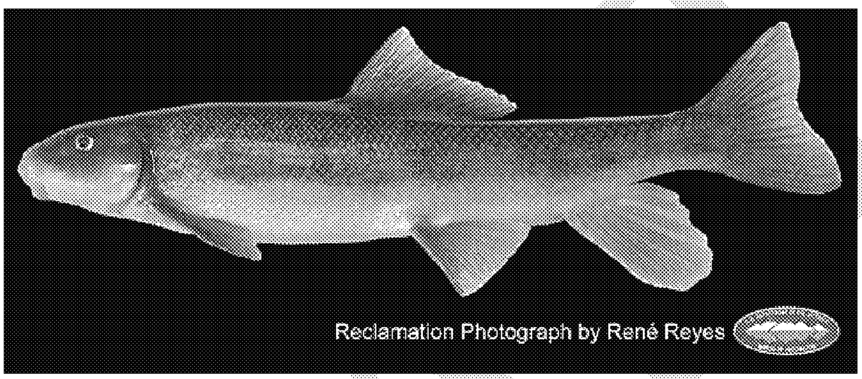


Figure 6. Sacramento Sucker, *Catostomus occidentalis* (Source R. Reyes, US Bureau of Reclamation).

Sculpin sp. (likely prickly sculpin) grow up to 20 cm. Prickly Sculpin are adaptable to environments ranging from fresh to saltwater, and from small cool stream to large warm rivers and lakes. The Prickly Sculpin has a variety of forms as some are coastal, others live in the valley, and some are limited to Clear Lake proper where they are adapted to life in a warm shallow water reaching temperatures of 25-28°C. In the Central Valley of California these fish inhabit low elevation waters. The limitation to the spread of these fish seems to be water quality, as the Prickly Sculpin is not found in highly polluted waters. In streams these fish use a variety of habitats though good cover or overhanging vegetation is a common requirement. Both adults and juveniles consume invertebrates, aquatic insects, and mollusks. Adult sculpins may supplement their diet with small fish and amphibians as well. Prickly Sculpins reach sexual maturity between 2, and 4 years of age. Most spawning occurs between February and June.

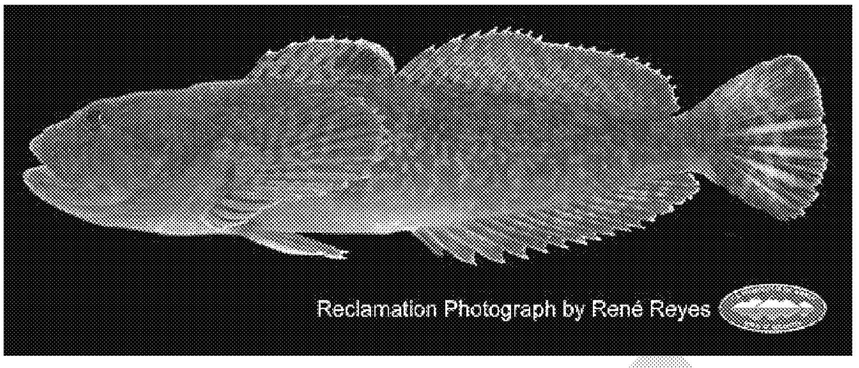


Figure 7. Prickly Sculpin, *Cottus asper* (Source R. Reyes, US Bureau of Reclamation).

Bluegill are most common in warm, shallow lakes, reservoirs, ponds, streams, and sloughs at low elevations. They prefer temperatures between 27°C and 32°C but can live in waters as cold as 2-5°C and as warm as 40-41°C. They are more limited by salinity levels however, occasionally being found in areas of 5 ppt but suffering from arrested development at 8 ppt and die at 12 ppt. They grow best in areas with dissolved oxygen levels between 4 ppm and 8 ppm. Aquatic insect larvae are preferred food but planktonic crustaceans, flying insects, and snails are common food items and small fish, fish eggs, and crayfish can be taken when available. Spawning occurs in summer when temperatures reach 18-21°C and may continue through to September. They construct nest that are 20-30 cm wide and 5-15 cm deep out of the gravel, sand, or mud substrate in shallow water.

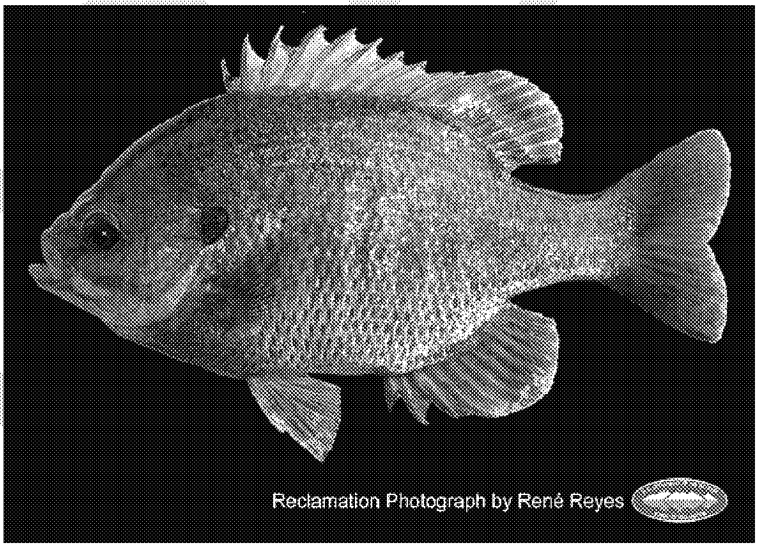


Figure 8. Bluegill, *Lepomis macrochirus* (Source R. Reyes, US Bureau of Reclamation).

Green Sunfish may grow to 30 cm. They are most common in small, warm streams with turbid, mud-bottom pools and aquatic vegetation, and are especially prevalent in streams that are intermittent in summer. They can tolerance temperatures greater than 38°C, dissolved oxygen levels less than 1 ppm. They are opportunistic predators, feeding primarily on invertebrates and small fish. Young of the year feed mainly on zooplankton, small benthic invertebrates, and the larvae of other fish, but, as they grow, the focus of their diet switches towards large aquatic and terrestrial insects, crayfish, and other fish. Green Sunfish mature at the beginning of their third year. Spawning occurs between May and August. Preferred spawning areas are 4-50 cm deep with fine gravel bottoms near overhanging bushes or other cover. Green Sunfish can live to be 10 years old.

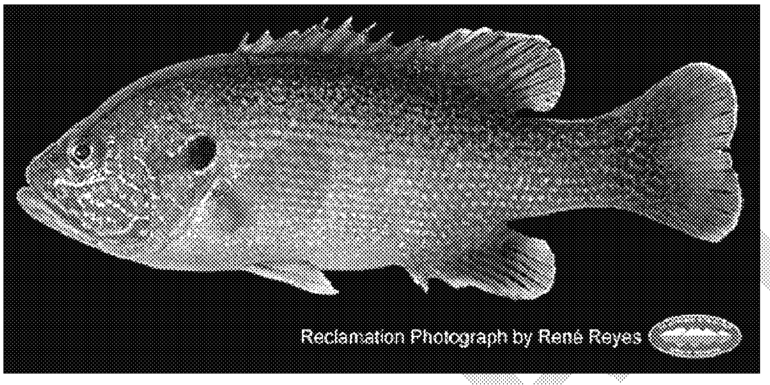


Figure 9. Green sunfish, *Lepomis cyanellus* (Source R. Reyes, US Bureau of Reclamation).

Largemouth Bass may grow to sizes of 76 cm in length. They occur commonly in warm shallow waters with moderate clarity and beds of aquatic plants. Largemouth Bass can survive temperatures up to 36-37°C but 27°C is preferred. They can also survive in water with dissolved oxygen levels as low as 1 ppm but will avoid areas with salinities higher than 3 ppt. In general, fry feed on crustaceans and rotifers before taking on insects and fish fry at 50-60 mm in length. They become primarily piscivorous at 100-125 mm in length. Crayfish, tadpoles, or frogs may also be consumed once a Largemouth Bass has grown large enough to digest them. Spawning starts in March or April when temperatures reach 15-16°C and continues through June in temperatures up to 24°C. Males build nests by brushing out shallow depressions, up to 1 m in diameter, into sand, gravel, or debris-littered bottoms.

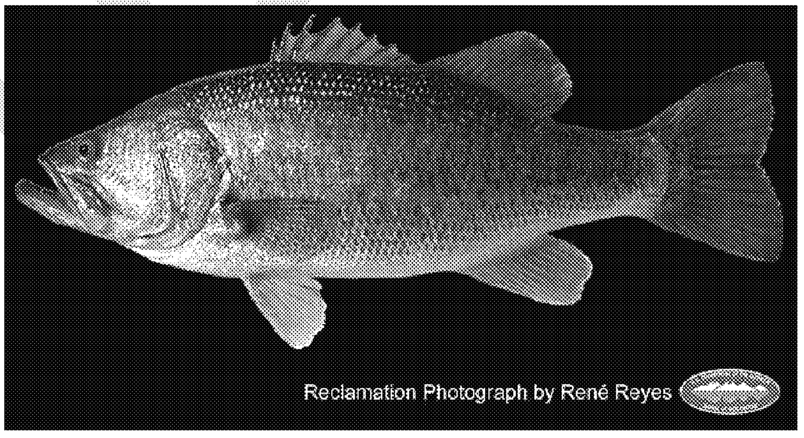


Figure 10. Largemouth bass, *Micropterus salmoides* (Source R. Reyes, US Bureau of Reclamation).

Western Mosquitofish are small fish; females reach lengths of 7 cm while male reach lengths of only 4 cm. They are extremely adaptable and can survive in habitats from brackish sloughs and salt marshes to warm ponds, lakes, and streams. They can tolerate temperatures of 42°C, pH levels of 4.7 to 10.2, and salinities as high as 58 ppt but prefer areas at 25-30°C, 7-9 pH, and salinities under 25 ppt. Due to their unique head shape Western Mosquitofish can push their mouth to the absolute edge of the water's surface where oxygen is just being dissolved. This allows them to live in bodies of water with extraordinarily low oxygen levels, as low as 0.2 ppm. They are opportunistic diurnal feeders, their diet includes mosquito larvae, algae, zooplankton, terrestrial insects, and various other invertebrates. In California, the breeding season is usually April through September. They are an ovoviviparous species with females giving birth to live young. Most fish breed only once, and few survive longer than 15 months.

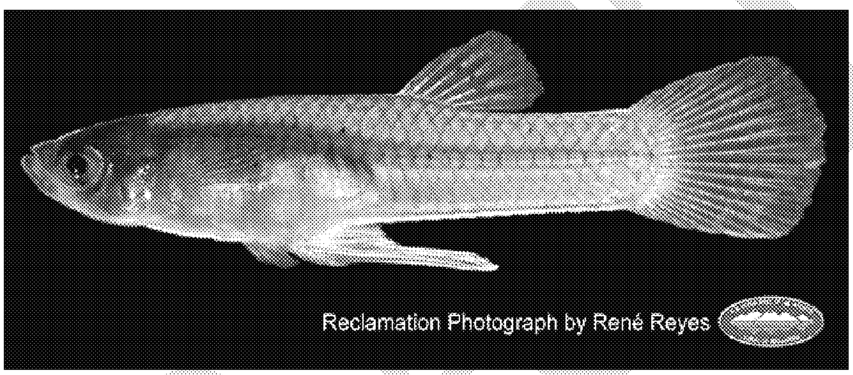


Figure 11. Western mosquitofish (male), *Gambusia affinis* (Source R. Reyes, US Bureau of Reclamation).

Table 3. Temperature, Spawning Seasons, and Substrates for Species in Project Area

Common Name	Temperature preference	Spawning season	Spawning substrate
California roach	30-35°C	Mar - Jul	Gravel
Sacramento hitch	> 30°C	Feb - Jul	Broadcast spawners over gravel
Sacramento blackfish	22-28°C	Feb - Jul	Think vegetation
Sacramento pikeminnow	18-28°C	Apr - May	Riffle and pool tails with gravel
Sacramento sucker	20-25°C	Feb - Jun	Riffles over gravel
Sculpin	25-28°C	Feb - Jun	Sandy area with overhanging vegetation
Bluegill	27-32°C	Jun - Sep	Gravel, sand, or mud
Green sunfish	< 38 °C	May - Aug	Fine gravel near overhanging vegetation
Largemouth bass	27-37 °C	Mar- Jun	Sand, gravel, or debris littered bottom
Mosquitofish	25-32 °C	Apr - Sep	Live bearing near cover

We note that the UC Davis California Fish Website/fish by location for Stone Corral and Funks creeks lists all these species plus several other species (see the attached appendix), including additional warm water species and cold water/anadromous species. We opted to not include these additional species in this memo because the original sources of information for including them on the UC Davis Fish Website were not readily available and some of the listing appear outdated or dubious. For example, some species were included based on historical records (for example, Thicktail Chub, *Gila crassicauda*, are now extinct) and are no longer present. Some are included based on expert opinion rather than documented observations, and some appear to have been included by reference to higher level watersheds (8 digit hydrologic unit code (HUC) instead of a 12 digit HUC)[5], which include portions of the Sacramento River and sloughs. The warm water species on the UC Davis fish website but described in detail are all tolerant of a wide spectrum of temperatures, salinities, and dissolved oxygen levels and would likely be affected by the Sites Reservoir project just as the species that were documented as present in the CDFW studies.

The anadromous/cold water species in the UC Davis list may have been incorporated by reference to 8-digit HUC that the National Marine Fisheries Service (NMFS) used to identify critical habitat for spring-run Chinook salmon and Steelhead. That 8-digit HUC (the Sacramento-Stone Corral sub-basin) includes the Sacramento River mainstem from the confluence of the Feather River to the confluence with Stone Creek and therefore includes all the anadromous species in the Sacramento River. However, those anadromous/cold water species are unlikely to occur in the smaller 12-digit HUCs of Stone Corral and Funks creeks because the habitat in Stone Corral and Funks creek is unlikely to support anadromous/cold water species.

CDFW investigators did observe one adult Chinook salmon (later confirmed to be a spring-run Chinook Salmon) in Antelope Creek. Antelope Creek is a tributary that flows into Stone Corral Creek in the inundation area of the proposed reservoir. This was likely an out-of-habitat stray that wandered from the Sacramento River through the CBD and Stone Corral Creek to Antelope Creek. Like Stone Corral Creek, Antelope Creek receives no cold snowmelt water, is flashy in nature, frequently dries in summer months, and otherwise is too warm to support cold water species of anadromous fish. Consequently, the CDFW investigators did not include Chinook salmon as a species present in the Stone Corral or Funks creeks in their report (CDFG 2003).

In addition, the only access to Stone Corral and Funks creeks from the Sacramento River is through the CBD. State and federal fish agencies have been working with local water districts to exclude anadromous fish from the CBD (NMFS 2014). Salmon and sturgeon migrating upstream through the Yolo Bypass can be attracted to flows in Knights Landing Ridge Cut and the CBD, particularly if diverted water carries olfactory cues from the upstream Sacramento River. In the CBD, a combination of warm temperatures, poor water quality, limited habitat, and a lack of access upstream for returning to the Sacramento River leaves anadromous fish stranded where they perish without spawning (ICF 2016).

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[5] USGS delineates watersheds using a nationwide system based on surface hydrologic features. This system divides the country into 21 regions (2-digit), 222 subregions (4-digit), 370 basins (6-digit), 2,270 sub-basins (8-digit), ~20,000 watersheds (10-digit), and ~100,000 sub-watersheds (12-digit). Each division is assigned a hydrologic unit code beginning at the regional level with 2 digits. Each level is subsequently divided into smaller units down to the smallest units, the 12-digit HUC. Each higher units contains all the smaller units within its boundaries.

In 2016, Reclamation District (RD) 108 completed construction of the Wallace Weir Fish Rescue Facility, which is designed to exclude fish migrating upstream in the Yolo Bypass from entering Knights Landing Ridge Cut and the CBD (NMFS 2019). RD 108 and the resource agencies are also working to preclude fish from entering the CBD via the Knights Landing Outfall Gates. Additionally, the NMFS recovery plan for salmonids in the Central Valley calls for identifying other potential entry points into the CBD and installing fish exclusion devices to reduce migration of listed adult salmonids into the CBD complex (NMFS 2014).

Effects of Sites Reservoir Project on Stone Corral Creek and Funks Creek

The Sites Reservoir Project is an offstream storage project designed to store and manage water diverted from the Sacramento River. To create the reservoir, Sites Dam and Golden Gate Dam will be built across Stone Corral Creek and Funks Creek along with several saddle dams to raise low points in the rim around the proposed reservoir site. The dams across Stone Corral and Funks creeks will retain the flow from these creeks. The project description in the Draft EIR/EIS included low-level outlet works in the two dams capable of releasing stream maintenance flows of up to 10 cfs into Stone Corral and Funks creeks to mimic the intermittent nature of these streams (Chapter 3 of the Draft EIR/EIS). Flow into the low-level outlets would be from low in the reservoir. To the extent the reservoir stratifies in the late spring and summer, these outlets would release cold water into the streams, which are currently populated with species more typically adapted to warm water environments. Releases of 10 cfs would likely warm quickly below the dams due to the lack of riparian cover and high ambient temperatures that occur in late spring, summer, and early fall in the Sacramento Valley. In addition, flow from Funks Creek into Funks Reservoir would likely be warmed in the shallow reservoir and would not affect temperatures below Funks Dam. The effect of this temperature shift on the warm water community below the dams is anticipated to be minimal due to the potential for solar warming on the valley floor.

Given that construction plans do not include fish passage facilities, fish will be precluded from moving above the dams in search of refugia during late spring and summer dry periods, and information on the availability of refugia habitat below the reservoir location is lacking so there is a potential for stranding of fish below the dams as winter flows diminish. CDFW's recommendation for a perennial flow would address this issue. However, absent a perennial flow, fish could continue to move downstream to wetted habitat given GCID's use of the stream channels for conveyance.

High flood flows in the historical hydrograph will be retained in the reservoir to achieve the flood control benefits recognized by the California Water Commission in its review of the Sites Authority request for funding from the Water Storage Investment Program (WSIP). Consideration should be given to when and how those flows will be released, whether a portion of these flows are needed to maintain fluvial geomorphic processes, and what level of variability in base flows will satisfy California Fish and Game Code section 5937 goals consistent with the goals and objectives of the Sites Reservoir Project.

Recommendations for Consideration

The CDFW fish investigation referenced above was conducted upstream of the Sites Dam and Golden Gate Dam locations. The assemblage of fish identified in those studies is reasonably representative of the fish species that occur below the dam locations because the same species have been documented in the CBD. For reasons discussed above, Stone Corral and Funks creeks are unlikely to support populations of any special-status fish species. To the extent special-status species occur in the CBD, cooperative efforts are underway to exclude them. Nevertheless, the Sites Authority should confirm with CDFW that the appropriate list of fish likely to be affected in Stone Corral and Funks creeks is the warm water community documented in the 1998 and 1999 CDFW studies.

The Sites Authority should also meet with CDFW to discuss CDFW's expectation for flows that would maintain fishes in good condition in Stone Corral and Funks creeks. CDFW input on whether hydrologic studies are needed to define the hydrology of these watersheds under current conditions would be useful, and if so, their input on the design of those studies. The recommendation presented below was developed to provide a rationale for a reasonable approach the engineering team could use for preliminary design of facilities to be incorporated in the project description for the environmental review being conducted by the Sites Authority. While we think this recommendation is sufficient for planning purposes, we have no way of knowing whether it will satisfy CDFW concerns without their review.

