# **Appendices**

# **Restoration of the Salton Sea**

**Volume 1: Evaluation of the Alternatives** 

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# **Restoration of the Salton Sea**

**Volume 1: Evaluation of the Alternatives** 

Appendix 1A: Alternative Cost Estimate Details and

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# Chapter 1. Embankment Design

#### **Design Criteria and Considerations**

The restoration alternatives include embankment structures at various locations around the Salton Sea (Sea). All designs of high and significant hazard embankments were developed to meet Reclamation's Public Protection Guidelines (Reclamation, 2003). These guidelines focus on the estimated annual probability of failure, the potential for loss of life (LOL), and the public trust components of decision-making. Estimates of possible LOL were made in accordance with the procedures outlined in Reclamation's Dam Safety Office publication DSO-99-06 (Reclamation, 1999). The potentials for loss of life or for environmental consequences in the event of failure led to determination of what Reclamation and the Federal Emergency Management Agency (FEMA) refer to as the "hazard classification" for the dam, dike, barrier, and habitat pond embankment structures evaluated in this study. On the basis of the potential for loss of life, the mid-, north-, and south-Sea dams of Alternative Nos. 1 and 4 would be classified as **high hazard** structures. Because of the potential for high environmental consequences in the event of failure, the mid-Sea barrier, perimeter dikes, and concentric ring dikes of Alternative Nos. 1, 2, and 3 would be classified as **significant hazard** structures. The habitat pond embankments would be classified as low hazard structures because of minimal environmental consequences of failure.

The general design criteria determined for the mid-, south-, and north-Sea dams; perimeter dikes; concentric ring dikes; mid-Sea barrier; and habitat pond embankments would be as follows:

- Resist and control embankment seepage, foundation seepage, internal erosion, and static settlements
- Resist large offsets, slope instability, and deformations due to seismic loading, and flooding
- Provide for constructability using proven methods and safe construction

### **Evaluation of Embankment Designs**

Detailed seepage, stability, deformation, risk, constructability, and cost evaluations were completed to support the evaluation of the various dam, dike,

barrier, and habitat pond embankments that comprise the alternatives. The sequence of study tasks was as follows:

- 1. Existing information and construction material sources assessment
- 2. Seepage and stability evaluations
- 3. Seismic deformation evaluations
- 4. Formulation and initial screening of embankment cross-section options
- 5. Supplemental seepage and stability evaluations
- 6. FLAC deformation evaluations
- 7. Finalization of decision criteria and cross-section requirements
- 8. Final screening of embankment cross-section options
- 9. Selection of preferred cross-section option
- 10. Initial cross-section optimization
- 11. Risk analysis
- 12. Final cross-section optimization
- 13. Cost estimates for optimized embankments

Following evaluation of the embankment design options, which included the Salton Sea Authority's rock notch design and California Department of Water Resources' (DWR) rock dam design, Reclamation determined that an optimized "sand dam with stone columns" was the preferred basic configuration for all of the various embankments, except habitat pond embankments, which were optimized as earthfill embankments. Overviews of both configurations are provided in the following sections.

#### Sand Dam with Stone Columns Embankment Design

Existing very soft and weak foundation materials would be removed beneath the entire footprint of the embankment, and additional soft and weak foundation materials would be removed beneath the central section. The sand dam with stone columns embankment would consist of sand/gravel materials forming the central section and the outer shells. To resist static loadings, the embankment cross-section would include filter and drainage zones to help control embankment and foundation seepage. To resist seismic loadings, the central section's sand/gravel material would be densified using stone columns. A soil-cement-bentonite (SCB) wall would be constructed down through the middle of the central section and into the foundation. Riprap slope protection would be placed over the upstream and downstream embankment slopes. To resist seismic loadings, the embankment would be constructed using a combination of placement methods. Placement methods would include:

 Dumping/placing directly into the water from barges for the lower portion of the central section and the outer portions of the embankment, including riprap slope protection. • End dumping or conveyor placement for the upper portions of the central and outer portions of the embankment.

The size of this basic sand dam with stone columns design would be adjusted as required to meet the location and configuration requirements of the mid-Sea, south-Sea, and north-Sea dams; perimeter dikes; concentric ring dikes; and barrier embankment designs. The basic embankment design also would be adjusted to address certain potential risks, such as the possibility of fault offsets of 2 to 5 meters in the foundation beneath the south-Sea dam and the concentric ring dikes in the southern Sea.

**Figure 1.1** provides the cross-section view of the basic sand dam with stone columns embankment design for a mid-Sea dam. Configurations for the less tall mid-Sea barrier, south-Sea dam, and concentric lakes dikes would be similar but with different heights.

#### Sand Dam Without Stone Columns Embankment Design

The sand dam concept was considered with and without stone columns for the significant hazard structures in Alternative No. 2, Mid-Sea Barrier with South Marine Lake, and Alternative No. 3, Concentric Lakes.

The sand dam concept was applied to these alternatives to compare the risk replacement costs of structures that reduce both seismic and static risks with the risk-based replacement costs of structures that reduce only static risk. Costs are presented in Chapter 2 for these two alternatives assuming that (1) stone columns are included and (2) stone columns are not included.

#### **Habitat Pond Embankments Design**

**Figure 1.2** provides the cross-section view of the habitat pond embankment design. This design would be applied to habitat pond embankments associated with the saline habitat complex components in each of the alternatives. These low earthfill embankments would be very simple designs that would be constructed in the dry. The existing soft and weak foundation materials would be removed beneath the entire footprint of the embankment to achieve a competent foundation. The excavated material would be dried and reused as earthfill to construct the habitat pond embankments. The embankment cross-section would include a blanket layer of sand filter/drain material under the embankment's downstream shell. There would be no riprap slope protection. Because of its small size and shallow water depth, the habitat pond embankment design would likely not need to meet Reclamation's Public Protection Guidelines.

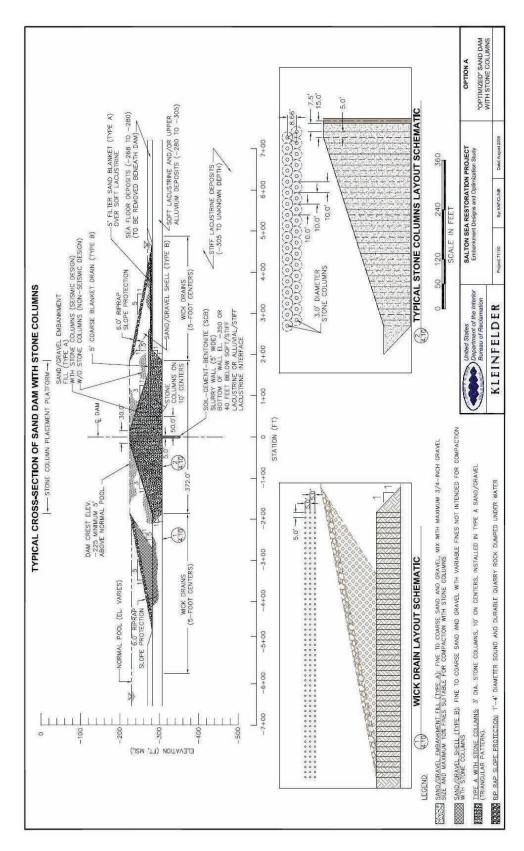


Figure 1.1 Typical cross-section of sand dam with stone columns.

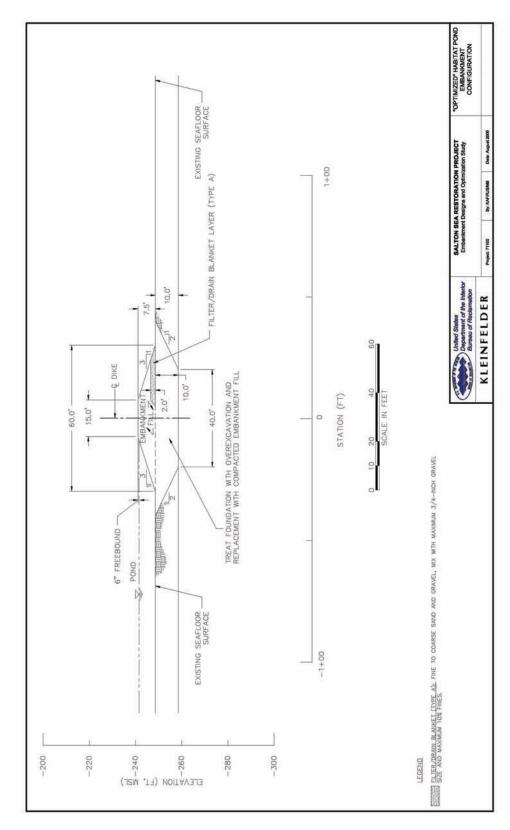


Figure 1.2 Typical cross-section of habitat pond embankment.

#### Geotube® Embankment Design

The Imperial Group has proposed using Geotube® technology to construct the concentric lakes dikes. Reclamation considered three concentric lake dike design options, and one incorporates the Geotube® technology (**Figure 1.3**). The other two options are based on the sand dam approach discussed above. One design includes features to reduce only static loading risks (without stone columns), and the other includes features to reduce both static and seismic loading risks (with stone columns). The Geotube® design would not reduce either seismic or static loading risks.

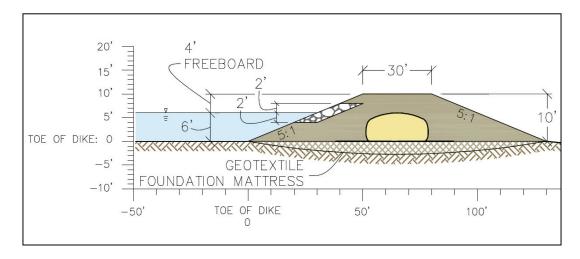


Figure 1.3 Typical Geotube® design.

Constructing concentric lakes dikes using Geotubes® would likely result in significant seismic, static, and constructability problems.

#### SSA Rockfill and Rock Notches Embankment Designs

The SSA has proposed using a rockfill embankment design for its proposed alternative as shown in **Figure 1.4.** The SSA had previously proposed using a rock notches embankment design similar to that shown in **Figure 1.5**. Reclamation evaluated both the rockfill and rock notches embankment concepts and determined they would not meet Reclamation's general design criteria. The use of traditional sand and gravel horizontal filters in these designs would not be possible without sacrificing stability under seismic loadings. Use of geocomposite filters would result in constructability problems and would result in unreliable filter performance. Cost estimates were prepared for the SSA's original (south alignment) alternative using the rockfill and rock notches concepts. (The rockfill embankment cost estimate includes costs for an SCB wall and a fine rockfill layer above the geocomposite not shown in **Figure 1.4**.) The SSA's original alternative incorporated a mid-Sea dam about 1.5 miles farther south than what is presented in Figure 3.2. (This south alignment is also

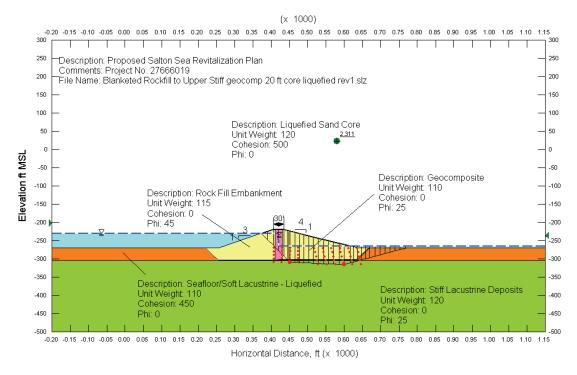


Figure 1.4 Typical cross-section of the SSA rockfill embankment.

included in Alternative 1C – Mid-Sea Dam – Sand with Stone Columns and Alternative 1D – Mid-Sea Dam – Rock Notches Dam.) The SSA original alternative also included a smaller SHC of 12,000 acres. Reclamation's cost estimates for the SSA rockfill and rock notches designs (Attachments 1B, 1D and 9) provide a basis for making comparisons to cost estimates prepared by DWR and the SSA for this same original alignment. The Alternatives 1B, 1C and 1D air quality mitigation cost estimates presented in Attachments 7 and 9 assume the use of salt crusting (as originally proposed by the SSA) via construction of small earth embankments (2.5 feet tall) to impound brine released from the SHC.

#### **Embankment Materials**

Following is a description of the construction materials used in the embankment designs described above.

#### **Seafloor Materials**

Suction-dredged and clamshell-excavated materials consist of a heterogeneous mixture of earth materials found on the floor of the Sea. These materials consist of very soft, weak, loose Seafloor deposits, soft, fine-grained lacustrine soils, and fine-grained alluvial soils. These materials are expected to be removed using barge-mounted, suction dredges and clamshell excavation equipment. The

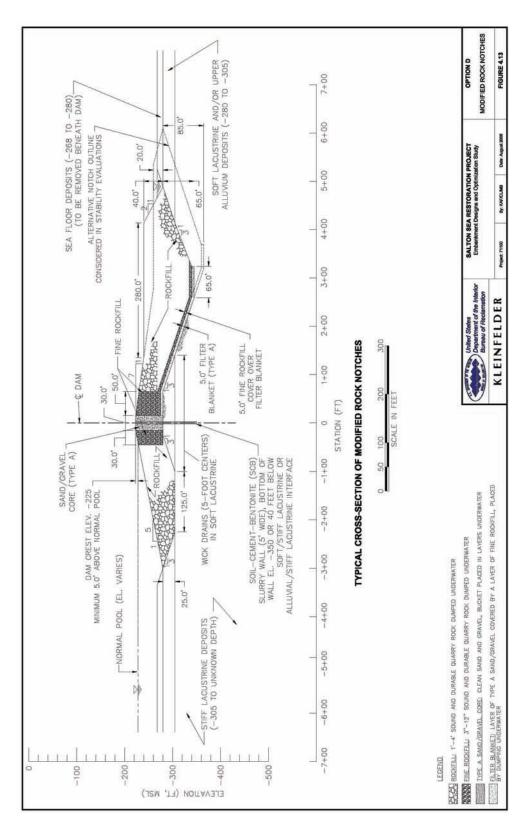


Figure 1.5 Typical cross-section of the rock notches embankment.

Seafloor, soft lacustrine deposits, and alluvial soils would be removed from the foundation zones of the various embankments before the embankment materials are placed, except in the case of the Geotube embankments. Seafloor materials would not be removed from beneath the Geotube embankments, but materials dredged and clamshell-excavated from areas near the embankments would be used to fill and cover the Geotubes, respectively. This process is discussed further under the Geotubes discussion later in this section. The suction-dredged waste materials would be pumped as slurry to areas well outside of the embankment limits and discharged at the Seafloor.

#### Type A Sand/Gravel

Type A sand/gravel would be used to build the interior zones within all the dam, barrier and dike embankment components of the restoration alternatives, except the habitat pond embankments. Type A sand/gravel would be developed from alluvial borrow sources and screened to create a 3/4—inch minus material. Fines contents would be limited to less than 10 percent passing the No. 200 screen. This material would be suitable for densification using stone column construction techniques.

#### Type B Sand/Gravel

Type B sand/gravel would be used in the outer shell zones of the various embankment dam, barrier and dike structures. Type B sand/gravel would be developed concurrently with the screening operations for the Type A sand/gravel. This material would not be as tightly controlled as the Type A sand/gravel, with gravels and cobbles allowed up to 1 foot in maximum dimension, or perhaps more. Fines content requirements would also be relaxed relative to the Type A sand/gravel. (Some Type B material would be used as blanket drain material, which would require a low fines content.)

#### **Filter and Drain Materials**

Sand and gravel, fine rockfill, and geocomposite filter and drain materials would be developed for drainage blankets and internal drainage features in the various alternatives. The gradations of the fine rockfill and sand and gravel materials would be controlled to meet filter compatibility standards consistent with sound embankment design criteria. Both fine and coarse filter and drain gradations would likely be needed for the project. These materials would be produced concurrent with the Type A sand/gravel and Type B sand/gravel materials described above.

The geocomposite filter included in the SSA rockfill embankment design is a combination of two types of geosynthetics: 1) a geotextile serving the primary function to filter seepage from the dam foundation into the downstream rockfill and 2) a geonet (or geogrid) functioning to provide additional tensile strength and puncture resistance under the weight of the overlying rockfill. The two synthetics would be heat bonded together in the factory.

#### Rockfill and Fine Rockfill

The gradation of the large rockfill material included in the SSA rockfill and rock notches embankment designs is from six inches to four feet in diameter. Fine rockfill would be used in the outer shell zones of the various embankment dam elements and for filter and drain elements, as discussed above. Two fine rockfill gradations are used: 1-inch to 6-inches diameter and 3-inches to 12-inches diameter. All rockfill material would be quarried from either a new source near the west shore (the Coolidge Mountain site) or salvaged from the waste rock stockpiles or a new quarry at the Eagle Mountain Mine site northeast of the Salton Sea.

#### **Riprap**

Large riprap rock would be required to provide protection against the high waves that occur on the Sea. The riprap material has been tentatively sized to consist of hard angular rock ranging from 1 to 4 feet in diameter. The riprap would be quarried from either a new source near the west shore (the Coolidge Mountain site) or salvaged from the waste rock stockpiles or a new quarry at the Eagle Mountain Mine site.

#### **Stone Columns**

The Type A sand/gravel material in the sand dam embankments would be densified to improve its insitu strength characteristics using stone column or vibrodensification techniques. Stone columns would be constructed within the Type A sand/gravel zone on a 10-foot triangular grid spacing and would average about 3 feet in diameter. The replacement stone within the columns would be produced concurrent with the Type A, Type B, and filter/drain material screening operations. The replacement stone (gravel) would range from <sup>3</sup>/<sub>4</sub> to 1½ inches in diameter.

#### **Soil-Cement-Bentonite Slurry Wall**

The SCB slurry wall would be constructed to control seepage through the permeable Type A sand/gravel within the interior zones of the various embankments. The SCB slurry walls would extend fully through the embankment height and penetrate into the underlying upper stiff lacustrine deposit. The upper stiff lacustrine deposit embedment by the wall would vary from 35 feet for the perimeter dikes, concentric lakes dikes, and south-Sea dam to 40 feet for the north-Sea and mid-Sea dams. The total depths would vary but could conceivably extend up to 125 feet from crest to bottom. As added protection against seepage through imperfections in the SCB slurry wall, a high-density polyethylene (HDPE) membrane could be inserted into the SCB wall as well. However, at this time a specialty contractor who has inserted the membranes to the depths contemplated for the Salton Sea restoration project has not been located. New techniques or procedures would have to be developed to insert a membrane

properly into the SCB slurry wall. Vinyl sheet piles may also be an alternative to the HDPE membrane. The slurry itself is contemplated to have a 7 percent bentonite and 2 percent cement content. The Type A sand/gravel would be used as the aggregate mass for the SCB wall. Construction of an SCB slurry wall in saline conditions would require special precautions to reduce flocculation of the bentonite and cement within the slurry and associated potential for adverse settlement of the flocculated materials and collapse of the upper portions of the slurry wall excavation.

#### **Wick Drains**

Wick drains would be used to accelerate consolidation of the soft lacustrine deposits that would be left in place below select locations of the various embankment options. The wick drains would be installed from barges after dredging of the Seafloor deposits and prior to dumping of the Type A or B sand/gravel. Wick drain depths would vary, but they are expected to average 25 feet deep and would be placed on a 5-foot by 5-foot square grid pattern.

#### **Habitat Pond Embankments**

Shallow habitat ponds are planned for all of the restoration alternatives, except for Alternative No. 3, Concentric Lakes. The size of concentric lakes varies from 16,000 to more than 42,200 acres. As opposed to the various embankment options, such as the mid-Sea dam, south-Sea dam, north-Sea dam, mid-Sea barrier, perimeter dikes, and concentric lakes dikes, the habitat pond embankments would be built entirely "in the dry" using earthfill materials salvaged from the dried Seafloor as the Sea retreats. The embankments would range from 6 to 9 feet high. Soft materials would be over-excavated from beneath the embankments, aerated to reduce moisture contents to manageable levels in order to achieve compaction, and replaced as compacted earthfill. A geogrid or geotextile would be placed on the bottom of the over-excavation area to reduce pumping and improve equipment mobility. The over-excavation depth is estimated to be about 10 feet. The pond embankments would incorporate a horizontal drainage blanket to prevent uncontrolled seepage from exiting the downstream embankment face and improve the stability of the embankments.

#### **Geotubes**®

The Imperial Group has proposed the use of a proprietary geosynthetic product called Geotubes® as an alternative technique to construct the concentric lakes embankment structures. Geotubes® consist of a closed cylindrical bladder constructed using a permeable geotextile material. Very wet soils, suction-dredged from the nearby Seafloor, could be pumped as a slurry into the Geotube's® bladder, creating an elliptically shaped structure. Water would bleed through the geotextile material, leaving the slurried soil as a backfill material. Two Geotube components are included in the embankment design: a central core and a foundation mattress (**Figure 1.3**). The central core is a near-round elliptical

tube that would be placed on top of the near-flat foundation mattress. Constructing concentric lakes dikes using Geotubes® would likely result in significant seismic, static, and constructability problems.

#### **Material Sources**

A materials evaluation identified three possible sources for embankment materials: (1) the Coolidge Mountain/Aggregate Products (API) site on the west shore, (2) the Eagle Mountain mine site located well northeast of the project, and (3) relatively small borrow sites located along the east shore near the Bombay Beach area. The Bombay Beach sites are relatively thin and, after further evaluation, have been eliminated from consideration as a possible source for large-scale earthfill and riprap production. The two remaining sources are described in detail below.

#### Coolidge Mountain/API Site

The Coolidge Mountain/API site is located within the Torres Martinez Indian Reservation. API operates a sand and gravel pit and screening operation just west of Highway 86 near the northwest shore of the Sea. The API pit produces a variety of aggregate products, including washed and natural sands and gravels for asphalt concrete and Portland cement concrete, and similar rock products. The source is a natural sand and gravel deposit within a broad alluvial fan. The existing pit is about 140 feet deep with indications that the alluvial materials continue to considerably greater depths. The surrounding topography infers that the alluvial deposits continue in all directions over a large area. This site seems promising for production of all of the embankment materials with the exception of rockfill and riprap.

West and upslope of the existing API pit, Coolidge Mountain rises above the alluvial fan. Much of this area is also located within the Torres Martinez Indian Reservation. Geology within this area appears to be more complex than previously known. Outcrops of hard granites, siliceous limestones, and perhaps metasedimentary rocks exist in this area. These materials could be used to quarry the rockfill and riprap for the project. Tight rock joint spacing could affect the "yield" for 4-foot minus rockfill and riprap from the quarry. This constraint should be evaluated to assess whether the tight jointing will limit production of the larger rockfill and riprap sizes.

#### **Eagle Mountain / Kaiser Ventures**

The Eagle Mountain Mine site is located well northeast of the Sea beyond Interstate 10. The Eagle Mountain site is owned by Kaiser Ventures, which manages this former iron mine and mill site. The materials available at the Eagle Mountain site are vast and diverse. Processed materials such as sands and gravels are available within mill tailing waste dumps. In addition, large angular rock

derived from granites, monzonites, and iron ore has been deposited in huge waste rock stockpiles, but the percentage of large rock material is not high (less than 10 percent). Kaiser Ventures has estimated the existing tailings and waste rock to be up to 800 million tons. The Eagle Mountain site was once served by a rail line that extends from the mine itself to a tie-in to the Union Pacific Railroad at the northeast margin of the Sea. The existing rail line has been destroyed by flash flooding and would need to be rebuilt prior to shipping materials out of the Eagle Mountain site. This single trackline is estimated to be about 52 miles long. Kaiser Ventures estimates that the line can be placed back into service for approximately \$6 million. The restored line would have considerable capacity constraints given its curvature, grade, and single-track nature. Kaiser Ventures believes the line can be restored to transport about 5,000,000 tons of rock per year. This production rate is very small in comparison to the volume of materials contemplated for the various alternatives.

#### **Construction Materials Production and Methods**

#### **Quarry Stone**

The most promising source for quarry stone appears to be the Coolidge Mountain area at the northwest margin of the Sea. This site appears to be sufficient to produce all of the rockfill and/or riprap needs for the project without using the Eagle Mountain site as a secondary source. Rockfill and/or riprap would be produced within a hard rock quarry operation. Extensive drilling and blasting would be required to produce the rockfill and/or riprap. Because the riprap size would be closely controlled in the 1-foot to 4-foot range, the yield from the quarry would be impacted by the presence of particles less than 1 foot in diameter. In simple terms, the undersized fragments would need to be separated from the riprap production stream. The undersized material would be generated by the same drilling and blasting that creates the riprap. However, for the sand dam embankments, there is no direct alternative use for this smaller material within the project and it would have to be stockpiled or "wasted" from the riprap production line. Crushing the sub-one-foot particles to create Type B materials or stone for the stone columns may be economical and should be evaluated as part of future materials evaluations. For this study, it was assumed that the Coolidge Mountain quarry site would operate at 50-percent yield, in the production of riprap. In other words, 2 cubic yards of material would need to be blasted and screened to create each cubic yard of suitable riprap. In the production of rockfill, this study assumed there would be a very small percentage of wasted material. (A test quarry would be needed to verify this assumption.)