Given that the dams associated with Sites Reservoir will retain the flows from these streams in the proposed reservoir, the project should be modified to provide a flow representative of the variability in pre-project flows for the purpose of maintaining fish in good condition. The critical question is: what is the appropriate level of variability in flows? There has not been a flow investigation to develop a recommended hydrograph for releases from Sites Dam or Golden Gate Dam and the WSIP schedule for environmental review precludes a detailed study. Richter et al. (2011) have proposed a "presumptive standard" for stream flows that would likely sustain fishery resources in the affected streams. They proposed implementation of this standard when time and resources are not available to undertake the extensive hydrological studies that are required to develop values for sustaining fishery resources. Their presumptive standard is based on characterizing unimpaired flow and protecting a percentage of those flows to protect the ecological function of a waterway, similar to SWRCB's proposed percent of unimpaired flow approach for its update of the Bay Delta Plan for flows in the San Joaquin and Sacramento Rivers (SWRCB 2018).

Richter et al. (2011) suggest that protecting 80 percent of daily flow will maintain ecological integrity in most rivers and streams. While they suggest a reduction in flows of 20 percent may result in some structural change, they expect it would result in only minimal changes in ecosystem function.

While other approaches exist to estimate minimum stream flows to maintain ecosystem and geomorphic function, such as "the functional flow" approach suggested by Yarnell et al. (2015), they require information that is not currently available. In addition, the Yarnell et al. (2015) approach was developed for consideration in highly developed streams and rivers where societal demands are well established and mimicking the full natural flow regime is not likely to be implemented. This situation does not appear to apply to Funks and Stone Corral creeks.

For the Sites Project, the reaches of stream likely to be most modified by the two proposed dams are the reaches from below the dams to where they have been modified by historical water management practices (reaches of interest, Fig. 1). On Stone Corral Creek, the reach of interest is from the downstream face of the Sites Dam to just above the GCID canal; on Funks Creek, it is from the downstream face of Golden Gate Dam to the upper end of Funks Reservoir. While these reaches have been modified by cattle grazing and minor diversions for domestic use and stock watering, they still experience much of their natural hydrograph and fluvial geomorphic processes. As such, the Richter et al. (2011) approach is a reasonable starting point for addressing CDFG Code Section 5937.

Table 4 presents the 80th percentile of mean daily values of water years for the period of record for the USGS stream gage which was located on Stone Corral Creek. There is only one day that exceeded 78 cfs. Therefore, we recommend that the Sites Authority ask its engineering team to consider designing facilities capable of releasing up to 80 cfs to the reaches of interest in Stone Corral and Funks creeks. Given the erosive nature of the soils in the Stone Corral and Funks watersheds and the current constraints of their respective stream channels (i.e., deep channels and shallow ravines) in the reaches of interest, a variable flow up to 80 cfs may be enough to maintain geomorphic processes (e.g. mobilization of bedload, and erosion of stream banks) that support the fish assemblage and other aquatic species below the dams.

The project description in the Draft EIS/EIR included a base flow of 10 cfs. However, it was equivocal whether the base flow would be provided year-round or from October to May. Since Stone Corral and Funks Creeks are intermittent streams, which did not flow in summer months of average years and in dry years did not flow at all (Table 1). While CDFW code section requires maintaining fish in good condition, it's not clear that it requires conversion of intermittent streams to perennial streams, and while fish will be precluded from migrating to the upper reaches of Stone Corral and Funks Creek they will be able to move downstream to reaches maintained by agricultural diversions into the stream channels. Therefore, we recommend a flow regime that maintains the intermittent nature of these streams and protects the 80th percentile of the documented hydrology.

Finally, for reasons stated above, we recommend the engineering team consider facilities in the project design capable of delivering 0 to 80 cfs to the stream channels below Sites Dam and Golden Gate Dam. Also, consideration should be given to a mechanism that will provide higher flows on an infrequent basis, consistent with the project's flood control benefit for maintenance of fluvial geomorphic processes, such as channel forming flows (perhaps flows of several hundred cfs).

If necessary, the Richter et al. (2011) approach could be adaptively managed to incorporate some of the more flexible processes suggested by a functional flow approach. This would likely require installation of stream gages to record the hydrograph in these steams over several years and water year types to determine flow variability. Fish surveys to confirm species presence, distribution and habitat use. Also monitoring programs to confirm the frequency and magnitude of flows to mobilize the bedload, freeing embedded gravel, clearing sandy and muddy areas of vegetation, and eroding stream banks are all elements that may be required to maintain the diversity of spawning habitats used by the assemblage of fish documented to be present in these streams. In addition, whether the 80th percentile of the historical hydrograph is sufficient for channel forming flow needed maintain ecological function of the reaches below the dams needs to be determined. These studies would need to document habitat availability and habitat use. Such information would provide important information for determining whether these reaches will provide habitat necessary for the fish present to complete their life cycles after the dams are constructed and perennial flow is provided.

Development of an adaptive management approach for compliance with California Fish and Game Code 5937 is another subject for which input from CDFW would be valuable. Absent CDFW input, the Sites Authority risks over-designing this aspect of the project which would result in unnecessary cost. Under-designing this aspect of the project could lead to costly re-engineering late in the design or permitting processes.

Table 4. 80th percentile of daily mean values for each day for water year of record (calculation period of record 1957-10-01 to 1985-09-30)

Day of the Month	Discharge, Cubic Feet per Second											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1.9	21	26	13	3.3	0.34	0.04	0	0	0	0	0.72
2	2.7	19	17	12	2.9	0.26	0.04	0	0	0	0	2.3
3	2.5	19	29	10	3	0.18	0.04	0	0	0	0	2.1
4	4.8	15	42	9.5	3.2	0.25	0.04	0	0	0	0	1.1
5	4.7	17	47	11	3	0.32	0.04	0	0	0	0	1
6	5.4	13	39	11	3	0.28	0	0	0	0	0	0.6
7	4.2	13	40	11	3	0.24	0	0	0	0	0	0.42
8	4.8	26	29	8	2.6	0.23	0	0	0	0	0	0.48
9	20	32	24	7.4	2.4	0.23	0	0	0	0	0	0.57
10	9.4	44	23	7.5	2.2	0.15	0	0	0	0	0	0.52
11	15	11	20	7.3	2.1	0.19	0	0	0	0	0	0.47
12	19	49	18	7.1	1.8	0.19	0	0	0	0	0	0.47
13	29	76	17	6.9	1.6	0.23	0	0	0	0	0	0.47
14	24	58	16	9.5	1.5	0.17	0	0	0	0	0.01	0.47
15	38	78	15	9	1.3	0.18	0	0	0	0	0.01	0.51
16	191	69	18	8.5	1.1	0.1	0	0	0	0	0	0.62
17	50	55	16	6.9	0.84	0.1	0	0	0	0	0	0.82
18	33	46	16	5.6	0.7	0.1	0	0	0	0	0.04	0.89
19	24	28	18	5.2	0.66	0.07	0	0	0	0	0.26	6.2
20	29	31	15	4.9	0.63	0.06	0	0	0	0	0.07	2.8
21	34	31	37	4.7	0.57	0.06	0	0	0	0	0.02	15
22	23	23	24	4.6	0.5	0.07	0	0	0	0	0	9.8
23	19	18	17	4.7	0.52	0.06	0	0	0	0	0.06	6
24	17	16	13	4.9	0.44	0.05	0	0	0	0	0	7.2
25	18	16	13	4.6	0.44	0.04	0	0	0	0	0	4.4
26	15	15	9.2	5.2	0.44	0.04	0	0	0	0	0.02	4
27	28	15	15	4.6	0.34	0.03	0	0	0	0	0.09	3.2
28	20	15	15	4.3	0.29	0.03	0	0	0	0	1.9	3.8
29	44	18	11	3.7	0.27	0.04	0	0	0	0	1.1	4.7
30	34		14	3.6	0.24	0.04	0	0	0	0	0.68	2.6
31	29		12		0.18		0	0		0		1.5

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Appendix

Species Lists Funks and Stone Corral Creeks: University of California Agriculture and Natural Resources - California Fish Website - Fish Species by Watersheds

Funks Creek-180201040602'	**Stone Corral Creek-180201040604'**
Native species	**Native species**
Western Brook - *LampreyLampetra richardsoni*	Western Brook - *LampreyLampetra richardsoni*
Thick tail Chub - *Siphatales carssicauda*	Thick tail Chub - *Siphatales carssicauda*
Riffle Sculpin - *Cottus gulosus*	Riffle Sculpin - *Cottus gulosus*
Sacramento Blackfish - *Orthodon microlepidotus*	Sacramento Blackfish - *Orthodon microlepidotus*
Sacramento Perch - *Archoplites interruptus*	Sacramento Perch - *Archoplites interruptus*
Sacramento Pikeminnow - *Ptychocheilus grandis*	Sacramento Pikeminnow - Ptychocheilus grandis
Sacramento Speckled Dace - *Rhinichthys osculls*	Sacramento Speckled Dace - *Rhinichthys osculls*
Sacramento Splitttail - *Pogonichthys macrolepidotus*	Sacramento Splitttail - *Pogonichthys macrolepidotus*
Sacramento Sucker - Catostomus *occidentalis occidentalis*	Sacramento Sucker - *Catostomus occidentalis occidentalis*
Pacific Lamprey - *Entosphenus tridentate*	Pacific Lamprey - *Entosphenus tridentate*
Prickly Sculpin - *Cottus asper* subspecies	Prickly Sculpin - *Cottus asper subspecies*
Hardhead - *Mylopharodon conocephalus*	Hardhead - *Mylopharodon conocephalus*
Inland Treespine Stickelback - *Gasterosteus aculeatus*	Inland Treespine Stickelback - *Gasterosteus aculeatus*
Central California Roach - *Lavinia symmetricus*	Central California Roach - *Lavinia symmetricus*
Central Valley Steelhead - *Oncorhynchus mykiss*	Central Valley Steelhead - *Oncorhynchus mykiss*
Coastal Rainbow Trout - *Oncorhynchus mykiss irideus*	Central Valley Spring Chinook *Oncorhynchus tshawytscha*
Introduced species	**Introduced species**
Black Bullhead - *Ameiurus melas*	Common Carp - *Cyprinus carpio*
Bluegill - *Loponis macrochirus*	Goldfish - *Carassius auratus*
Brown Bullhead - *Ameiurus nebulosus*	Readear Sunfish - *Leponis microlophus*
Common Carp - *Cyprinus carpio*	Samllmouth Bass - *Micropterus dolomieu*
Golden Shiner - *Notemigonus crysoleucas*	White Crappie - Pomoxis annularis
Goldfish - Carassius auratus	Spotted Bass - *Micropterus punctulatus*
Green Sunfish - Lepomis cyanellus	
Largemouth Bass - Micropterus salmonoides	
Readear Sunfish - *Leponis microlophus*	
Samllmouth Bass - *Micropterus dolomieu*	
Western Mosquitofish - *Gambusia affinis*	
White Crappie - *Pomoxis annularis*	
http://calfish.ucdavis.edu/location/?ds=697&reportnumber=1294&catcol=4703&categorysearch=Colusa	

From: Davis-Fadtke, Kristal@Wildlife [Kristal.Davis-Fadtke@wildlife.ca.gov]
Sent: 2/18/2021 4:09:35 PM
To: Heydinger, Erin [erin.heydinger@hdrinc.com]; Evan Sawyer - NOAA Federal [evan.sawyer@noaa.gov]; Miller, Aaron@DWR [Aaron.Miller@water.ca.gov]; Davis, Ryan A [rdavis@usbr.gov]; Sumer, Derya [dsumer@usbr.gov]; Lee Bergfeld [Bergfeld@mbkengineers.com]; Montgomery, Amanda@Waterboards [Amanda.Montgomery@waterboards.ca.gov]; Sherrick, Robert@Wildlife [Robert.Sherrick@Wildlife.ca.gov]; Williams, Jonathan@Wildlife [Jonathan.Williams@wildlife.ca.gov]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Spranza, John [john.spranza@hdrinc.com]; Thayer, Reed/SAC [Reed.Thayer@jacobs.com]; Leaf, Rob/SAC [Rob.Leaf@jacobs.com]; steve.micko@jacobs.com; Lecky, Jim [Jim.Lecky@icf.com]; Hendrick, Mike [Mike.Hendrick@icf.com]
Subject: RE: Sites CalSim II Model

Hi Erin,

Thank you for sending this information and we have started to review the model runs. It would greatly help our review if you could provide us with a detailed description of the changes to the code to incorporate the ITP Conditions of Approval and information on how the WSIP benefits were modeled.

Thank you,

Kristal

From: Heydinger, Erin <Erin.Heydinger@hdrinc.com>
Sent: Wednesday, February 10, 2021 4:09 PM
To: Davis-Fadtke, Kristal@Wildlife <Kristal.Davis-Fadtke@wildlife.ca.gov>; Evan Sawyer - NOAA Federal <evan.sawyer@noaa.gov>; Miller, Aaron@DWR <Aaron.Miller@water.ca.gov>; Davis, Ryan A <rdavis@usbr.gov>; Sumer, Derya <dsumer@usbr.gov>; Lee Bergfeld <Bergfeld@mbkengineers.com>; Montgomery, Amanda@Waterboards <Amanda.Montgomery@waterboards.ca.gov>; Sherrick, Robert@Wildlife <Robert.Sherrick@Wildlife.ca.gov>
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Subject: Sites CalSim II Model

Good afternoon,

We are excited to let you know that the Sites project has completed its CalSim model for the Revised Draft EIR/Supplemental Draft EIS. We would like to give you the opportunity to review the model – it will be used for much of the impacts analysis included in the new document. You can access it at this link (you may have also received a separate email notification):

https://hdrinc-my.sharepoint.com/:f:/p/eheydinger/Eq1KZrFyTgRErqjOkmGMwL4BP3Boe3Jlenj9zs8b2Eukjg

The link includes CalSim models for the No Action Alternative as well as four operating options as described in the attached document. The "spreadsheets" folder includes an Excel file that summarizes the CalSim output. THe link above only works for the folks on this email thread. Please let me know if you would like access granted to others.

We recognize these models will take some time to review. The Authority will also be posting the draft Project Description on its website next week that may be of interest to all of you. So, to allow for adequate review time we will be scheduling a workshop to discuss the models during early March - likely the week of March 8^{th}. The Authority expects to release the Revised Draft EIR/Supplemental Draft EIS in late summer.

Please don't hesitate to reach out with any questions.

Best,
Erin

Erin Heydinger, PE, PMP
Sites Reservoir Integration Lead for Operations

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File Provided Natively

Draft – Subject to Revision
Sites Project: Participant Delivery Reports

This document summarizes Sites Project Participants Delivery Reports that have been prepared for Alternative 1A 011221, Alternative 1B 011221, Alternative 2 011221, and Alternative 3 020121. These reports allow each participant to see their long-term and water year-type average Sites Project deliveries as modeled in CalSim II.

Summary of Reports

This document consists of a summary table and individual reports for each participant. The summary table reports the modeled end-point deliveries of Sites Project water to participants for each alternative. Participants are listed alphabetically, grouped by North of Delta and South of Delta.

The individual participants reports display long-term, dry, and critically dry water year, and water year type average end-point deliveries for each Sites Project participant. Water year types are assigned using the D-1641 Sacramento Valley 40-30-30 water year type calculation and annual averages are calculated on a March-February CVP contract year for North of Delta participants and a January-December SWP contract year for South of Delta participants.

Assumptions

End-point deliveries of Sites Project water to each region was assigned proportionally to each participant based on their participation level in Amendment 2 on November 20, 2020.

The following assumptions apply to deliveries to each participant group:

Tehama-Colusa Canal Authority (TCCA)

Water is released from the TCCA Sites account with the intention of meeting up to 100% of participants' CVP contract amount. When water is not needed to meet TCCA participants contract amounts, water may be transferred to the South of Delta Participants account during May of Above Normal and Below Normal water years when account storage is over two-thirds of capacity. Releases are made directly to the Tehama-Colusa Canal. Deliveries are equal to these releases; no conveyance losses are assumed.

Glenn-Colusa Irrigation District (GCID)

Water is released from the GCID Sites account in April and May when CVP Settlement Contract deliveries are reduced to 75% in Shasta critical years. In all other years, except for wet years, water is transferred to the South of Delta Participants account. Releases are made directly to the Glenn-Colusa Canal. Deliveries are equal to these releases; no conveyance losses are assumed.

Reclamation District 108 (RD-108) and Carter MWC

Water is released from the RD-108 and Carter MWC Sites account in April and May when CVP Settlement Contract deliveries are reduced to 75% in Shasta critical years. In all other years, except for wet years, water is transferred to the South of Delta Participants account. Releases are made through the Tehama-Colusa Canal to the Dunnigan Pipeline to facilitate an exchange with the Sacramento River. Deliveries are equal to these releases; no conveyance losses are assumed.

County of Colusa

Water is released from the County of Colusa Sites account for groundwater replenishment. Releases are limited to 10 TAF per year from June through September. Releases are made directly to the Tehama-Colusa Canal. Deliveries are equal to these releases; no conveyance losses are assumed.

South of Delta Participants

Water may be released from the South of Delta Participants Sites account in all but wet water years. There are four ways that water may be delivered to South of Delta Participants: direct release to the Sacramento River through the Dunnigan Pipeline, exchanges with Sacramento River at Hamilton City by replacing CVP diversions to GCID with releases from Sites, exchanges with Shasta Lake, and exchanges with the SWP at Lake Oroville. Releases are then exported from the Delta through Banks Pumping Plant. Exports of releases of South of Delta Participants water are limited to July through November.

Deliveries to South of Delta participants are based on the export at the Banks Pumping Plant. In these reports, deliveries are allocated based on Sites Project participation levels. The difference between the release from Sites Reservoir and Delta Exports accounts for carriage water and other losses. Exports to South of Delta Participants are subject to export availability. It is assumed that all South of Delta participants proportionally share exported water regardless of the pattern of exports.

Limitations

These reports only include deliveries to Sites Project participants from the Sites PWA accounts. It does not report incidental changes in SWP and CVP deliveries or additional CVP deliveries due to CVP Operational Flexibility from federal investment in the Sites Project.

Sites Project Deliveries

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Participant	Long Term Average Deliveries (TAF/year)			
	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
North of Delta Participants				
Carter Mutual Water Company	0.03	0.03	0.03	0.02
Colusa County WD	10.4	9.7	9.9	8.2
Cortina WD	0.5	0.4	0.4	0.4
County of Colusa	7.0	6.9	7.0	6.7
Davis Water District	2.1	1.9	2.0	1.6
Dunnigan WD	3.1	2.9	2.9	2.4
Glenn Colusa Irrigation District	0.5	0.5	0.5	0.4
LaGrande Water District	1.0	1.0	1.0	0.8
RD-108	0.4	0.4	0.4	0.3
Westside W.D.	5.6	5.2	5.3	4.4
Total NOD Delivery	30.5	28.9	29.3	25.2
South of Delta Participants				
Antelope Valley East Kern WA	0.4	0.4	0.3	0.3
City of American Canyon	2.1	2.1	2.1	2.1
Coachella Valley Water District	7.8	7.2	7.0	5.6
Desert WA	5.1	4.7	4.5	3.7
Irvine Ranch Water District	0.8	0.7	0.7	0.6
Metropolitan Water District of Southern California	38.9	36.1	34.8	28.2
Rosedale-Rio Bravo Water District	0.4	0.4	0.3	0.3
San Bernardino Valley Municipal Water District	16.6	15.4	14.9	12.1
San Gorgonio Pass Water Agency	10.9	10.1	9.7	7.9
Santa Clara Valley WD	0.4	0.4	0.3	0.3
Santa Clarita Valley Water Agency	3.9	3.6	3.5	2.8
Wheeler Ridge-Maricopa WSD	2.4	2.2	2.1	1.7
Zone 7 Water Agency	7.8	7.2	7.0	5.6
Total SOD Delivery	97.4	90.5	87.3	71.3
Total Sites PWA Delivery	127.9	119.4	116.6	96.5

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for North of Delta participants
4. Annual average deliveries are calculated on a Jan-Dec SWP contract year for South of Delta participants
5. South of Delta deliveries are based on Authority exports modeled in CalSim II
6. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
7. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries **DRAFT-Subject to Revision**

Sites Participant: Carter Mutual Water Company

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.0**	**0.0**	**0.0**	**0.0**
Dry and Critically Dry Years	**0.1**	**0.1**	**0.1**	**0.1**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.0	0.0	0.0	0.0
Dry Years	0.0	0.0	0.0	0.0
Critically Dry Years	0.2	0.2	0.2	0.1

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Colusa County WD

	Deliveries (TAF/year)			
	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**10.4**	**9.7**	**9.9**	**8.2**
Dry and Critically Dry Years	**24.3**	**22.6**	**23.3**	**19.4**
Wet Years	0.8	0.8	0.8	0.8
Above Normal Years	0.3	0.3	0.3	0.3
Below Normal Years	6.5	6.3	5.5	4.0
Dry Years	21.7	20.8	21.2	17.7
Critically Dry Years	28.3	25.2	26.4	22.0

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

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Sites Participant: Cortina WD

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.5**	**0.4**	**0.4**	**0.4**
Dry and Critically Dry Years	**1.1**	**1.0**	**1.0**	**0.9**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.3	0.3	0.2	0.2
Dry Years	1.0	0.9	0.9	0.8
Critically Dry Years	1.3	1.1	1.2	1.0

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: County of Colusa

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**7.0**	**6.9**	**7.0**	**6.7**
Dry and Critically Dry Years	**8.7**	**8.5**	**8.7**	**7.8**
Wet Years	5.1	5.1	5.1	5.1
Above Normal Years	5.7	5.7	5.7	5.7
Below Normal Years	8.0	8.0	8.1	8.1
Dry Years	8.4	8.6	8.6	8.7
Critically Dry Years	9.1	8.3	8.7	6.5

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Davis Water District

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**2.1**	**1.9**	**2.0**	**1.6**
Dry and Critically Dry Years	**4.8**	**4.5**	**4.6**	**3.9**
Wet Years	0.2	0.2	0.2	0.2
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	1.3	1.3	1.1	0.8
Dry Years	4.3	4.1	4.2	3.5
Critically Dry Years	5.6	5.0	5.2	4.4

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Dunnigan WD

	Deliveries (TAF/year)			
	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**3.1**	**2.9**	**2.9**	**2.4**
Dry and Critically Dry Years	**7.2**	**6.7**	**6.9**	**5.7**
Wet Years	0.2	0.2	0.2	0.2
Above Normal Years	0.1	0.1	0.1	0.1
Below Normal Years	1.9	1.9	1.6	1.2
Dry Years	6.4	6.1	6.3	5.2
Critically Dry Years	8.4	7.4	7.8	6.5

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Glenn Colusa Irrigation District

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.5**	**0.5**	**0.5**	**0.4**
Dry and Critically Dry Years	**1.4**	**1.2**	**1.4**	**1.2**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.0	0.0	0.0	0.0
Dry Years	0.3	0.2	0.3	0.2
Critically Dry Years	3.0	2.8	3.0	2.6

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: LaGrande Water District

	Deliveries (TAF/year)			
	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**1.0**	**1.0**	**1.0**	**0.8**
Dry and Critically Dry Years	**2.4**	**2.2**	**2.3**	**1.9**
Wet Years	0.1	0.1	0.1	0.1
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.6	0.6	0.5	0.4
Dry Years	2.1	2.1	2.1	1.8
Critically Dry Years	2.8	2.5	2.6	2.2

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: RD-108

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.4**	**0.4**	**0.4**	**0.3**
Dry and Critically Dry Years	**1.0**	**1.0**	**1.0**	**0.9**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.0	0.0	0.0	0.0
Dry Years	0.1	0.1	0.1	0.1
Critically Dry Years	2.3	2.2	2.3	2.0

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Westside W.D.

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**5.6**	**5.2**	**5.3**	**4.4**
Dry and Critically Dry Years	**13.0**	**12.0**	**12.4**	**10.4**
Wet Years	0.4	0.4	0.4	0.4
Above Normal Years	0.1	0.1	0.1	0.1
Below Normal Years	3.5	3.4	2.9	2.2
Dry Years	11.6	11.1	11.3	9.4
Critically Dry Years	15.1	13.5	14.1	11.7

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries **DRAFT-Subject to Revision**

Sites Participant: Total NOD Delivery

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**30.5**	**28.9**	**29.3**	**25.2**
Dry and Critically Dry Years	**63.9**	**59.8**	**61.7**	**52.0**
Wet Years	6.8	6.8	6.8	6.8
Above Normal Years	6.2	6.2	6.2	6.2
Below Normal Years	22.0	21.7	20.0	16.8
Dry Years	55.8	54.1	55.1	47.4
Critically Dry Years	76.0	68.2	71.5	59.0

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Antelope Valley East Kern WA

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.4**	**0.4**	**0.3**	**0.3**
Dry and Critically Dry Years	**1.0**	**0.9**	**0.9**	**0.7**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.2	0.1	0.2	0.1
Dry Years	1.0	0.9	0.9	0.7
Critically Dry Years	0.9	0.9	0.8	0.7

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries **DRAFT-Subject to Revision**

Sites Participant: City of American Canyon

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**2.1**	**2.1**	**2.1**	**2.1**
Dry and Critically Dry Years	**3.9**	**3.9**	**3.9**	**3.9**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	4.0	4.0	4.0	4.0
Dry Years	4.0	4.0	4.0	4.0
Critically Dry Years	3.7	3.7	3.7	3.7

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Coachella Valley Water District

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**7.8**	**7.2**	**7.0**	**5.6**
Dry and Critically Dry Years	**19.5**	**18.2**	**17.3**	**14.2**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	3.1	2.8	3.2	2.2
Dry Years	20.8	18.9	18.6	14.6
Critically Dry Years	17.7	17.0	15.3	13.5

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Desert WA

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**5.1**	**4.7**	**4.5**	**3.7**
Dry and Critically Dry Years	**12.7**	**11.8**	**11.2**	**9.2**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	2.0	1.9	2.1	1.5
Dry Years	13.5	12.3	12.1	9.5
Critically Dry Years	11.5	11.1	9.9	8.8

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Irvine Ranch Water District

	Deliveries (TAF/year)			
	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.8**	**0.7**	**0.7**	**0.6**
Dry and Critically Dry Years	**2.0**	**1.8**	**1.7**	**1.4**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.3	0.3	0.3	0.2
Dry Years	2.1	1.9	1.9	1.5
Critically Dry Years	1.8	1.7	1.5	1.4

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Metropolitan Water District of Southern California

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**38.9**	**36.1**	**34.8**	**28.2**
Dry and Critically Dry Years	**97.7**	**90.8**	**86.3**	**71.0**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	15.6	14.2	16.1	11.2
Dry Years	103.9	94.5	92.9	73.2
Critically Dry Years	88.4	85.2	76.4	67.7

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Rosedale-Rio Bravo Water District

	Deliveries (TAF/year)			
	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.4**	**0.4**	**0.3**	**0.3**
Dry and Critically Dry Years	**1.0**	**0.9**	**0.9**	**0.7**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.2	0.1	0.2	0.1
Dry Years	1.0	0.9	0.9	0.7
Critically Dry Years	0.9	0.9	0.8	0.7

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: San Bernardino Valley Municipal Water District

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**16.6**	**15.4**	**14.9**	**12.1**
Dry and Critically Dry Years	**41.8**	**38.9**	**37.0**	**30.4**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	6.7	6.1	6.9	4.8
Dry Years	44.5	40.5	39.8	31.3
Critically Dry Years	37.8	36.5	32.7	29.0

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: San Gorgonio Pass Water Agency

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**10.9**	**10.1**	**9.7**	**7.9**
Dry and Critically Dry Years	**27.4**	**25.4**	**24.2**	**19.9**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	4.4	4.0	4.5	3.1
Dry Years	29.1	26.5	26.0	20.5
Critically Dry Years	24.7	23.9	21.4	19.0

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Santa Clara Valley WD

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**0.4**	**0.4**	**0.3**	**0.3**
Dry and Critically Dry Years	**1.0**	**0.9**	**0.9**	**0.7**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	0.2	0.1	0.2	0.1
Dry Years	1.0	0.9	0.9	0.7
Critically Dry Years	0.9	0.9	0.8	0.7

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Santa Clarita Valley Water Agency

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**3.9**	**3.6**	**3.5**	**2.8**
Dry and Critically Dry Years	**9.8**	**9.1**	**8.6**	**7.1**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	1.6	1.4	1.6	1.1
Dry Years	10.4	9.5	9.3	7.3
Critically Dry Years	8.8	8.5	7.6	6.8

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Wheeler Ridge-Maricopa WSD

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**2.4**	**2.2**	**2.1**	**1.7**
Dry and Critically Dry Years	**6.0**	**5.5**	**5.3**	**4.3**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	1.0	0.9	1.0	0.7
Dry Years	6.3	5.8	5.7	4.5
Critically Dry Years	5.4	5.2	4.7	4.1

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Zone 7 Water Agency

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**7.8**	**7.2**	**7.0**	**5.6**
Dry and Critically Dry Years	**19.5**	**18.2**	**17.3**	**14.2**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	3.1	2.8	3.2	2.2
Dry Years	20.8	18.9	18.6	14.6
Critically Dry Years	17.7	17.0	15.3	13.5

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Total SOD Delivery

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**97.4**	**90.5**	**87.3**	**71.3**
Dry and Critically Dry Years	**243.2**	**226.2**	**215.3**	**177.7**
Wet Years	0.0	0.0	0.0	0.0
Above Normal Years	0.0	0.0	0.0	0.0
Below Normal Years	42.2	38.9	43.5	31.5
Dry Years	258.5	235.5	231.6	183.2
Critically Dry Years	220.1	212.3	190.8	169.6

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

Sites Project Deliveries

DRAFT-Subject to Revision

Sites Participant: Total Sites PWA Delivery

Deliveries (TAF/year)

	ALT 1A 011221	ALT 1B 011221	ALT 2 011221	ALT 3 020121
Long-term Average	**127.9**	**119.4**	**116.6**	**96.5**
Dry and Critically Dry Years	**307.1**	**286.0**	**277.0**	**229.8**
Wet Years	6.8	6.8	6.8	6.8
Above Normal Years	6.2	6.2	6.2	6.2
Below Normal Years	64.2	60.6	63.6	48.3
Dry Years	314.4	289.6	286.7	230.5
Critically Dry Years	296.1	280.5	262.3	228.6

Notes:

1. Water year types are calculated using the D-1641 Sacramento Valley 40-30-30 water year type calculation
2. End-point deliveries assume the NOD to SOD transfer operation as defined in the assumptions
3. Annual average deliveries are calculated on a Mar-Feb CVP contract year for NOD participants and on a Jan-Dec SWP contract year for SOD participants
4. South of Delta deliveries are based on Authority exports modeled in CalSim II
5. Deliveries do not include any San Luis reoperation or south of Delta storage agreements
6. South of Delta delivery arcs were combined and then deliveries were distributed proportional to participation

RDEIR/SDEIS Modeling Results

Erin Heydinger & Steve Micko

Background

1. Last presented results in December
2. Change since last update:
   a. CalSim 2020 Benchmark Baseline
      i. Created by Reclamation in coordination with DWR and CDFW
      ii. Includes latest model assumptions for ROC on LTO and SWP ITP
3. Results will be used in analysis for EIR/EIS, biological assessment

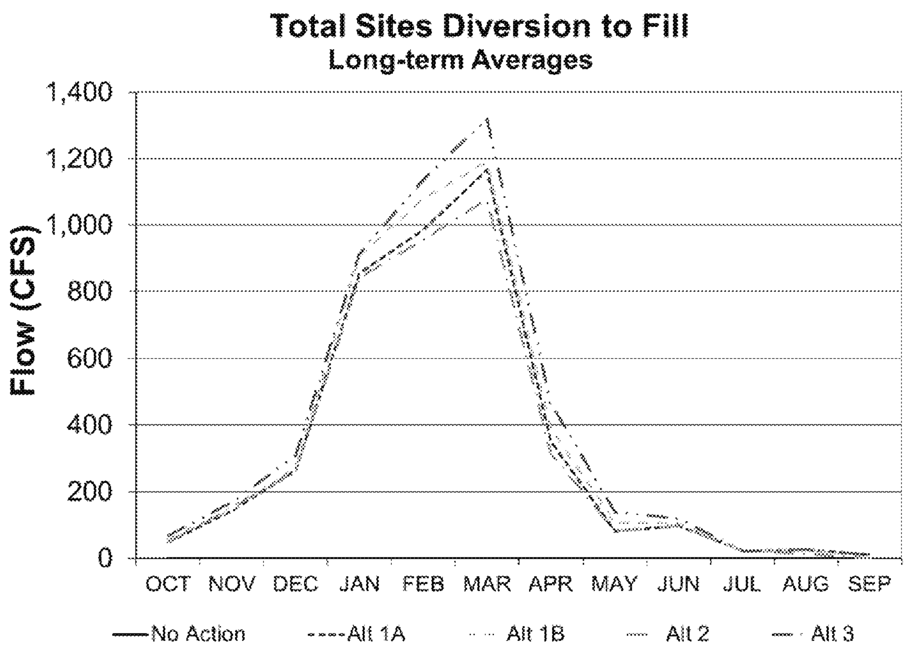
Background: Alternatives

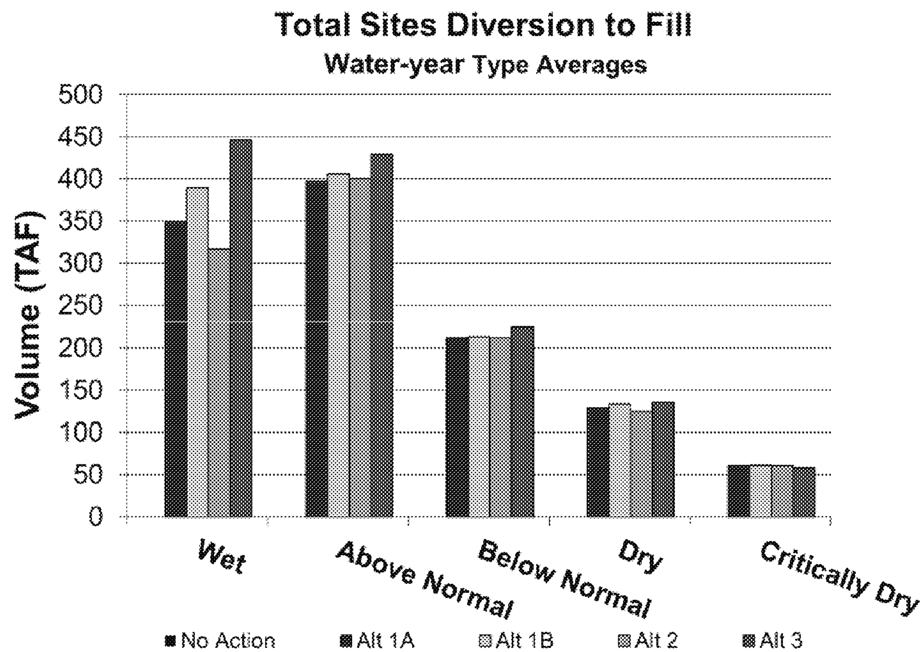
Facilities / Operations	Alternative 1A	Alternative 1B	Alternative 2	Alternative 3
Reservoir Size	1.5 MAF	Same as Alt 1A	1.3 MAF	1.5 MAF
Conveyance Release / Dunnigan Release	1,000 cfs to Colusa Basin Drain	Same as Alt 1A	1,000 cfs to Sacramento River. Partial release to CBD.	Same as Alt 1A
Reclamation Involvement	• Operational exchanges only • No funding	• Funding Partner up to 7% Cost-Share • Also includes operational exchanges	• Operational exchanges only • No funding	Same as Alt 1B, but up to 25% investment
DWR Involvement	Operational Exchanges with Oroville and use of SWP facilities South-of-Delta	Same as Alt 1A	Same as Alt 1A	Same as Alt 1A

Background: Demand Assumptions

1. Release water to NoD partners during dry periods
   a. TCCA
      i. Receives Sites water to make up CVP allocation shortfalls
   b. Settlement Contractors
      i. Receive Sites water during Shasta critical years
      ii. Transfer water to SoD partners in other years (except wet)
   c. Colusa County
      i. Receives water on a consistent schedule
2. Release water to SoD partners when export capacity is available
   a. July through November when capacity is available
   b. All year types except wet

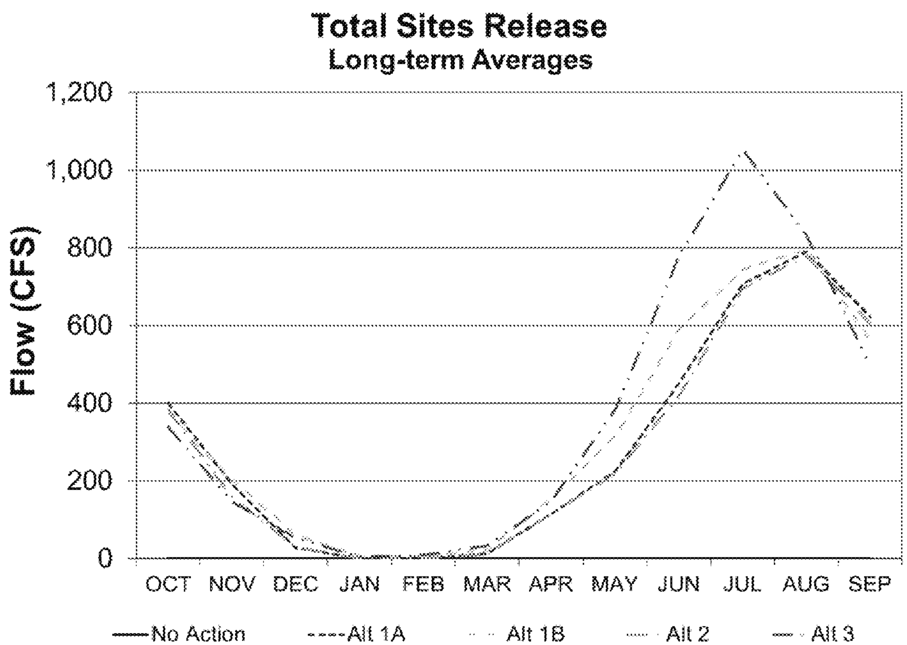
Results: Diversions

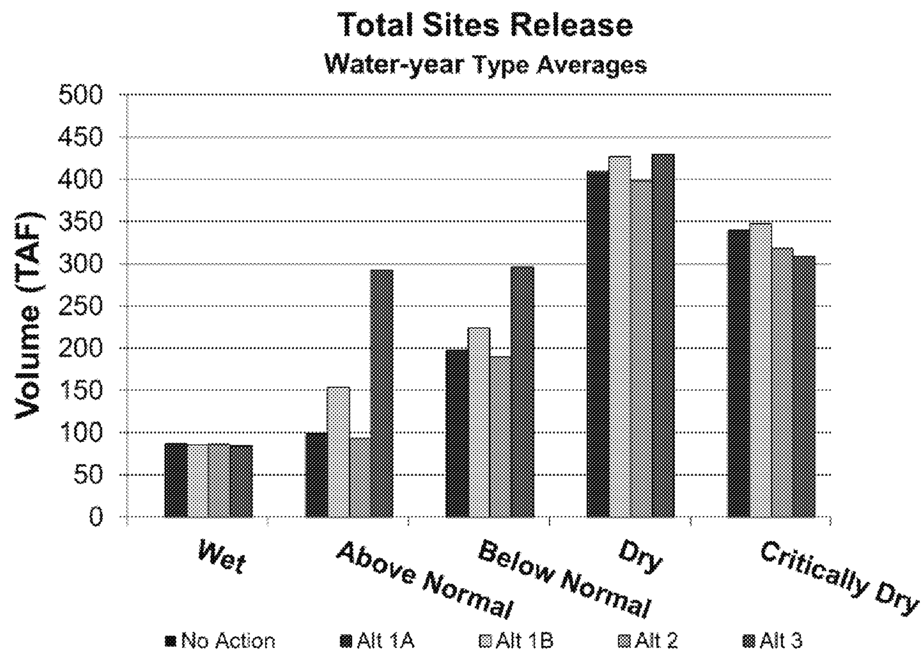




Total Sites Diversion to Fill	Alt 1A	Alt 1B	Alt 2	Alt 3
Long-term Average (TAF)	240	255	229	279
Dry and Critical Average (TAF)	101	104	99	105