#### Alluvial Soil Sources

As described above, the API site and its surrounding deposits appear to represent a promising source for all of the embankment materials (except for rockfill and riprap, which would be quarried from Coolidge Mountain) for the various project alternatives. There appear to be abundant deposits for Type A, Type B, and filter rock materials. The source is near the northwest shore of the Sea and in close proximity to Highway 86, which would facilitate economical hauling by trucks and transport by barge for at least the closest portions of the work. The close proximity to Highway 86 also provides opportunity for extensive hauling by truck. Transportation for elements that are significant distances from this location would have significantly higher transportation costs. These higher transportation costs have been considered in these appraisal level cost estimates.

#### **Screening and Crushing**

It appears possible that all embankment materials could be mined, crushed, screened, and distributed from a single integrated plant at or near the existing API site. It may also be possible to create a portion of the processing operations at the API site and others at a location adjacent to or at a beach location. Multiple product lines could be used to create Type A, Type B, filter rock, and stone column infill materials. Quality control data provided by API indicate that the source would not require extensive washing to reduce fines content. Depending on the option selected, there appears to be sufficient borrow area to support embankment material production.

#### Sorting

Embankment materials could be distributed from the API site using conveyors, trucks, or a combination of these methods. The material handling and processing site(s) would need to be developed to allow suitable stockpiling of Type A, Type B, filter rock, and stone column infill materials necessary to meet project schedule, maintenance, and contingency requirements. Multiple conveyors would likely be needed within the production plant area to move the processed materials from stockpiles to either trucks for land deployment or to barges for over-water conveyance. The sorting operations would have to be sequenced so the different materials could be delivered using the same mainline conveyor to the shore or trucks as needed.

#### **Waste Materials**

As discussed above, the rock quarry operations for riprap production may create a relatively large volume of material that could not be economically used and, consequently, would have to be wasted. It is likely that the API alluvial pit operations could be managed so that unsuitable materials would be kept to a minimum. A materials production evaluation should be performed to determine the most economical and effective systems for the large amounts of materials that would be required.

#### Transport and Placement

Using the Coolidge Mountain/API site for the embankment materials would provide opportunities for transport using both over-water and over-land methods.

The Torres Martinez Indian Reservation extends east out into the Sea itself, which allows for creation of barge load-out facilities contiguous to the quarry and pit production facilities. Highway 86 bisects this area. A conveyor system could be used to load barges. The conveyor would be threaded through an elevated CMP casing over the highway so that any materials dislodged from the belts would not impact the traffic. The conveyor would be used to move all of the Type A and Type B sand/gravel, fine rockfill and filter rock that would be placed over-water. Riprap and large rockfill cannot be moved by conveyor but must be transported by truck. A temporary traffic bridge over Highway 86 would likely be required to minimize traffic conflicts between construction traffic and the traveling public. Most of the embankments needed for the various project alternatives call for the creation of a broad crest width to allow for densification of the Type A sand/gravel using stone columns. The broad crest width provides the opportunity to use overland trucks to transport and place the embankment materials. It is possible that up to two-thirds of embankment materials could be placed by overland material handling methods and about one-third could be placed over-water using flexi-float barges. The over-water placement would be needed on the outer edges of the embankments, which cannot be reasonably reached from the edge of the broad crest areas. Temporary causeways would be required to provide access for trucks for construction of the mid-Sea dam, the south-Sea dam, the north-Sea dam, and perimeter dike features. Causeways would vary from 4,000 to 7,000 feet long and would be built out from shore using end dump techniques. Though relatively long, the shallow water depths inhibit the use of barges for constructing the temporary causeways. As described above, all of the dam alternatives would rely heavily on overland hauling of embankment materials. However, it is possible that substantial portions if not the entire mid-Sea barrier could be built with over-water techniques, allowing the barrier to emerge and become effective as the water level drops.

#### **Suction Dredging**

Suction dredging would be performed for removal of the Seafloor deposits from the entire embankment footprint, except in the case of the Geotube® embankments. Dredging would be done with barge-mounted suction dredges, and the slurried waste material would be pumped by flexible pipeline several miles to a designated Sea-bottom discharge location within the Sea. It may be necessary for barges to place a berm of Type B sand/gravel at the outer toe of the dredged zone to prevent migration of the remaining soft deposits back into the excavated embankment footprint.

After removal of the Seafloor deposits, a second pass of suction dredging would remove the soft lacustrine and/or alluvial deposits from the central core area of the various alternative embankments. The slurried materials removed from the foundation area would be similarly discharged outside of the project area.

Dredging would also be performed to acquire material for the filling of the Geotube® embankment central core and foundation mattress features. Seafloor

material would be dredged from areas near the embankment alignments using barge-mounted suction dredges. It is assumed the dredged material would be pumped directly into the Geotube® bladders as it is placed from the barge onto the Sea bottom and allowed to drain. It is also assumed two or more fill-and-drain cycles would be required for the foundation mattress and three or more cycles would be required for the central core. Constructing concentric lakes dikes using Geotubes® would likely result in significant seismic, static, and constructability problems.

#### Clamshell Excavation

Construction of the Geotube® embankments would include excavation of Seafloor materials from areas near the embankments using clamshell excavation equipment and barges. The clamshell excavated material would be placed over the Geotube® components of the embankments to form the upstream and downstream shells and the crest of the embankments. It is assumed borrow materials would be excavated from areas within ¼ mile of the constructed embankment location.

#### **Foundation Treatment**

Depending on the alternative, unsuitable foundation materials would be treated by either removal by dredging or by accelerated consolidation using wick drains. Wick drain installation would also be performed using a barge-mounted mandrel system.

#### **Foundation Excavation**

All foundation treatment and dredging for the major embankment alternatives would be performed over-water. However, construction of the habitat pond embankments is expected to be performed "in the dry" as the current Sea shrinks in the future. The habitat pond embankment foundations would be over-excavated using track-mounted excavators. The materials removed would then be spread and aerated using low ground pressure equipment prior to replacement into the over-excavated foundation area.

#### Stone Columns

Stone columns would be used to densify the Type A sand/gravel used to construct the various embankments. The crest widths would be overbuilt to allow for overland access to equipment used for the densification process. Stone (gravel) infill for the stone columns would also be delivered overland as well. Stone column densification would occur once the final embankment prism is in place, including all of the Type A and Type B materials. Placement of the Type B material is needed to provide lateral containment of the Type A sand/gravel during the densification process.

#### **Soil-Cement-Bentonite Slurry Walls**

The SCB slurry walls would be constructed from the embankment crest following installation of the stone columns. The SCB slurry walls would extend up to 125 feet deep and would have a nominal width of 5 feet. The potential benefits of an HDPE membrane inserted into the SCB wall to serve as a redundant seepage protection against "windows" or other potential defects in the wall were evaluated during the risk analysis. The benefits appear to be significant but HDPE membranes have not been installed to this depth. Some technology innovations would be required to derive the potential benefits of the membrane.

#### **Schedule and Project Duration**

A master schedule has not been developed for any of the restoration alternatives under evaluation. Project schedules have been discussed only in very broad terms. Cost estimates have been developed using year 2006 cost data. Further, it has been assumed that each of the alternatives would be bid and constructed as a single continuous project. Project costs are a function of time and market conditions. A master schedule should be developed for each of the alternatives so that future cost values can be better estimated.

#### **Contracting Methods and Packaging**

Many opportunities exist for using alternative contracting methods and packages to optimize the constructability of the various embankment alternatives. The project definition currently available does not provide a basis to identify which options should be considered. The very large size of the project would severely limit the number of potential contractors given the large bonding requirements as well as physical resources necessary to complete the work. Developing a contract packaging strategy early would be a key to accessing as large a contracting pool as possible.

#### **Project Risks**

There are many risks to the completion of construction of the various alternatives. These risks are both physical and economic/contractual. Examples of physical risks included the need to protect workers from the hydrogen sulfide releases that can occur as the Sea turns over in the spring and heavy sea conditions that develop during high wind events. Examples of contractual/economic risks include such items as escalation of fuel prices, labor disputes, and bonding capacity.

# Chapter 2. Embankment Construction Cost Estimates

This chapter summarizes the results of cost estimating work for the embankment included in the restoration alternatives under evaluation. The cost estimating process has consisted of developing quantity models and unit pricing information using a bottoms-up approach. The unit price and quantity data have been merged into a construction cost subtotal for each of the alternatives. The construction cost estimates are presented in the context of 2006 dollars. Davis Bacon labor rates for the Imperial Valley (September 15, 2006) have been used. The project schedule and duration are entirely dependent on the alternative selected, and the schedule-related impacts to the cost estimates have not been included at this time. It should be noted that these are appraisal level cost estimates for planning purposes and should not be used to establish project funding until feasibility level evaluations and designs have been completed.

#### **Embankment Cost Estimate Development**

Cost estimates have been prepared considering: (1) bottoms-up unit price derivations for each of the major construction material and placement requirements, (2) estimates of construction material quantities, (3) costs for the contractor's direct costs, indirect costs and profit, and (4) estimates for mobilization. These were summed to the "Subtotal Construction Costs" level only. These costs do not include allowances and contingencies for design, construction management, permitting, unscheduled items, and changed conditions. Quantity estimations were based on geometric equations that will allow for updating of the overall cost estimates should some of the dimensions of the embankments change.

#### **Unit Prices**

Unit price information has been generated using 2006 cost data for similar size projects in the southern California area. Davis Bacon wage scales (September 15, 2006) were used to estimate labor costs. Equipment rates assume that the contractor will use owned equipment. Given the project duration, it was assumed all of the equipment would be fully depreciated over the project life with zero salvage value. These unit costs have been developed using a resource-loaded model that assigns fixed and variable costs for the construction of the 13 main construction elements that include:

- Type A Sand/Gravel
- Type B Sand/Gravel

- Stone Columns
- Riprap Slope Protection
- Dredging
- Soil-Cement-Bentonite Slurry Wall without Membrane
- Geotubes®
- Geocomposite
- Habitat Pond Embankments
- Wick Drains
- Filter Rock
- Rockfill
- Fine Rockfill

The methodology used to build up these rates is described below.

#### Fixed Direct Costs

Fixed costs were developed for each of the major cost items. The fixed costs consist of one-time costs that are required but are not a function of the volume of the material produced. For instance, constructing a truck crossing over Highway 86 represents a fixed cost that is independent of the volume of material that would be hauled over this feature. By identifying the fixed costs separately, the fixed cost portion of the unit rates can be allocated depending on the volume of each material needed. An example of this is reflected in the varying cost of Type A material from alternative to alternative. The unit price portion of the fixed direct costs is computed by dividing the fixed direct cost by the estimated quantity of material produced. The unit price portion of the fixed costs decreases as the volume of material produced increases and vice versa.

#### Variable Direct Costs

Variable costs are defined as those costs that are directly related to the production of each individual unit. For instance, blasting for riprap production can be directly estimated based on the quantity of material produced. In general, the variable unit costs are constant, regardless of the volume of materials created.

#### **Total Direct Unit Costs**

Total direct unit costs consist of the sum of the variable unit costs and the fixed unit costs for each material type. This sum is the actual cost that the contractor would expend to produce each of the various material types. Total direct unit costs are the expense accrued to the contractor's operations; they are not the rates that would be charged to the owner.

#### **Indirect Costs**

Indirect costs are the overhead expenses that the contractor must absorb incidental to the total direct costs listed above. Items in the indirect cost category include:

• Supervision and project management

- Temporary buildings
- Temporary utilities
- Temporary job construction
- Job transportation
- Office expenses
- Insurance
- Employee move costs
- Bonds
- Equipment contingency
- Summer/Winter protection
- Contractor's "Internal" Contingency
- Surveying

Indirect costs have been estimated as 10 percent of the direct costs.

#### Profit

The Contractor's profit is compounded to the total of direct and indirect expenses. The Salton Sea Restoration Project represents a very large construction project and, therefore, represents a high risk to the contractor charged with its execution. Accordingly, a contractor's target profit may be as high as 20 percent, commensurate with such a high-risk endeavor. Following Reclamation costing protocols, a profit target of 10 percent was used in the cost estimate.

#### Mobilization

Mobilization costs include mobilizing contractor personnel and equipment to the project site during initial project start-up. The assumed 5 percent of the subtotal cost used in the appraisal level cost estimates contained in this study is based on past experience. The mobilizations costs are either built into the unit costs or shown as a line item in the estimate worksheets discussed at the end of this chapter.

#### **Unit Price Escalation**

Cost estimates are presented using 2006 dollars, and no allowance for escalation that would occur over an extended construction duration has been included at this time. Escalation will be a significant consideration when developing funding level cost estimates. Future construction costs are dependent on the level of labor and materials inflation. Construction cost inflation averages were between 2 and 3 percent per year prior to 2003. Since then, construction cost inflation has become much more volatile, approaching 10 percent or more per year. It is recommended that a risk-based approach to estimating costs and inflation factors be used during feasibility level cost estimate development.

#### **Production Rates and Constraints**

More detailed project schedules should be developed as the timelines for construction are developed. Once completed, the production rates and constraints listed in the accompanying cost estimates should be appropriately updated.

#### **Quantity Estimates**

Quantity models have been developed for each of the alternatives, except for the Concentric Lakes with Geotubes® Alternative (No. 3C). These models are mathematical in nature and automatically calculate the volume of the various construction elements as described above. The quantity models allow for changes in both the embankment height and length and foundation depth as the input variables. With changes in the input variables, the quantity models automatically recompute the new embankment volumes. The revised volumes are then loaded into the cost estimate sheets, and the new cost estimate is generated.

The estimated costs of the Geotube® embankments are based on quantities provided to Reclamation by the Imperial Group's engineering consultant (Stetson Engineers). The level of detail on the quantities information provided was insufficient for a thorough review and verification of the quantities. Also, the information provided on the design and construction methods was insufficient with regard to development of unit prices. Therefore, the Geotube® embankment costs estimates are at a preliminary level relative to the other embankments costs estimates.

#### **Cost Estimate Worksheets**

Embankment cost estimate worksheets, and other cost estimate worksheets, for each of the alternatives are provided as attachments to this document as follows:

- Attachment 1A: Cost Estimate Worksheets for Alternative No. 1A: Mid-Sea Dam with North Marine Lake Sand Dam with Stone Columns (Salton Sea Authority Alternative Revised Alignment)
- Attachment 1B: Cost Estimate Worksheets for Alternative No. 1B: Mid-Sea Dam with North Marine Lake - SSA Rockfill Dam (Salton Sea Authority Alternative - Original Alignment)
- Attachment 1C: Cost Estimate Worksheets for Alternative No. 1C: Mid-Sea Dam with North Marine Lake Sand Dam with Stone Columns (Salton Sea Authority Alternative Original Alignment)

- Attachment 1D: Cost Estimate Worksheets for Alternative No. 1D: Mid-Sea Dam with North Marine Lake Rock Notches Dam (Salton Sea Authority Alternative Original Alignment)
- Attachment 2A: Cost Estimate Worksheets for Alternative No. 2A: Mid-Sea Barrier with South Marine Lake – Sand Barrier with Stone Columns
- Attachment 2B: Cost Estimate Worksheets for Alternative No. 2B: Mid-Sea Barrier with South Marine Lake – Sand Barrier without Stone Columns
- Attachment 3A: Cost Estimate Worksheets for Alternative No. 3A: Concentric Lakes Sand Dikes with Stone Columns (Imperial Group Alternative)
- Attachment 3B: Cost Estimate Worksheets for Alternative No. 3B: Concentric Lakes Sand Dikes without Stone Columns (Imperial Group Alternative)
- Attachment 3C: Cost Estimate Worksheets for Alternative No. 3C: Concentric Lakes Earthfill Dikes with Geotubes® (Imperial Group Alternative)
- Attachment 4: Cost Estimate Worksheets for Alternative No. 4: North-Sea Dam with North Marine Lake – Sand Dam with Stone Columns
- Attachment 5: Cost Estimate Worksheets for Alternative No. 5: Habitat Enhancement without Marine Lake
- **Attachment 6:** Cost Estimate Worksheets for Alternative No. 6: No-Project

# Chapter 3. Water Conveyance and Air Quality Construction Cost Estimates

#### **Air Quality Mitigation**

Air quality mitigation (AQM) costs would be incurred whether or not any of the restoration features are constructed, as playas are exposed over time as the Sea recedes. No-Project Alternative consists entirely of this cost. AQM costs for all alternatives, except Alternatives 1B, 1C and 1D, were estimated using construction costs consistent with the California Department of Water Resources' Salton Sea Ecosystem Restoration Plan. Construction costs for mitigation using water-efficient vegetation were assumed to be \$14,000 per acre. Construction costs for mitigation using other methods was \$7,000 per acre. The AQM cost estimates for Alternatives 1B, 1C and 1D were developed by Reclamation based on the SSA's proposed salt-crusting method. It is assumed the State of California will manage AQM in coordination with landowners and other stakeholders as may be applicable by Federal and State laws, regulations, ordinances, and legal agreements. **Attachment 7** summarizes air quality mitigation feature construction costs for each of the alternatives.

#### **Water Conveyance Facilities**

Cost estimates for the water conveyance features included with each alternative are based on quantities and unit prices developed by Reclamation. The various alternative conveyance features consist of river diversion structures, pumping stations, canals, pipelines and appurtenances (bridges, siphons, cross drainage, etc.). These conveyance features are associated with the salinity control, water treatment, and air quality mitigation components of the alternatives. The conveyance features were sized based on estimated future river flows, treatment capacities, air quality mitigation areas, and typical design criteria. It is assumed river diversion structures would be constructed of reinforced concrete, canals would be lined with concrete, and large diameter pipelines would be of steel and reinforced concrete materials.

Water conveyance cost estimate worksheets for each of the alternatives are included in the attachments described in Chapter 2.

# Chapter 4. Operations, Maintenance, Energy, Replacement, and Risk Costs of Alternatives

Annual operations, maintenance, energy, replacement, and risk costs were developed by Reclamation at a relatively low level of detail because those costs for the restoration alternatives, incremental to the No-Project Alternative, are small relative to initial project implementation costs. Costs were included for staff, office space, vehicles, materials, and pumping energy. Reclamation relied on State of California information for operation and replacement costs of air quality mitigation features. For Alternative No. 1 only, Reclamation relied on an estimate for operation of the water treatment facilities prepared by the Salton Sea Authority that is considered by Reclamation to be significantly understated. Operations, maintenance, energy, and replacement cost calculations for the Restoration alternatives are provided in **Attachment 8**.

The Salton Sea is located in an area with a history of earthquakes of sufficient magnitude to cause significant damage to the constructed features of the various alternatives; i.e., the dams, dikes, barriers, habitat pond embankments and islands, conveyance facilities, and treatment facilities. Repair and replacement costs for each of these features were estimated to range from 5 to 50 percent of original project implementation costs. No damage from potential seismic activity was assumed for the air quality mitigation features. The annual probability of failure was estimated for each of the facilities susceptible to earthquake damage for all alternatives, except Alternatives 1B and 1D. The annual probability of failure for each potentially earthquake-damaged feature was multiplied by the estimated repair and replacement costs for that feature to derive the "annual risk cost" associated with its location in an active seismic area. For the Concentric Lakes Alternative with Geotubes® (Alternative No. 3C), an additional annual risk cost was considered for repair and replacement of significant portions of the dikes due to expected foundation piping and erosion problems. Attachment 9 provides details on the percentages of each component that would have to be replaced upon seismic activity strong enough to result in failure. This attachment also presents the annualized probability of failure of each alternative component and the resulting "annual risk costs."

The annual operation, maintenance, energy and replacement (OME&R) costs were added to the annual risk cost for each alternative, except Alternatives 1B and 1D to derive the total operations, maintenance, energy, replacement, and risk (OMER&Risk) costs, as shown in **Attachment 9**.

# **Chapter 5. Total Costs of Alternatives**

**Attachment 9** displays appraisal level estimates of initial implementation costs and recurring operational costs of all alternatives, including the No-Project Alternative. All appraisal level cost estimates are expressed in 2006 price levels for comparison purposes. Appraisal level cost estimates are not appropriate for requesting authorization or construction fund appropriations from Congress.

The costs of all alternatives are based on very limited geologic and geotechnical data that were obtained through exploration in years 2003 and 2004. Significant design uncertainties exist as a result of the limited amount of site information. Uncertainties also exist relative to constructability, seismic performance, static performance, and construction costs. These uncertainties can only be reduced by conducting significant geologic and geotechnical design data collection programs.

Specific schedules that take into account the construction duration of each alternative feature have not been developed. Without consideration of construction durations, escalation during construction cannot be properly evaluated. The appraisal level cost estimates provided in this chapter do not include funds for escalation during construction. Escalation during construction is expected to be a very significant dollar amount given the size, probable duration of construction, and cost magnitude of the various restoration alternatives presented here. The appraisal level cost estimates presented in this chapter are not appropriate for requesting authorization or construction funding appropriations from Congress.

The following sections of this chapter describe the various components of the appraisal level cost estimates.

#### **Total Project Implementation Costs**

The cost estimating process for alternative features involved application of models and equations to determine major construction material quantities and placement requirements. Unit prices per physical quantity were developed and then applied to physical quantities to develop the construction cost estimates. Unit prices included a 5-percent additive for initial mobilization of contractor personnel and equipment to the project site during start-up.

Some appraisal level cost estimates for other less costly features were developed in a different manner. The construction costs for the air quality mitigation features for most of the alternatives relied heavily on estimates presented by the State of California in its Salton Sea Ecosystem Restoration Program Draft

Programmatic Environmental Impact Report. The construction costs for the water treatment facilities in Alternative No. 1 were based on estimates developed by the Salton Sea Authority and are considered by Reclamation to be significantly understated.

In accordance with the Reclamation's Cost Estimating Handbook guidelines (Reclamation, 1989), a 10-percent allowance, based upon engineering judgment, was added to construction costs to cover additional unlisted items of work that would appear in the specifications and would be required for a fully finished feature. The sum of construction costs and the allowances for environmental mitigation and unlisted items is termed "contract costs", as shown in **Attachment 9**.

Costs are provided in **Attachment 9** for two mid-Sea barrier alternatives (Alternative Nos. 2A and 2B). Alternative No. 2A includes stone columns to reduce seismic risk; Alternative No. 2B does not include stone columns. These two sets of costs provide for an understanding of the costs associated with reducing seismic risk.

Costs are provided in **Attachment 9** for three different concentric lakes dikes design alternatives (Alternative Nos. 3A, 3B, and 3C). These costs assume three concentric lakes would be required under mean possible inflow. Implementation costs for four concentric lakes, as proposed by the Imperial Group, are provided as a footnote to **Attachment 9**. Alternative No. 3B includes a design that does not include stone columns and, as such, it carries with it seismic risks that would not occur in Alternative No. 3A, which does include stone columns. Alternative No. 3C involves use of Geotubes® as proposed by the Imperial Group. It is Reclamation's opinion that constructing concentric lakes dikes using Geotubes® would result in significant seismic, static, and constructability problems. Based on these identified problems, the Geotube® approach is likely not feasible. These three sets of costs for the Concentric Lakes Alternative provide an understanding of the costs associated with reducing risk.

A 25-percent allowance for "contingencies", based upon engineering judgment, was added to contract costs to address the differences between actual and estimated quantities, unforeseeable difficulties at the site, possible minor changes in plans, and other uncertainties. As shown in **Attachment 9**, the sum of contract costs and contingencies equals "total field costs."

"Non-contract costs" were estimated to be 20 percent of the total field costs. This allowance was based on typical non-contract costs from past large Reclamation projects. Non-contract costs reflect some or all of the following items: services facilities, investigations and studies including environmental compliance, final designs and specifications, permits, construction engineering and management, and other general expenses.

The sum of total field costs and non-contract costs is equal to the "total project implementation costs", which are the total estimated costs of putting any of the alternatives fully in service. As shown in **Attachment 9**, these costs range from a low of \$1.6 billion for the No-Project Alternative to a high of \$14.0 billion for Alternative No. 3B, expressed in 2006 prices.

# References

Reclamation, 1999. A Procedure for Estimating Loss of Life Caused by Dam Failure by Wayne J. Graham, P.E., DSO-99-06, Dam Safety Office, Denver, Colorado.

Reclamation, 2003. *Guidelines for Achieving Public Protection in Dam Safety Decision Making*, June 15, 2003.