Results: Releases



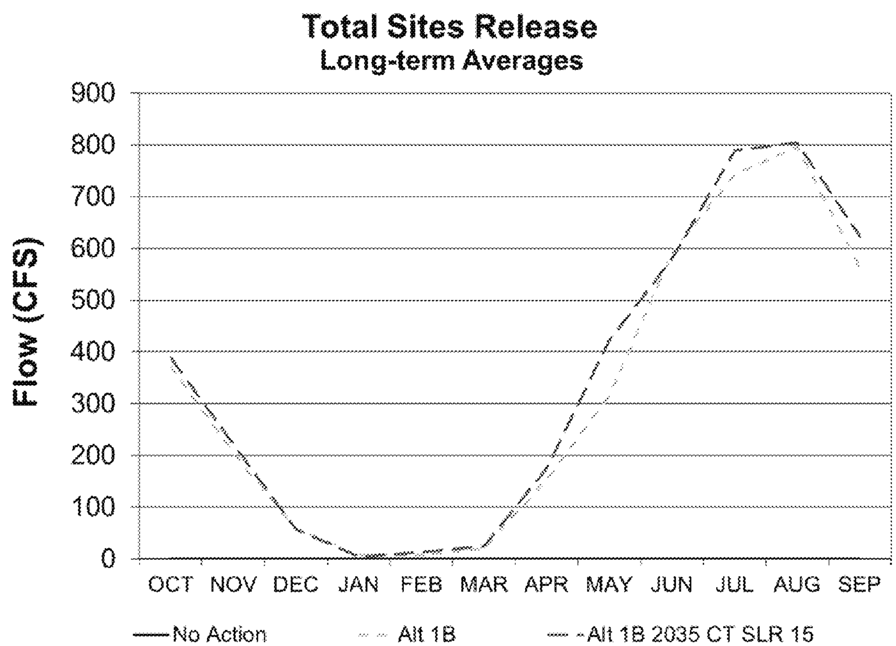


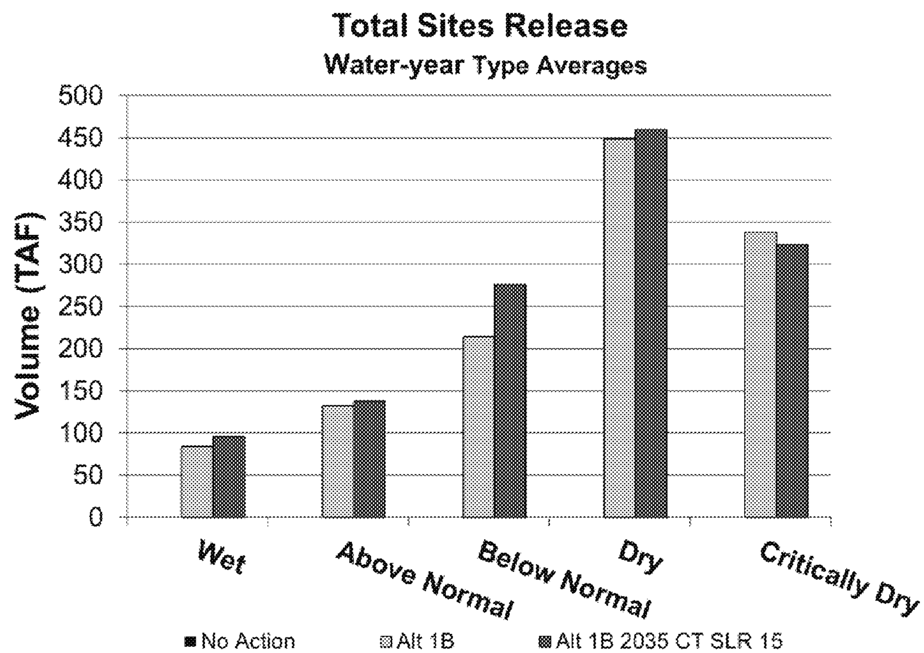
Total Sites Release	Alt 1A	Alt 1B	Alt 2	Alt 3
Long-term Average (TAF)	217	234	209	260
Dry and Critical Average (TAF)	402	404	374	383

Reservoir Releases – Summary Table

	Alternative 1A	Alternative 1B	Alternative 2	Alternative 3	Value Planning (VP7)
Reservoir Size	1.5 MAF	1.5 MAF	1.3 MAF	1.5 MAF	1.5 MAF
Federal Cost-Share	0%	6.6%	0%	25%	0%
Releases by Year Type (TAF)					
Wet	87	86	86	85	85-115
Above Normal	98	154	93	292	255-285
Below Normal	197	224	190	296	245-275
Dry	409	427	398	429	355-385
Critically Dry	340	348	318	308	205-235
Long-Term Annual Average	217	234	209	260	213-243

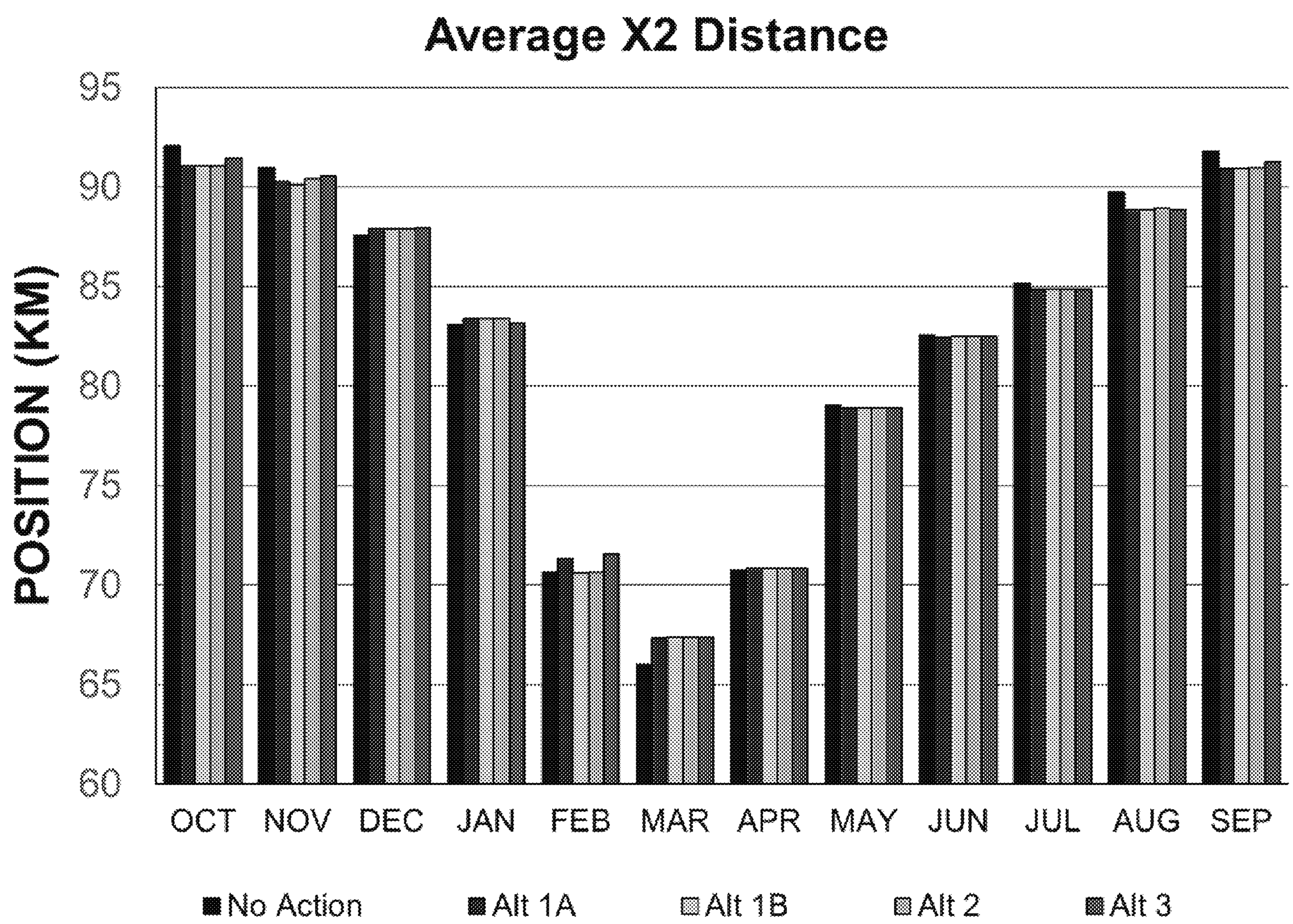
Results: Releases Under Climate Change



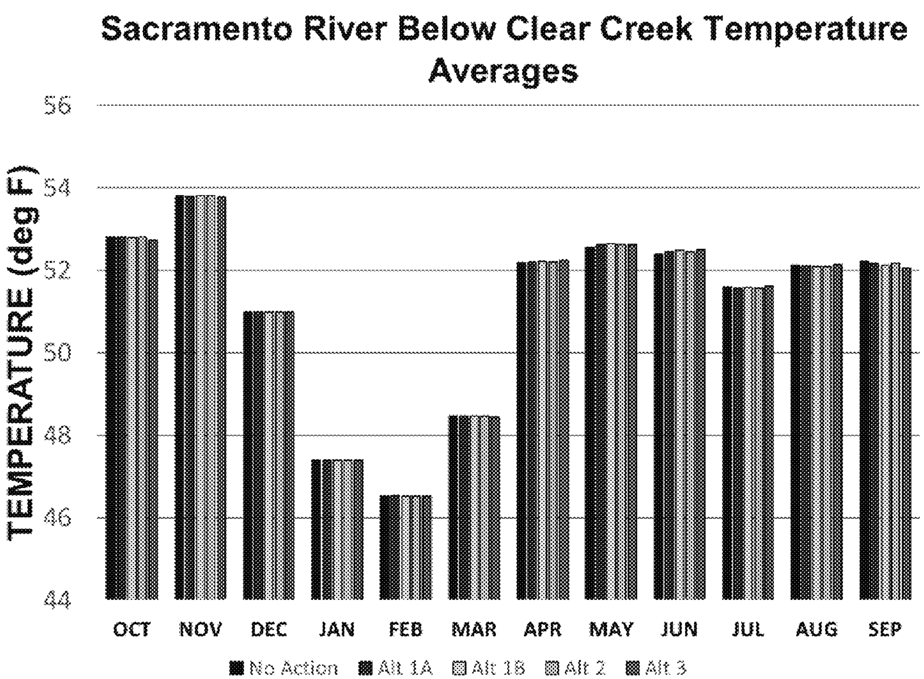


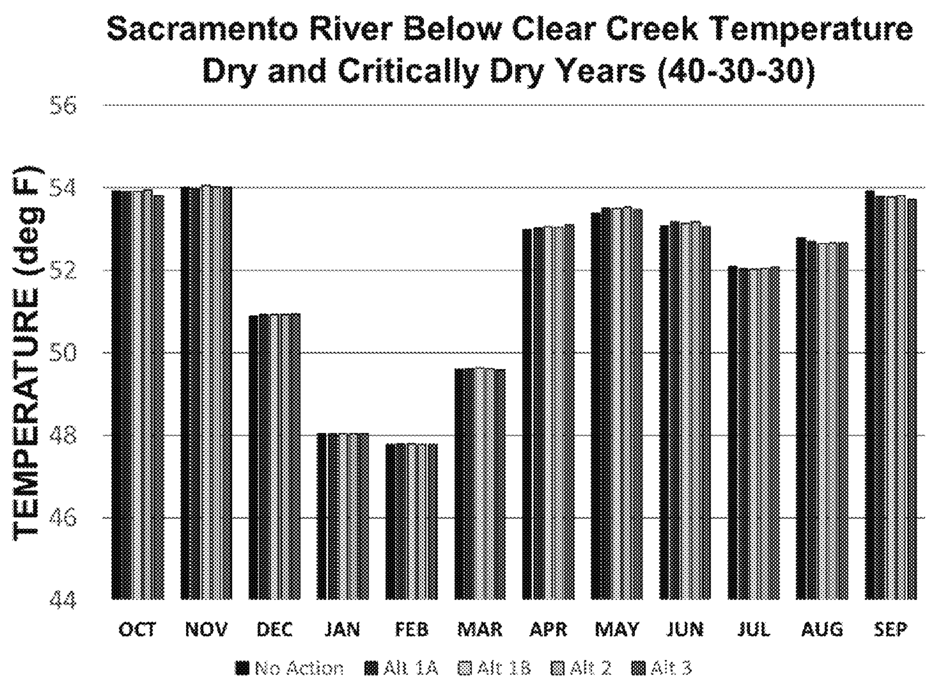
Total Sites Release	Alt 1B	Alt 1B 2035CT SLR15
Long-term Average (TAF)	234	250
Dry and Critical Average (TAF)	404	405

Results - Delta Water Quality X2

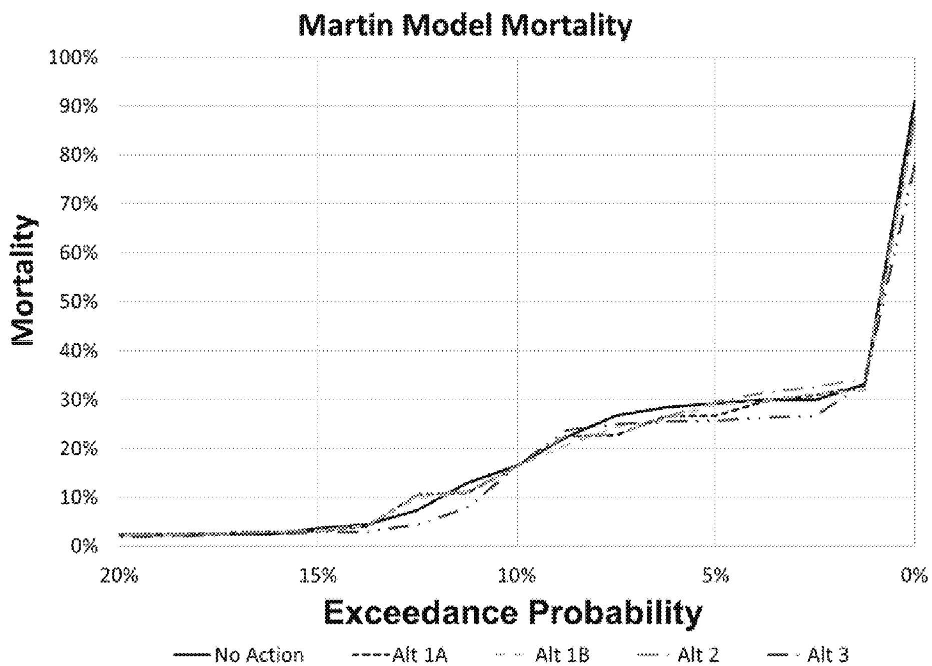


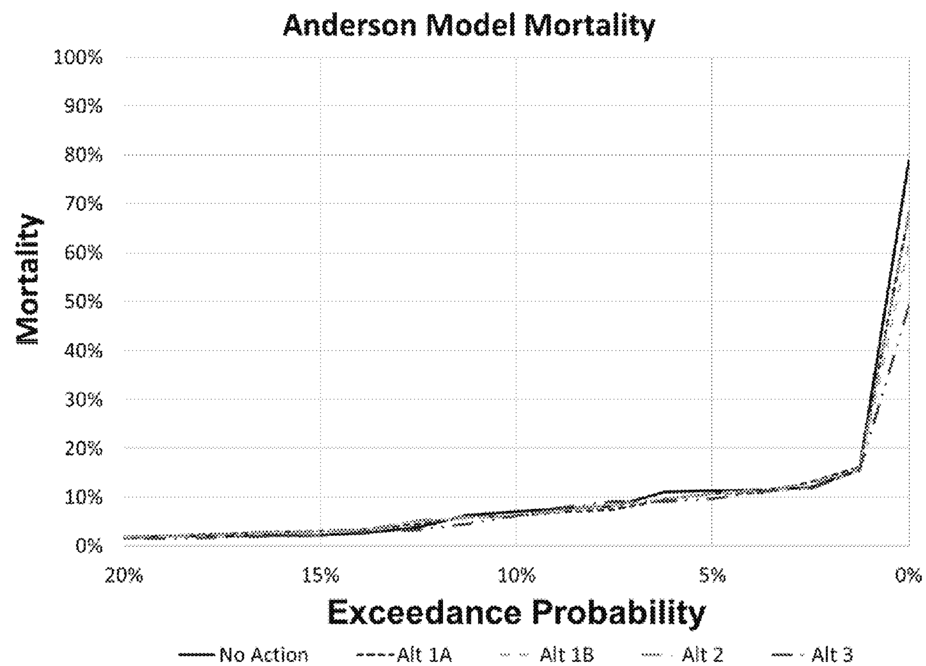
Results – Sacramento River Temperature





Results – Fisheries - Mortality





Next Steps

- Other models:
  - Power
  - Reservoir temperature
  - Further updates with Alt 3
- Deliveries by participant by year type
  - Work with participants on operating assumptions
- Run analysis under 2030 and 2070 WSIP hydrology for CWC Feasibility
- Use updated cost estimate and operating options to develop a range of costs per acre-foot
- Work with permitting agencies to discuss possible areas of concern

From: Spranza, John [John.Spranza@hdrinc.com]
Sent: 2/22/2021 2:58:57 PM
To: evan.sawyer [evan.sawyer@noaa.gov]; Cathy Marcinkevage - NOAA Federal [cathy.marcinkevage@noaa.gov]; Kundargi, Kenneth (Kenneth.Kundargi@wildlife.ca.gov) [Kenneth.Kundargi@wildlife.ca.gov]; Johnson, Matt@Wildlife [Matt.Johnson@wildlife.ca.gov]; Davis-Fadtke, Kristal@Wildlife [kristal.davis-fadtke@wildlife.ca.gov]; Williams, Jonathan@Wildlife [Jonathan.Williams@wildlife.ca.gov]; Duane Linander (Duane.Linander@wildlife.ca.gov) [Duane.Linander@wildlife.ca.gov]; La Luz, Felipe@Wildlife [Felipe.LaLuz@wildlife.ca.gov]; Boyd, Ian@Wildlife [Ian.Boyd@Wildlife.ca.gov]; Nancy.A.Haley@usace.army.mil; Michael S. Jewell (michael.s.jewell@usace.army.mil) [michael.s.jewell@usace.army.mil]; Kevin.C.Lee@usace.army.mil; Stephen Maurano - NOAA Federal [stephen.maurano@noaa.gov]; Wilson, Billie@Wildlife [Billie.Wilson@wildlife.ca.gov]; Kearns, Zachary@Wildlife [Zachary.Kearns@Wildlife.ca.gov]; Schoenberg, Steven [steven_schoenberg@fws.gov]; annmarie.ore@waterboards.ca.gov; Biondi, Oscar@Waterboards [Oscar.Biondi@waterboards.ca.gov]
CC: Alicia Forsythe [aforsythe@sitesproject.org]; Heydinger, Erin [erin.heydinger@hdrinc.com]; Berryman, Ellen (Ellen.Berryman@icf.com) [Ellen.Berryman@icf.com]; Hendrick, Mike [mike.hendrick@icf.com]; Dekar, Melissa D [mdekar@usbr.gov]; Davis, Ryan A [rdavis@usbr.gov]
Subject: Availability of Sites Project Authority's Preliminary Project Description

Greetings from the Sites Project Team,

We have posted a draft of the Authority's *Preliminary Project Description and Alternatives* at the link below. The purpose for circulating this document at this time is to facilitate early coordination on initial approaches currently under consideration by the Authority. As such, the content of this document will be subject to continued discussions and modifications, and although the Authority is not soliciting formal comments on this Preliminary Project Description, you input and feedback on its content is welcome.

Please let me know if you have any questions.

John

https://sitesproject.org/resources/information-materials/

John Spranza, MS, CCN
Senior Ecologist / Regulatory Specialist

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From: Laurie Warner Herson [laurie.warner.herson@phenixenv.com]
Sent: 2/24/2021 2:28:52 PM
To: Alicia Forsythe [aforsythe@sitesproject.org]; Kevin Spesert [kspesert@sitesproject.org]
Subject: FW: Tribal conservation easements
Attachments: Tsnungwe presentation (2021-02-18 EAF).pdf; Tsnungwe article_(2021-02-19 EAF).pdf

I am passing along a presentation and handout regarding the use of conservation easements to mitigate tribal cultural resource effects. This could be a mechanism for Sites to address tribal cultural resources affected by reservoir inundation, although it wouldn't fully mitigate impacts.

Using Conservation Easements to Create Access to Native American Cultural & Ceremonial Gathering Sites

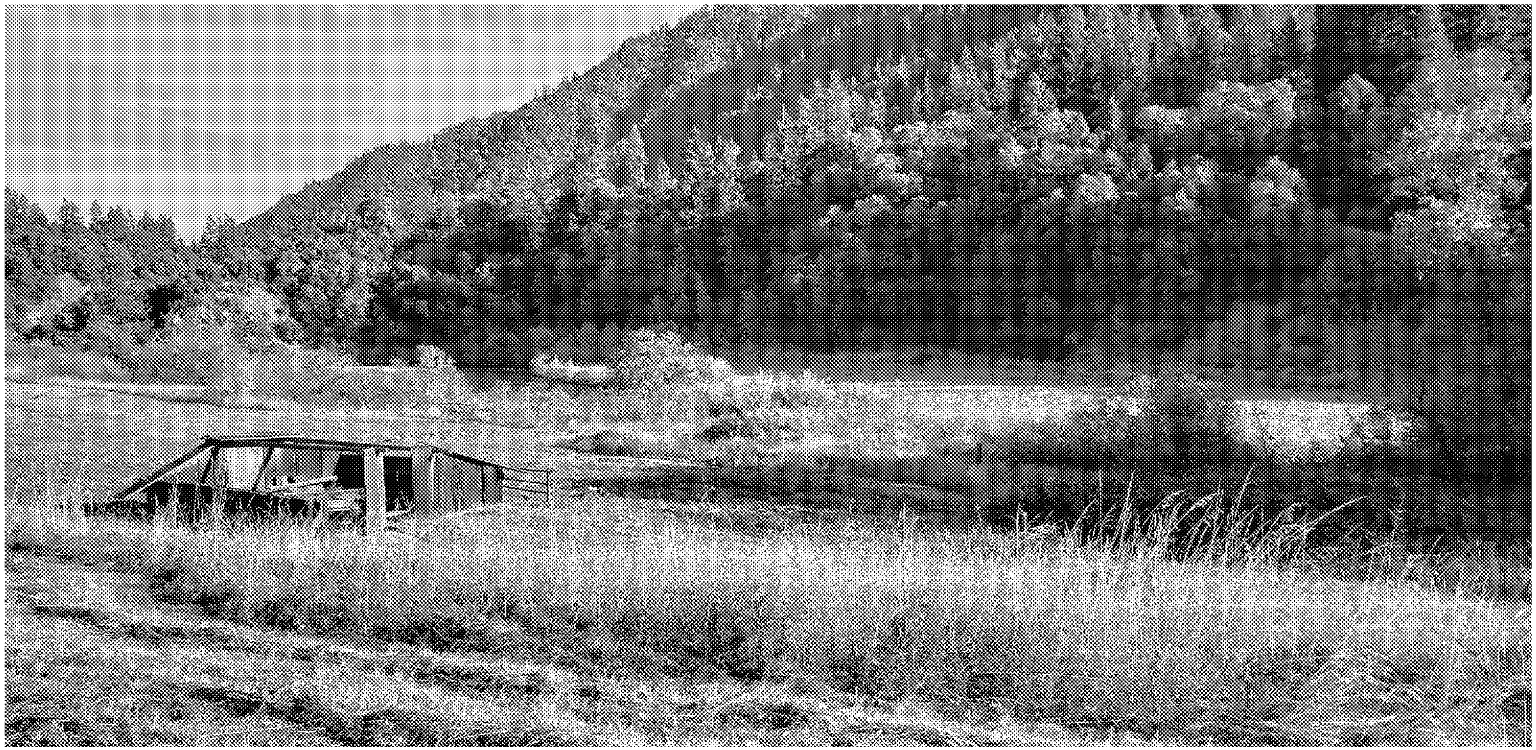
Robert Benson, Tsnungwe Council
Ellen Fred, Conservation Partners LLP

Sacramento County Bar Association
February 19, 2021

History of Tsnungwe Council and Hlel-din Village

Ancestral land of the Tsnungwe people

- Located in Humboldt County at the confluence of the Trinity River and South Fork Trinity River

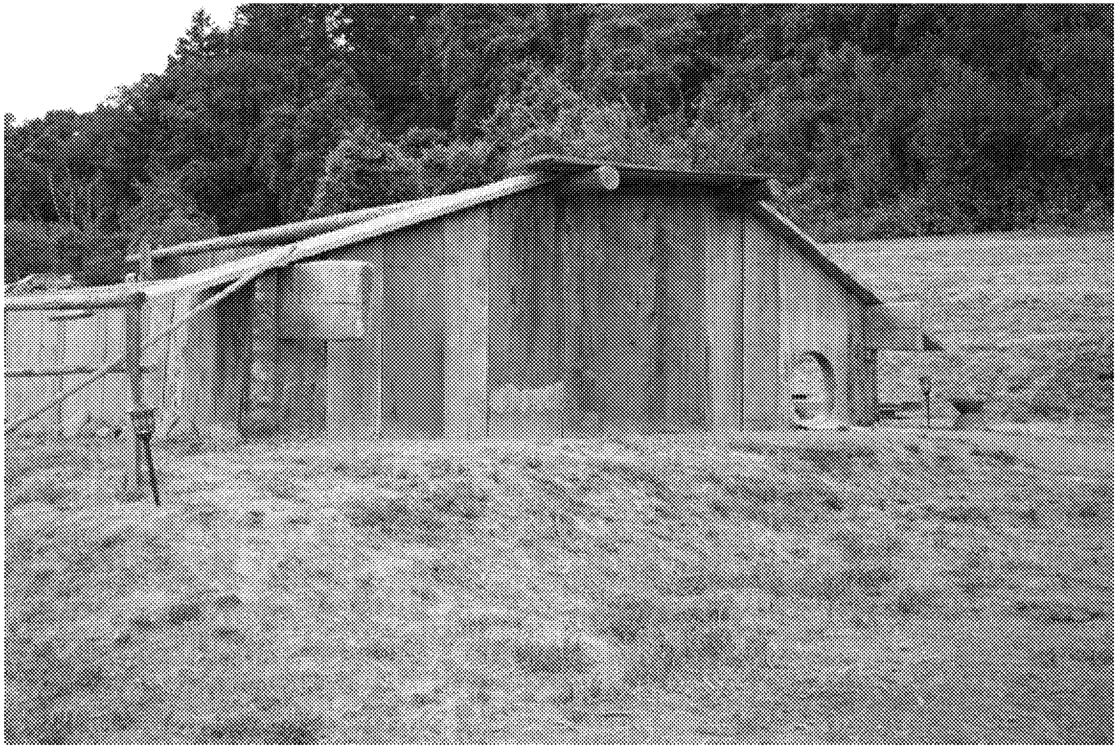


Gathering and Ceremonial Activities at Hlel-din Village

View of Ceremonial Grounds at Hlel'din village with conservation property in background

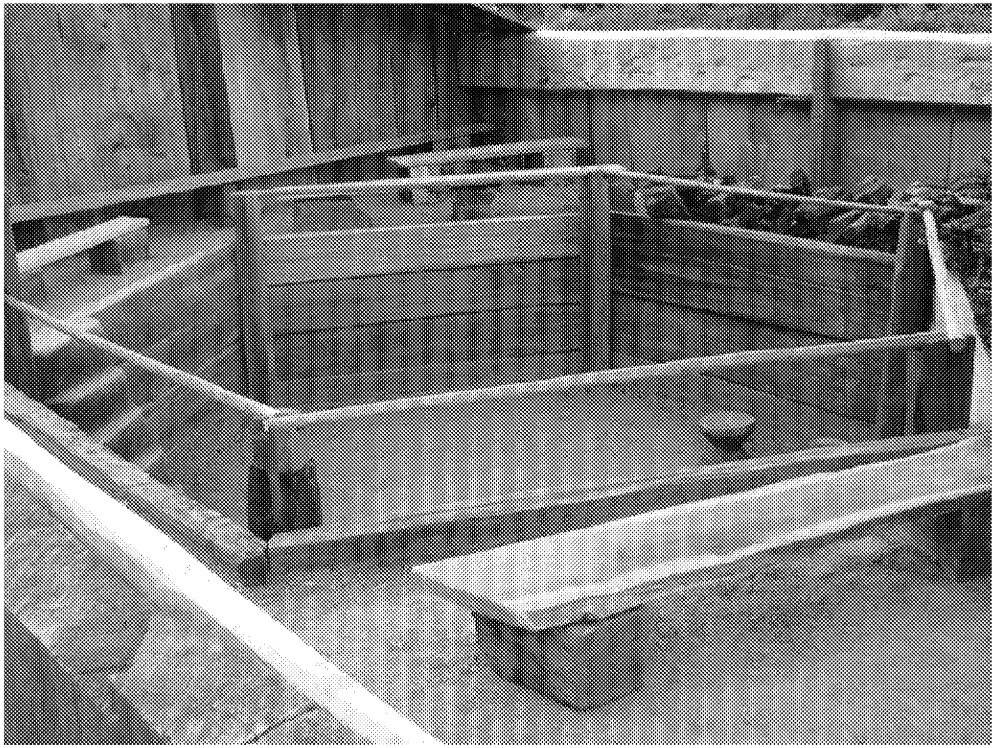
Draft_0006741

Gathering and Ceremonial Activities at Hlel-din Village, continued…



View of Ceremonial House at Hlel'din village with conservation property in background

Gathering and Ceremonial Activities at Hlel-din Village, continued…



View of
Ceremonial House
at Hlel'din village

Gathering and Ceremonial Activities at Hlel-din Village, continued…

Crowd at Flower Dance Ceremony, Hlel'din village, 2015

“The earth has music for those who listen.”

William Shakespeare

What is a conservation easement?

An interest in real property/agreement between grantor and grantee

Donation versus mitigation/sold versus bargain-sale

- Sale
- Donation
- Bargain-Sale

- Mitigation
  - Habitat for endangered species
  - Water banking
  - Cultural resources

California Civil Code sections 815 – 816

- Definition of conservation easement (§ 815.1)

  For the purposes of this chapter, "conservation easement" means any limitation in a deed, will, or other instrument in the form of an easement, restriction, covenant, or condition, which is or has been executed by or on behalf of the owner of the land subject to such easement and is binding upon successive owners of such land, and the purpose of which is to retain land predominantly in its natural, scenic, historical, agricultural, forested, or open-space condition.

- Perpetuity requirement (§ 815.2(a))

- The particular characteristics of a conservation easement shall be those granted or specified in the instrument creating or transferring the easement. (§ 815.2(d))

California Civil Code sections 815 – 816

- Eligible holders (§ 815.3)
  - (a) A tax-exempt nonprofit organization qualified under Section 501(c)(3) of the Internal Revenue Code and qualified to do business in this state which has as its primary purpose the preservation, protection, or enhancement of land in its natural, scenic, historical, agricultural, forested, or open-space condition or use.
  - (b) The state or any city, county, city and county, district, or other state or local governmental entity, if otherwise authorized to acquire and hold title to real property and if the conservation easement is voluntarily conveyed. No local governmental entity may condition the issuance of an entitlement for use on the applicant's granting of a conservation easement pursuant to this chapter.
  - (c) A federally recognized California Native American tribe or a nonfederally recognized California Native American tribe that is on the contact list maintained by the Native American Heritage Commission to protect a California Native American prehistoric, archaeological, cultural, spiritual, or ceremonial place, if the conservation easement is voluntarily conveyed.

Rights Granted to Easement Holder

- Identify, preserve, and protect the conservation values of the subject property
- Enter the property to monitor compliance with the terms of the conservation easement and to confirm, verify, and document a violation or threatened violation of the terms of the easement
- Enforce the terms of the easement pursuant to its terms
- Unique rights
  - Restoration
  - Scientific research
  - Cultural rights

Unique Rights Granted to Tsnungwe Council

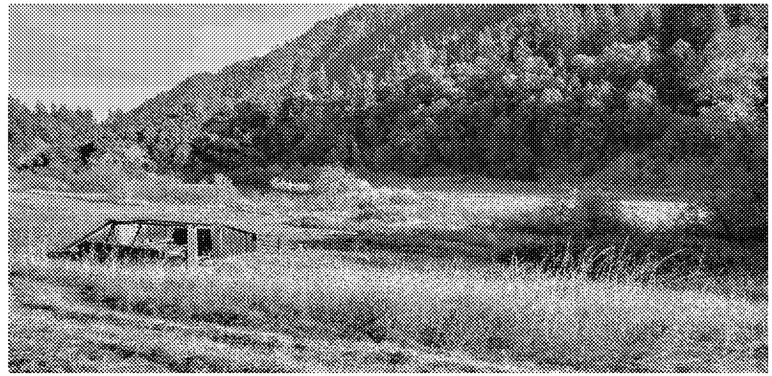
- i. Restore, conserve, and steward the Property's natural and cultural resources;
- ii. Promote indigenous land and cultural stewardship through the application and sharing of traditional ecological knowledge related to traditional conservation and sustainable resource management practices, including for example: plant gathering; collection of seeds; digging bulbs/roots; cutting and pruning vegetation; tending of plants; and planting and dispersing seeds and bulbs;
- iii. Provide educational services about traditional cultural and ecological knowledge, including traditional land management principles and resource management methods that reflect Grantee's cultural values;

Unique Rights Granted to Tsnungwe Council, continued…

- iv. Host and engage in traditional recreational, cultural, ceremonial, and educational activities and gatherings, including without limitation: ceremonies, dances, games, and knowledge-sharing workshops, for members of Grantee and its guests and invitees;
- v. Perform a cultural resources survey of the Property to identify and determine whether additional cultural resources or archaeological sites are in need of protection, including ongoing documentation and monitoring of any such cultural resources, and perform other scientific and cultural research; and
- vi. Install cultural improvements, subject to Grantor's review and prior written approval pursuant to the process described in Section 7 below.

Questions?

Ellen A. Fred
Traverse City, MI
(510) 290-0165
efred@conservationpartners.com



conservation partners LLP
LAND PRESERVATION ATTORNEYS

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Utilizing Conservation Easements to Protect Land and Create Access to Native American Cultural and Ceremonial Gathering Sites

Members of the Tsnungwe Native American tribe (now known formally as the Tsnungwe Council) have resided along the Trinity River in Northern California for thousands of years. They describe their original ancestral village, Hlel-din (pronounced "clay-el-ting"), located at the confluence of the Trinity River and South Fork Trinity River, as "the place where the rivers come together." With a mild climate and rich with natural resources, Hlel-din became a cultural and economic center for tribes along the Klamath, Trinity, and South Fork Rivers. However, the arrival of white settlers in the mid-1800s led to the Tsnungwe people being pushed from their land and ultimately being fully displaced.[1]

On May 19, 2020, after more than 150 years of not having legal access to its homeland, the Tsnungwe Council regained the right to access what was once its ancestral village, Hlel-din, to gather traditional plants and medicines and to perform ceremonies; the Council also gained the right to prevent the land from ever being developed or altered from its natural condition. And yet these rights were not obtained by the Council through acquiring ownership of the land, but rather through the conveyance to the Council of a conservation easement.

A conservation easement is a real estate interest that serves to protect the environmental, agricultural, cultural, and/or scenic attributes of a piece of property in perpetuity. The owner of the property continues to own the underlying fee interest, while a nonprofit or governmental entity or Native American tribe holds the conservation easement and sees that its terms are upheld. The holder of the easement will visit the property, typically annually, to confirm that the owner is abiding by the easement, and, if a violation is discovered, may pursue legal and equitable remedies to stop the violation and repair any damage. In the Hlel-din conservation easement, the Tsnungwe Council is also granted certain additional rights to undertake cultural activities.

Conservation easements are technically considered "easements in gross," meaning that they are not appurtenant to an adjacent property, and are governed by Cal. Civil Code sections 815 – 816, colloquially known as the conservation easement enabling act. The act provides the applicable purposes for which easements may be granted, eligible easement holders, available remedies, and other requirements. The act also provides that all conservation easements must be granted in perpetuity.

The entities eligible to hold conservation easements in California include local and state governments, qualified nonprofit organizations, and certain Native American tribes. In particular, the act provides that, to be eligible to hold a conservation easement, a Native American tribe must either be federally

[1] More about Hlel-din and the Tsnungwe tribe's history is available at https://lnkd.in/gCqSDrk.

recognized or "a nonfederally recognized California Native American tribe that is on the contact list maintained by the Native American Heritage Commission to protect a California Native American prehistoric, archaeological, cultural, spiritual, or ceremonial place, if the conservation easement is voluntarily conveyed."[2]

The conservation easement at Hlel-din was conveyed by the landowner to the Council to mitigate for potential impacts to cultural and natural resources from a proposed agricultural operation the landowner is undertaking on nearby property. While not technically required to be conveyed, the conservation easement served to offset any possible negative consequences to the cultural resources on the neighboring land, thereby allaying the concerns of the Tsnungwe tribal government about the proposed agricultural operation and garnering the Council's support for the project.

As noted, the conservation not only ensures that Hlel-din will never be developed or materially changed from its current natural condition, but it also grants the Council certain unique rights to undertake the following cultural, research, recreational, and land stewardship activities:

i. Restore, conserve, and steward the Property's natural and cultural resources;

ii. Promote indigenous land and cultural stewardship through the application and sharing of traditional ecological knowledge related to traditional conservation and sustainable resource management practices, including for example: plant gathering; collection of seeds; digging bulbs/roots; cutting and pruning vegetation; tending of plants; and planting and dispersing seeds and bulbs;

iii. Provide educational services about traditional cultural and ecological knowledge, including traditional land management principles and resource management methods that reflect Grantee's cultural values;

iv. Host and engage in traditional recreational, cultural, ceremonial, and educational activities and gatherings, including without limitation: ceremonies, dances, games, and knowledge-sharing workshops, for members of Grantee and its guests and invitees;

v. Perform a cultural resources survey of the Property to identify and determine whether additional cultural resources or archaeological sites are in need of protection, including ongoing documentation and monitoring of any such cultural resources, and perform other scientific and cultural research; and

vi. Install cultural improvements, subject to Grantor's review and prior written approval pursuant to the process described in Section 7 below.

These cultural rights augment the more typical rights granted to an easement grantee to access the property to monitor compliance with the easement terms and to enforce the terms of the easement.

[2] Cal. Civ. Code § 815.3.

While working on this conservation easement, members of the Tsnungwe Council explained that the outright ownership of the land was less important to the tribal members. Instead, knowing that the land would never be developed and having the legal right to access the land to gather and perform ceremony was deeply significant to the Council. In this way, conservation easements could be a perfect tool to fulfill the hugely important function of returning protection, stewardship, and cultural use of a landscape to the land's original inhabitants without necessarily involving the conveyance of the underlying fee.