Reclamation, 1989. Cost Estimating Handbook, Revised March 1989

## **Attachment 1A**

Cost Estimate Worksheets for Alternative No. 1A: Mid-Sea Dam with North Marine Lake - Sand Dam with Stone Columns (Salton Sea Authority Alternative–Revised Alignment)

BUREAU OF RECLAMATION

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_5\_\_

				PROJECT:					
Altern	ative	No. 1A		Salton Sea Restoration Feasibility Study					
Mid-Sea Dam/North Marine Lake			WOID:		ESTIMATE LEVEL:		Appraisal		
Salton Sea Authority Alternative				REGION	:	PRICE L	.EVEL:		
		-	olumns Embankment Design	FILE:					
			•		C:\ALL\SEA\2007\[Cos	st Estimate - us	br - 12-18-06.xls]Altern	ative 1A	
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
A		Mid-Sea Dam							
	1	Dredging			38,146,900	CY	\$6.70	\$255,584,23	
	'	Dreaging			30,140,900	O1	\$0.70	Ψ200,004,20	
	2	Type A Sand			59,759,700	CY			
		Type A Sand-Barg	e Haul		29,879,850	CY	\$13.84	\$413,537,12	
		Type A Sand-Truck	k Haul		29,879,850	CY	\$18.77	\$560,844,78	
	3	Type B Sand/Grave	el		15,275,700	CY			
		Type B Sand/Grave			7,637,850	CY	\$13.51	\$103,187,3	
		Type B Sand/Grave	el-Truck Haul		7,637,850	CY	\$18.53	\$141,529,30	
	4	Filter Rock (Fine a	nd Coarse)-Barge Haul		1,544,400	CY	\$13.51	\$20,864,8	
	5	Riprap			5,777,200	CY			
		Riprap-Barge Haul			3,870,724	CY	\$28.02	\$108,457,68	
		Riprap-Truck Haul			1,906,476	CY	\$32.22	\$61,426,6	
	6	Stone Columns			7,757,200	FT	\$45.92	\$356,210,62	
	7	Soil-coment-hento	nite slurry wall without membrane		6,024,700	SF	\$10.12	\$60,969,96	
	,	301-cement-bento	inte sturry wan without membrane		0,024,700	SF	\$10.12	φου,909,90	
	8	Wick Drains			24,505,800	FT	\$5.21	\$127,675,2	
SUBTOTAL (Sheet 1 of 5)			\$2,210,287,8						
QUANTITIES			PRICES						
BY CHECKED  M. Spears  D. Wilhshire			Unit prices are revised (December 20, 2006) from the September 2006 Restoration of the Salto						
				Sea Volume 2	Sea Volume 2: Embankment Designs and Optimization Study Administrative Draft by				
	ARED 12/20/06		D. Wiltshire PEER REVIEW		Embankment Design				

SHEET\_\_2\_\_ OF \_\_5\_\_

				PROJE					
	Alternative No. 1A Mid-Sea Dam/North Marine Lake			WOID:	Salton Se	ea Restoration Feasi  ESTIMATE LEVEL:		sibility Study Appraisal	
		Authority Alter		REGION	:	PRICE L		pp	
Sand	Dam	with Stone Coli	umns Embankment Design	FILE:					
				C:\ALL\SEA\2007\[Cos	st Estimate - usl	br - 12-18-06.xls]Altern	ative 1A		
₽ <del>2</del>	Ε								
PLANT ACCOUNT	PAY ITEN		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
∢	ш					0)/			
						CY			
							+		
В		South-Sea Dam							
	1	Dredging			5,683,700	CY	\$6.70	\$38,080,790	
	2	Type A Sand-Truck H	loul		15,673,900	CV	\$24.42	\$279 OE 4 469	
		*Thicken Dam Sectio			15,675,900	01	\$24.12	\$378,054,468	
		Thicken Balli Occilo	n at radic orossing				+		
	3	Type B Sand/Gravel-	Truck Haul		2,737,900	CY	\$23.88	\$65,381,052	
						2)/			
	4	Fine Rock Fill-Truck	Haul		1,530,100	CY	\$23.88	\$36,538,788	
	5	Riprap-Truck Haul			3,655,300	CY	\$51.04	\$186,566,512	
		P - P			-,,		*	*	
	6	Stone Columns			2,876,500	FT	\$45.92	\$132,088,880	
	7	Soil-cement-hentonite slurr	y wall without membrane (Section A-Fault Resistance)		2,962,300	SF	\$18.00	\$53,321,400	
	7		y wall without membrane (Section B)		3,751,000	SF	\$6.00	\$22,506,000	
		*Triple wide slurry wall			-, - ,		****	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	8	Wick Drains			8,065,200	FT	\$5.21	\$42,019,692	
	-								
	-								
	-	SUBTOTAL (She	pet 2 of 5)					\$954,557,582	
	1		ANTITIES			PRIC	ES	ψου4,υυ7,002	
ву			HECKED				-		
M. Spears			. Wiltshire					Restoration of the Salton	
DATE PREP	ARED		EER REVIEW	Sea Volume 2: Kleinfelder, Inc	Embankment Design c.	ns and Optimiz	zation Study Adminis	trative Draft by	
	12/20/06								

#### **ESTIMATE WORKSHEET**

SHEET\_3\_ OF \_5\_

			PROJECT:						
	Alternative No. 1A			Salton Sea Restoration Feasibility Study					
		m/North Marii		WOID:		ESTIMA	TE LEVEL:	Appraisal	
Saltor	ı Sea	Authority Alte	ernative	REGION	:	PRICE I	EVEL:		
			lumns Embankment Design	FILE:		•			
			ŭ		C:\ALL\SEA\2007\[Cos	st Estimate - us	br - 12-18-06.xls]Altern	ative 1A	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
С		Perimeter Dike	S						
	1	Dredging			6,097,300	CY	\$6.70	\$40,851,910	
	2	Type A Sand-Truck	Haul		9,479,800	CY	\$21.82	\$206,849,236	
	3	Type B Sand/Grave	el-Truck Haul		895,400	CY	\$21.59	\$19,331,686	
	4	Filter Rock (Fine ar	nd Coarse)			CY			
	5	Riprap-Truck Haul			2,570,700	CY	\$37.85	\$97,300,995	
	5	Crest Armoring (Ac	Iditional 3 feet of riprap on top of crest)		125,400	CY	\$37.85	\$4,746,390	
	6	Stone Columns			2,065,800	FT	\$45.92	\$94,861,536	
	7	Soil-cement-bentor	nite slurry wall without membrane		7,659,300	SF	\$6.00	\$45,955,800	
	8	Wick Drains			6,430,600	FT	\$5.21	\$33,503,426	
		Wick Brains			0,100,000		φοιΣΤ	φου,σου, 120	
		SUBTOTAL (SI						\$543,400,979	
		QU	IANTITIES			PRIC	ES		
BY M. Spears			CHECKED D. Wiltshire		e revised (December 2 : Embankment Desigi			Restoration of the Salton trative Draft by	
DATE PREP	ARED 12/20/06		PEER REVIEW	Kleinfelder, In		and Opuille			

#### **ESTIMATE WORKSHEET**

SHEET\_4\_ OF \_\_5\_

		PROJECT:						
Alternative No. 1A			Salton Sea Restoration Feasibility Study					
		m/North Marii	ne Lake	WOID:		ESTIMATE LEVEL: App		Appraisal
		Authority Alte		REGION	l:	PRICE L	EVEL:	
Sand	Dam v	vith Stone Co	lumns Embankment Design	FILE:				
			3		C:\ALL\SEA\2007\[Cos	st Estimate - ust	or - 12-18-06.xls]Alter	native 1A
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
D		Habitat Ponds						
	1	Habitat Ponds			16,000	ACRE	\$13,473.00	\$215,568,000
	'		tion googrid replacement and embantment		16,000	ACRE	\$13,473.00	\$215,566,000
		includes overexcava	tion geogrid replacement and embankment					
		SUBTOTAL (SI	heet 4 of 5)					\$215,568,000
	1		JANTITIES			PRIC	ES	
вү			CHECKED					_
M. Spears			D. Wiltshire	Sea Volume 2	2: Embankment Design			Restoration of the Salton strative Draft by
DATE PREP	ARED 12/20/06		PEER REVIEW	Kleinfelder, In	nc.			

### **ESTIMATE WORKSHEET**

SHEET\_5\_ OF \_\_5\_

FEATURE:		PROJE	PROJECT:					
Alternative No. 1A			Salton Sea Restoration Feasibility Study					
Mid-S	ea Da	m/North Mari	ne Lake	WOID:	WOID:		TE LEVEL:	Appraisal
Saltor	Sea .	Authority Alte	ernative	REGION	l:	PRICE L	EVEL:	
			olumns Embankment Design	FILE:				
					C:\ALL\SEA\2007\[Cost Estimate - usbr - 12-18-06.xls]Alternative 1A			native 1A
PLANT ACCOUNT	DESCRIPTION  A PAGE  DESCRIPTION		CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Notes:						
		SUBTOTAL (S						<b>₱245 500 000</b>
		SUBTOTAL (S SUBTOTAL (S					+	\$215,568,000 \$543,400,979
		SUBTOTAL (S					+	\$954,557,582
		SUBTOTAL (S						\$2,210,287,846
		Subtotal Cons	struction Costs					\$3,923,814,407
		QL	JANTITIES			PRIC	ES	
ву		-	CHECKED					
M. Spears			D. Wiltshire					Restoration of the Salton
DATE PREP			PEER REVIEW	Sea Volume 2 Kleinfelder, In		gns and Optimiz	zation Study Adminis	trative Draft by
12/20/06								

FE/	FEATURE:			PROJECT:					
Alte	ernat	tive No. 1A		Salton Sea Restoration Feasibility Study					
Mid	-Sea	Dam/North	Marine Lake	WOID:		ESTIMATE LEVEL Appraisal			
Salt	ton S	Sea Authority	Alternative	REGION:			LEVEL:	•	
	-	Ponds Deep		FILE:					
	=	•			C:\ALL\SEA\2006i	new\[HabitatP	ondDeepExc.xls]Alt	1A	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Habitat Pond	ds Deep Excavation						
		Excavation			36,138,667	CY	\$6.50	\$234,901,333	
		Assumes uniform	7-foot excavation in the dry using						
		conventional exca	vation techniques to remove soft						
			00 acres of ponds with 20 percent						
		or 320 acres of de	ep areas)						
		Subtotal Co	nstruction Costs					\$234,901,333	
		Subtotal Co	instruction costs					φ234,901,333	
		Mobilization	5% (+/-)					\$11,750,000	
		Subtotal Co						\$246,651,333	
				1					
		QU	ANTITIES			PRICE	S		
вү			CHECKED						
	M. Spe	ars	J. Cunningham				Restoration Projec	ct, Feasibility	
DATE P	PREPAR	RED	PEER REVIEW	Study - Phase 1,	Alternatives and (	Cost Estimate	es		
	10/12/0	6							

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_2 \_\_

FEATURE:			PROJECT:							
Alternative Nos. 1A, 1B, 1C & 1D			Salton Sea							
Mic	t-Se	a Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Sal	ton	Sea Authority Alternative	REGION:	LC	PRICE	LEVEL:	Apr-06			
Wa	ter (	Conveyance Components	FILE:				-			
		·		C:\ALL\SEA\2007\[C	conveyance_	_Worksheets1-10.xls]Alternative 1	SSA est			
PLANT ACCOUNT	DESCRIPTION		CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SE Quadrant River Diversion								
		Diversion structure								
		48" Rock riprap		13,390	CY	\$90.00	\$1,205,100.00			
		Sheet pile cutoff		15,885	SF	\$35.00	\$555,975.00			
		Alamo River settling basin		13,003	OI.	ψ33.00	ψ555,915.00			
		Excavation		14,855	CY	\$8.00	\$118,840.00			
		Embankment		14,655	CY	\$5.00	\$72,100.00			
			in in a		CY	\$5.00 \$500.00				
		Unreinforced concrete canal l	ining	405	CY	\$500.00	\$202,500.00			
		Circulation canal, 967 cfs, 19.8 mi								
		Excavation		1,821,000	CY	\$5.00	\$9,105,000.00			
		Compacted embankment		63,600	CY	\$6.00	\$381,600.00			
		Unreinforced concrete canal lining		50,800	CY	\$500.00	\$25,400,000.00			
		17 Siphons, 50' head class								
		15.5' dia Precast reinf conc p	ipe	3,400	LF	\$2,500.00	\$8,500,000.00			
		Excavation		216,500	CY	\$8.00	\$1,732,000.00			
		Backfill		167,900	CY	\$6.00	\$1,007,400.00			
		Reinforced concrete		2,150	CY	\$1,000.00	\$2,150,000.00			
		19 Cross drainage structures								
		48" dia Precast reinforced concret	e pipe	3,165	LF	\$300.00	\$949,500.00			
		10 Bridges								
		Reinforced concrete		1,020	CY	\$1,000.00	\$1,020,000.00			
		QUANTITIES				PRICES				
вү		GOARTITIEO	BY			CHECKED				
	Mark L	eavitt Steve Robertson	Dan Mar							
DATE	PREPAR	RED	DATE PREPARE	D		PEER REVIEW				
	April 2	0, 2006								

SHEET\_2\_ OF \_2 \_

FEATURE:			PROJECT:							
Alt	erna	ative Nos. 1A, 1B, 1C & 1D	Salton Sea							
Mic	d-Se	ea Dam/North Marine Lake	WOID: L165C ESTIM			MATE LEVEL: Appraisal				
Sal	ton	Sea Authority Alternative	REGION:	LC	PRICE	LEVEL:	Apr-06			
		Conveyance Components	FILE:				·			
,,,		conveyance components		C:\ALL\SEA\2007\[C	Conveyance	Worksheets1-10.xls]Alternative 1	SSA est			
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SE Quadrant								
		South Lake Water Pipeline, 35 cfs, 1	6.0 mi, 189	' head						
		3.0' dia Steel pipe		16.0	Mi	\$1,200,000.00	\$19,200,000.00			
		Regulating tank tower (200,000 gal, 190 ft tall) South Lake Pumping Plant, 35 cfs, 2	201' TDH	1.0	Ea. LS		\$1,000,000.00			
		Structure Improvements		-			<b>¥</b> 1,000,000			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Circulation Pump Plant, 967 cfs, 34' Structure Improvements	TDH	1	LS		\$35,000,000.00			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Treatment Plant Sludge Conveyance	e, 29 cfs, 7		_					
		3.5' dia Steel pipe		7.6	Mi	\$1,400,000.00	\$10,640,000.00			
		NE Quadrant Deep Water Intake Pipe, 608 cfs, 8.4	mi. 25' he:	ad						
		12.4' dia Steel pipe	, _0	8.4	Mi	\$15,000,000.00	\$126,000,000.00			
		Deep Water Pumping Plant, 608 cfs,	33' TDH	1	LS	+ 10,000,000	\$21,000,000.00			
		Structure Improvements					<del>+</del> ,,			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Filtration Backflush Conveyance, 30	cfs, 3.1 m	i, 25' head						
		2.8' dia Steel pipe		3.1	Mi	\$1,100,000.00	\$3,410,000.00			
		Subtotal	100()				\$272,650,015.00			
		Alternative Specific Unlisted Items (+/-	10%)				\$27,265,002.00			
		Total w/ Alt. Specific Unlisted Items					\$299,915,017.00			
		Mobilization (+/-5%)					\$15,000,000.00			
		Subtotal w/Mobilization					\$314,915,017.00			
		QUANTITIES				PRICES				
вү	Mark L	eavitt Steve Robertson	BY Dan Mar			CHECKED				
DATE	PREPA		DATE PREPARE	ED.		PEER REVIEW				
		20, 2006		-		. ==:::::=:::=::				

# Alternative No. 1A, 1B, 1C & 1D Salton Sea Authority Water Treatment Facilities Costs

<u>Source:</u> "Salton Sea Authority Plan For Multi-Purpose Project" Draft for TAC Review dated 6/9/06 Bob Hamilton spoke with Bill Brownlie of Tetra Tech, Inc. on 9/18/06 and the costs are the most current at that time; Mr. Brownlie stated that he believed these costs were expressed in \$2006 and were developed by Mr. Ron Entwiler

Construction Cost	<u>\$Million</u>
Treatment & Pumping Plant Costs in Report (page 72)	300
adjustment for unlisted items (10%) and contingencies (25	%) 1.375
Construction Cost for Reclamation Spreadsheet (includes 5% mobilization)	218.1818 ounded <b>218</b>

OM&R	<u>\$Million</u>
Phosphorus Removal Plant in Report (page 73)	31.1
Filtration/Ozone Plant in Report (page 73)	13.4
Pumping Plant in Report (page 73)	0.8
total from Report	45.3

## **Attachment 1B**

Cost Estimate Worksheets for Alternative No. 1B: Mid-Sea Dam with North Marine Lake - SSA Rockfill Dam (Salton Sea Authority Alternative - Original Alignment)

SHFFT	1	OF	3	

FEATURE:		• · · · · · · ·	PROJECT:							
	JIVE.				1 11001	_01.			_	
Alternative No. 1B				Salton Sea Restoration						
		m/North Mari	ne Lake		WOID: ES		ESTIM	ATE LEVEL:	Appraisal	
Saltor	n Sea	Authority Alte	ernative		REGION	<b>l</b> :		LEVEL:	Oct-06	
		ill Embankme			FILE:					
			J			C:\ALL\SEA\200	7\[SSA Cost V	Vorksheets.xls]URS Rock	fill	
F	E									
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION		CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
1	-	Mid-Sea Dam								
		ima ooa zam								
	1	Dredging				22,459,800	CY	\$6.70	150,480,660	
	0	DLeill				20.040.000	0)/	<b>#00.40</b>	005 050 000	
	2	Rockfill				30,049,800	CY	\$23.16	695,953,368	
	3	Sand Core				3,487,000	CY	\$16.30	56,838,100	
	4	SCB Slurry Wall				4,955,500	SF	\$10.12	50,149,660	
	5	Geocomposite				11,859,100	SF	\$6.00	71,154,600	
	3	Geocomposite				11,039,100	31	φ0.00	71,134,000	
	6	Fine Rockfill				1,317,800	CY	\$13.51	17,803,478	
						_				
						_				
		Page 1 Subtota	ıl						1,042,379,866	
						_				
	1									
	+									
	L									
		QUAN	TITIES					PRICES		
вү			CHECKED		вү		CI	HECKED		
DATE PREP	M. Spears	s	P. Weghorst PEER REVIEW		DATE PREPA	D. Donaldson	pi	EER REVIEW		
DATE FREE	ANLU	January 4, 2007			DATE FREFA		y 25, 2007	IVE AIFAA		

SHEET	2	ΩF	3

FEATURE:				PROJECT:					
FEAT	JKE.			FKOJI	ECI.				
Altern	ative	No. 1B				Salton	alton Sea Restoration		
Mid-S	ea Da	m/North Mari	ne Lake	WOID:		ESTIM <i>A</i>	TE LEVEL:	Appraisal	
Saltor	Sea .	Authority Alte	ernative	REGION	N:	PRICE	LEVEL:	Oct-06	
		ill Embankme		FILE:					
			J		C:\ALL\SEA\200	7\ISSA Cost W	orksheets.xls]URS Rock	fill	
Ļ \ E	Σ								
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		South-Sea Dan	1						
	1	Dredging			10,967,000	CY	\$6.70	73,478,900	
	2	Rockfill			18,223,700	CY	\$31.77	578,966,949	
		ROCKIIII			10,223,700	CT	φ31.77	576,966,949	
	3	Sand Core			3,633,300	CY	\$24.12	87,635,196	
	4	COD Oliver Mall			0.500.500	05	<b>#</b> 0.00	20 027 000	
	4	SCB Slurry Wall			6,539,500	SF	\$6.00	39,237,000	
	5	Geocomposite			12,060,400	SF	\$6.00	72,362,400	
	6	Fine Rockfill			1,339,800	CY	\$23.88	31,994,424	
		Page 2 Subtota	1					002 674 060	
		i age 2 Subtota						883,674,869	
		OHAN	TITIES				RICES		
ву		QUAN	CHECKED	BY			ECKED		
J.	M. Spears	i	P. Weghorst	5.	D. Donaldson	СП	-0.1.		
DATE PREP			PEER REVIEW	DATE PREP		PE	ER REVIEW		
		January 4, 2007			Januar	y 25, 2007			

SHEET	3	OF	3

FEATURE:			PROJE	PROJECT:							
		No. 1B					Salton Sea Restoration				
		m/North Mari		WOID:			TE LEVEL:	Appraisal			
		Authority Alte		REGION	<b>l</b> :	PRICE L	.EVEL:	Oct-06			
URS F	Rockf	ill Embankme	nt Design	FILE:	FILE:  C:\ALL\SEA\2007\[SSA Cost Worksheets.xls]URS Rockfill						
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		Perimeter Dike	S								
	1	Dredging			12,459,700	CY	\$6.70	83,479,990			
	2	Rockfill			14,997,400	CY	\$25.24	378,534,376			
	3	Sand Core			3,676,200	CY	\$21.82	80,214,684			
	4	SCB Slurry Wall			7,362,300	SF	\$6.00	44,173,800			
	5	Geocomposite			12,002,100	SF	\$6.00	72,012,600			
	6	Fine Rockfill			1,333,200	CY	\$21.59	28,783,788			
		Page 3 Subtota	al					687,199,238			
		Pages 1, 2 and	3 Total					2,613,253,973			
		QUAN	TITIES		1	Р	RICES				
вү	M. Spears	s	CHECKED P. Weghorst	ВҮ	D. Donaldson	СНІ	ECKED				
DATE PREP	ARED	January 4, 2007	PEER REVIEW	DATE PREP <i>a</i>		PEE y 25, 2007	R REVIEW				

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_2 \_\_

FE/	ATU	RE:	PROJECT:						
Alt	erna	ative Nos. 1A, 1B, 1C & 1D	Salton Sea						
Mic	t-Se	a Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal		
Sal	ton	Sea Authority Alternative	REGION:	LC	PRICE	LEVEL:	Apr-06		
Wa	ter (	Conveyance Components	FILE:				-		
		·		C:\ALL\SEA\2007\[Conveyance_Worksheets1-10.xls]Alternative 1 SSA est					
PLANT ACCOUNT	DESCRIPTION  DESCRIPTION		CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
		SE Quadrant River Diversion							
		Diversion structure							
		48" Rock riprap		13,390	CY	\$90.00	\$1,205,100.00		
		Sheet pile cutoff		15,885	SF	\$35.00	\$555,975.00		
		Alamo River settling basin		13,003	OI.	ψ33.00	ψ555,915.00		
		Excavation		14,855	CY	\$8.00	\$118,840.00		
		Embankment		14,655	CY	\$5.00	\$72,100.00		
			in in a		CY	\$5.00 \$500.00			
		Unreinforced concrete canal l	ining	405	CY	\$500.00	\$202,500.00		
		Circulation canal, 967 cfs, 19.8 mi							
		Excavation		1,821,000	CY	\$5.00	\$9,105,000.00		
		Compacted embankment		63,600	CY	\$6.00	\$381,600.00		
		Unreinforced concrete canal lining		50,800	CY	\$500.00	\$25,400,000.00		
		17 Siphons, 50' head class							
		15.5' dia Precast reinf conc p	ipe	3,400	LF	\$2,500.00	\$8,500,000.00		
		Excavation		216,500	CY	\$8.00	\$1,732,000.00		
		Backfill		167,900	CY	\$6.00	\$1,007,400.00		
		Reinforced concrete		2,150	CY	\$1,000.00	\$2,150,000.00		
		19 Cross drainage structures							
		48" dia Precast reinforced concret	e pipe	3,165	LF	\$300.00	\$949,500.00		
		10 Bridges							
		Reinforced concrete		1,020	CY	\$1,000.00	\$1,020,000.00		
		QUANTITIES				PRICES			
вү		GOARTITIEO	BY			CHECKED			
	Mark L	eavitt Steve Robertson	Dan Mar						
DATE	PREPAR	RED	DATE PREPARE	D		PEER REVIEW			
	April 2	0, 2006							

SHEET\_2\_ OF \_2 \_

FE/	ATU	IRE:	PROJECT:						
Alt	erna	ative Nos. 1A, 1B, 1C & 1D	Salton Sea						
Mic	d-Se	ea Dam/North Marine Lake	WOID:	L165C	ESTIM	MATE LEVEL: Appraisal			
Sal	ton	Sea Authority Alternative	REGION:	LC	PRICE	LEVEL:	Apr-06		
		Conveyance Components	FILE:				·		
,,,		conveyance components		C:\ALL\SEA\2007\[C	Conveyance	Worksheets1-10.xls]Alternative 1	SSA est		
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
		SE Quadrant							
		South Lake Water Pipeline, 35 cfs, 1	6.0 mi, 189	' head					
		3.0' dia Steel pipe		16.0	Mi	\$1,200,000.00	\$19,200,000.00		
		Regulating tank tower (200,000 gal, 190 ft tall) South Lake Pumping Plant, 35 cfs, 2	201' TDH	1.0	Ea. LS		\$1,000,000.00		
		Structure Improvements		-			<b>¥</b> 1,000,000		
		Waterways							
		Pumps and motors							
		Access electrical							
		Misc. equipment							
		Switchyard							
		Circulation Pump Plant, 967 cfs, 34' Structure Improvements	TDH	1	LS		\$35,000,000.00		
		Waterways							
		Pumps and motors							
		Access electrical							
		Misc. equipment							
		Switchyard							
		Treatment Plant Sludge Conveyance	e, 29 cfs, 7		_				
		3.5' dia Steel pipe		7.6	Mi	\$1,400,000.00	\$10,640,000.00		
		NE Quadrant Deep Water Intake Pipe, 608 cfs, 8.4	mi. 25' he:	ad					
		12.4' dia Steel pipe	, _0	8.4	Mi	\$15,000,000.00	\$126,000,000.00		
		Deep Water Pumping Plant, 608 cfs,	33' TDH	1	LS	<del>+ 10,000,000</del>	\$21,000,000.00		
		Structure Improvements					<del>+</del> ,,		
		Waterways							
		Pumps and motors							
		Access electrical							
		Misc. equipment							
		Switchyard							
		Filtration Backflush Conveyance, 30	cfs, 3.1 m	i, 25' head					
		2.8' dia Steel pipe		3.1	Mi	\$1,100,000.00	\$3,410,000.00		
		Subtotal	100()				\$272,650,015.00		
		Alternative Specific Unlisted Items (+/-	10%)				\$27,265,002.00		
		Total w/ Alt. Specific Unlisted Items					\$299,915,017.00		
		Mobilization (+/-5%)					\$15,000,000.00		
		Subtotal w/Mobilization					\$314,915,017.00		
		QUANTITIES				PRICES			
вү	Mark L	eavitt Steve Robertson	BY Dan Mar			CHECKED			
DATE	PREPA		DATE PREPARE	ED.		PEER REVIEW			
		20, 2006		-		. ==:::::=:::=::			

# Alternative No. 1A, 1B, 1C & 1D Salton Sea Authority Water Treatment Facilities Costs

<u>Source:</u> "Salton Sea Authority Plan For Multi-Purpose Project" Draft for TAC Review dated 6/9/06 Bob Hamilton spoke with Bill Brownlie of Tetra Tech, Inc. on 9/18/06 and the costs are the most current at that time; Mr. Brownlie stated that he believed these costs were expressed in \$2006 and were developed by Mr. Ron Entwiler

Construction Cost	<u>\$Million</u>
Treatment & Pumping Plant Costs in Report (page 72)	300
adjustment for unlisted items (10%) and contingencies (25	%) 1.375
Construction Cost for Reclamation Spreadsheet (includes 5% mobilization)	218.1818 ounded <b>218</b>

OM&R	<u>\$Million</u>
Phosphorus Removal Plant in Report (page 73)	31.1
Filtration/Ozone Plant in Report (page 73)	13.4
Pumping Plant in Report (page 73)	0.8
total from Report	45.3

## **Attachment 1C**

Cost Estimate Worksheets for Alternative No. 1C: Mid-Sea Dam with North Marine Lake – Sand Dam with Stone Columns (Salton Sea Authority Alternative - Original Alignment)

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_5\_\_

				PROJECT:				
Altern	ative	No. 1C			Salton Se	ea Resto	oration Feas	ibility Study
Mid-S	ea Da	am/North Mari	ne Lake	WOID:	WOID:		TE LEVEL:	Appraisal
Saltor	า Sea	<b>Authority Alte</b>	ernative	REGION	:	PRICE	LEVEL:	
Sand	Dam	with Stone Co	olumns Embankment Design	FILE:				
			3		C:\ALL\SEA\2007\[Co:	st Estimate by	Kleinfelder 12-18-06.xls	Alternative 1
卢토	Σ							-
PLANT ACCOUNT	РАУ ПЕМ	DESCRIPTION		CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
A		Mid-Sea Dam						
	1	Dredging			27,802,500	CY	\$6.70	\$186,276,750
	2	Type A Sand			44,295,900	CY		
		Type A Sand-Barge	a Haul		22,147,950	CY	\$13.84	\$306,527,628
	+	Type A Sand-Barge			22,147,950	CY	\$13.84	\$415,717,022
		Type A Gana Track	· · · · · · · · · · · · · · · · · · ·		22,147,000	01	ψ10.77	Ψ110,717,022
	3	Type B Sand/Grave	el		10,777,800	CY		
		Type B Sand/Grave			5,388,900	CY	\$13.51	\$72,804,039
		Type B Sand/Grave	el-Truck Haul		5,388,900	CY	\$18.53	\$99,856,317
	4	Filter Book (Fine or	nd Coarse)-Barge Haul		1 210 000	CY	¢40 E4	\$16.490.940
	4	Filler ROCK (Fille al	iu Coarsej-barge naur		1,219,900	Cf	\$13.51	\$16,480,849
	5	Riprap			4,527,600	CY		
	3	Riprap-Barge Haul			3,033,492	CY	\$28.02	\$84,998,446
		Riprap-Truck Haul			1,494,108	CY	\$32.22	\$48,140,160
		, and the second			, , , , , , , , , , , , , , , , , , , ,			, , , , ,
	6	Stone Columns			7,757,200	FT	\$45.92	\$356,210,624
	7	Sail sament hanta	nite slurry wall without membrane		4.055.500	SF	\$10.12	\$50.140.660
	,	Son-cement-bento	inte sturry wan without membrane		4,955,500	SF	\$10.12	\$50,149,660
	8	Wick Drains			18,905,700	FT	\$5.21	\$98,498,697
		SUBTOTAL (S						\$1,735,660,191
		Ql	JANTITIES			PRIC		
BY			CHECKED	BY			ECKED	
J. Yu			R. Allen/C. Spandau	M. Pauletto			Martinson	
DATE PREP	ARED 08/25/06		PEER REVIEW	DATE PREPAI	RED 01/25/07	PE	ER REVIEW	

#### **ESTIMATE WORKSHEET**

SHEET\_\_2\_\_ OF \_\_5\_\_

			PROJE	CI:			
		no Loko	WOID.	Salton Se			
							Appraisal
I Sea Dom	Authority Aite	erriative Jumps Embankmant Dasian			PRICE	LEVEL:	
Daiii	with Stone Co	numns Embankmem Design		C:\ALL\SEA\2007\[Cos	ost Estimate by Kleinfelder 12-18-06.xls1Alternative 1		
Σ							
PAY IT		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
					CY		
	South-Sea Dam	1					
1	Dredging			5,683,700	CY	\$6.70	\$38,080,790
2	Type A Sand-Truck	t Haul		15,673,900	CY	\$24.12	\$378,054,468
	*Thicken Dam Sect	ion at Fault Crossing					
3	Type B Sand/Grave	N-Truck Haul		2 737 900	CY	\$23.88	\$65,381,052
<u> </u>	Type B dana Grave	n-Huok Huui		2,707,300		Ψ25.00	ψ00,301,002
4	Fine Rock Fill-Truc	k Haul		1,530,100	CY	\$23.88	\$36,538,788
5	Riprap-Truck Haul			3,655,300	CY	\$51.04	\$186,566,512
6	Stone Columns			2,876,500	FT	\$45.92	\$132,088,880
7	Soil-cement-bentonite sli	urry wall without membrane (Section A-Fault Resistance)		2,962,300	SF	\$18.00	\$53,321,400
7	Soil-cement-bentonite sl	urry wall without membrane (Section B)		3,751,000	SF	\$6.00	\$22,506,000
	*Triple wide slurry w	all at fault crossing					
8	Wick Drains			8,065,200	FT	\$5.21	\$42,019,692
	SUBTOTAL (S	heet 2 of 5)					\$954,557,582
					PRIC	CES	, ,==
		CHECKED	BY		CI	HECKED	
		R. Allen/C. Spandau	M. Pauletto		P.	Martinson	
ARED 08/25/06		PEER REVIEW	DATE PREPAR	RED 01/25/07	PE	EER REVIEW	
	Page   Page	South-Sea Dam  South-Sea Dam  Dredging  Type A Sand-Truck *Thicken Dam Sect  Type B Sand/Grave  Thicken Dam Sect  Riprap-Truck Haul  Soil-cement-bentonite sl Tosoil-cement-bentonite sl Triple wide slurry w  Wick Drains  SUBTOTAL (S	PER Dam/North Marine Lake a Sea Authority Alternative Dam with Stone Columns Embankment Design    DESCRIPTION	Active No. 1C  Bea Dam/North Marine Lake of Sea Authority Alternative Dam with Stone Columns Embankment Design    DESCRIPTION   CODE	Bea Dam/North Marine Lake I Sea Authority Alternative Dam with Stone Columns Embankment Design    Description   Code   Guantity	Salton Sea Rest  WOID: ESTIM. REGION: PRICE FILE:  CMALISEAWOOF(Cost Estimate by BESCRIPTION)  DESCRIPTION  DESCRIPTION  CODE  QUANTITY  UNIT  CY  South-Sea Dam  1 Dredging  1 Dredging  1 Type A Sand-Truck Haul  1 Thicken Dam Section at Fault Crossing  3 Type B Sand/Gravel-Truck Haul  4 Fine Rock Fill-Truck Haul  5 Riprap-Truck Haul  5 Riprap-Truck Haul  7 Sell-cement-bentonite sturry wall without membrane (Section A-Fault Resistance)  7 Sell-cement-bentonite sturry wall without membrane (Section B)  1 Triple wide sturry wall without membrane (Section A-Fault Resistance)  8 Wick Drains  REGION:  CMALISEAWOOF(Cost Estimate by CAULISEAWOOF(Cost Estimate by CAU	Salton Sea Restoration Feas  WOID: ESTIMATE LEVEL:  REGION: PRICE LEVEL:  FILE:  CHALLSER/ADDOT/LOSE Estimate by Kinefister 12-18 Gate  BESCRIPTION  DESCRIPTION  DESCRIPTION  DESCRIPTION  DESCRIPTION  CODE GUANTITY UNIT UNIT PRICE  CY UNIT PRICE  CY S6.70  CY \$6.70  South-Sea Dam  1 Dredging  5.683,700 CY \$6.70  Thicken Dam Section at Fault Crossing  3 Type B Sand/Gravel-Truck Haul  1,5873,900 CY \$24.12  Thicken Dam Section at Fault Crossing  3 Type B Sand/Gravel-Truck Haul  4 Fine Rock Fill-Truck Haul  5 Riprap-Truck Haul  5 Riprap-Truck Haul  7 Soil-cement-bentonite shurry wall without membrane (Section A-Fault Resistance)  7 Soil-cement-bentonite shurry wall without membrane (Section B)  7 Soil-cement-bentonite shurry wall without membrane (Section A-Fault Resistance)  7 Soil-cement-bentonite shurry wall without membrane (Section A-Fault Resistance)  7 Soil-cement-bentonite shurry wall without membrane (Section B)  7 Soil-cement-bentonite shurry wall without membrane (Section B)  9 SUBTOTAL (Sheel 2 of 5)  CHECKED  1 A Minimum  PRICES  ONECKED  1 A Manimum  PRICES  PRICES  PRICES  ONECKED  1 A Manimum  PRICES  PRI

#### **ESTIMATE WORKSHEET**

SHEET\_3\_ OF \_5\_

				PROJECT:					
Altern	ative	No. 1C		Salton Sea Restoration Feasibility Study					
		m/North Mari		WOID:			MATE LEVEL:	Appraisal	
Saltor	ı Sea	Authority Alte	ernative	REGION	:	PRIC	E LEVEL:		
Sand	Dam 1	with Stone Co	lumns Embankment Design	FILE:					
					C:\ALL\SEA\2007\[Cos	t Estimate	by Kleinfelder 12-18-06.xl	s]Alternative 1	
PLANT ACCOUNT	DESCRIPTION		DESCRIPTION	CODE	QUANTITY	UNI	T UNIT PRICE	AMOUNT	
С		Perimeter Dike	s						
	1	Dredging			5,473,600	CY	ý \$6.70	\$36,673,120	
	2	Type A Sand-Truck	Haul		8,493,100	CY	\$21.82	\$185,319,442	
	3	Type B Sand/Grave	el-Truck Haul		797,500	CY	′ \$21.59	\$17,218,025	
	4	Filter Rock (Fine ar	nd Coarse)			CY	,		
	5	Riprap-Truck Haul			2,291,300	CY	′ \$37.85	\$86,725,705	
	5	Crest Armoring (Ad	dditional 3 feet of riprap on top of crest)		114,400	CY	\$37.85	\$4,330,040	
	6	Stone Columns			1,859,000	FT	\$45.92	\$85,365,280	
	7	Soil-cement-benton	nite slurry wall without membrane		6,856,300	SF	\$6.00	\$41,137,800	
					5,555,555		75155	<b>*</b> * * * * * * * * * * * * * * * * * *	
	8	Wick Drains			5,835,500	FT	\$5.21	\$30,402,955	
		SUBTOTAL (S	heet 3 of 5)					\$487,172,367	
		QL	JANTITIES			PF	RICES		
BY J. Yu			CHECKED R. Allen/C. Spandau	BY M. Pauletto			CHECKED  P. Martinson		
DATE PREP	ARED 08/25/06		PEER REVIEW	DATE PREPAI	RED 01/25/07		PEER REVIEW		

#### **ESTIMATE WORKSHEET**

SHEET\_4\_ OF \_5\_

			PROJECT:						
Altern	ative	No. 1C		Salton Sea Restoration Feasibility Study					
Mid-S	ea Da	m/North Marii	ne Lake	WOID:		ESTIN	MATE LEVEL:	Appraisal	
Saltor	Sea .	Authority Alte	ernative	REGION	:	PRICE	E LEVEL:		
Sand	Dam v	vith Stone Co	olumns Embankment Design	FILE:					
				C:\ALL\SEA\2007\[Cost Estimate by Kleinfelder 12-18-06.xls]Alternative 1					
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
D		Habitat Ponds							
	1	Habitat Ponds			12,000	ACRI	E \$13,473.00	\$161,676,000	
		Includes overexcava	ation geogrid replacement and embankment						
		SUBTOTAL (S						\$161,676,000	
		QU	JANTITIES			PR	ICES		
BY J. Yu			CHECKED R. Allen/C. Spandau	BY M. Pauletto			CHECKED P. Martinson		
DATE PREP			PEER REVIEW	DATE PREPA			PEER REVIEW		
	8/25/20006	)			01/25/07				

SHEET	5	OF	5

FEATURE:			PROJECT:							
Altern	ative	No. 1C		Salton Sea Restoration Feasibility Study						
		m/North Mari	ne Lake	WOID:		ESTI	MATE	LEVEL:	Appraisal	
•		Authority Alte		REGION		PRIC				
			olumns Embankment Design	FILE:	·•	0		<b></b> -		
Garia	Dann v	viai Gione Go	nannis Embankment Design	1 122.						
					C:\ALL\SEA\2007\[Co	ost Estimate	e by Kiein	itelder 12-18-06.XIS	sjAlternative 1	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNI	Т	UNIT PRICE	AMOUNT	
		Notes:								
		SUBTOTAL (S	heet 5 of 5)							
		SUBTOTAL (S							\$161,676,000	
		SUBTOTAL (S	heet 3 of 5)						\$487,172,367	
		SUBTOTAL (S							\$954,557,582	
		SUBTOTAL (S	heet 1 of 5)						\$1,735,660,191	
		Subtotal Cons	struction Costs						\$3,339,066,140	
		QL	JANTITIES			PF	RICES	3		
BY J. Yu			CHECKED R. Allen/C. Spandau	BY M. Pauletto			CHECK P. Marti			
DATE PREP	ARED		PEER REVIEW	DATE PREPA	RED			REVIEW		
08/25/06			01/25/07							

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_2 \_\_

FEATURE:			PROJECT:							
Alt	erna	ative Nos. 1A, 1B, 1C & 1D	Salton Sea							
Mic	t-Se	a Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Salton Sea Authority Alternative			REGION:	LC	PRICE	LEVEL:	Apr-06			
Water Conveyance Components			FILE:				-			
				C:\ALL\SEA\2007\[C	conveyance_	_Worksheets1-10.xls]Alternative 1	SSA est			
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SE Quadrant River Diversion								
		Diversion structure								
		48" Rock riprap		13,390	CY	\$90.00	\$1,205,100.00			
		Sheet pile cutoff		15,885	SF	\$35.00	\$555,975.00			
		Alamo River settling basin		13,003	OI.	ψ33.00	ψ555,915.00			
		Excavation		14,855	CY	\$8.00	\$118,840.00			
		Embankment		14,655	CY	\$5.00	\$72,100.00			
			in in a		CY	\$5.00 \$500.00				
		Unreinforced concrete canal l	ining	405	CY	\$500.00	\$202,500.00			
		Circulation canal, 967 cfs, 19.8 mi								
		Excavation		1,821,000	CY	\$5.00	\$9,105,000.00			
		Compacted embankment		63,600	CY	\$6.00	\$381,600.00			
		Unreinforced concrete canal lining		50,800	CY	\$500.00	\$25,400,000.00			
		17 Siphons, 50' head class								
		15.5' dia Precast reinf conc p	ipe	3,400	LF	\$2,500.00	\$8,500,000.00			
		Excavation		216,500	CY	\$8.00	\$1,732,000.00			
		Backfill		167,900	CY	\$6.00	\$1,007,400.00			
		Reinforced concrete		2,150	CY	\$1,000.00	\$2,150,000.00			
		19 Cross drainage structures								
		48" dia Precast reinforced concret	e pipe	3,165	LF	\$300.00	\$949,500.00			
		10 Bridges								
		Reinforced concrete		1,020	CY	\$1,000.00	\$1,020,000.00			
		QUANTITIES				PRICES				
вү		GOARTITIEO	BY			CHECKED				
	Mark L	eavitt Steve Robertson	Dan Mar							
DATE	PREPAR	RED	DATE PREPARE	D		PEER REVIEW				
	April 2	0, 2006								

SHEET\_2\_ OF \_2 \_

FE/	ATU	IRE:	PROJECT:							
Alt	erna	ative Nos. 1A, 1B, 1C & 1D	Salton Sea							
Mic	d-Se	ea Dam/North Marine Lake	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal			
Sal	ton	Sea Authority Alternative	REGION:	LC	PRICE	LEVEL:	Apr-06			
Water Conveyance Components			FILE:				·			
,,,		conveyance components		C:\ALL\SEA\2007\[C	Conveyance	Worksheets1-10.xls]Alternative 1	SSA est			
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SE Quadrant								
		South Lake Water Pipeline, 35 cfs, 1	6.0 mi, 189	' head						
		3.0' dia Steel pipe		16.0	Mi	\$1,200,000.00	\$19,200,000.00			
		Regulating tank tower (200,000 gal, 190 ft tall) South Lake Pumping Plant, 35 cfs, 2	201' TDH	1.0	Ea. LS		\$1,000,000.00			
		Structure Improvements		-			<b>¥</b> 1,000,000			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Circulation Pump Plant, 967 cfs, 34' Structure Improvements	TDH	1	LS		\$35,000,000.00			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Treatment Plant Sludge Conveyance	e, 29 cfs, 7		_					
		3.5' dia Steel pipe		7.6	Mi	\$1,400,000.00	\$10,640,000.00			
		NE Quadrant Deep Water Intake Pipe, 608 cfs, 8.4	mi. 25' he:	ad						
		12.4' dia Steel pipe	, _0	8.4	Mi	\$15,000,000.00	\$126,000,000.00			
		Deep Water Pumping Plant, 608 cfs,	33' TDH	1	LS	<del>+ 10,000,000</del>	\$21,000,000.00			
		Structure Improvements					<del>+</del> ,,			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Filtration Backflush Conveyance, 30	cfs, 3.1 m	i, 25' head						
		2.8' dia Steel pipe		3.1	Mi	\$1,100,000.00	\$3,410,000.00			
		Subtotal	100()				\$272,650,015.00			
		Alternative Specific Unlisted Items (+/-	10%)				\$27,265,002.00			
		Total w/ Alt. Specific Unlisted Items					\$299,915,017.00			
		Mobilization (+/-5%)					\$15,000,000.00			
		Subtotal w/Mobilization					\$314,915,017.00			
		QUANTITIES				PRICES				
вү	Mark L	eavitt Steve Robertson	BY Dan Mar			CHECKED				
DATE	PREPA		DATE PREPARE	ED.		PEER REVIEW				
		20, 2006		-		. ==:::::=:::=::				

# Alternative No. 1A, 1B, 1C & 1D Salton Sea Authority Water Treatment Facilities Costs

<u>Source:</u> "Salton Sea Authority Plan For Multi-Purpose Project" Draft for TAC Review dated 6/9/06 Bob Hamilton spoke with Bill Brownlie of Tetra Tech, Inc. on 9/18/06 and the costs are the most current at that time; Mr. Brownlie stated that he believed these costs were expressed in \$2006 and were developed by Mr. Ron Entwiler

Construction Cost	<u>\$Million</u>
Treatment & Pumping Plant Costs in Report (page 72)	300
adjustment for unlisted items (10%) and contingencies (25	%) 1.375
Construction Cost for Reclamation Spreadsheet (includes 5% mobilization)	218.1818 ounded <b>218</b>

OM&R	<u>\$Million</u>
Phosphorus Removal Plant in Report (page 73)	31.1
Filtration/Ozone Plant in Report (page 73)	13.4
Pumping Plant in Report (page 73)	0.8
total from Report	45.3

## **Attachment 1D**

Cost Estimate Worksheets for Alternative No. 1D: Mid-Sea Dam with North Marine Lake - Rock Notches Dam (Salton Sea Authority Alternative - Original Alignment)

SHEET\_\_1\_\_ OF \_\_3\_

	BUREAU OF RECLAMATION <b>ESTITIV</b>				AIE VVORNSHEEI SHEET_1_OF_3_						
FEAT	URE:			PROJE	PROJECT:						
Altern	ative	No. 1D			Salton Sea Restoration						
Mid-S	ea Da	m/North Mari	ne Lake	WOID:		ESTIM	STIMATE LEVEL: Appraisa				
Saltor	n Sea	Authority Alte	ernative	REGION	<b>l</b> :	PRICE	LEVEL:	Oct-06			
		nes Dams		FILE:							
					C:\ALL\SEA\200	7\[SSA Cost	Worksheets.xls] Rock No	atches			
. 늘	Σ				O.W.LENGE/NEGO	7 (007 (003)	Volkoneets.xisj Neok N	Nones			
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		Mid-Sea Dam									
	1	Dredging			44,198,000	CY	\$6.70	296,126,600			
	2	Rockfill			55,706,200	CY	\$23.16	1,290,155,592			
	3	Fine Rockfill			7,862,800	CY	\$13.51	106,226,428			
	4	Sand/Gravel Type A			5,024,800	CY	\$16.30	81,904,240			
	5	SCB Slurry Wall			4,955,500	SF	\$10.12	50,149,660			
		,					,				
	6	Wick Drains			9,032,100	LF	\$5.21	47,057,241			
							+				
		Page 1 Subtota	I					1,871,619,761			
		. age : Cabieta	•					1,011,010,101			
							+				
		QUAN	TITIFS				PRICES				
ву		QUAN	CHECKED	BY			HECKED				
51	M. Spears	s	P. Weghorst	ы	D. Donaldson	ľ	TILORED				
DATE PREP		-	PEER REVIEW	DATE PREPA		P	EER REVIEW				
		January 4, 2007			Januar	y 25, 2007					

SHEET	2	OF	3

				SHEET_2_OF_3_							
FEAT	URE:			PROJI	PROJECT:						
Altern	native	No. 1D				Salton	Sea Restor	ation			
Mid-S	ea Da	am/North Mari	ne Lake	WOID:		ESTIMA	TE LEVEL:	Appraisal			
		Authority Alt		REGION	1:	PRICE L		Oct-06			
		hes Dams		FILE:							
ποσπ	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	100 Dui110			C:\\\    \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	7\[22\ Cost\\/a	orksheets.xls] Rock Noto	shoc			
. 5	Σ				O.IALLIOLAI200	7 (OOA OOSI WO	rkaneeta.xiaj rkock rkoto	1103			
PLANT	PLANT ACCOUNT ACCOUNT TEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		South-Sea Dan	n								
	1	Dredging			31,076,100	CY	\$6.70	208,209,870			
	2	Doolstill			24 244 200	CV	<b>CO4 77</b>	4 000 000 004			
	2	Rockfill			34,311,200	CY	\$31.77	1,090,066,824			
	3	Fine Rockfill			8,607,500	CY	\$23.88	205,547,100			
					5,551,555		Ų-0.00				
	4	Sand/Gravel Type A	1		6,435,000	CY	\$24.12	155,212,200			
	5	SCB Slurry Wall			6,539,500	SF	\$6.00	39,237,000			
		cos ciany man			0,000,000	<u> </u>	ψο.σσ	00,20.,000			
	6	Wick Drains			10,201,400	LF	\$5.21	53,149,294			
			_								
	1	Page 2 Subtota	al .		1			1,751,422,288			
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	1				-		+ +				
	1						+				
	<u> </u>										
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	1										
	1	QUAN	TITIES			l Pi	RICES				
вү		QUAIT	CHECKED	вү			CKED				
	M. Spear	rs	P. Weghorst		D. Donaldson	5112					
DATE PREP			PEER REVIEW	DATE PREPA	ARED	PEE	R REVIEW				
		January 4, 2007			Januar	y 25, 2007					