Winter Run Chinook Temperature Dependent Egg Mortality Results (Martin and Anderson Models)

The following results of the Martin and Anderson models are included for winter run Chinook Salmon temperature-dependent egg mortality for the following alternatives:

- No Action Alternative 011221
- Alternative 1A 011221
- Alternative 1B 011221
- Alternative 2 011221
- Alternative 3 020121

Title	Model Parameter	Table Numbers	Figure Numbers
Upper Sacramento Winter Run Chinook Salmon, Martin Model	NA	1-1 to 1-4	1-1 to 1-6
Upper Sacramento Winter Run Chinook Salmon, Anderson Model	NA	1-1 to 1-4	2-1 to 2-6

Report formats

- Tables comparing No Action Alternative with Alternative 1A, Alternative 1B, Alternative 2, and Alternative 3 (exceedance values, long-term average, and average by water year type)
- Exceedance charts including all alternatives

Table 1-1a. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.5%	7.0%
20%	2.3%	1.7%
30%	1.2%	0.9%
40%	0.9%	0.7%
50%	0.8%	0.6%
60%	0.6%	0.5%
70%	0.6%	0.4%
80%	0.5%	0.3%
90%	0.4%	0.3%
Long Term		
Full Simulation Period[a]	4.8%	2.8%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.5%	0.3%
Below Normal (17%)	1.1%	0.8%
Dry (22%)	2.5%	1.5%
Critical (15%)	24.4%	13.5%

Table 1-1b. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 1A 011221

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.4%	6.2%
20%	2.4%	1.9%
30%	1.4%	1.0%
40%	0.9%	0.7%
50%	0.8%	0.6%
60%	0.6%	0.6%
70%	0.5%	0.4%
80%	0.5%	0.3%
90%	0.3%	0.3%
Long Term		
Full Simulation Period[a]	4.7%	2.6%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.5%	0.3%
Below Normal (17%)	1.1%	0.8%
Dry (22%)	2.5%	1.4%
Critical (15%)	23.6%	12.7%

Table 1-1c. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 1A 011221 minus No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance[a]		
10%	-0.1%	-0.8%
20%	0.1%	0.3%
30%	0.2%	0.1%
40%	0.0%	0.0%
50%	0.0%	0.0%
60%	0.0%	0.0%
70%	0.0%	0.0%
80%	0.0%	0.0%
90%	0.0%	0.0%
Long Term		
Full Simulation Period[a]	-0.1%	-0.1%
Water Year Types[b,c]		
Wet (32%)	0.0%	0.0%
Above Normal (15%)	0.0%	0.0%
Below Normal (17%)	0.0%	0.0%
Dry (22%)	0.0%	-0.1%
Critical (15%)	-0.8%	-0.8%

a Based on the 82-year simulation period.
b As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).
c These results are displayed with calendar year - year type sorting.
d All scenarios are simulated at current climate condition and 0 cm sea level rise.

Table 1-2a. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.5%	7.0%
20%	2.3%	1.7%
30%	1.2%	0.9%
40%	0.9%	0.7%
50%	0.8%	0.6%
60%	0.6%	0.5%
70%	0.6%	0.4%
80%	0.5%	0.3%
90%	0.4%	0.3%
Long Term		
Full Simulation Period[a]	4.8%	2.8%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.5%	0.3%
Below Normal (17%)	1.1%	0.8%
Dry (22%)	2.5%	1.5%
Critical (15%)	24.4%	13.5%

Table 1-2b. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 1B 011221

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.4%	6.2%
20%	2.1%	1.8%
30%	1.4%	0.9%
40%	1.0%	0.7%
50%	0.7%	0.6%
60%	0.7%	0.6%
70%	0.6%	0.4%
80%	0.5%	0.3%
90%	0.4%	0.3%
Long Term		
Full Simulation Period[a]	4.7%	2.5%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.6%	0.4%
Below Normal (17%)	1.0%	0.7%
Dry (22%)	2.4%	1.4%
Critical (15%)	23.5%	12.0%

Table 1-2c. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 1B 011221 minus No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance[a]		
10%	0.0%	-0.8%
20%	-0.2%	0.2%
30%	0.2%	0.0%
40%	0.1%	0.0%
50%	0.0%	0.0%
60%	0.0%	0.0%
70%	0.0%	0.0%
80%	0.0%	0.0%
90%	0.0%	0.0%
Long Term		
Full Simulation Period[a]	-0.1%	-0.2%
Water Year Types[b,c]		
Wet (32%)	0.0%	0.0%
Above Normal (15%)	0.1%	0.1%
Below Normal (17%)	0.0%	0.0%
Dry (22%)	-0.1%	-0.1%
Critical (15%)	-0.9%	-1.4%

a Based on the 82-year simulation period.

b As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).

c These results are displayed with calendar year - year type sorting.

d All scenarios are simulated at current climate condition and 0 cm sea level rise.

Table 1-3a. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.5%	7.0%
20%	2.3%	1.7%
30%	1.2%	0.9%
40%	0.9%	0.7%
50%	0.8%	0.6%
60%	0.6%	0.5%
70%	0.6%	0.4%
80%	0.5%	0.3%
90%	0.4%	0.3%
Long Term		
Full Simulation Period[a]	4.8%	2.8%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.5%	0.3%
Below Normal (17%)	1.1%	0.8%
Dry (22%)	2.5%	1.5%
Critical (15%)	24.4%	13.5%

Table 1-3b. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 2 011221

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.4%	6.2%
20%	2.4%	2.0%
30%	1.4%	1.0%
40%	0.9%	0.7%
50%	0.8%	0.6%
60%	0.6%	0.6%
70%	0.5%	0.4%
80%	0.5%	0.3%
90%	0.3%	0.3%
Long Term		
Full Simulation Period[a]	4.8%	2.6%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.5%	0.3%
Below Normal (17%)	1.1%	0.8%
Dry (22%)	2.4%	1.4%
Critical (15%)	24.2%	12.8%

Table 1-3c. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 2 011221 minus No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance[a]		
10%	0.0%	-0.8%
20%	0.1%	0.3%
30%	0.2%	0.1%
40%	0.0%	0.0%
50%	0.0%	0.0%
60%	0.0%	0.0%
70%	0.0%	0.0%
80%	0.0%	0.0%
90%	0.0%	0.0%
Long Term		
Full Simulation Period[a]	0.0%	-0.1%
Water Year Types[b,c]		
Wet (32%)	0.0%	0.0%
Above Normal (15%)	0.0%	0.0%
Below Normal (17%)	0.0%	0.0%
Dry (22%)	0.0%	-0.1%
Critical (15%)	-0.1%	-0.7%

a Based on the 82-year simulation period.

b As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).

c These results are displayed with calendar year - year type sorting.

d All scenarios are simulated at current climate condition and 0 cm sea level rise.

Table 1-4a. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.5%	7.0%
20%	2.3%	1.7%
30%	1.2%	0.9%
40%	0.9%	0.7%
50%	0.8%	0.6%
60%	0.6%	0.5%
70%	0.6%	0.4%
80%	0.5%	0.3%
90%	0.4%	0.3%
Long Term		
Full Simulation Period[a]	4.8%	2.8%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.5%	0.3%
Below Normal (17%)	1.1%	0.8%
Dry (22%)	2.5%	1.5%
Critical (15%)	24.4%	13.5%

Table 1-4b. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 3 020121

Statistic	Martin	Anderson
Probability of Exceedance		
10%	16.4%	6.2%
20%	1.9%	1.5%
30%	1.4%	1.1%
40%	1.0%	0.9%
50%	0.8%	0.7%
60%	0.7%	0.6%
70%	0.6%	0.5%
80%	0.5%	0.4%
90%	0.4%	0.3%
Long Term		
Full Simulation Period[a]	4.4%	2.3%
Water Year Types[b,c]		
Wet (32%)	1.3%	0.8%
Above Normal (15%)	0.7%	0.6%
Below Normal (17%)	1.0%	0.7%
Dry (22%)	2.5%	1.5%
Critical (15%)	21.3%	10.5%

Table 1-4c. Annual Temperature-Dependent Winter-Run Chinook Salmon Mortalities, Alternative 3 020121 minus No Action Alternative 011221

Statistic	Martin	Anderson
Probability of Exceedance[a]		
10%	0.0%	-0.8%
20%	-0.4%	-0.2%
30%	0.2%	0.2%
40%	0.1%	0.2%
50%	0.1%	0.1%
60%	0.1%	0.0%
70%	0.1%	0.1%
80%	0.0%	0.0%
90%	0.0%	0.0%
Long Term		
Full Simulation Period[a]	-0.4%	-0.4%
Water Year Types[b,c]		
Wet (32%)	0.0%	0.0%
Above Normal (15%)	0.2%	0.3%
Below Normal (17%)	0.0%	0.0%
Dry (22%)	0.0%	0.0%
Critical (15%)	-3.0%	-3.0%

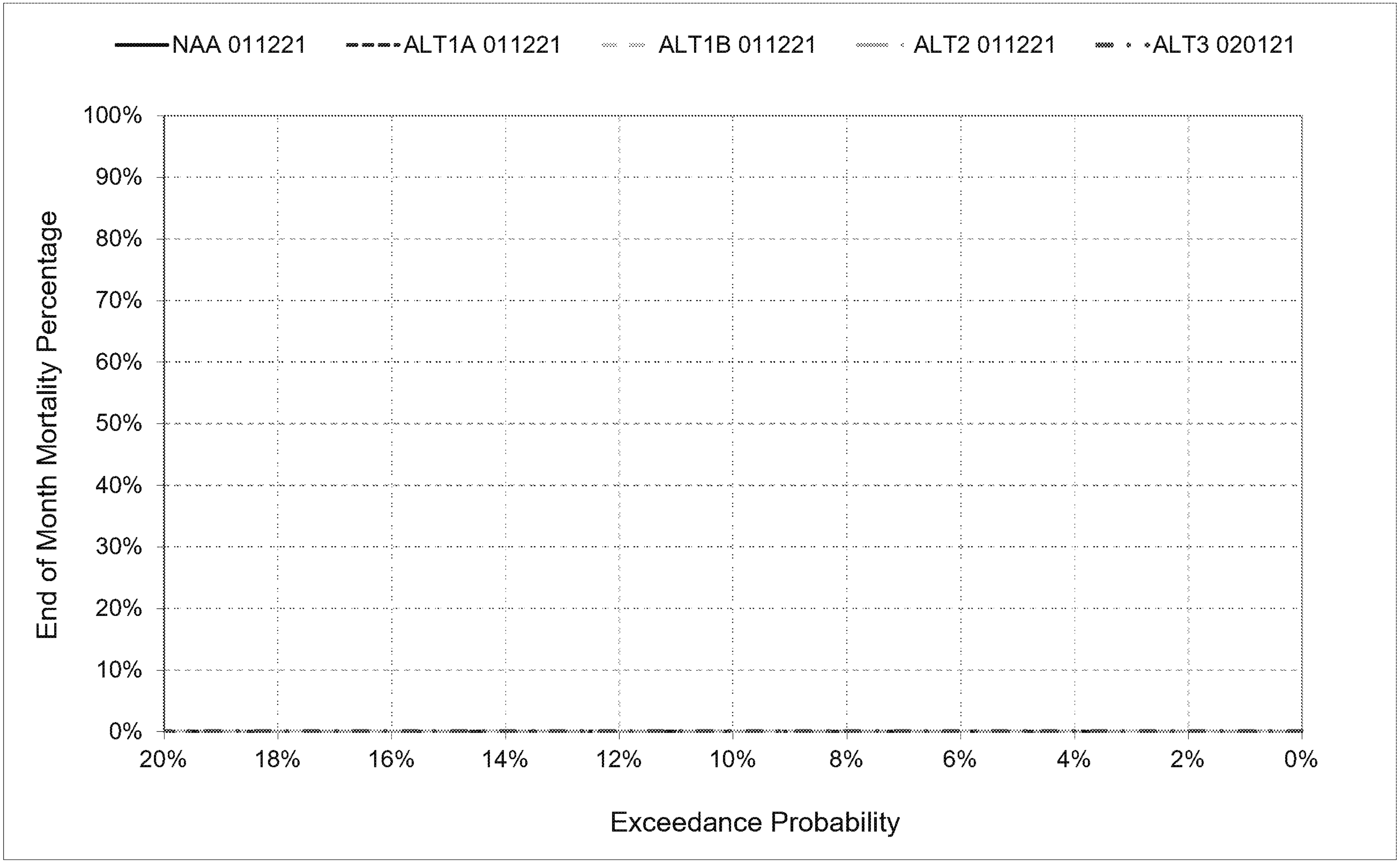
a Based on the 82-year simulation period.

b As defined by the Sacramento Valley 40-30-30 Index Water Year Hydrologic Classification (SWRCB D-1641, 1999).

c These results are displayed with calendar year - year type sorting.

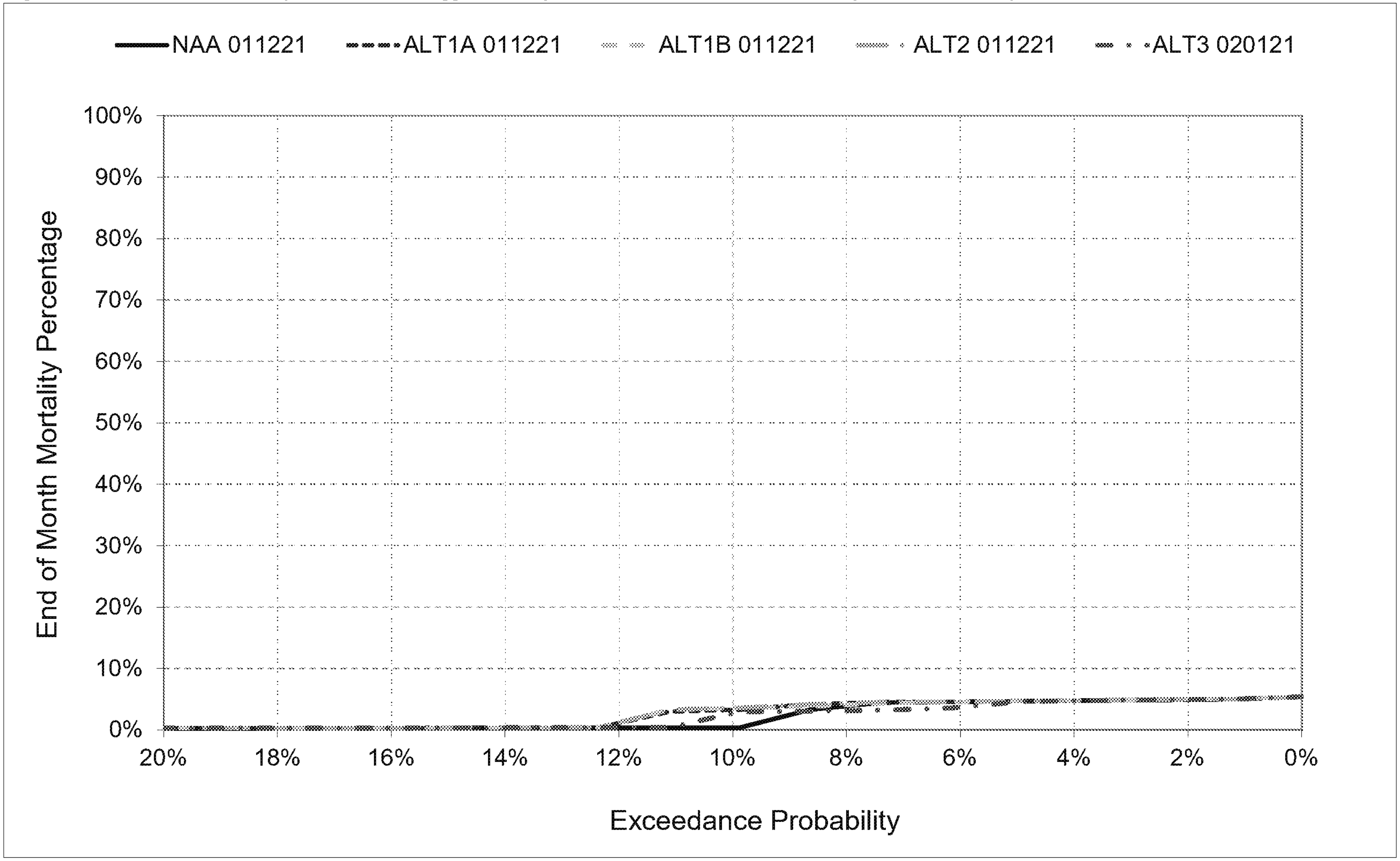
d All scenarios are simulated at current climate condition and 0 cm sea level rise.

Figure 1-1. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Anderson Model), May



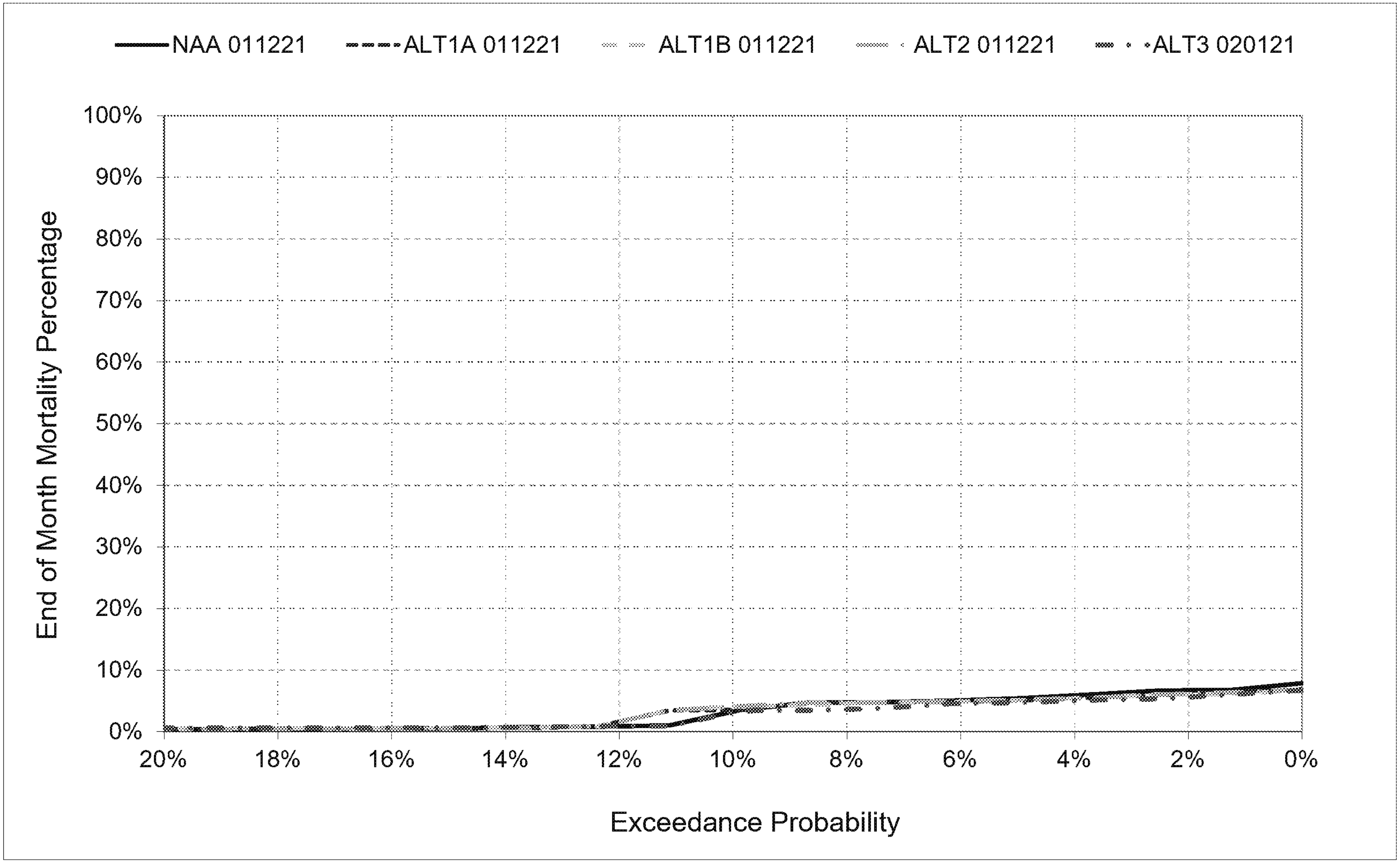
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 1-2. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Anderson Model), June