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_2 \_\_

FEATURE:			PROJECT:							
Alt	erna	ative Nos. 1A, 1B, 1C & 1D	Salton Sea							
Mic	t-Se	a Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Salton Sea Authority Alternative			REGION:	LC	PRICE	LEVEL:	Apr-06			
Water Conveyance Components			FILE:				-			
				C:\ALL\SEA\2007\[C	conveyance_	_Worksheets1-10.xls]Alternative 1	SSA est			
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SE Quadrant River Diversion								
		Diversion structure								
		48" Rock riprap		13,390	CY	\$90.00	\$1,205,100.00			
		Sheet pile cutoff		15,885	SF	\$35.00	\$555,975.00			
		Alamo River settling basin		13,003	OI.	ψ33.00	ψ555,915.00			
		Excavation		14,855	CY	\$8.00	\$118,840.00			
		Embankment		14,655	CY	\$5.00	\$72,100.00			
			in in a		CY	\$5.00 \$500.00				
		Unreinforced concrete canal l	ining	405	CY	\$500.00	\$202,500.00			
		Circulation canal, 967 cfs, 19.8 mi								
		Excavation		1,821,000	CY	\$5.00	\$9,105,000.00			
		Compacted embankment		63,600	CY	\$6.00	\$381,600.00			
		Unreinforced concrete canal lining		50,800	CY	\$500.00	\$25,400,000.00			
		17 Siphons, 50' head class								
		15.5' dia Precast reinf conc p	ipe	3,400	LF	\$2,500.00	\$8,500,000.00			
		Excavation		216,500	CY	\$8.00	\$1,732,000.00			
		Backfill		167,900	CY	\$6.00	\$1,007,400.00			
		Reinforced concrete		2,150	CY	\$1,000.00	\$2,150,000.00			
		19 Cross drainage structures								
		48" dia Precast reinforced concret	e pipe	3,165	LF	\$300.00	\$949,500.00			
		10 Bridges								
		Reinforced concrete		1,020	CY	\$1,000.00	\$1,020,000.00			
		QUANTITIES				PRICES				
вү		GOARTITIEO	BY			CHECKED				
	Mark L	eavitt Steve Robertson	Dan Mar							
DATE	PREPAR	RED	DATE PREPARE	D		PEER REVIEW				
	April 2	0, 2006								

SHEET\_2\_ OF \_2 \_

FE/	ATU	IRE:	PROJECT:							
Alt	erna	ative Nos. 1A, 1B, 1C & 1D	Salton Sea							
Mic	d-Se	ea Dam/North Marine Lake	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal			
Sal	ton	Sea Authority Alternative	REGION:	LC	PRICE	LEVEL:	Apr-06			
Water Conveyance Components			FILE:				·			
,,,		conveyance components		C:\ALL\SEA\2007\[C	Conveyance	Worksheets1-10.xls]Alternative 1	SSA est			
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SE Quadrant								
		South Lake Water Pipeline, 35 cfs, 1	6.0 mi, 189	' head						
		3.0' dia Steel pipe		16.0	Mi	\$1,200,000.00	\$19,200,000.00			
		Regulating tank tower (200,000 gal, 190 ft tall) South Lake Pumping Plant, 35 cfs, 2	201' TDH	1.0	Ea. LS		\$1,000,000.00			
		Structure Improvements		-			<b>¥</b> 1,000,000			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Circulation Pump Plant, 967 cfs, 34' Structure Improvements	TDH	1	LS		\$35,000,000.00			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Treatment Plant Sludge Conveyance	e, 29 cfs, 7		_					
		3.5' dia Steel pipe		7.6	Mi	\$1,400,000.00	\$10,640,000.00			
		NE Quadrant Deep Water Intake Pipe, 608 cfs, 8.4	mi. 25' he:	ad						
		12.4' dia Steel pipe	, _0	8.4	Mi	\$15,000,000.00	\$126,000,000.00			
		Deep Water Pumping Plant, 608 cfs,	33' TDH	1	LS	<del>+ 10,000,000</del>	\$21,000,000.00			
		Structure Improvements					<del>+</del> ,,			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Filtration Backflush Conveyance, 30	cfs, 3.1 m	i, 25' head						
		2.8' dia Steel pipe		3.1	Mi	\$1,100,000.00	\$3,410,000.00			
		Subtotal	100()				\$272,650,015.00			
		Alternative Specific Unlisted Items (+/-	10%)				\$27,265,002.00			
		Total w/ Alt. Specific Unlisted Items					\$299,915,017.00			
		Mobilization (+/-5%)					\$15,000,000.00			
		Subtotal w/Mobilization					\$314,915,017.00			
		QUANTITIES				PRICES				
вү	Mark L	eavitt Steve Robertson	BY Dan Mar			CHECKED				
DATE	PREPA		DATE PREPARE	ED.		PEER REVIEW				
		20, 2006		-		. ==:::::=:::=::				

SHEET\_3\_ OF \_3\_

_				WIATE VVORNSHEET SHEET 3_ 0F _3_						
FEAT	URE:			PROJECT:						
Altern	native	No. 1D				Saltor	Sea Rest	oration		
Mid-S	ea Da	m/North Mari	ne Lake	WOID:		ESTIM	ATE LEVEL:	Appraisal		
Saltoi	n Sea	Authority Alte	ernative	REGION	l:	PRICE	LEVEL:	Oct-06		
		nes Dams		FILE:						
					C:\ALL\SEA\200	7\[SSA Cost V	Vorksheets.xls] Rock N	Notches		
⊢₽	Σ									
PLANT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
		Perimeter Dike	S							
	1	Dredging			32,084,800	CY	\$6.70	214,968,160		
	2	Rockfill			25,502,400	CY	\$25.24	643,680,576		
	2	IXOCKIIII			25,502,400	O1	Ψ23.24	043,000,370		
	3	Fine Rockfill			8,195,000	CY	\$21.59	176,930,050		
	4	Sand/Gravel Type A	<b>1</b>		7,108,200	CY	\$21.82	155,100,924		
	5	SCB Slurry Wall			7,362,300	SF	\$6.00	44,173,800		
	6	Wick Drains			13,741,200	LF	\$5.21	71,591,652		
		Page 3 Subtota	ıl					1,306,445,162		
		Pages 1, 2 and	3 Total					4,929,487,211		
	1									
		OHAN	TITIES			[	PRICES			
ву		QUAN	CHECKED	BY			HECKED			
	M. Spears	s	P. Weghorst		D. Donaldson	J.	<del>-</del>			
DATE PREP			PEER REVIEW	DATE PREPA			EER REVIEW			
January 4, 2007				January 25, 2007			007			

# Alternative No. 1A, 1B, 1C & 1D Salton Sea Authority Water Treatment Facilities Costs

<u>Source:</u> "Salton Sea Authority Plan For Multi-Purpose Project" Draft for TAC Review dated 6/9/06 Bob Hamilton spoke with Bill Brownlie of Tetra Tech, Inc. on 9/18/06 and the costs are the most current at that time; Mr. Brownlie stated that he believed these costs were expressed in \$2006 and were developed by Mr. Ron Entwiler

Construction Cost	<u>\$Million</u>
Treatment & Pumping Plant Costs in Report (page 72)	300
adjustment for unlisted items (10%) and contingencies (25	%) 1.375
Construction Cost for Reclamation Spreadsheet (includes 5% mobilization)	218.1818 ounded <b>218</b>

OM&R	<u>\$Million</u>		
Phosphorus Removal Plant in Report (page 73)	31.1		
Filtration/Ozone Plant in Report (page 73)	13.4		
Pumping Plant in Report (page 73)	0.8		
total from Report	45.3		

## **Attachment 2A**

Cost Estimate Worksheets for Alternative No. 2A: Mid-Sea Barrier with South Marine Lake – Sand Barrier with Stone Columns

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_2\_\_

				PROJECT:				
		No. 2A			Salton Se	a Res	toration Feas	ibility Study
Mid-Sea Barrier/South Marine Lake Sand Barrier with Stone Columns Embankment Design			WOID:		ESTIN	MATE LEVEL:	Appraisal	
			REGION	:	PRICE	E LEVEL:		
				FILE:				
					C:\ALL\SEA\2007\[Cos	t Estimate I	by Kleinfelder 12-18-06.xls	]Alternative 2A
_ <u>\</u>	Σ							
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
A		Mid-Sea Barrie	r					
	1	Dredging			11,099,000	CY	\$6.70	\$74,363,300
	2	Type A Sand			13,037,200	CY		
		Type A Sand-Barge Type A Sand-Truck			6,518,600	CY CY		\$99,343,464
		Type A Sand-Truck	. I I aui		6,518,600	CY	\$19.78	\$128,937,908
	3	Type B Sand/Grave	el		1,020,800	CY		
		Type B Sand/Grave			510,400	CY		\$6,895,504
		Type B Sand/Grave	el-Truck Haul		510,400	CY	\$18.53	\$9,457,712
	4	Filter Rock (Fine a	nd Coarse)		0	CY	\$0.00	\$0
	5	Riprap			2,896,300	CY		¢50.476.020
		Riprap-Barge Haul Riprap-Truck Haul			1,940,521 955,779	CY CY		\$58,176,820 \$32,066,385
					,		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	6	Stone Columns			2,651,000	FT	\$45.92	\$121,733,920
	7	Sail sament haute	nite aliumuusellusikkasse mankassa		2 704 700	er.	£10.12	¢20.272.004
	7	Soil-cement-bento	nite slurry wall without membrane		3,791,700	SF	\$10.12	\$38,372,004
	8	Wick Drains			6,736,400	FT	\$5.40	\$36,376,560
		SUBTOTAL (S	heet 1 of 2)					¢605 700 577
			JANTITIES			PR	ICES	\$605,723,577
BY		Q.	CHECKED	ву			CHECKED	
J. Yu			R. Allen/C. Spandau	M. Pauletto			P. Martinson	
	DATE PREPARED PEER REVIEW			DATE PREPAR	RED		PEER REVIEW	
	08/25/06				01/25/07			

SHEET\_2\_ OF \_2\_

FEATURE:		PROJECT:							
Alternative No. 2A Mid-Sea Barrier/South Marine Lake				Salton Sea Restoration Feasibility Stud					
			WOID:		ESTII	MATE LEVEL:	Appraisal		
Sand	Barrie	er with Stone	Columns Embankment Design	REGION	l:	PRIC	E LEVEL:		
				FILE:					
					C:\ALL\SEA\2007\[Cos	t Estimate	by Kleinfelder 12-18-06.x	ls]Alternative 2A	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNI	Γ UNIT PRICE	AMOUNT	
_ A	9								
В		Habitat Ponds							
	1	Habitat Ponds			21,700	ACR	E \$13,473.00	\$292,364,100	
		Includes overexcava	ation geogrid replacement and embankment						
		SUBTOTAL (S	choot 2 of 2)					\$292,364,100	
		SUBTOTAL (S	· · · · · · · · · · · · · · · · · · ·					\$605,723,577	
		Subtotal Cons	struction Costs					\$898,087,677	
		QL	JANTITIES			PF	RICES		
вү			CHECKED	ву			CHECKED		
J. Yu			R. Allen/C. Spandau	M. Pauletto			P. Martinson		
DATE PREP	08/25/06		PEER REVIEW	DATE PREPA	RED 01/25/07		PEER REVIEW		

Alternative Nos. 2A and 2B			PROJECT: Salton Sea Restoration Feasibility Study								
									WOID:		ESTIM
			Hak	oitat	<b>Ponds Dee</b>	p Excavation	REGION:		PRICE	LEVEL:	
	-		•	FILE:							
				C:\ALL\SEA\2006new\[HabitatPondDeepExc.xls]Alt 2A & 2B							
PLANT ACCOUNT	РАУ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		Habitat Pon	ds Deep Excavation								
		Excavation	7-foot excavation in the dry using		49,013,067	CY	\$6.50	\$318,584,933			
		conventional exca	avation techniques to remove soft acres deep excavation per 2,500								
		(acres of ponds)									
		Subtotal Co	nstruction Costs					\$318,584,933			
								40.0,00.,000			
		Mobilization Subtotal Co	5% (+/-) ntract Costs					\$15,930,000 \$334,514,933			
		QU	ANTITIES			PRICE	S				
BY CHECKED  M. Spears J. Cunningham  DATE PREPARED PEER REVIEW				n September 30, 20 Alternatives and 0		ea Restoration Proj es	ect, Feasibility				
10/12/06		16									

SHEET\_\_1\_\_ OF \_\_9 \_\_

FEATURE:		PROJECT:								
Alternative Nos. 2A & 2B			Salton Sea							
Mid-	-Sea	Barrier/South Marine Lake V	VOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Wat	er C	onveyance Components	REGION:	LC	PRICE	LEVEL:	Apr-06			
			ILE:							
		ľ	C:\ALL\SEA\2007\[Conveyance_Worksheets1-10.xls]Alternative 2 MSB est							
PLANT ACCOUNT	РАУ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SW Left Quadrant								
		River Diversion								
		Diversion structure								
		48" Rock riprap		335	CY	\$90.00	\$30,150.00			
		Sheet pile cutoff		2,900	SF	\$35.00	\$101,500.00			
		New River settling basin								
		Excavation		11,200	CY	\$8.00	\$89,600.00			
		Embankment		40,600	CY	\$5.00	\$203,000.00			
		Unreinforced concrete canal lin	ning	910	CY	\$500.00	\$455,000.00			
		River Water Channel, 69 cfs, 10.0 mi								
		Excavation		147,800	CY	\$7.00	\$1,034,600.00			
		Compacted embankment		10,950	CY	\$6.00	\$65,700.00			
		Unreinforced concrete canal lining		7,160	CY	\$500.00	\$3,580,000.00			
		12 Siphons, 50' head class				<b>#</b>	<b>A=00.000.00</b>			
		4.0' dia Precast reinf conc pipe	)	2,400	LF	\$300.00	\$720,000.00			
		Excavation		36,100	CY	\$8.00	\$288,800.00			
		Backfill		34,500	CY	\$6.00	\$207,000.00			
		Reinforced concrete		120	CY	\$1,000.00	\$120,000.00			
		2 Cross drainage structures 48" dia Precast reinforced cond	crata nina	200	LF	\$300.00	\$60,000.00			
		40 dia i recast reililorced cont	siete pipe	200	L1	ψ500.00	ΨΟΟ,ΟΟΟ.ΟΟ			
		River Water Distrib'n Channel, 69 cfs,	12.6 mi							
		Excavation		186,250	CY	\$7.00	\$1,303,750.00			
		Compacted embankment		13,800	CY	\$6.00	\$82,800.00			
		Unreinforced concrete canal lining		9,050	CY	\$500.00	\$4,525,000.00			
		8 Siphons, 50' head class								
		4.0' dia Precast reinf conc pipe	)	1,600	LF	\$300.00	\$480,000.00			
		Excavation		24,000	CY	\$8.00	\$192,000.00			
		Backfill		23,000	CY	\$6.00	\$138,000.00			
		Reinforced concrete		100	CY	\$1,000.00	\$100,000.00			
		5 Cross drainage structures								
		48" dia Precast reinforced concrete	pipe	500	LF	\$300.00	\$150,000.00			
		9 Bridges								
		Reinforced concrete		280	CY	\$1,000.00	\$280,000.00			
		Pup Fish Channel, 0 cfs, 10.0 mi								
		Excavation		10,900	CY	\$7.00	\$76,300.00			
		Compacted embankment		8,550	CY	\$6.00	\$51,300.00			
		Unreinforced concrete canal lining		6,900	CY	\$500.00	\$3,450,000.00			
		QUANTITIES	PRICES							
BY			BY CHECKED							
<u> </u>	Mark Le		an Mar							
DATE P			ATE PREPAREI	)		PEER REVIEW				
	April 20									

SHEET\_2\_ OF \_\_9 \_\_

Embankment	FEA		E:	PROJEC				SHEE1_2_ OF _9 _		
River Diversion   Diversion   Share Rideriston   Diversion   Diversion structure   A8* Rock riprap	Alte	rnat	ive Nos. 2A & 2B				Salton Sea			
River Diversion   Diversion   Share Rideriston   Diversion   Diversion structure   A8* Rock riprap				WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal		
PILE:   CAULISEASONYCorwaystics   Workshares 1-10.00/Notember 2 M50 est										
DESCRIPTION   CODE   QUANTITY   UNIT   UNIT PRICE   AMOUNT		J. <b>J</b>	en ejanes components			,oL		Zhi-oo		
River Diversion   Diversion   Sheet pile cutoff   Sheet pile cut					C:\ALL\SEA\2007\t	Conveyance	Worksheets1-10 vls14ltarnative 2	MSR est		
River Diversion	ᆫ片	Σ			V 1.L. (OLA (2007 (	Conveyance_				
Diversion structure	PLANT	PAY ITE	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
Diversion structure			River Diversion							
A8* Rock riprap										
Sheet pile cutoff					330	CY	\$90.00	\$29,700.00		
New River settling basin										
Excavation					,		, , , , ,	+ - ,		
Embankment					2,200	CY	\$10.00	\$22,000.00		
Unreinforced concrete canal lining								\$41,500.00		
River Water Distrib'n Channel, 69 cfs, 6.4 mi   Excavation   95,000 CY   \$7.00 \$665,000.00				lining				\$100,000.00		
Excavation				_				•		
Compacted embankment				5, U.4 IIII	95 000	CY	\$7.00	\$665,000,00		
Unreinforced concrete canal lining										
10 Siphons, 50' head class										
4.0' dia Precast reinf conc pipe				,	4,000	O1	ψ300.00	Ψ2,300,000.00		
Excavation   30,000   CY   \$8.00   \$240,000.00     Backfill   29,000   CY   \$6.00   \$174,000.00     Reinforced concrete   100   CY   \$1,000.00   \$100,000.00     1 Bridges				) <del>C</del>	2 000	IF	\$300.00	\$600,000,00		
Backfill						1				
Reinforced concrete										
1 Bridges										
Reinforced concrete							Ţ:,= <b>30.00</b>	, , , , , , , , , , , , , , , , , , , ,		
BY Mark Leavitt Steve Robertson DATE PREPARED  PER REVIEW					30	CY	\$1,000.00	\$30,000.00		
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
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BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW			QUANTITIES	PRICES						
DATE PREPARED DATE PREPARED PEER REVIEW	вү			вү			CHECKED			
		Mark Le	eavitt Steve Robertson	Dan Mar						
April 20, 2006	DATE PR	REPARE	D	DATE PREPARE	D		PEER REVIEW			
		April 20	, 2006							

SHEET\_3\_ OF \_\_9 \_\_

Compacted embankment         8,100         CY         \$6.00         \$48,600.00           Unreinforced concrete canal lining         5,300         CY         \$500.00         \$2,650,000.00           12 Cross drainage structures         48" dia Precast reinforced concrete pipe         1,200         LF         \$300.00         \$360,000.00           9 Bridges         9 Bridges         1,200         LF         \$300.00         \$360,000.00	FEA	TUR	E: F	PROJEC	T:			
### REGION: LC PRICE LEVEL: Apr-06 FILE:   CMLLOSEASOUT/Conveyance Windsheers-10.MM/Memorize 2 M050 est   CMLOSEASOUT/Conveyance WINDSHEERS-10.MM/Memorize 2 M050 est   CMLOSEASOUT/CONVEY	Alte	ernat	ive Nos. 2A & 2B				Salton Sea	
FILE:	Mid	-Sea	Barrier/South Marine Lake	VOID:	L165C	ESTIN	IATE LEVEL:	Appraisal
FILE:	Wat	ter C	onvevance Components	REGION:	LC	PRICE	LEVEL:	
River Diversion   Diversion structure   A300   CY   \$90.00   \$387,000.00			,		-			<b>P</b>
River Diversion   Diversion structure   48° Rock riprap   4,300 CY \$90.00 \$387,000.00 Sheet pile cutoff   13,300 SF \$35.00 \$465,500.00					C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 2	MSB est
River Diversion   Diversion structure   48° Rock riprap   4,300 CY \$90.00 \$387,000.00 Sheet pile cutoff   13,300 SF \$35.00 \$465,500.00	LANT	Y ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Diversion structure	AC P	PĀ						
A8" Rock riprap								
Sheet pile cutoff								
Alamo River settling basin   Excavation   5,700 CY   \$10.00   \$57,000.00								
Excavation   5,700 CY   \$10.00   \$57,000.00					13,300	SF	\$35.00	\$465,500.00
Embankment							<b>A</b> ( <b>a a a</b>	<b></b>
Unreinforced concrete canal lining					,			
River Water Channel, 274 cfs, 6.7 ml   Excavation   241,150   CY   \$7.00   \$1,688,050.00   Compacted embankment   12,500   CY   \$500.00   \$4,700,000.00   Unreinforced concrete canal lining   9,400   CY   \$500.00   \$4,700,000.00   12 Siphons, 50' head class   8.5' dia Precast reinf conc pipe   2,400   LF   \$1,200.00   \$2,880,000.00   Excavation   72,250   CY   \$8.00   \$578,000.00   Backfill   65,350   CY   \$6.00   \$392,100.00   CY   \$1,000.00   \$450,000.00   EXCAVARION   EXCAVARIO								
Excavation   241,150   CY   \$7.00   \$1,688,050.00   Compacted embankment   12,500   CY   \$6.00   \$75,000.00   CY   \$500.00   \$75,000.00   S75,000.00   S75,000.				ning	270	CY	\$500.00	\$135,000.00
Compacted embankment			,				<b>A</b>	
Unreinforced concrete canal lining								
12 Siphons, 50' head class								
8.5' dia Precast reinf conc pipe					9,400	CY	\$500.00	\$4,700,000.00
Excavation   72,250   CY   \$8.00   \$578,000.00     Backfill   65,350   CY   \$6.00   \$392,100.00     Reinforced concrete   450   CY   \$1,000.00   \$450,000.00     6 Cross drainage structures   48° dia Precast reinforced concrete pipe   760   LF   \$300.00   \$228,000.00     River Water Distrib'n Channel, 274 cfs, 8.0 mi   Excavation   288,000   CY   \$7.00   \$2,016,000.00     Compacted embankment   15,000   CY   \$6.00   \$90,000.00     Unreinforced concrete canal lining   11,150   CY   \$6.00   \$90,000.00     5 Siphons, 50° head class   5 Siphons, 50° head class   8.5° dia Precast reinf conc pipe   1,000   LF   \$1,200.00   \$1,200,000.00     Excavation   30,100   CY   \$8.00   \$240,800.00     Excavation   30,100   CY   \$8.00   \$163,800.00     Reinforced concrete   190   CY   \$1,000.00   \$190,000.00     5 Cross drainage structures   48° dia Precast reinforced concrete pipe   660   LF   \$300.00   \$198,000.00     1 Bridges   Reinforced concrete   60   CY   \$1,000.00   \$60,000.00     River Water Distrib'n Channel, 69 cfs, 7.4 mi   Excavation   109,400   CY   \$6.00   \$48,600.00     Compacted embankment   109,400   CY   \$500.00   \$765,800.00     Laccavation   109,400   CY   \$500.00   \$48,600.00     Laccavation   109,400   CY   \$500.00   \$2,650,000.00     Laccavation   109,400   CY   \$1,000.00   \$300,000.00     Laccavation   109,400   CY   \$1,000.00   \$3					0.400		<b>#4.000.00</b>	<b>#</b> 0.000.000.00
Backfill				)				
Reinforced concrete					,			
6 Cross drainage structures							· ·	
A8" dia Precast reinforced concrete pipe   760   LF   \$300.00   \$228,000.00					450	CY	\$1,000.00	\$450,000.00
River Water Distrib'n Channel, 274 cfs, 8.0 mi   Excavation   288,000 CY \$7.00 \$2,016,000.00			<u> </u>		700	1.5	¢200.00	<b>#</b> 222 000 00
Excavation					760	LF	\$300.00	\$228,000.00
Compacted embankment				5, 0.0 1111	288 000	CV	\$7.00	\$2.016.000.00
Unreinforced concrete canal lining								
S Siphons, 50' head class   8.5' dia Precast reinf conc pipe   1,000					,			
8.5' dia Precast reinf conc pipe					11,130	Ci	ψ300.00	ψ3,373,000.00
Excavation   30,100   CY   \$8.00   \$240,800.00     Backfill   27,300   CY   \$6.00   \$163,800.00     Reinforced concrete   190   CY   \$1,000.00   \$190,000.00     5 Cross drainage structures					1 000	1 F	\$1,200,00	\$1,200,000,00
Backfill   27,300   CY   \$6.00   \$163,800.00     Reinforced concrete   190   CY   \$1,000.00   \$190,000.00     5 Cross drainage structures			<u> </u>	,	,			
Reinforced concrete								
5 Cross drainage structures						1		
A8" dia Precast reinforced concrete pipe   660   LF   \$300.00   \$198,000.00						<u> </u>	ψ1,000.00	Ψ100,000.00
1 Bridges			Ü	oe	660	LF	\$300.00	\$198.000.00
Reinforced concrete			<u> </u>	F -			Ţ J J J J J	<b>+</b> 100,000100
River Water Distrib'n Channel, 69 cfs, 7.4 mi					60	CY	\$1,000,00	\$60,000,00
Excavation				7.4 mi			+ ,	* <b>,</b>
Compacted embankment					109,400	CY	\$7.00	\$765,800.00
12 Cross drainage structures			Compacted embankment		8,100	CY	\$6.00	\$48,600.00
48" dia Precast reinforced concrete pipe			Unreinforced concrete canal lining		5,300	CY	\$500.00	\$2,650,000.00
48" dia Precast reinforced concrete pipe					· · · · · · · · · · · · · · · · · · ·			•
9 Bridges         300 CY \$1,000.00           QUANTITIES           BY         BY           Mark Leavitt         Steve Robertson           DATE PREPARED         DATE PREPARED   PEER REVIEW			<u> </u>	ре	1,200	LF	\$300.00	\$360,000.00
BY BY Dan Mark Leavitt Steve Robertson DATE PREPARED PEER REVIEW  DATE PREPARED PEER REVIEW			9 Bridges					
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW		Reinforced concrete			300	CY		\$300,000.00
Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW							PRICES	
DATE PREPARED DATE PREPARED PEER REVIEW	BY		В	BY CHECKED				
		Mark Le						
April 20, 2006	DATE P	TE PREPARED			D		PEER REVIEW	
		April 20	, 2006					

SHEET\_\_4\_\_ OF \_\_9 \_\_

FEA	TUR	E:	PROJEC	CT:				
Alte	rnati	ive Nos. 2A & 2B				Salton Sea		
Mid-	Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	NATE LEVEL:	Appraisal	
Wat	er Co	onveyance Components	REGION:	LC		LEVEL:	Apr-06	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<b>.</b> .		FILE:				7.0.00	
				C:\ALL\SEA\2007\[	Conveyance	e_Worksheets1-10.xls]Alternative 2	MSB est	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Pup Fish Channel, 0 cfs, 6.7 mi						
		Excavation		73,000	CY	\$7.00	\$511,000.00	
		Compacted embankment		5,800	CY	\$6.00	\$34,800.00	
		Unreinforced concrete canal lining	)	4,650	CY	\$500.00	\$2,325,000.00	
						+		
		QUANTITIES			1	PRICES		
вү			вү			CHECKED		
	Mark Le	avitt Steve Robertson	Dan Mar					
DATE PF		)	DATE PREPARE	ED.		PEER REVIEW		
	, 0,							

SHEET\_\_5\_\_ OF \_\_9 \_\_

FEA		F.	PROJEC				SHEE1_5_ OF _9 _
. –, .			··········	′ • •			
Alte	rnati	ive Nos. 2A & 2B				Salton Sea	
			WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal
Wat	er C	onveyance Components	REGION:	LC		LEVEL:	Apr-06
2201		,	FILE:				7. <b>p</b> . 00
				C:\ALL\SEA\2007\[0	Conveyance	_Worksheets1-10.xls]Alternative 2	2 MSB est
μŸ	Ε						
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		River Diversion					
		Diversion structure		4.000	01/	<b>#00.00</b>	<b>#400 000 00</b>
		48" Rock riprap		1,200	CY	\$90.00	\$108,000.00
		Sheet pile cutoff		7,500	SF	\$35.00	\$262,500.00
		Whitewater River settling basin Excavation		2 000	CY	\$10.00	¢20,000,00
		Excavation Embankment		2,900 8,800	CY	\$5.00	\$29,000.00 \$44,000.00
		Unreinforced concrete canal I	ining	205	CY	\$5.00	\$102,500.00
		River Water Channel, 100 cfs, 4.2 mi	U	203	Ci	φ500.00	\$102,500.00
		Excavation		83,200	CY	\$7.00	\$582,400.00
		Compacted embankment		4,875	CY	\$6.00	\$29,250.00
		Unreinforced concrete canal lining		3,575	CY	\$500.00	\$1,787,500.00
		3 Cross drainage structures		3,373	01	ψ500.00	ψ1,707,300.00
		48" dia Precast reinforced concrete p	nine	360	LF	\$300.00	\$108,000.00
		2 Bridges	,,po			φοσο.σσ	ψ100,000.00
		Reinforced concrete		75	CY	\$1,000.00	\$75,000.00
		River Water Channel, 69 cfs, 2.9 mi			<u> </u>	<b>\$1,000.00</b>	ψ. σ,σσσ.σσ
		Excavation		42,900	CY	\$7.00	\$300,300.00
		Compacted embankment		3,200	CY	\$6.00	\$19,200.00
		Unreinforced concrete canal lining		2,100	CY	\$500.00	\$1,050,000.00
		3 Siphons, 50' head class					
		4.0' dia Precast reinf conc pip	е	600	LF	\$300.00	\$180,000.00
		Excavation		9,000	CY	\$8.00	\$72,000.00
		Backfill		8,600	CY	\$6.00	\$51,600.00
		Reinforced concrete		30	CY	\$1,000.00	\$30,000.00
		1 Cross drainage structures					
		48" dia Precast reinforced concrete p	oipe	100	LF	\$300.00	\$30,000.00
		2 Bridges					
		Reinforced concrete		65	CY	\$1,000.00	\$65,000.00
		River Water Distrib'n Channel, 69 cfs	s, 14.7 mi			4	<b>A</b> . ====================================
		Excavation		217,500	CY	\$7.00	\$1,522,500.00
		Compacted embankment		16,100	CY	\$6.00	\$96,600.00
		Unreinforced concrete canal lining		10,600	CY	\$500.00	\$5,300,000.00
		9 Siphons, 50' head class		4 000		<b>#</b>	<b>#</b> F40 000 00
		4.0' dia Precast reinf conc pip	е	1,800	LF	\$300.00	\$540,000.00
		Excavation		27,000	CY	\$8.00	\$216,000.00
	Backfill			26,000	CY	\$6.00	\$156,000.00
		Reinforced concrete		85	CY	\$1,000.00	\$85,000.00
		11 Bridges		050	CY	¢4 000 00	<b>¢</b> 250,000,00
	Reinforced concrete			350	CT	\$1,000.00	\$350,000.00
	QUANTITIES					PRICES	
вү			BY			CHECKED	
	Mark Le		Dan Mar			-	
DATE PE	REPAREI		DATE PREPARE	D		PEER REVIEW	
	April 20	, 2006					

SHEET\_6\_ OF \_\_9 \_\_

FEA	TUR	E:	PROJEC	CT:				
		ve Nos. 2A & 2B				Salton Sea		
Mid-	-Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal	
Wat	er Co	onveyance Components	REGION:	LC		LEVEL:	Apr-06	
			FILE:					
<u> </u>	-			C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 2	2 MSB est	
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Pup Fish Channel, 0 cfs, 7.1 mi						
		Excavation		77,250	CY	\$7.00	\$540,750.00	
		Compacted embankment		6,100	CY	\$6.00	\$36,600.00	
		Unreinforced concrete canal lining	g	4,885	CY	\$500.00	\$2,442,500.00	
		QUANTITIES				PRICES		
BY		407.411111E0	ву			CHECKED		
	Mark Lea	avitt Steve Robertson	Dan Mar					
DATE P	REPARED		DATE PREPARE	ED.		PEER REVIEW		
	April 20,	2006						

SHEET\_\_7\_\_ OF \_\_9 \_\_

FEA	TUR	E:	PROJEC	T:				
Alte	rnati	ive Nos. 2A & 2B				Salton Sea		
Mid-	Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal	
Wate	er C	onveyance Components	REGION:	LC	PRICE	LEVEL:	Apr-06	
			FILE:				·	
				C:\ALL\SEA\2007\[	Conveyance_	_Worksheets1-10.xls]Alternative 2	MSB est	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		River Diversion						
		Diversion structure		4 000	0) (	<b>A</b> 2 2 2 2	<b>*</b>	
		48" Rock riprap		1,200	CY	\$90.00	\$108,000.00	
		Sheet pile cutoff		7,500	SF	\$35.00	\$262,500.00	
		Whitewater River settling basin			0)/	<b>#</b> 40.00	400 000 00	
		Excavation		2,900	CY	\$10.00	\$29,000.00	
		Embankment	in in a	8,800	CY CY	\$5.00	\$44,000.00	
		Unreinforced concrete canal	ining	205	CY	\$500.00	\$102,500.00	
		River Water Channel, 100 cfs, 4.7 mi		02 400	CV	¢7.00	¢654 700 00	
		Excavation		93,100 5,500	CY CY	\$7.00 \$6.00	\$651,700.00	
		Compacted embankment Unreinforced concrete canal lining		4,000	CY	\$500.00	\$33,000.00 \$2,000,000.00	
		5 Siphons, 50' head class		4,000	CY	φουυ.υυ	\$2,000,000.00	
		5.0' dia Precast reinf conc pip		1,000	LF	\$380.00	\$380,000.00	
		Excavation	6	18,000	CY	\$8.00	\$144,000.00	
		Backfill		17,000	CY	\$6.00	\$102,000.00	
		Reinforced concrete		70	CY	\$1,000.00	\$70,000.00	
		1 Cross drainage structures		70	O1	ψ1,000.00	Ψ7 0,000.00	
		48" dia Precast reinforced concrete   3 Bridges	oipe	110	LF	\$300.00	\$33,000.00	
		Reinforced concrete River Water Channel, 69 cfs, 11.2 mi		110	CY	\$1,000.00	\$110,000.00	
		Excavation		165,500	CY	\$7.00	\$1,158,500.00	
		Compacted embankment		12,250	CY	\$6.00	\$73,500.00	
		Unreinforced concrete canal lining		8,000	CY	\$500.00	\$4,000,000.00	
		4 Siphons, 50' head class				•		
		4.0' dia Precast reinf conc pip	е	800	LF	\$300.00	\$240,000.00	
		Excavation		12,000	CY	\$8.00	\$96,000.00	
		Backfill		11,500	CY	\$6.00	\$69,000.00	
		Reinforced concrete		40	CY	\$1,000.00	\$40,000.00	
		5 Cross drainage structures		500		#200.00	<b>#450,000,00</b>	
		48" dia Precast reinforced concrete	oipe	500	LF	\$300.00	\$150,000.00	
		7 Bridges		220	CY	¢4 000 00	\$220,000,00	
		Reinforced concrete River Water Distrib'n Channel, 69 cfs	. 10 mi	220	UT	\$1,000.00	\$220,000.00	
		Excavation	5, 1.U IIII	14,800	CY	\$7.00	\$103,600.00	
		Compacted embankment		1,100	CY	\$6.00	\$6,600.00	
		Unreinforced concrete canal lining		720	CY	\$500.00	\$360,000.00	
		Cross drainage structures		120	U I	φουυ.υυ	ψουυ,υυυ.υυ	
		48" dia Precast reinforced concrete	oipe	100	LF	\$300.00	\$30,000.00	
	40 dia 1100dot 10iiilo100d 0011010te p			100		ψ000.00	Ψου,ουσ.ου	
		QUANTITIES	PRICES					
BY			BY CHECKED					
	Mark Le		Dan Mar	,				
	ATE PREPARED			D		PEER REVIEW		
	April 20	, 2006						

SHEET\_\_8\_\_ OF \_\_9 \_\_

FEA	TUR	E:	PROJEC	CT:				
		ve Nos. 2A & 2B				Salton Sea		
Mid	-Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal	
Wat	er Co	onveyance Components	REGION:	LC	PRICE	LEVEL:	Apr-06	
			FILE:	C-\ALL\SEA\2007\I	Convoyance	e_Worksheets1-10.xls]Alternative 2	MSB oct	
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
₹	Δ.							
		Pup Fish Channel, 0 cfs, 15.9 mi						
		Excavation		173,000	CY	\$7.00	\$1,211,000.00	
		Compacted embankment		13,600	CY	\$6.00	\$81,600.00	
		Unreinforced concrete canal lining		11,000	CY	\$500.00	\$5,500,000.00	
		QUANTITIES				PRICES		
вү			ВҮ			CHECKED		
DATE PI	Mark Le		Dan Mar DATE PREPARE	:D		PEER REVIEW		
	April 20,	2000						

SHEET\_\_9\_\_ OF \_\_9 \_\_

FEA		E:	PROJEC				SHEE1_9_ OF9
Alte	rnat	ive Nos. 2A & 2B				Salton Sea	
Mid-	-Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal
		onveyance Components	REGION:	LC		LEVEL:	Apr-06
,,,,,	J, J	on of the second	FILE:	LU	INICL	. <u></u> ¥ <u></u> .	∆b1-00
				C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative	2 MSB est
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
ACCC	PAY	BECOM HOW	OODL	QOANTITI	ONT	ONITTRIOE	AWOUNT
		SE Quadrant					
		Sea Water Pipeline, 85 cfs, 15.2 mi,	136' head				
		4.5' dia Steel pipe		15.2	Mi	\$2,500,000.00	\$38,000,000.00
		Regulating tank tower (200,000 gal, 135 ft tall)		1.0	Ea.		\$980,000.00
		Sea Water Pumping Plant, 85 cfs, 17	8' TDH		LS		\$8,500,000.00
		Structure Improvements					,
		Waterways					
		Pumps and motors					
		Access electrical					
		Misc. equipment					
		Switchyard					
		NE Quadrant					
		Sea Water Pipeline, 26 cfs, 27.8 mi,	104' head				
		3.5' dia Steel pipe		27.8	Mi	\$1,400,000.00	\$38,920,000.00
		Regulating tank tower (200,000 gal,		1.0	Ea.		\$950,000.00
		105 ft tall) Sea Water Pumping Plant, 26 cfs, 14	6' TDH		LS		\$2,600,000.00
		Structure Improvements					
		Waterways					
		Pumps and motors					
		Access electrical					
		Misc. equipment					
		Switchyard					
		<del>                                     </del>					
		Co.hk-t-1					Ф474 C40 050 00
		Subtotal	100/\				\$174,618,850.00 \$17,461,885,000
		Alternative Specific Unlisted Items (+/- Total w/ Alt. Specific Unlisted Items	1070)				\$17,461,885.00 \$192,080,735.00
		Mobilization (+/-5%)					\$9,600,000.00
		Subtotal w/Mobilization					\$201,680,735.00
		Castata. WWoomization					<u></u>
	OHANTITIES					DDICES	
BY		QUANTITIES	BY			PRICES CHECKED	
DΤ	Mark Le	eavitt Steve Robertson	BY Dan Mar			CHECKED	
DATE PE			DATE PREPARE	D		PEER REVIEW	
	April 20, 2006					_	

# **Attachment 2B**

Cost Estimate Worksheets for Alternative No. 2B: Mid-Sea Barrier with South Marine Lake – Sand Barrier without Stone Columns

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_2\_\_

				PROJE	CT:					
Alteri	native	No. 2B			Salton Se	a Res	storation Feas	ibility Study		
Mid-S	ea Ba	arrier/South M	larine Lake	WOID:		ESTI	MATE LEVEL:	Appraisal		
Sand	Barri	er w/o Stone (	Columns Embankment Design	REGION			E LEVEL:	• •		
			3	FILE:						
					C:\ALL\SEA\2007\ICos	NLL\SEA\2007\[Cost Estimate by Kleinfelder 12-18-06.xls]Alternative 2B				
⊨	5							,		
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNI	T UNIT PRICE	AMOUNT		
A		Mid-Sea Barrie	r							
	1	Dredging			10,111,200	CY	ý \$6.70	\$67,745,040		
	2	Type A Sand			6,696,800	CY	,			
		Type A Sand-Barg	e Haul		3,348,400	CY		\$56,520,993		
		Type A Sand-Truc	k Haul		3,348,400	CY	\$20.96	\$70,182,464		
	3	Type B Sand/Grav	el		3,217,500	CY	,			
		Type B Sand/Grav	el-Barge Haul		1,608,750	CY	′ \$13.51	\$21,734,21		
		Type B Sand/Grav	el-Truck Haul		1,608,750	CY	′ \$18.83	\$30,292,763		
	4	Filter Rock (Fine a	nd Coarse)		0	CY	\$0.00	\$0		
	5	Riprap			2,816,000	CY				
		Riprap-Barge Haul Riprap-Truck Haul			1,886,720 929,280	CY CY		\$56,752,533 \$31,223,803		
	6	Stone Columns			0	FT	\$0.00	\$(		
	7	Soil-cement-hento	nite slurry wall without membrane		3,791,700	SF	\$10.12	\$38,372,00		
		CON CONTON DON'T	and starry war warrout membrane		0,701,700	- Ci	Ψ10.12	Ψ00,012,00		
	8	Wick Drains			7,803,400	FT	\$5.37	\$41,904,25		
		SUBTOTAL (S	Sheet 1 of 2)					\$414,728,07		
		QI	JANTITIES			PF	RICES			
вү			CHECKED	вү			CHECKED			
J. Yu			R. Allen/C. Spandau	M. Pauletto			P. Martinson			
DATE PREF	PARED		PEER REVIEW	DATE PREPAR	RED		PEER REVIEW			
	08/25/06			1	01/25/07					

#### **ESTIMATE WORKSHEET**

SHEET\_2\_ OF \_2\_

FEAT	JRE:			PROJE	ECT:			
		No. 2B			Salton Se	a Resto	oration Feas	sibility Study
Mid-S	ea Ba	nrrier/South M	arine Lake	WOID:		ESTIM <i>A</i>	ATE LEVEL:	Appraisal
Sand	Barri	er w/o Stone (	Columns Embankment Design	REGION	l:	PRICE I	LEVEL:	
				FILE:				
					C:\ALL\SEA\2007\[Cos	t Estimate by I	Kleinfelder 12-18-06.xl	s]Alternative 2B
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
В		Habitat Ponds						
	1	Habitat Ponds			21,700	ACRE	\$13,473.00	\$292,364,100
			ation geogrid replacement and embankment		,,		<b>,</b> , , , , , , , , , , , , , , , , , ,	<del>*************************************</del>
		SUBTOTAL (S						\$292,364,100
		SUBTOTAL (S	sneet 1 01 2)					\$414,728,079
		Subtotal Cons	struction Costs					\$707,092,179
		OI	JANTITIES			PRIC	:FS	
ву		Q.	CHECKED	ву			IECKED	
J. Yu			R. Allen/C. Spandau	M. Pauletto			Martinson	
DATE PREP	ARED 08/25/06		PEER REVIEW	DATE PREPA	01/25/07	PE	ER REVIEW	
	30,20,00				0.720/01			

# **ESTIMATE WORKSHEET**

FE/	١TU	RE:		PROJEC	CT:			
Alte	erna	ntive Nos. 2	A and 2B		Salton		storation F Study	easibility
Mia	l-Se	a Barrier/Sc	outh Marine Lake	WOID:		ESTIM	ATE LEVEL	Appraisal
Hak	oitat	<b>Ponds Dee</b>	p Excavation	REGION:		PRICE	LEVEL:	
	-		•	FILE:				
					C:\ALL\SEA\2006	new\[HabitatP	ondDeepExc.xls]Alt	2A & 2B
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Habitat Pon	ds Deep Excavation					
		Excavation	7-foot excavation in the dry using		49,013,067	CY	\$6.50	\$318,584,933
		conventional exca	avation techniques to remove soft acres deep excavation per 2,500					
		(acres of ponds)						
		Subtotal Co	nstruction Costs					\$318,584,933
								40.0,00.,000
		Mobilization Subtotal Co	5% (+/-) ntract Costs					\$15,930,000 \$334,514,933
		QU	ANTITIES			PRICE	S	
BY DATE F	M. Spe		CHECKED  J. Cunningham  PEER REVIEW		n September 30, 20 Alternatives and 0		ea Restoration Proj es	ect, Feasibility
	10/12/0	16						

SHEET\_\_1\_\_ OF \_\_9 \_\_

FEA	TUR	E: F	PROJECT:							
Alte	rnat	ive Nos. 2A & 2B				Salton Sea				
Mid-	-Sea	Barrier/South Marine Lake V	VOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Wat	er C	onveyance Components	REGION:	LC	PRICE	LEVEL:	Apr-06			
			ILE:				•			
		ľ		C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 2	MSB est			
PLANT ACCOUNT	РАУ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SW Left Quadrant								
		River Diversion								
		Diversion structure								
		48" Rock riprap		335	CY	\$90.00	\$30,150.00			
		Sheet pile cutoff		2,900	SF	\$35.00	\$101,500.00			
		New River settling basin								
		Excavation		11,200	CY	\$8.00	\$89,600.00			
		Embankment		40,600	CY	\$5.00	\$203,000.00			
		Unreinforced concrete canal lin	ning	910	CY	\$500.00	\$455,000.00			
		River Water Channel, 69 cfs, 10.0 mi								
		Excavation		147,800	CY	\$7.00	\$1,034,600.00			
		Compacted embankment		10,950	CY	\$6.00	\$65,700.00			
		Unreinforced concrete canal lining		7,160	CY	\$500.00	\$3,580,000.00			
		12 Siphons, 50' head class								
		4.0' dia Precast reinf conc pipe	!	2,400	LF	\$300.00	\$720,000.00			
		Excavation		36,100	CY	\$8.00	\$288,800.00			
		Backfill		34,500	CY	\$6.00	\$207,000.00			
		Reinforced concrete		120	CY	\$1,000.00	\$120,000.00			
		2 Cross drainage structures 48" dia Precast reinforced cond	rata nina	200	LF	\$300.00	\$60,000.00			
		40 dia i recast reililorced conc	riete bibe	200	LI	ψ500.00	ψ00,000.00			
		River Water Distrib'n Channel, 69 cfs,	12.6 mi							
		Excavation		186,250	CY	\$7.00	\$1,303,750.00			
		Compacted embankment		13,800	CY	\$6.00	\$82,800.00			
		Unreinforced concrete canal lining		9,050	CY	\$500.00	\$4,525,000.00			
		8 Siphons, 50' head class								
		4.0' dia Precast reinf conc pipe	!	1,600	LF	\$300.00	\$480,000.00			
		Excavation		24,000	CY	\$8.00	\$192,000.00			
		Backfill		23,000	CY	\$6.00	\$138,000.00			
		Reinforced concrete		100	CY	\$1,000.00	\$100,000.00			
		5 Cross drainage structures								
		48" dia Precast reinforced concrete	pipe	500	LF	\$300.00	\$150,000.00			
		9 Bridges								
		Reinforced concrete		280	CY	\$1,000.00	\$280,000.00			
		Pup Fish Channel, 0 cfs, 10.0 mi								
		Excavation		10,900	CY	\$7.00	\$76,300.00			
		Compacted embankment		8,550	CY	\$6.00	\$51,300.00			
		Unreinforced concrete canal lining		6,900	CY	\$500.00	\$3,450,000.00			
		QUANTITIES	PRICES							
BY						CHECKED				
<u> </u>	Mark Le	B' Bravitt Steve Robertson Da	an Mar							
DATE P	TE PREPARED		DATE PREPARED PEER REVIEW							
	April 20									

SHEET\_2\_ OF \_\_9 \_\_

Embankment	FEA		E:	PROJEC				SHEE1_2_ OF _9 _		
River Diversion   Diversion   Share Rideriston   Diversion   Diversion structure   A8* Rock riprap	Alte	rnat	ive Nos. 2A & 2B				Salton Sea			
River Diversion   Diversion   Share Rideriston   Diversion   Diversion structure   A8* Rock riprap				WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal		
PILE:   CAULISEASONYCorwaystics   Workshares 1-10.00/Notember 2 M50 est										
DESCRIPTION   CODE   QUANTITY   UNIT   UNIT PRICE   AMOUNT		J. <b>J</b>	en ejanes components			,oL		Zhi-oo		
River Diversion   Diversion   Sheet pile cutoff   Sheet pile cut					C:\ALL\SEA\2007\t	Conveyance	Worksheets1-10 vls14ltarnative 2	MSR est		
River Diversion	ᆫ片	Σ			V 1.L. (OLA (2007 (	Conveyance_				
Diversion structure	PLANT	PAY ITE	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
Diversion structure			River Diversion							
A8* Rock riprap										
Sheet pile cutoff					330	CY	\$90.00	\$29,700.00		
New River settling basin										
Excavation					,		, , , , ,	+ - ,		
Embankment					2,200	CY	\$10.00	\$22,000.00		
Unreinforced concrete canal lining								\$41,500.00		
River Water Distrib'n Channel, 69 cfs, 6.4 mi   Excavation   95,000 CY   \$7.00 \$665,000.00				lining				\$100,000.00		
Excavation				_				•		
Compacted embankment				5, U.4 IIII	95 000	CY	\$7.00	\$665,000,00		
Unreinforced concrete canal lining										
10 Siphons, 50' head class										
4.0' dia Precast reinf conc pipe				,	4,000	O1	ψ300.00	Ψ2,300,000.00		
Excavation   30,000   CY   \$8.00   \$240,000.00     Backfill   29,000   CY   \$6.00   \$174,000.00     Reinforced concrete   100   CY   \$1,000.00   \$100,000.00     1 Bridges				) <del>C</del>	2 000	IF	\$300.00	\$600,000,00		
Backfill						1				
Reinforced concrete										
1 Bridges										
Reinforced concrete							Ţ:,= <b>30.00</b>	, , , , , , , , , , , , , , , , , , , ,		
BY Mark Leavitt Steve Robertson DATE PREPARED  PER REVIEW					30	CY	\$1,000.00	\$30,000.00		
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
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BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
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BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW										
Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW			QUANTITIES				PRICES			
DATE PREPARED DATE PREPARED PEER REVIEW	вү			вү			CHECKED			
		Mark Le	eavitt Steve Robertson	Dan Mar						
April 20, 2006	DATE PR	REPARE	D	DATE PREPARE	D		PEER REVIEW			
		April 20	, 2006							