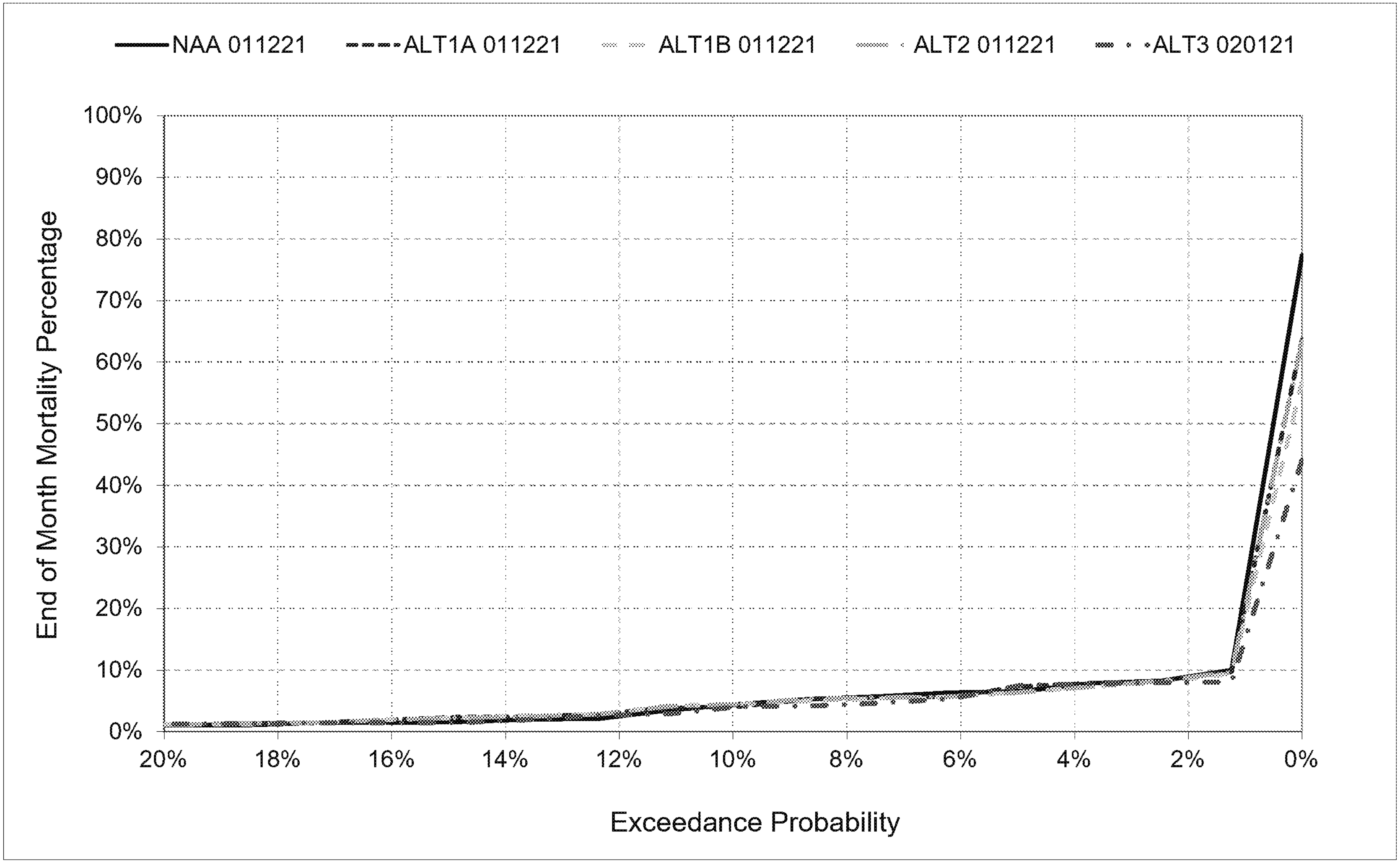
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 1-3. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Anderson Model), July



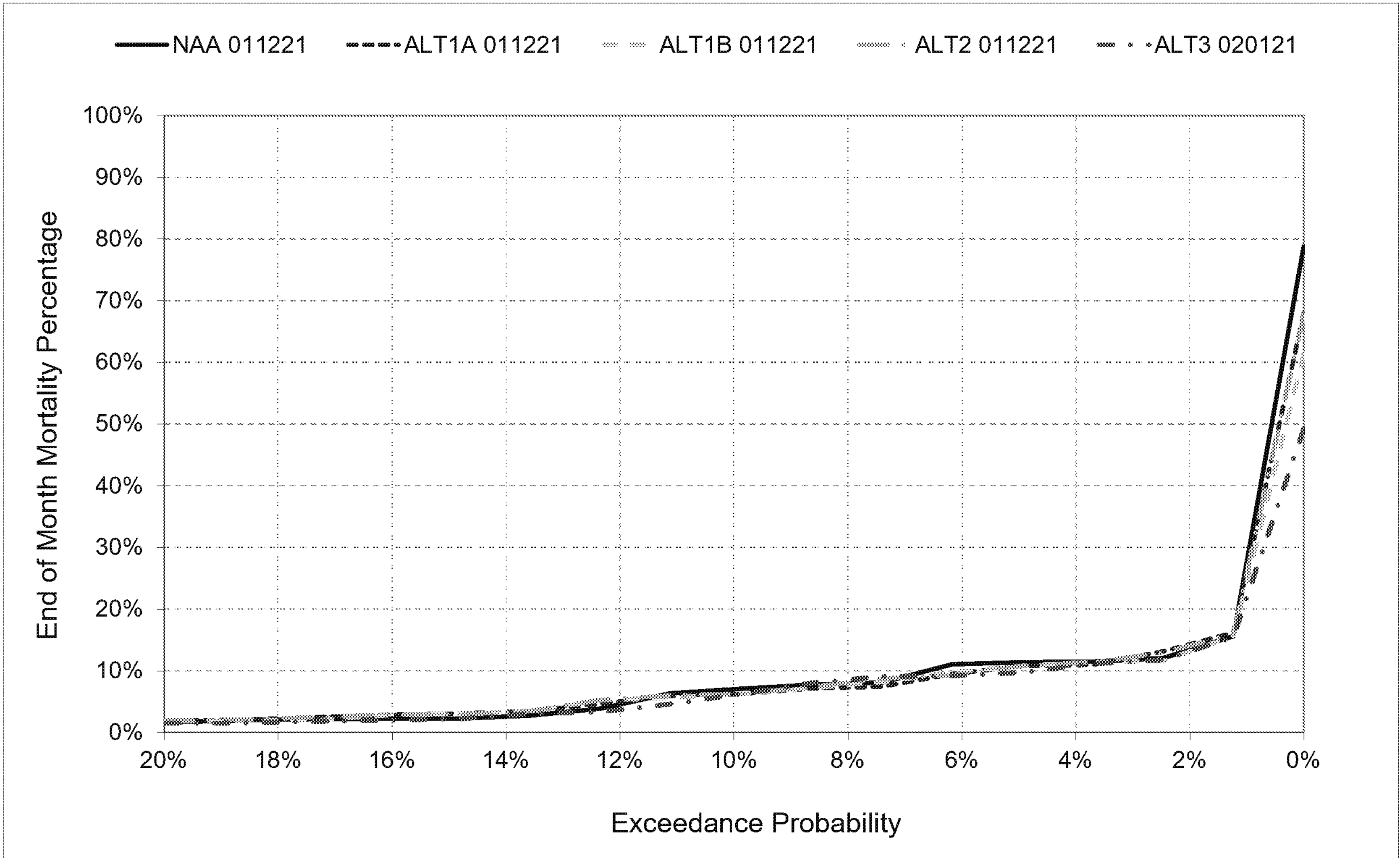
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 1-4. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Anderson Model), August



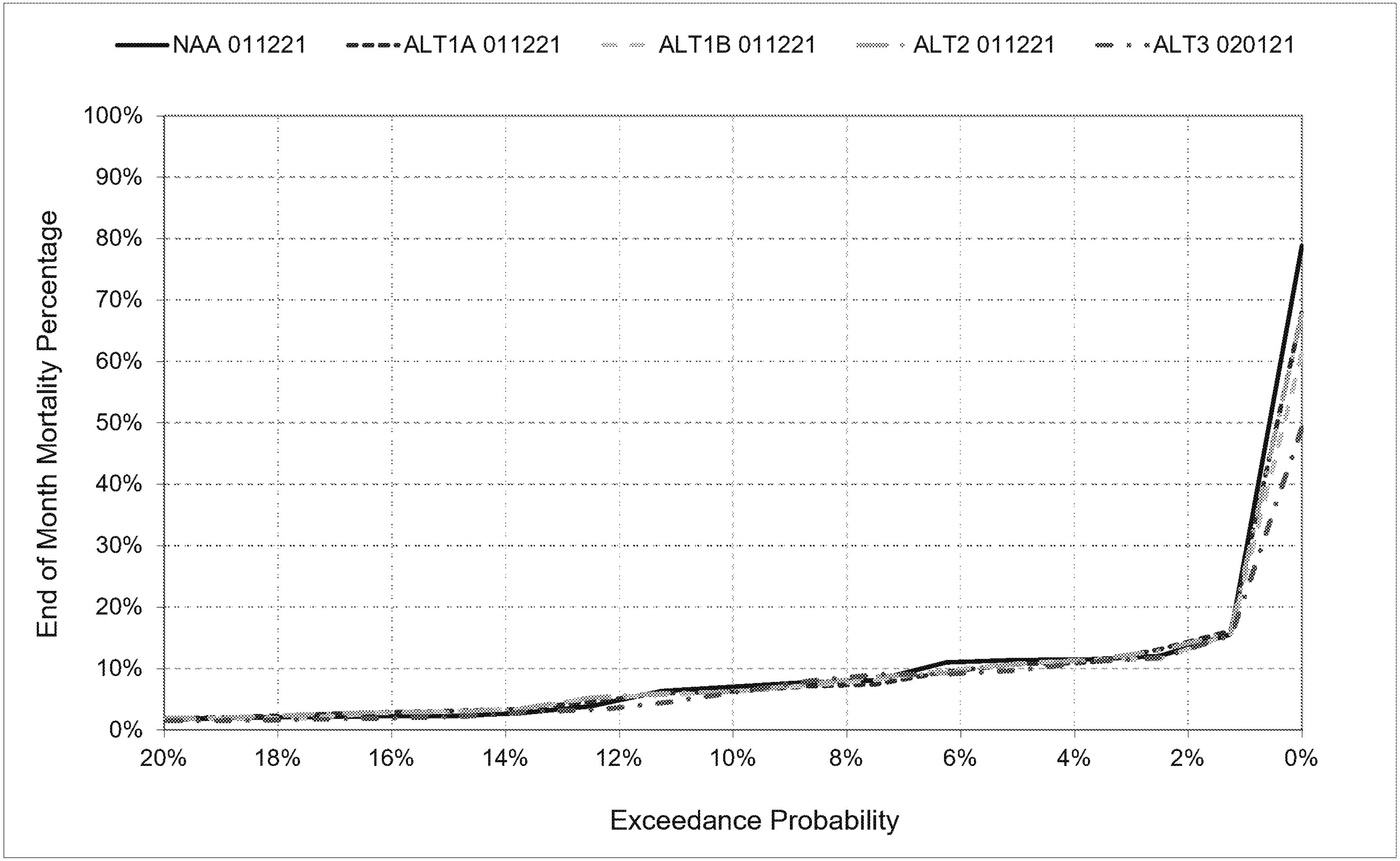
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 1-5. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Anderson Model), September



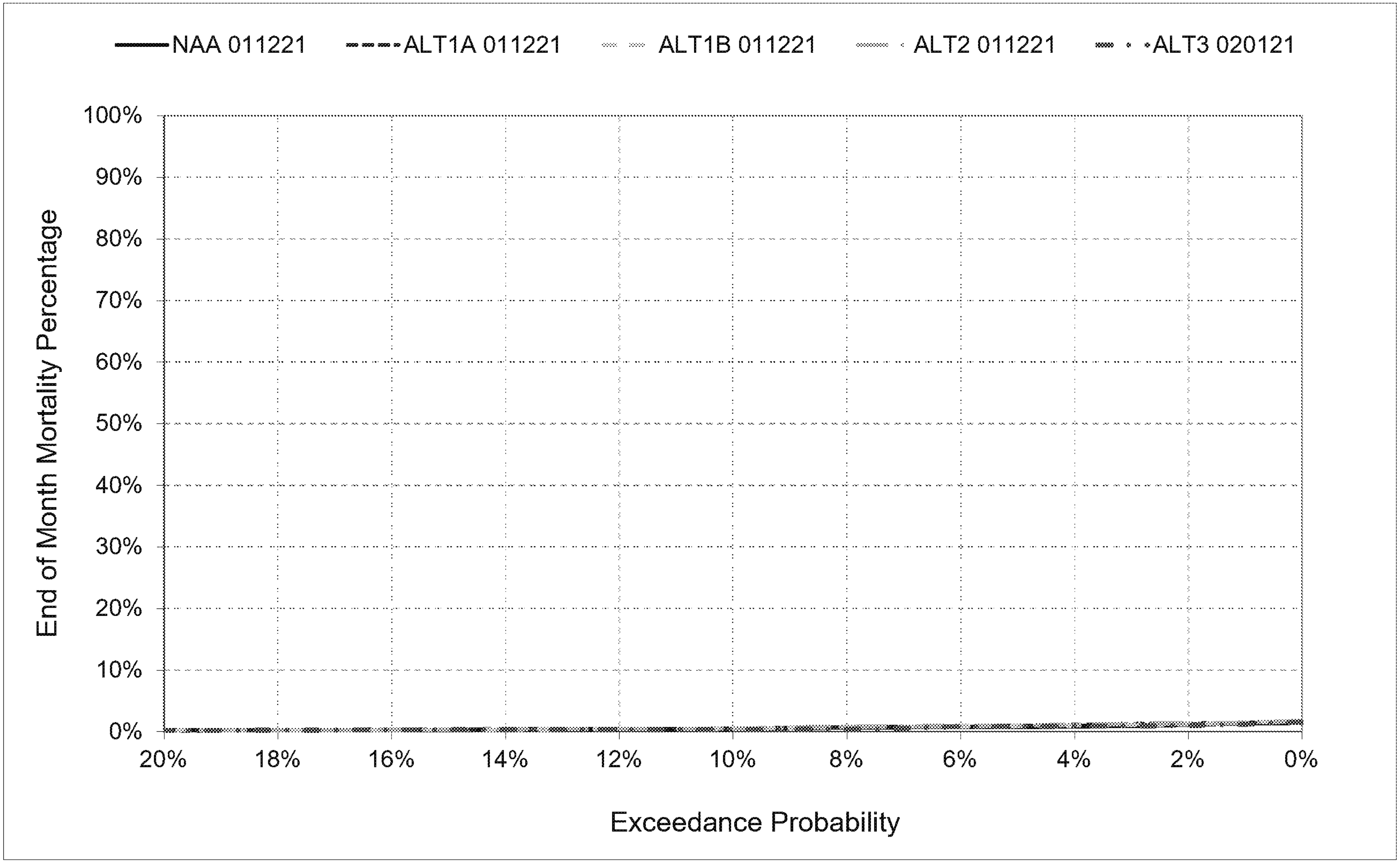
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 1-6. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Anderson Model), October



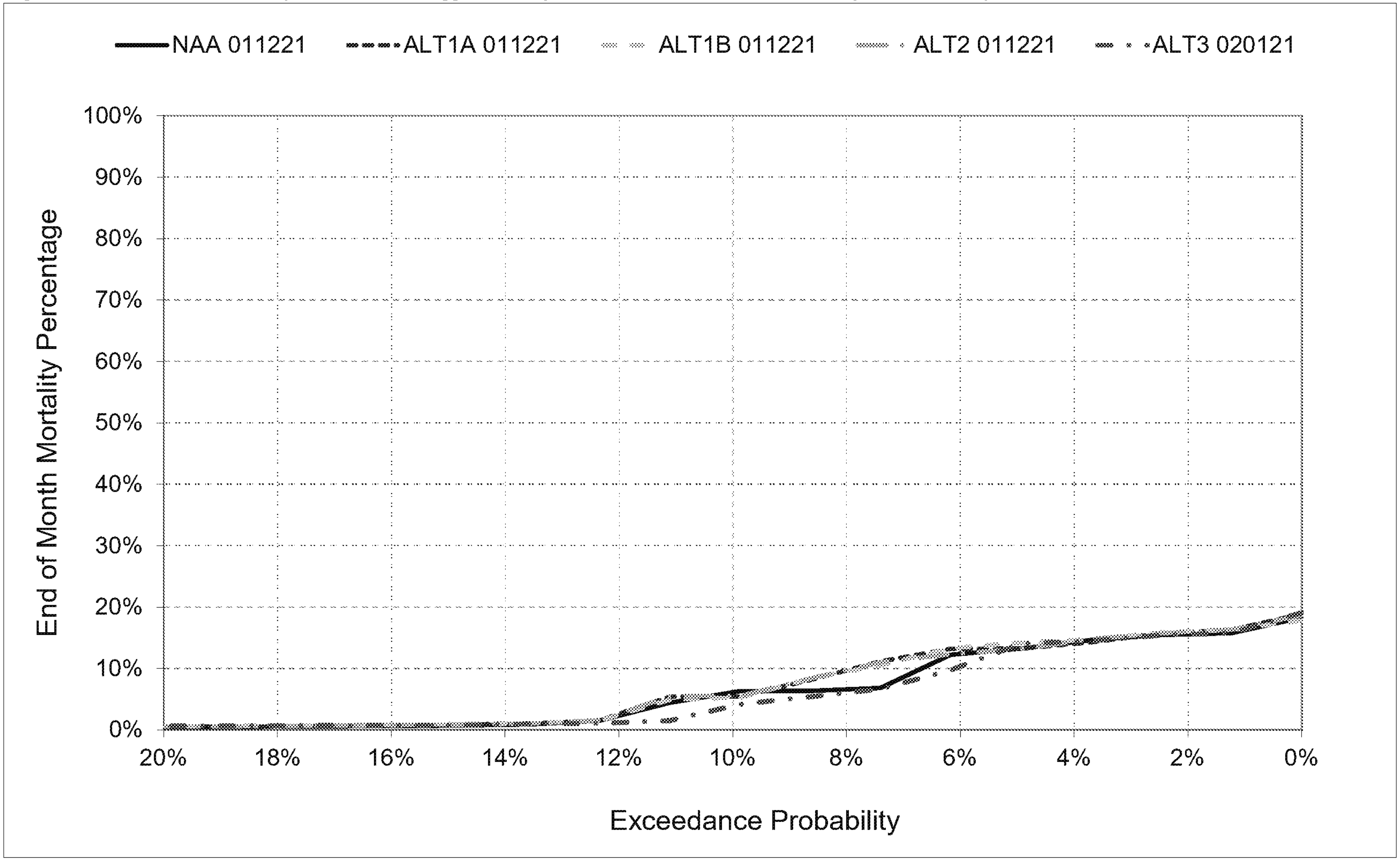
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 2-1. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Martin Model), May