SHEET\_3\_ OF \_\_9 \_\_

Compacted embankment         8,100         CY         \$6.00         \$48,600.00           Unreinforced concrete canal lining         5,300         CY         \$500.00         \$2,650,000.00           12 Cross drainage structures         48" dia Precast reinforced concrete pipe         1,200         LF         \$300.00         \$360,000.00           9 Bridges         9 Bridges         1,200         LF         \$300.00         \$360,000.00	FEA	TUR	E: F	PROJEC	T:				
### REGION: LC PRICE LEVEL: Apr-06 FILE:   CMLLOSEASOUT/Conveyance Windsheers-10.MM/Memorize 2 M050 est   CMLOSEASOUT/Conveyance WINDSHEERS-10.MM/Memorize 2 M050 est   CMLOSEASOUT/CONVEY	Alte	ernat	ive Nos. 2A & 2B				Salton Sea		
FILE:	Mid	-Sea	Barrier/South Marine Lake	VOID:	L165C	ESTIN	IATE LEVEL:	Appraisal	
FILE:	Wat	ter C	onvevance Components	REGION:	LC	PRICE	LEVEL:		
River Diversion   Diversion structure   A300   CY   \$90.00   \$387,000.00			,		-			<b>P</b>	
River Diversion   Diversion structure   48° Rock riprap   4,300 CY \$90.00 \$387,000.00 Sheet pile cutoff   13,300 SF \$35.00 \$465,500.00					C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 2	MSB est	
River Diversion   Diversion structure   48° Rock riprap   4,300 CY \$90.00 \$387,000.00 Sheet pile cutoff   13,300 SF \$35.00 \$465,500.00	LANT	Y ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
Diversion structure	AC P	PĀ							
A8" Rock riprap									
Sheet pile cutoff									
Alamo River settling basin   Excavation   5,700 CY   \$10.00   \$57,000.00									
Excavation   5,700 CY   \$10.00   \$57,000.00					13,300	SF	\$35.00	\$465,500.00	
Embankment							<b>A</b> ( <b>a a a</b>	<b></b>	
Unreinforced concrete canal lining					,				
River Water Channel, 274 cfs, 6.7 ml   Excavation   241,150   CY   \$7.00   \$1,688,050.00   Compacted embankment   12,500   CY   \$500.00   \$4,700,000.00   Unreinforced concrete canal lining   9,400   CY   \$500.00   \$4,700,000.00   12 Siphons, 50' head class   8.5' dia Precast reinf conc pipe   2,400   LF   \$1,200.00   \$2,880,000.00   Excavation   72,250   CY   \$8.00   \$578,000.00   Backfill   65,350   CY   \$6.00   \$392,100.00   CY   \$1,000.00   \$450,000.00   EXCAVARION   EXCAVARIO									
Excavation   241,150   CY   \$7.00   \$1,688,050.00   Compacted embankment   12,500   CY   \$6.00   \$75,000.00   CY   \$500.00   \$75,000.00   S75,000.00   S75,000.				ning	270	CY	\$500.00	\$135,000.00	
Compacted embankment			,				<b>A</b>		
Unreinforced concrete canal lining									
12 Siphons, 50' head class									
8.5' dia Precast reinf conc pipe					9,400	CY	\$500.00	\$4,700,000.00	
Excavation   72,250   CY   \$8.00   \$578,000.00     Backfill   65,350   CY   \$6.00   \$392,100.00     Reinforced concrete   450   CY   \$1,000.00   \$450,000.00     6 Cross drainage structures   48° dia Precast reinforced concrete pipe   760   LF   \$300.00   \$228,000.00     River Water Distrib'n Channel, 274 cfs, 8.0 mi   Excavation   288,000   CY   \$7.00   \$2,016,000.00     Compacted embankment   15,000   CY   \$6.00   \$90,000.00     Unreinforced concrete canal lining   11,150   CY   \$6.00   \$90,000.00     5 Siphons, 50° head class   5 Siphons, 50° head class   8.5° dia Precast reinf conc pipe   1,000   LF   \$1,200.00   \$1,200,000.00     Excavation   30,100   CY   \$8.00   \$240,800.00     Excavation   30,100   CY   \$8.00   \$163,800.00     Reinforced concrete   190   CY   \$1,000.00   \$190,000.00     5 Cross drainage structures   48° dia Precast reinforced concrete pipe   660   LF   \$300.00   \$198,000.00     1 Bridges   Reinforced concrete   60   CY   \$1,000.00   \$60,000.00     River Water Distrib'n Channel, 69 cfs, 7.4 mi   Excavation   109,400   CY   \$6.00   \$48,600.00     Compacted embankment   109,400   CY   \$500.00   \$765,800.00     Laccavation   109,400   CY   \$500.00   \$48,600.00     Laccavation   109,400   CY   \$500.00   \$2,650,000.00     Laccavation   109,400   CY   \$1,000.00   \$300,000.00     Laccavation   109,400   CY   \$1,000.00   \$3					0.400		<b>#4.000.00</b>	<b>#</b> 0.000.000.00	
Backfill				)					
Reinforced concrete					,				
6 Cross drainage structures							· ·		
A8" dia Precast reinforced concrete pipe   760   LF   \$300.00   \$228,000.00					450	CY	\$1,000.00	\$450,000.00	
River Water Distrib'n Channel, 274 cfs, 8.0 mi   Excavation   288,000 CY \$7.00 \$2,016,000.00			<u> </u>		700	1.5	¢200.00	<b>#</b> 220,000,00	
Excavation					760	LF	\$300.00	\$228,000.00	
Compacted embankment				5, 0.0 1111	288 000	CV	\$7.00	\$2.016.000.00	
Unreinforced concrete canal lining									
S Siphons, 50' head class   8.5' dia Precast reinf conc pipe   1,000					,				
8.5' dia Precast reinf conc pipe					11,130	Ci	ψ300.00	ψ3,373,000.00	
Excavation   30,100   CY   \$8.00   \$240,800.00     Backfill   27,300   CY   \$6.00   \$163,800.00     Reinforced concrete   190   CY   \$1,000.00   \$190,000.00     5 Cross drainage structures					1 000	1 F	\$1,200,00	\$1,200,000,00	
Backfill   27,300   CY   \$6.00   \$163,800.00     Reinforced concrete   190   CY   \$1,000.00   \$190,000.00     5 Cross drainage structures			<u> </u>	,	,				
Reinforced concrete									
5 Cross drainage structures						1			
A8" dia Precast reinforced concrete pipe   660   LF   \$300.00   \$198,000.00						<u> </u>	ψ1,000.00	Ψ100,000.00	
1 Bridges			Ü	oe	660	LF	\$300.00	\$198.000.00	
Reinforced concrete			<u> </u>				Ţ J J J J J	<b>+</b> 100,000100	
River Water Distrib'n Channel, 69 cfs, 7.4 mi					60	CY	\$1,000,00	\$60,000,00	
Excavation				7.4 mi			+ ,	* <b>,</b>	
Compacted embankment					109,400	CY	\$7.00	\$765,800.00	
12 Cross drainage structures			Compacted embankment		8,100	CY	\$6.00	\$48,600.00	
48" dia Precast reinforced concrete pipe			Unreinforced concrete canal lining		5,300	CY	\$500.00	\$2,650,000.00	
48" dia Precast reinforced concrete pipe					· · · · · · · · · · · · · · · · · · ·			•	
9 Bridges         300 CY \$1,000.00           QUANTITIES           BY         BY           Mark Leavitt         Steve Robertson           DATE PREPARED         DATE PREPARED   PEER REVIEW			<u> </u>	ре	1,200	LF	\$300.00	\$360,000.00	
BY BY Dan Mark Leavitt Steve Robertson DATE PREPARED PEER REVIEW  DATE PREPARED PEER REVIEW		Reinforced concrete							
BY CHECKED  Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW					300	CY		\$300,000.00	
Mark Leavitt Steve Robertson Dan Mar  DATE PREPARED DATE PREPARED PEER REVIEW							PRICES		
DATE PREPARED DATE PREPARED PEER REVIEW	BY		В	ву			CHECKED		
		Mark Le							
April 20, 2006	DATE P	REPARE	D	DATE PREPARED			PEER REVIEW		
		April 20	, 2006						

SHEET\_\_4\_\_ OF \_\_9 \_\_

FEA	TUR	E:	PROJEC	CT:				
Alte	rnati	ive Nos. 2A & 2B				Salton Sea		
Mid-	Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	NATE LEVEL:	Appraisal	
Wat	er Co	onveyance Components	REGION:	LC		LEVEL:	Apr-06	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<b>.</b> .		FILE:				7.0.00	
				C:\ALL\SEA\2007\[	Conveyance	e_Worksheets1-10.xls]Alternative 2	MSB est	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Pup Fish Channel, 0 cfs, 6.7 mi						
		Excavation		73,000	CY	\$7.00	\$511,000.00	
		Compacted embankment		5,800	CY	\$6.00	\$34,800.00	
		Unreinforced concrete canal lining	)	4,650	CY	\$500.00	\$2,325,000.00	
						+		
		QUANTITIES			1	PRICES		
вү			вү			CHECKED		
	Mark Le	avitt Steve Robertson	Dan Mar					
DATE PF		)	DATE PREPARE	ED.		PEER REVIEW		
	, 0,							

SHEET\_\_5\_\_ OF \_\_9 \_\_

FEA		F.	PROJEC				SHEE1_5_ OF _9 _	
. –, .			··········	′ • •				
Alte	rnati	ive Nos. 2A & 2B				Salton Sea		
			WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal	
Wat	er C	onveyance Components	REGION:	LC		LEVEL:	Apr-06	
2201		,	FILE:				7. <b>p</b> . 00	
				C:\ALL\SEA\2007\[0	Conveyance	_Worksheets1-10.xls]Alternative 2	2 MSB est	
μŸ	Ε							
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		River Diversion						
		Diversion structure		4.000	01/	<b>#00.00</b>	<b>#400 000 00</b>	
		48" Rock riprap		1,200	CY	\$90.00	\$108,000.00	
		Sheet pile cutoff		7,500	SF	\$35.00	\$262,500.00	
		Whitewater River settling basin Excavation		2 000	CY	\$10.00	¢20,000,00	
		Excavation Embankment		2,900 8,800	CY	\$5.00	\$29,000.00 \$44,000.00	
		Unreinforced concrete canal I	ining	205	CY	\$5.00	\$102,500.00	
		River Water Channel, 100 cfs, 4.2 mi	U	203	Ci	φ500.00	\$102,500.00	
		Excavation		83,200	CY	\$7.00	\$582,400.00	
		Compacted embankment		4,875	CY	\$6.00	\$29,250.00	
		Unreinforced concrete canal lining		3,575	CY	\$500.00	\$1,787,500.00	
		3 Cross drainage structures		3,373	01	ψ500.00	ψ1,707,300.00	
		48" dia Precast reinforced concrete p	nine	360	LF	\$300.00	\$108,000.00	
		2 Bridges	,,po			φοσο.σσ	ψ100,000.00	
		Reinforced concrete		75	CY	\$1,000.00	\$75,000.00	
		River Water Channel, 69 cfs, 2.9 mi			<u> </u>	<b>\$1,000.00</b>	ψ. σ,σσσ.σσ	
		Excavation		42,900	CY	\$7.00	\$300,300.00	
		Compacted embankment		3,200	CY	\$6.00	\$19,200.00	
		Unreinforced concrete canal lining		2,100	CY	\$500.00	\$1,050,000.00	
		3 Siphons, 50' head class						
		4.0' dia Precast reinf conc pip	е	600	LF	\$300.00	\$180,000.00	
		Excavation		9,000	CY	\$8.00	\$72,000.00	
		Backfill		8,600	CY	\$6.00	\$51,600.00	
		Reinforced concrete		30	CY	\$1,000.00	\$30,000.00	
		1 Cross drainage structures						
		48" dia Precast reinforced concrete p	oipe	100	LF	\$300.00	\$30,000.00	
		2 Bridges						
		Reinforced concrete		65	CY	\$1,000.00	\$65,000.00	
		River Water Distrib'n Channel, 69 cfs	s, 14.7 mi			4	<b>A</b> . =========	
		Excavation		217,500	CY	\$7.00	\$1,522,500.00	
		Compacted embankment		16,100	CY	\$6.00	\$96,600.00	
		Unreinforced concrete canal lining		10,600	CY	\$500.00	\$5,300,000.00	
		9 Siphons, 50' head class		4 000		<b>#</b>	<b>#</b> F40 000 00	
		4.0' dia Precast reinf conc pip	е	1,800	LF	\$300.00	\$540,000.00	
		Excavation		27,000	CY	\$8.00	\$216,000.00	
	Backfill			26,000	CY	\$6.00	\$156,000.00	
	Reinforced concrete			85	CY	\$1,000.00	\$85,000.00	
	11 Bridges			050	CY	¢4 000 00	<b>¢</b> 250,000,00	
	Reinforced concrete			350	CT	\$1,000.00	\$350,000.00	
	QUANTITIES					PRICES		
вү			BY CHECKED					
	Mark Le		Dan Mar			-		
DATE PE	REPAREI		DATE PREPARE	D		PEER REVIEW		
	April 20	, 2006	DATE PREPARED					

SHEET\_6\_ OF \_\_9 \_\_

FEA	EATURE:		PROJECT:							
		ve Nos. 2A & 2B				Salton Sea				
Mid-	-Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Wat	er Co	onveyance Components	REGION:	LC		LEVEL:	Apr-06			
			FILE:							
<u> </u>	-			C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 2	e 2 MSB est			
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		Pup Fish Channel, 0 cfs, 7.1 mi								
		Excavation		77,250	CY	\$7.00	\$540,750.00			
		Compacted embankment		6,100	CY	\$6.00	\$36,600.00			
		Unreinforced concrete canal lining	g	4,885	CY	\$500.00	\$2,442,500.00			
		QUANTITIES	PRICES							
BY		407.411111E0	ву			CHECKED				
	Mark Lea	avitt Steve Robertson	Dan Mar			OHEORED				
DATE P	REPARED		DATE PREPARE	ED.		PEER REVIEW				
	April 20,	2006								

SHEET\_\_7\_\_ OF \_\_9 \_\_

FEA	TUR	E:	PROJEC	T:				
Alte	rnati	ive Nos. 2A & 2B				Salton Sea		
Mid-	Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal	
Wate	er C	onveyance Components	REGION:	LC	PRICE	LEVEL:	Apr-06	
			FILE:				·	
				C:\ALL\SEA\2007\[	Conveyance_	_Worksheets1-10.xls]Alternative 2	MSB est	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		River Diversion						
		Diversion structure		4 000	0) (	<b>A</b> 2 2 2 2	<b>*</b>	
		48" Rock riprap		1,200	CY	\$90.00	\$108,000.00	
		Sheet pile cutoff		7,500	SF	\$35.00	\$262,500.00	
		Whitewater River settling basin			0)/	<b>#</b> 40.00	400 000 00	
		Excavation		2,900	CY	\$10.00	\$29,000.00	
		Embankment	in in a	8,800	CY CY	\$5.00	\$44,000.00	
		Unreinforced concrete canal	ining	205	CY	\$500.00	\$102,500.00	
		River Water Channel, 100 cfs, 4.7 mi		02 400	CV	¢7.00	¢654 700 00	
		Excavation		93,100 5,500	CY CY	\$7.00 \$6.00	\$651,700.00	
		Compacted embankment Unreinforced concrete canal lining		4,000	CY	\$500.00	\$33,000.00 \$2,000,000.00	
		5 Siphons, 50' head class		4,000	CY	φουυ.υυ	\$2,000,000.00	
		5.0' dia Precast reinf conc pip		1,000	LF	\$380.00	\$380,000.00	
		Excavation	6	18,000	CY	\$8.00	\$144,000.00	
		Backfill		17,000	CY	\$6.00	\$102,000.00	
		Reinforced concrete		70	CY	\$1,000.00	\$70,000.00	
		1 Cross drainage structures		70	O1	ψ1,000.00	Ψ7 0,000.00	
		48" dia Precast reinforced concrete   3 Bridges	oipe	110	LF	\$300.00	\$33,000.00	
		Reinforced concrete River Water Channel, 69 cfs, 11.2 mi		110	CY	\$1,000.00	\$110,000.00	
		Excavation		165,500	CY	\$7.00	\$1,158,500.00	
		Compacted embankment		12,250	CY	\$6.00	\$73,500.00	
		Unreinforced concrete canal lining		8,000	CY	\$500.00	\$4,000,000.00	
		4 Siphons, 50' head class				•		
		4.0' dia Precast reinf conc pip	е	800	LF	\$300.00	\$240,000.00	
		Excavation		12,000	CY	\$8.00	\$96,000.00	
		Backfill		11,500	CY	\$6.00	\$69,000.00	
		Reinforced concrete		40	CY	\$1,000.00	\$40,000.00	
		5 Cross drainage structures		500		#200.00	<b>#450,000,00</b>	
		48" dia Precast reinforced concrete	oipe	500	LF	\$300.00	\$150,000.00	
		7 Bridges		220	CY	¢4 000 00	\$220,000,00	
		Reinforced concrete River Water Distrib'n Channel, 69 cfs	. 10 mi	220	UT	\$1,000.00	\$220,000.00	
		Excavation	5, 1.U IIII	14,800	CY	\$7.00	\$103,600.00	
		Compacted embankment		1,100	CY	\$6.00	\$6,600.00	
	Unreinforced concrete canal lining			720	CY	\$500.00	\$360,000.00	
	1 Cross drainage structures  48" dia Precast reinforced concrete pi			120	O I	φουυ.υυ	ψουυ,υυυ.υυ	
			oipe	100	LF	\$300.00	\$30,000.00	
			- ·   ~ ~	100		ψ000.00	Ψου,ουσ.ου	
		QUANTITIES	PRICES					
BY			BY CHECKED					
	Mark Le		Dan Mar					
DATE PR			DATE PREPARED PEER REVIEW					
	April 20	, 2006						

SHEET\_\_8\_\_ OF \_\_9 \_\_

FEA	ATURE:		PROJECT:							
		ve Nos. 2A & 2B				Salton Sea				
Mid	-Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Wat	er Co	onveyance Components	REGION:	LC	PRICE	LEVEL:	Apr-06			
			FILE:	C-\ALL\SEA\2007\I	Convoyance	e_Worksheets1-10.xls]Alternative 2	MSB oct			
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
₹	Δ.									
		Pup Fish Channel, 0 cfs, 15.9 mi								
		Excavation		173,000	CY	\$7.00	\$1,211,000.00			
		Compacted embankment		13,600	CY	\$6.00	\$81,600.00			
		Unreinforced concrete canal lining		11,000	CY	\$500.00	\$5,500,000.00			
	QUANTITIES					PRICES				
вү			ВҮ			CHECKED				
DATE PI	Mark Le		Dan Mar DATE PREPARE	:D		PEER REVIEW				
	April 20,	2000								

SHEET\_\_9\_\_ OF \_\_9 \_\_

FEA		E:	PROJEC				SHEE1_9_ OF9		
Alte	rnat	ive Nos. 2A & 2B				Salton Sea			
Mid-	-Sea	Barrier/South Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal		
		onveyance Components	REGION:	LC		LEVEL:	Apr-06		
,,,,,	J, J	on of the second	FILE:	LU	INICL	. <u></u> ¥ <u></u> .	∆b1-00		
				C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative	2 MSB est		
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
ACCC	PAY	BECOM HOW	OODL	QOANTITI	ONT	ONITTRIOE	AWOUNT		
		SE Quadrant							
		Sea Water Pipeline, 85 cfs, 15.2 mi,	136' head						
		4.5' dia Steel pipe		15.2	Mi	\$2,500,000.00	\$38,000,000.00		
		Regulating tank tower (200,000 gal, 135 ft tall)		1.0	Ea.		\$980,000.00		
		Sea Water Pumping Plant, 85 cfs, 17	8' TDH		LS		\$8,500,000.00		
		Structure Improvements							
		Waterways							
		Pumps and motors							
		Access electrical							
		Misc. equipment							
		Switchyard							
		NE Quadrant							
		Sea Water Pipeline, 26 cfs, 27.8 mi,	104' head						
		3.5' dia Steel pipe		27.8	Mi	\$1,400,000.00	\$38,920,000.00		
		Regulating tank tower (200,000 gal,		1.0	Ea.		\$950,000.00		
		105 ft tall) Sea Water Pumping Plant, 26 cfs, 14	6' TDH		LS		\$2,600,000.00		
		Structure Improvements							
		Waterways							
		Pumps and motors							
		Access electrical							
		Misc. equipment							
		Switchyard							
		<del>                                     </del>							
		Co.hk-t-1					Ф474 C40 050 00		
		Subtotal	100/\				\$174,618,850.00 \$17,461,885,000		
		Alternative Specific Unlisted Items (+/- Total w/ Alt. Specific Unlisted Items	1070)				\$17,461,885.00 \$192,080,735.00		
		Mobilization (+/-5%)					\$9,600,000.00		
		Subtotal w/Mobilization					\$201,680,735.00		
		Castata. WWoomization					<u></u>		
	OUANTITIES					DDICES			
BY		QUANTITIES	PRICES						
DΤ	Mark Le	eavitt Steve Robertson	BY CHECKED  Dan Mar			CHECKED			
DATE PE			DATE PREPARE	D		PEER REVIEW			
	April 20								

# **Attachment 3A**

Cost Estimate Worksheets for Alternative No. 3A: Concentric Lakes – Sand Dikes with Stone Columns (Imperial Group Alternative)

#### **ESTIMATE WORKSHEET**

SHEET\_1\_ OF \_2\_

				PROJECT:						
Altern	ative	No. 3A			Salton Se	ea Restoration Feasibility Study				
		Lakes		WOID:		ESTIMA	TE LEVEL:	Appraisal		
Sand	Dikes	with Stone C	olumns Embankment Design	REGION:	:	PRICE L				
				FILE:						
					C:\ALL\SEA\2007\[Cos	t Estimate - ust	or - 12-18-06.xls]Alterna	ative 3A		
PLANT ACCOUNT	РАУ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
		Concentric Dik	es							
	1	Dredging			129,245,600	CY	\$6.70	\$865,945,520		
	2	Type A Sand-Truck	s Haul		120,887,800	CY	\$31.93	\$3,859,947,454		
	3	Type B Sand/Grave	el-Truck Haul		10,803,716	CY	\$31.80	\$343,558,169		
	4	Filter Rock (Fine a	nd Coarse)-Truck Haul		0	CY	\$0.00	\$0		
	5	Riprap-Truck Haul			32,070,500	CY	\$50.70	\$1,625,974,350		
	6	Stone Columns			27,325,100	FT	\$45.92	\$1,254,768,592		
	7	Soil-cement-bento	nite slurry wall without membrane		99,328,900	SF	\$6.00	\$595,973,400		
	8	Wick Drains			87,642,720	FT	\$5.17	\$453,112,862		
		SUBTOTAL (S	,					\$8,999,280,347		
		QL	JANTITIES			PRIC	ES			
BY M. Spears			CHECKED  D. Wiltshire	Unit prices are	e revised (December 2	0, 2006) from t	he September 2006 R	estoration of the Salton		
DATE PREP	ARED		PEER REVIEW		Embankment Design					
	12/20/06									

#### ESTIMATE WORKSHEET SHEET\_2\_OF\_2\_

FEATU				PROJECT: Salton Sea Restoration Feasibility Stud					
Alterna Conce				WOID:			TE LEVEL:	Appraisal	
Sand I	Dikes	with Stone C	olumns Embankment Design	REGION	:	PRICE L			
			•	FILE:					
					C:\ALL\SEA\2007\[Co	st Estimate - usb	r - 12-18-06.xls]Altern	ative 3A	
F K	Σ								
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		SUBTOTAL (S	•					\$0	
		SUBTOTAL (S	heet 1 of 2)					\$8,999,280,347	
		Subtotal Cons	struction Costs - 4-Rings					\$8,999,280,347	
		Subtotal Cons	struction Costs - 3-Rings (75% of 4-Rings Cos	sts)				\$6,749,460,260	
			<b>J</b> . (					, , , , , , , , , ,	
		Note: Elimination of	f the fourth ring reduces the construction quantiti	es by 25 per	cent.				
	QUANTITIES				PRICI	ES			
BY			CHECKED	Unit prices an	e revised (December 2	20, 2006) from th	e September 2006 R	estoration of the Salton	
M. Spears  DATE PREPA	ARED		D. Wiltshire PEER REVIEW	Unit prices are revised (December 20, 2006) from the September 2006 Restoration of the Salton Sea Volume 2: Embankment Designs and Optimization Study Administrative Draft by Kleinfelder, Inc.					
	12/20/06								