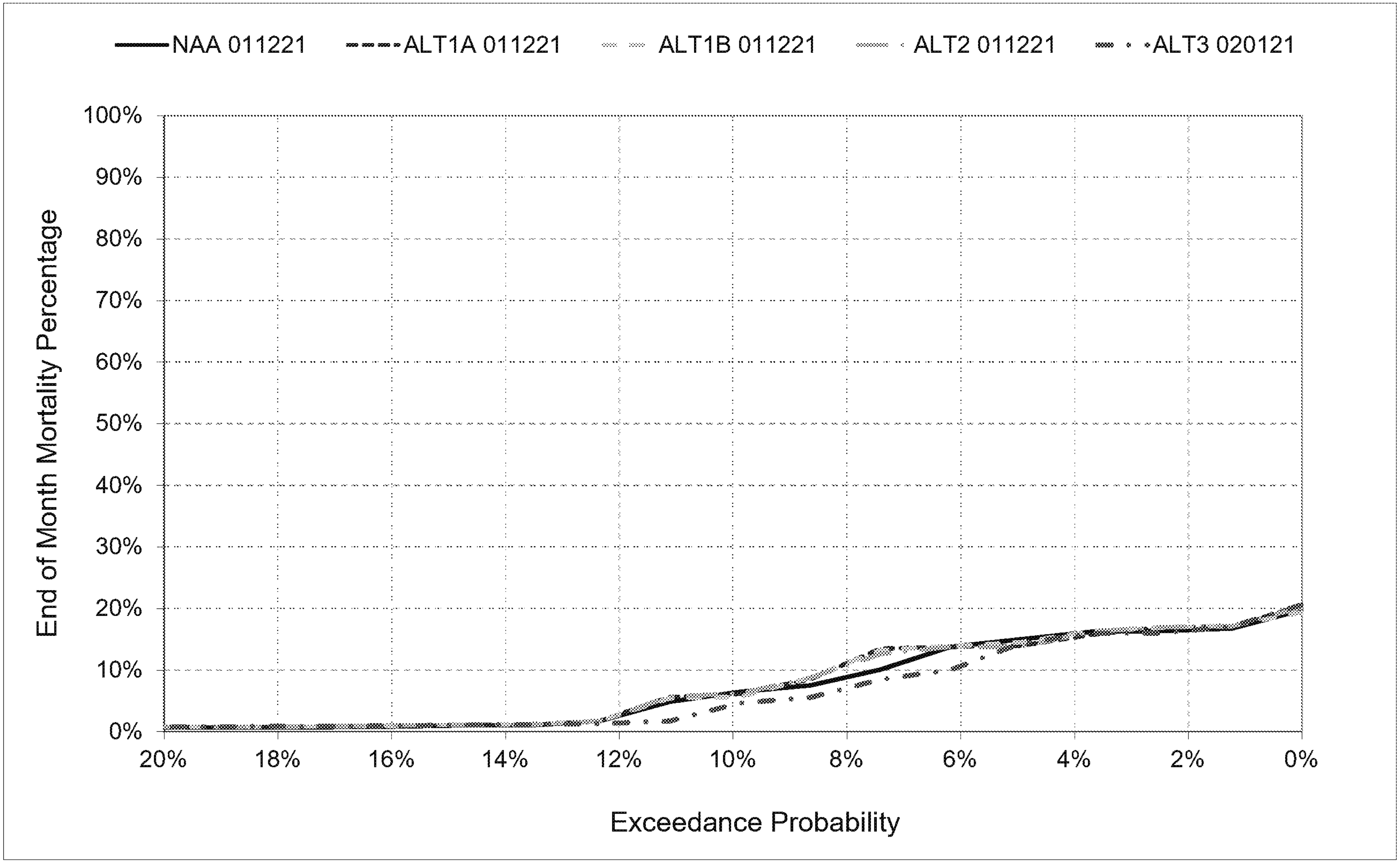
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 2-2. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Martin Model), June



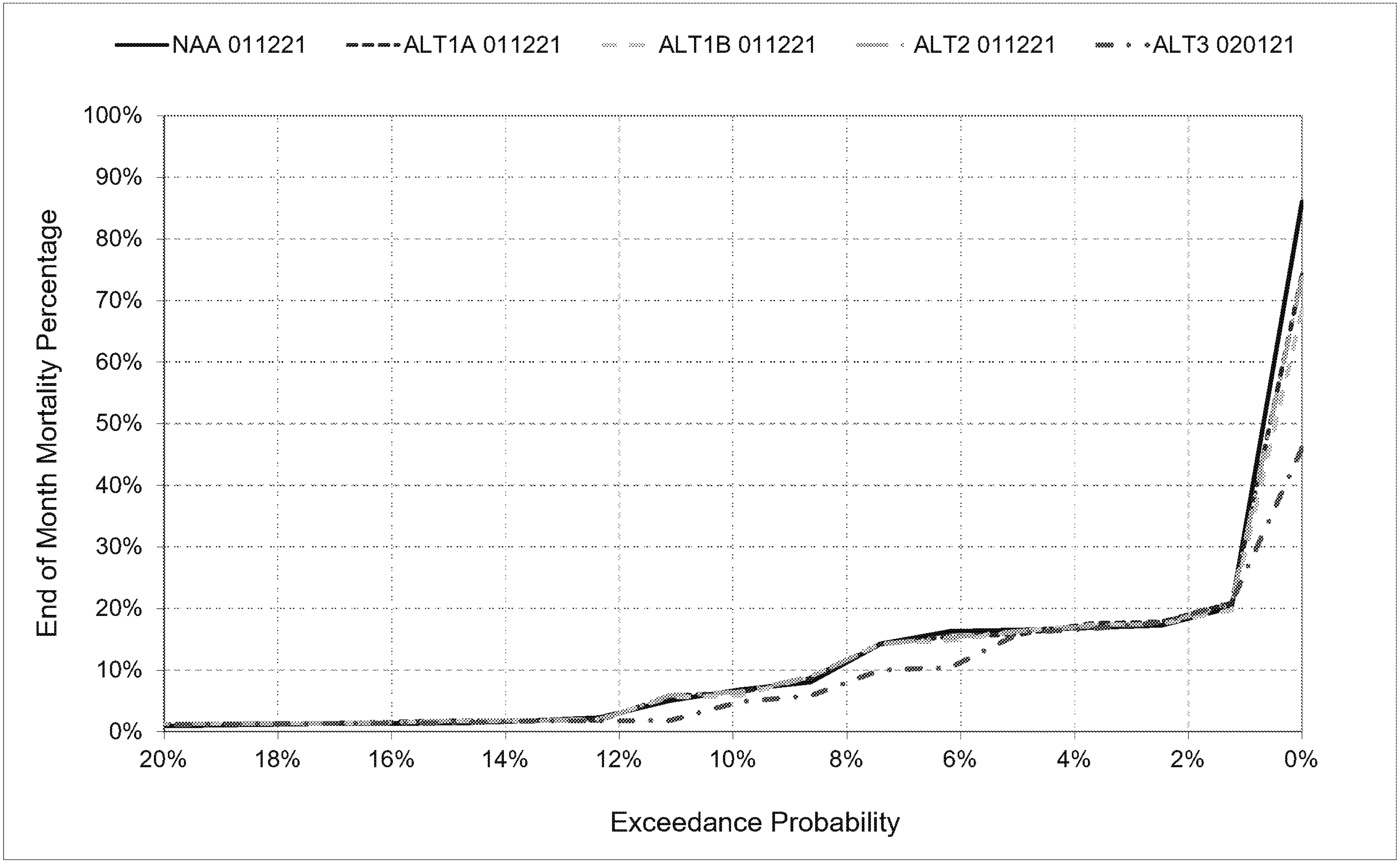
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 2-3. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Martin Model), July



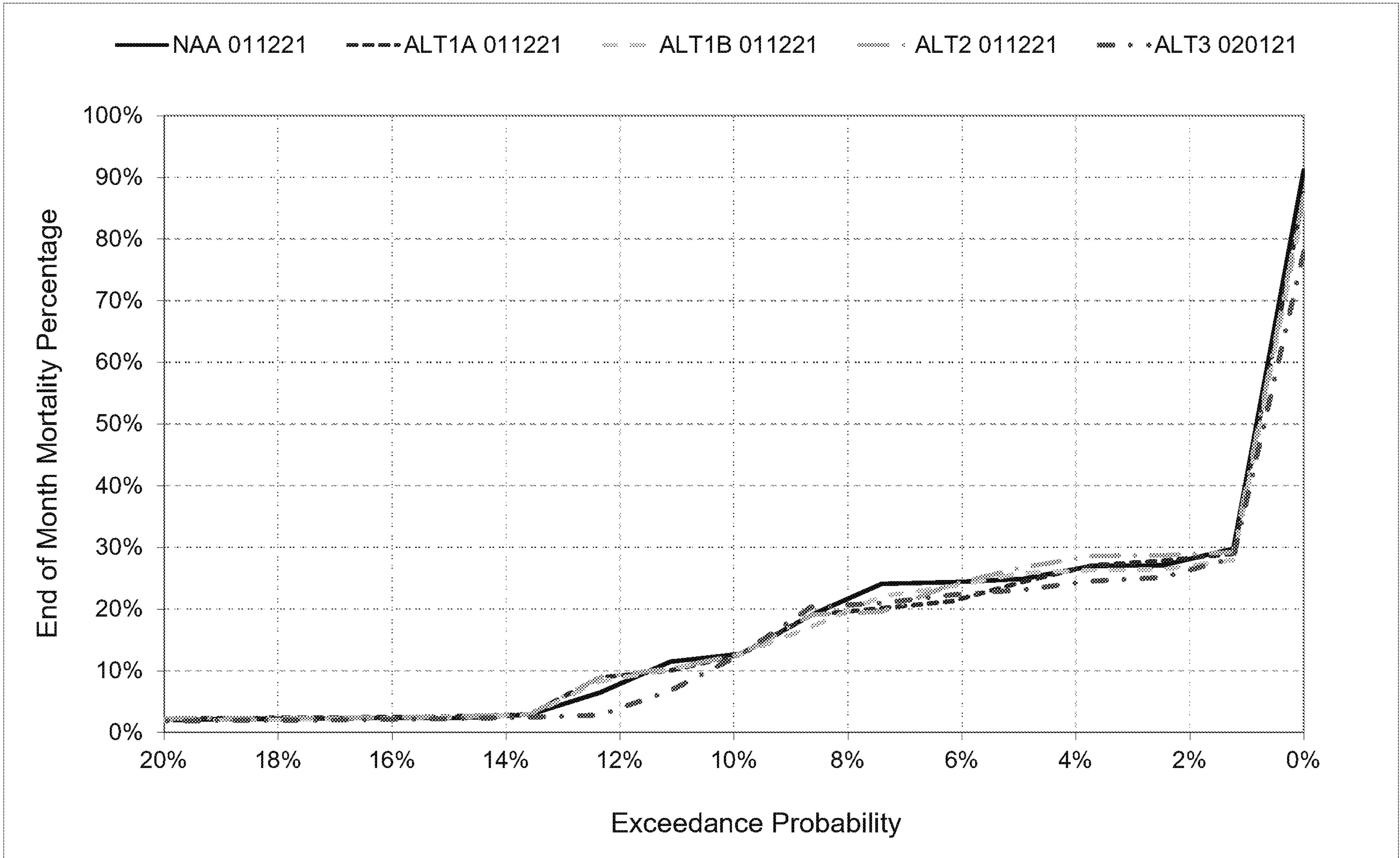
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 2-4. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Martin Model), August



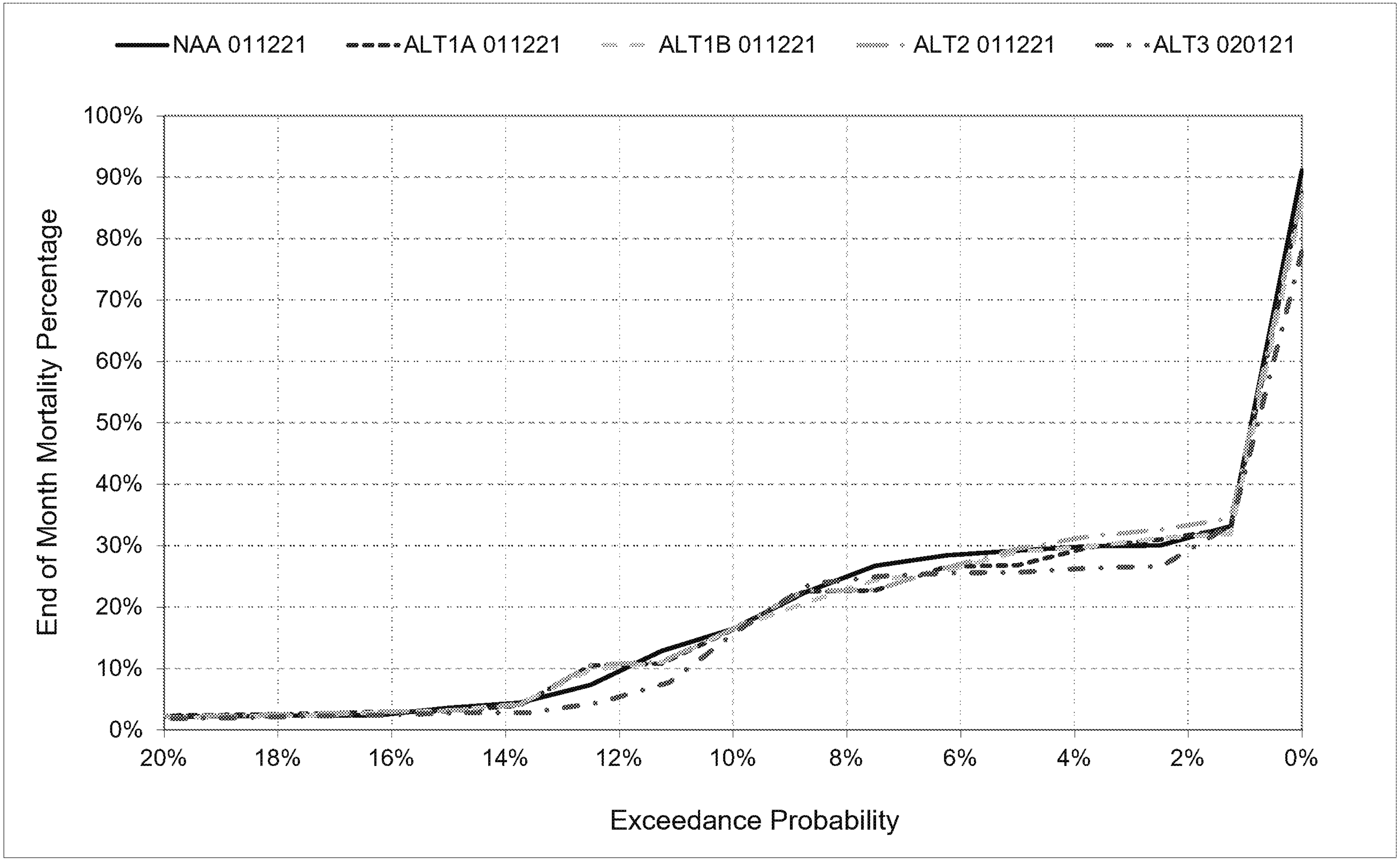
*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 2-5. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Martin Model), September



*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

Figure 2-6. Exceedance of Temperature-Based Egg Mortality for Winter Run Chinook Salmon (Martin Model), October



*All scenarios are simulated at Q0 with current climate and 0 cm sea level rise.

From: Nita Vail [Nita@nitavail.com]
Sent: 2/27/2021 9:39:52 AM
To: Marcia Kivett [MKivett@sitesproject.org]
Subject: Re: Marquee Mitigation

Marcia,

Mon at 3:30 pm is great.

Thanks,
Nita

Sent from my iPhone

On Feb 27, 2021, at 9:26 AM, Marcia Kivett <MKivett@sitesproject.org> wrote:

Good Morning Ms. Vail,

Jerry has time Monday at 3:30 or Tuesday at 1:00, 2:00 or any time at/after 4:00. Let me know if something works with your schedule and I will set up an appointment. Thank you and have a great weekend.

Marcia

Marcia Kivett
Sites Project Admin
Phone: 561.843.9740
Email: mkivett@sitesproject.org
Web: www.SitesProject.org
P.O. Box 517
122 Old Hwy 99W
Maxwell, CA 95955

From: Nita Vail <Nita@nitavail.com>
Date: Saturday, February 27, 2021 at 9:02 AM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: Re: Marquee Mitigation

Can we hop on a call early next week so I have a better sense of what you are thinking?

Sent from my iPhone

On Feb 27, 2021, at 9:00 AM, Jerry Brown <jbrown@sitesproject.org> wrote:

Yes, but probably not for another year or so until after we get public comment on the revised draft EIR (going out in August) and are further along with our permitting discussions. If there was something "marquee" that already is known, it would help streamline the whole process and give our participants and other stakeholders another reason to be supportive.

From: Nita Vail <Nita@nitavail.com>
Date: Saturday, February 27, 2021 at 8:49 AM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: Re: Marquee Mitigation

Jerry,

Very helpful. Will you all be developing a criteria (ie "must haves" and "desired?)

Nita

Sent from my iPhone

On Feb 27, 2021, at 7:13 AM, Jerry Brown <jbrown@sitesproject.org> wrote:

Nita – The desired result of a marquee mitigation is something that is 1) affordable and non-controversial, 2) exceeds the sites valley in terms of habitat value, and 3) is agreed across the spectrum of stakeholders to provide a significant and meaningful contribution to conserved lands in the state. Put another way, something that local, state and federal participants can be proud to have as part of the project, and something the conservation community is pleased to see added to the portfolio.

I like your thinking about the important of landowner advocacy. That's exactly along the lines of where we are trying to go.

Jerry

From: Nita Vail <Nita@nitavail.com>
Date: Friday, February 26, 2021 at 9:24 AM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: RE: Marquee Mitigation

Jerry,

Can you tell me more about what is desired in a "mitigation site in the area of the Sites Reservoir that would be viewed by the conservation community as a marquee location?" Much of Bear Valley is protected by conservations easements. Do you want an area that offers willing landowners interested in mitigation easements?

Interestingly, I am at brandings this weekend at the Sites Ranch owned by the LaGrande family. One key are the kind of landowners that will advocate and be public about these projects. Colusa County is eclectic as you know but I may be able to help you identify some opportunities. Assuming you will know too.

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, February 25, 2021 1:50 PM

To: Nita Vail <Nita@nitavail.com>
Subject: Re: Marquee Mitigation

Here's a map (very rough, inside the read area). We're not to the stage yet of having land ownership overlay or even acres needed yet. Mike suggested Bear Valley. Wanted to see if you had any other thoughts. Thanks.

From: Nita Vail <Nita@nitavail.com>
Date: Thursday, February 25, 2021 at 12:54 PM
To: Jerry Brown <jbrown@sitesproject.org>
Subject: RE: Marquee Mitigation

Jerry,

So glad you and Michael Delbar were able to connect last week. The Board's decision to hire Michael created a seamless and very gratifying transition, especially a blessing during Covid.

Is there a map you can share the current sphere that would qualify for terrestrial mitigation? It would help to see this and the correlating land ownership. I am happy to keep it confidential or sign an NDA if I can be helpful.

Hope all is well with you.

Best,
Nita

From: Jerry Brown <jbrown@sitesproject.org>
Sent: Thursday, February 25, 2021 7:56 AM
To: Nita Vail <Nita@nitavail.com>
Subject: Marquee Mitigation

Hi Nita – I had the pleasure of meeting Mike Delbar last week. Congratulations on securing a strong leader to replace you. I asked him a question that I'd like to ask you too "What would be a mitigation site in the area of the Sites Reservoir that would be viewed by the conservation community as a marquee location?" The reason I ask is because our participants have expressed interest in bringing a meaningful contribution to conservation with this project. I'm talking terrestrial mitigation only. Thanks for your thoughts on this.

Jerry