SHEET\_\_1\_\_ OF \_\_2\_\_

Altern	native	No. 3A		PROJE		ea Resto	ration Feas	ibility Study	
		Lakes		WOID:		ESTIMA	TE LEVEL:	Appraisal	
Cell D	ivide	rs Earthfill Dil	kes with Stone Columns	REGION	l:	PRICE L			
				FILE:					
					C:\ALL\SEA\2007\[Ce	ellDividersCosts-12-28-06.xls]Alternative 3A			
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Cell Dividers							
	1	Dredging			633,600	CY	\$6.70	\$4,245,120	
	2	Tune A Cond			274 000	CV	£24.00	¢44.002.002	
	2	Type A Sand			371,800	CY	\$31.99	\$11,893,882	
		T DO 1/0			004.000	0)/	004.00	<b>#7.450.740</b>	
	3	Type B Sand/Grave	ei		234,300	CY	\$31.80	\$7,450,740	
	4	Filter Rock (Fine a	nd Coorgo)			CY			
	4	Filler ROCK (Fille a	nu coarse)			Ci			
	5	Dinron			160 400	CY	¢50.70	Φο <b>Ε</b> 00 <b>Ε</b> 00	
	5	Riprap			169,400	Ci	\$50.70	\$8,588,580	
	6	Stone Columns			124 200	FT	\$4E.02	\$5,707,856	
	0	Stone Columns			124,300	ГІ	\$45.92	\$5,707,850	
	7	Soil coment hente	nite slurry wall without membrane		445,500	SF	\$6.00	\$2,673,000	
	,	Son-cement-bento	mite starry wan without membrane		445,500	SF	Φ0.00	\$2,673,000	
		Wick Drains			224 500	ГТ	ФE 47	Φ4 C77 CCF	
	8	WICK DIAINS			324,500	FT	\$5.17	\$1,677,665	
						4005			
	9	Habitat Ponds	ation geogrid replacement and embankment			ACRE			
		OLIDTOTAL (O	Shoot 4 of O					<b>\$40,000,040</b>	
		SUBTOTAL (S	Sheet 1 of 2)  JANTITIES			PRIC	ES	\$42,236,843	
ву		Q.C	CHECKED			0	_ <del>-</del>		
	M. Spears	3	J. Cunningham		e revised (December 2 Embankment Desig			Restoration of the Salton trative Draft by	
DATE PREP	PARED 10/12/06		PEER REVIEW	Kleinfelder, In			,	••	

SHEET\_2\_ OF \_2\_

FEAT	FEATURE:			PROJE	PROJECT:						
Altern	ative	No. 3A			Salton S	ea Resto	ration Feas	ibility Study			
Conce	entric	Lakes		WOID:		ESTIMA	TE LEVEL:	Appraisal			
Cell D	ividei	s Earthfill Dil	kes with Stone Columns	REGION: PRICE LEVEL:							
				FILE:							
					C:\ALL\SEA\2007\[C	CellDividersCosts-	12-28-06.xls]Alternativ	/e 3A			
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SUBTOTAL (S									
		SUBTOTAL (S	Sheet 1 of 2)					\$42,236,843			
		Subtotal Cons	struction Costs					\$42,236,843			
		Mobilization Subtotal Cont	5% (+/-) tract Costs					\$2,110,000 <b>\$44,346,843</b>			
		-									
		Ql	JANTITIES			PRIC	ES				
вү	M. Spears	•	CHECKED J. Cunningham					Restoration of the Salton			
DATE PREP	ARED 10/12/06		PEER REVIEW	Sea Volume 2 Kleinfelder, In		igns and Optimiz	zation Study Adminis	Suative Draft by			

SHEET\_\_1\_\_ OF \_\_1\_\_

Alternative Nos. 3A, 3B & 3C			PROJECT: Salton Sea Restoration Feasibility Study					
		Nos. 3A, 3B & 3C Lakes	WOID: ESTIMATE LEVEL: Apprai					
		nds and Deep Areas	REGION	1.	PRICE L		Appraisal	
Πανιιά	at 151a	nus and Deep Areas		l:	PRICEL	EVEL:		
			FILE:  C:\ALL\SEA\2006new\[HabitattslandsCosts.xls]Alternative 3A					
<b>-</b>	-	1		C:\ALL\SEA\2006new\	(HabitatIslands0	Costs.xls]Alternative 3.	A	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Habitat Islands and Deep Areas						
	1	Dredging		22,402,488	CY	\$6.70	\$150,096,668	
		Sea floor deposits and soft lacustrine materials suction dredged						
		and placed on adjacent Sea floor to create islands.						
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
		Subtotal Construction Costs				<del>                                     </del>	\$172,499,163	
		Custotal Construction Costs					ψ172,433,103	
		Mobilization 5% (+/-)					\$8,620,000	
		Subtotal Contract Costs					\$181,119,163	
				1		<del>                                     </del>	. , -,	
		QUANTITIES			PRIC	ES		
вү		CHECKED						
	M. Spear	s J. Cunningham					Volume 2: Embankment	
DATE PREP	ARED 10/12/06	PEER REVIEW	Designs and	Optimization Study Ad	Iministrative Dr	aft by Klleinfelder, Ir	nc.	

SHEET\_\_1\_\_ OF \_\_2\_\_

Alternative Nos. 3A, 3B and 3C			PROJE	Salton Sea Restoration Feasibility Study					
		Lakes		WOID:	WOID:		TE LEVEL:	Appraisal	
Conve	eyand	e Canals		REGION	l:	PRICE LEVEL:			
				FILE:					
					C:\ALL\SEA\2007\[Co	ncentricLakesC	onveyanceCosts-12-29	9-06.xls]Alternative 3	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Concentric Lak	es Conveyance Canals						
	1	Dredging			12,683,336	CY	\$6.70	\$84,978,352	
	2	Type A Sand			9,613,344	CY	\$31.99	\$307,530,873	
	3	Type B Sand/Grave	I		859,142	CY	\$31.80	\$27,320,729	
	4	Filter Rock (Fine an	d Coarse)			CY			
	5	Riprap			2,550,338	CY	\$50.70	\$129,302,135	
	6	Stone Columns			2,172,970	FT	\$45.92	\$99,782,791	
	7	Soil-cement-bentoni	ite slurry wall without membrane		7,898,918	SF	\$6.00	\$47,393,511	
	8	Wick Drains			6,969,600	FT	\$5.17	\$36,032,832	
		CHRTOTAL (C	hoot 1 of 2)					¢722.244.000	
		SUBTOTAL (S	JANTITIES			PRIC	ES	\$732,341,222	
BY CHECKED  M. Spears J. Cunningham  DATE PREPARED PEER REVIEW  10/18/06		Restoration o Administrativ	s, except for Item 9, and of the Salton Sea Volur or Draft by Klleinfelder Item 9 is from Reclam	e revised (Deco ne 2: Embanki , Inc.	ember 20, 2006) from ment Designs and Op	timization Study			

SHEET\_2\_ OF \_2\_

FEATURE: PROJE		PROJECT:						
Altern	ative	Nos. 3A, 3B a	and 3C		Salton Se	ea Resto	ration Feas	ibility Study
		Lakes		WOID:		ESTIMA	TE LEVEL:	Appraisal
Conve	evanc	e Canals		REGION	N:	PRICE I		•••
	,			FILE:				
					C:\ALL\SEA\2007\[Co	ncentricl akesC	onvevanceCosts-12-2	9-06 xls1Alternative 3
-	5						, , , , , , , , , , , , , , , , , , , ,	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	9	3.5" Unreinforced C	oncrete Canal Lining		58,967	CY	\$500.00	\$29,483,462
			-					
		SUBTOTAL (S	heet 2 of 2)					\$29,483,462
		SUBTOTAL (S	-					\$732,341,222
		Subtotal Cons	struction Costs					\$761,824,684
		Mobilization	5% (+/-)					\$38,090,000
		Alternative 3A	Subtotal Contract Costs					\$799,914,684
		Alternative 3E	3 Subtotal Contract Costs (77% of Alternative	3A Costs)				\$617,309,280
		Alternative 30	Subtotal Contract Costs (25% of Alternative	3A Costs)				\$202,783,291
		Note: Specific quar	ntities and costs calculated for Alternative 3A. Al	ternative 3B	and 3C costs		+	
		calculated relative to	o that of Alternative 3A. Percentages applied (77	'% and 25%				
		on the ratio of the 31	D and 30 total dive empatikment costs to that of	un.				
		QL	JANTITIES			PRIC	ES	
вү	M. Spears		CHECKED J. Cunningham	Restoration	es, except for Item 9, an	e revised (Dec ne 2: Embank	ember 20, 2006) from	
DATE PREF	ARED 10/18/06		PEER REVIEW		ve Draft by Klleinfelder r Item 9 is from Reclam		2, 2006 Approved Co	nveyance Estimate

# **Attachment 3B**

Cost Estimate Worksheets for Alternative No. 3B: Concentric Lakes – Sand Dikes without Stone Columns (Imperial Group Alternative)

#### **ESTIMATE WORKSHEET**

SHEET\_\_1\_\_ OF \_\_2\_\_

Alternative No. 3B					PROJECT: Salton Sea Restoration Feasibility Study					
Conce				WOID:		ESTIMATE LEVEL:		Appraisal		
			olumns Embankment Design	REGION	:	PRICE L				
			<b>G</b>	FILE:						
					C:\ALL\SEA\2007\[Cos	t Estimate - ust	e - usbr - 12-18-06.xls]Alternative 3B			
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
		Concentric Dik	es							
	1	Dredging			129,245,600	CY	\$6.70	\$865,945,520		
	2	Type A Sand-Trucl	k Haul		85,668,000	CY	\$31.99	\$2,740,519,320		
		Type A cana Traci	· · · · · · · · · · · · · · · · · · ·		00,000,000	0.	ψ01.33	ΨΣ,1-10,010,020		
	3	Type B Sand/Grave	el-Truck Haul		21,310,300	CY	\$31.80	\$677,667,540		
	4	Filter Rock (Fine a	nd Coarse)		0	CY	\$0.00	\$0		
	5	Riprap-Truck Haul			31,788,900	CY	\$50.70	\$1,611,697,230		
	6	Stone Columns				FT	\$0.00	\$0		
	7	Soil-cement-bento	nite slurry wall without membrane		99,328,900	SF	\$6.00	\$595,973,400		
	8	Wick Drains			87,642,500	FT	\$5.17	\$453,111,725		
		SUBTOTAL (S	heet 1 of 2)					\$6,944,914,735		
		Ql	JANTITIES			PRIC	ES			
BY M. Spears			CHECKED D. Wiltshire					estoration of the Salton rative Draft by Kleinfelder		
DATE PREPA	ARED 12/20/06		PEER REVIEW	Inc.				, , , , , , , , , , , , , , , , , , , ,		

#### **ESTIMATE WORKSHEET**

SHEET\_2\_ OF \_2\_

FEAT	URE:			PROJECT:				
•		No. 3B			Salton S			sibility Study
Conce	entric	Lakes		WOID:	WOID:		TE LEVEL:	Appraisal
Sand	Dikes	w/o Stone Co	olumns Embankment Design	REGIO	N:	PRICE L	.EVEL:	
				FILE:				
					C:\ALL\SEA\2007\[Co	ost Estimate - ust	or - 12-18-06.xls]Alterr	native 3B
. 5	Σ							
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SUBTOTAL (S	Sheet 2 of 2)					\$0
		SUBTOTAL (S	·					\$6,944,914,735
		Subtotal Cons	struction Costs - 4-Rings					\$6,944,914,735
		Subtotal Cons	struction Costs - 3-Rings (75% of 4-Rings Co	sts)				\$5,208,686,051
		Ql	JANTITIES			PRIC	ES	
вү			CHECKED					
M. Spears			D. Wiltshire	Sea Volume				Restoration of the Salton trative Draft by Kleinfelde
DATE PREP	ARED		PEER REVIEW	Inc.				
	12/20/06							

SHEET\_\_1\_\_ OF \_\_2\_\_

Alterr	Alternative No. 3B			Salton Sea Restoration Feasibility Study				
		Lakes		WOID:		ESTIMATE LEVEL:		Appraisal
Cell D	ivide	rs Earthfill Dil	res without Stone Columns	REGION	l:	PRICE L	EVEL:	
				FILE:				
	_	1			C:\ALL\SEA\2007\[Ce	IIDividersCosts-	12-28-06.xls]Alternativ	e 3B
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Cell Dividers						
		<u> </u>				o) (	40.00	
	1	Dredging			633,600	CY	\$6.70	\$4,245,120
	2	Type A Sand			530,200	CY	\$31.99	\$16,961,098
	3	Type B Sand/Grave	el		52,008	CY	\$31.80	\$1,653,854
	4	Filter Rock (Fine a	nd Coarse)			CY		
	5	Riprap			169,400	CY	\$50.70	\$8,588,580
	6	Stone Columns				FT		
	7	Soil-cement-bento	nite slurry wall without membrane		445,500	SF	\$6.00	\$2,673,000
	8	Wick Drains			325,248	FT	\$5.17	\$1,681,532
		SUBTOTAL (S	heet 1 of 2)					\$35,803,185
			JANTITIES		<u> </u>	PRIC	ES	<del>+,500,.00</del>
BY  DATE PREF	M. Spear	s	CHECKED J. Cunningham PEER REVIEW		: Embankment Desig			Restoration of the Salton trative Draft by
	10/12/06							

SHEET\_2\_ OF \_2\_

FEATURE: PROJECT:								
Altern	ative	No. 3B			Salton S	ea Resto	ration Feas	ibility Study
Conce	entric	Lakes		WOID:		ESTIMA	TE LEVEL:	Appraisal
Cell D	ivider	s Earthfill Dil	kes without Stone Columns	REGION: PRICE LEVEL:				
				FILE:				
					C:\ALL\SEA\2007\[C	ellDividersCosts-	12-28-06.xls]Alternativ	e 3B
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SUBTOTAL (S						<b>#25.002.405</b>
		SUBTOTAL (S	sheet 1 of 2)					\$35,803,185
		Subtotal Cons	struction Costs					\$35,803,185
		Mobilization Subtotal Cont	5% (+/-) tract Costs					\$1,790,000 <b>\$37,593,185</b>
		Ql	JANTITIES			PRIC	ES	
BY			CHECKED					
	M. Spears		J. Cunningham				the September 2006 I	Restoration of the Salton
DATE PREP			PEER REVIEW	Sea Volume 2 Kleinfelder, In		igns and Optimiz	audii Study Adminis	шашче рган ву
	10/12/06							

SHEET\_\_1\_\_ OF \_\_1\_\_

Alternative Nos. 3A, 3B & 3C			PROJECT: Salton Sea Restoration Feasibility Study					
		Nos. 3A, 3B & 3C Lakes	WOID: ESTIMATE LEVEL: Apprai					
		nds and Deep Areas	REGION	1.	PRICE L		Appraisal	
Πανιιά	at 151a	nus and Deep Areas		l;	PRICEL	EVEL:		
			FILE:  C:\ALL\SEA\2006new\[HabitattslandsCosts.xls]Alternative 3A					
<b>-</b>	-	1		C:\ALL\SEA\2006new\	(HabitatIslands0	Costs.xls]Alternative 3.	A	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Habitat Islands and Deep Areas						
	1	Dredging		22,402,488	CY	\$6.70	\$150,096,668	
		Sea floor deposits and soft lacustrine materials suction dredged						
		and placed on adjacent Sea floor to create islands.						
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						<del>                                     </del>		
						+		
		Subtotal Construction Costs				<del>                                     </del>	\$172,499,163	
		Custotal Construction Costs					ψ172,433,103	
		Mobilization 5% (+/-)					\$8,620,000	
		Subtotal Contract Costs					\$181,119,163	
				1		<del>                                     </del>	. , -,	
		QUANTITIES			PRIC	ES		
вү		CHECKED						
	M. Spear	s J. Cunningham					Volume 2: Embankment	
DATE PREP	ARED 10/12/06	PEER REVIEW	Designs and	Optimization Study Ad	Iministrative Dr	aft by Klleinfelder, Ir	nc.	

SHEET\_\_1\_\_ OF \_\_2\_\_

Alternative Nos. 3A, 3B and 3C			PROJE	Salton Sea Restoration Feasibility Study					
		Lakes		WOID:	WOID:		TE LEVEL:	Appraisal	
Conve	eyand	e Canals		REGION	l:	PRICE LEVEL:			
				FILE:					
					C:\ALL\SEA\2007\[Co	ncentricLakesC	onveyanceCosts-12-29	9-06.xls]Alternative 3	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Concentric Lak	es Conveyance Canals						
	1	Dredging			12,683,336	CY	\$6.70	\$84,978,352	
	2	Type A Sand			9,613,344	CY	\$31.99	\$307,530,873	
	3	Type B Sand/Grave	I		859,142	CY	\$31.80	\$27,320,729	
	4	Filter Rock (Fine an	d Coarse)			CY			
	5	Riprap			2,550,338	CY	\$50.70	\$129,302,135	
	6	Stone Columns			2,172,970	FT	\$45.92	\$99,782,791	
	7	Soil-cement-bentoni	ite slurry wall without membrane		7,898,918	SF	\$6.00	\$47,393,511	
	8	Wick Drains			6,969,600	FT	\$5.17	\$36,032,832	
		CHRTOTAL (C	hoot 1 of 2)					¢722.244.000	
		SUBTOTAL (S	JANTITIES			PRIC	ES	\$732,341,222	
BY CHECKED M. Spears J. Cunningham  DATE PREPARED PEER REVIEW  10/18/06		Restoration o Administrativ	s, except for Item 9, and of the Salton Sea Volur or Draft by Klleinfelder Item 9 is from Reclam	e revised (Deco ne 2: Embanki , Inc.	ember 20, 2006) from ment Designs and Op	timization Study			

SHEET\_2\_ OF \_2\_

FEAT	URE:			PROJI	ECT:			
Altern	ative	Nos. 3A, 3B á	and 3C		Salton Se	ea Resto	ration Feas	ibility Study
•		Lakes		WOID:		ESTIMA	TE LEVEL:	Appraisal
Conve	evanc	e Canals		REGION: PRICE LEVEL:				
	,			FILE:				
					C:\ALL\SEA\2007\[Co	ncentricl akesC	onvevanceCosts-12-2	9-06 xls1Alternative 3
⊢	-							
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	9	3.5" Unreinforced C	oncrete Canal Lining		58,967	CY	\$500.00	\$29,483,462
			-					
		SUBTOTAL (S	Sheet 2 of 2)					\$29,483,462
		SUBTOTAL (S						\$732,341,222
		Subtotal Cons	struction Costs					\$761,824,684
		Mobilization	5% (+/-)					\$38,090,000
		Alternative 3A	A Subtotal Contract Costs					\$799,914,684
		Alternative 3E	3 Subtotal Contract Costs (77% of Alternative	3A Costs)				\$617,309,280
		Alternative 30	Subtotal Contract Costs (25% of Alternative	3A Costs)				\$202,783,291
		Note: Specific quar	ntities and costs calculated for Alternative 3A. Al	ternative 3B	and 3C costs		+	
		calculated relative to	o that of Alternative 3A. Percentages applied (77	'% and 25%				
		on the ratio of the 3	B and 3C total dike embankment costs to that of	JA.				
	<u> </u>	QL	JANTITIES			PRIC	ES	
вү	M. Spears		CHECKED  J. Cunningham		es, except for Item 9, ar of the Salton Sea Volui	e revised (Dec	ember 20, 2006) from	
DATE PREP			PEER REVIEW	Administrati	ve Draft by Klleinfelder r Item 9 is from Reclam	, Inc.		·

### **Attachment 3C**

Cost Estimate Worksheets for Alternative No. 3C: Concentric Lakes - Earthfill Dikes with Geotubes<sup>®</sup> (Imperial Group Alternative)

SHEET\_\_1\_\_ OF \_\_2\_\_

			PROJE	CT:			SHEE1_1_ OFZ
Altern	ative	No. 3C		Salt	on Se	ea Restoration	Study
Conce	entric	Lakes	WOID:	L165C	ESTI	MATE LEVEL:	Appraisal
		kes with Geotubes® Embankment Design	REGION	LC		E LEVEL:	Oct-06
Laiun	ווו טוו	nes with declabes Embankment Design		LC	FKIC	L LLVLL.	061-06
			FILE:				
				C:\ALL\SEA\2007\[FIN	AL Geotul	oe Dikes Est Alt 3C 12-5-06	6.xls]Alternative 3C
PLANT ACCOUNT	ПEМ						
SCO PLA	РАҮ П	DESCRIPTION	CODE	QUANTITY	UNI	T UNIT PRICE	AMOUNT
¥	ď						
		Concentric Dikes - Total Length 255 Miles					
	1	Borrow Area Stripping		54,648,000	CY	′ \$3.50	\$191,268,000
		Strip borrow area using suction dredge and discharge					
		waste 0.25-mile away on Sea bottom, assume 1/3 no mud					
		volume, 1/3 shallow mud, & 1/3 deep mud volume cases					
	2	Construct Geotube Foundation Bund - Four Dikes					
		Foundation Bund 130 ft wide by 2 ft thick, geotextile tube filled with					
		soil material suction dredged near ring dike alignments - assume soil					
		material consists of clay, silt, and sand - assume two tube fillings					
		required					
	2A	Geotextile - assume 10% waste, assume five tubes joined together		281,166,000	SF	\$1.90	\$534,215,400
		horizontally, assume five tubes horizontally, perform stitching of					
		geotextile to form tubes					
	2B	Tube Filling - assume two tube fillings and 10% loss, material		10,256,000	CY	′ \$14.50	\$148,712,000
		suction dredged from adjacent borrow area, assume 0.25-mile					
		pumping of filling soil material					
	3	Construct Geotube Core - Four Dikes					
	Ŭ	Geotube core - 60 ft circumference geotube filled with soil material					
		suction dredged near ring dike aligments - assume soil material					
		consists of clay, silt, and sand - assume three tube fillings required					
	3A	Geotextile - assume 10% waste, assume geotube formed by		88,932,000	SF	\$1.60	\$142,291,200
		stitching geotextile to form single tube		, ,		,	, , , , ,
	3B	Tube Filling - assume three tube fillings and 10% loss, material		7,967,000	CY	′ \$14.50	\$115,521,500
		suction dredged from adjacent borrow area, assume 0.25-mile					
		pumping of filling soil material					
	4	Construct Dike Earthfill Cover - Four Dikes					
		Place earthfill cover by barge/clamshell using soil material from near					
		dike alignments - assume soil material consists of clay, silt, and sand					
		assume two placements required, allowing soil to consolidate, shape					
		dike surface after earthfill cover has consolidated					
	4A	Earthfill Dredging and Placement - assume a 1 cy loss for every		39,266,000	CY	s25.00 °	\$981,650,000
		1 cy soil placed due to slope runoff. Material placed w/3 cy clamshell					
		or modified dragline operation. Bucket fill factor assumed at 65%.					
	4B	Dike Surface Shaping - shape final dike surface to 5:1 (H:V) slopes		178,041,000	SF	\$0.30	\$53,412,300
		SUBTOTAL (Sheet 1 of 2)					\$2,167,070,400
		QUANTITIES			PF	RICES	
вү		CHECKED	вү			CHECKED	
R. Wiltshire		M. Spears		D. Donaldson			
DATE PREP	ARED	PEER REVIEW	DATE PREPAR			PEER REVIEW	
	12/04/00			04/25/07			
	12/04/06			01/25/07			

SHEET\_2\_ OF \_2\_

				PROJE	CT:			
Altern	ative	No. 3C			Salt	on Se	ea Restoration	n Study
Conce	entric	Lakes		WOID:		ESTII	MATE LEVEL:	Appraisal
			ubes® Embankment Design	REGION	l:	PRIC	E LEVEL:	Oct-06
			3	FILE:				
				FILE.	C:\ALL\SEA\2007\[FIN	AL Geotub	pe Dikes Est Alt 3C 12-5-0	06.xls]Alternative 3C
PLANT ACCOUNT	РАУ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNI	T UNIT PRICE	AMOUNT
	5	Slope Protection -	Four Dikes		3,517,000	TN	l \$32.50	\$114,302,500
	3		t thick and 4 ft high on upstream slope, assume		3,317,000	IIN	φ32.50	\$114,302,300
			feet, rock 1.60 tons/cubic yard, assume 10%					
			from Coolidge Mountain source, transport 5 miles					
			er to barge, transport to dike alignment - average					
		dike	0 miles, place from barge onto upstream slope of					
								•
		SUBTOTAL (S	Sheet 2 of 2)					\$114,302,500
		SUBTOTAL (S	heet 1 of 2)					\$2,167,070,400
		SUBTOTAL (S	· · · · · · · · · · · · · · · · · · ·					\$114,302,500
		Subtotal Co	onstruction Costs					\$2,281,372,900
		Subtotal Ct	Sharraction Coats					Ψ2,201,372,300
	<u>Techni</u>	cal concerns with th	nis alternative: It is Reclamation's opinion that o	onstructing	Concentric Lake	dikes us	ing Geotubes	
	would r	esult in significant sei	ismic, static, and constructability problems. Also,	a major con	cern is the Geotul	be's abil	ity to control	
	seepag	e. Based on these i	identified problems, the Geotube approach is p	probably no	ot feasible.			
	Recaus	se of the technical c	oncerns noted, this appraisal level cost estima	ate should	he considered w	ith cauti	ion	
	Decau.	se of the technical c	oncerns noted, this appraisal level cost estima	ite siloulu				
							1050	
		QU	JANTITIES			PF	RICES	
BY R. Wiltshire			CHECKED M. Spears	ВҮ	D. Donaldson		CHECKED	
DATE PREP	ARED		PEER REVIEW	DATE PREPA			PEER REVIEW	
	12/04/06				01/25/07			

SHEET\_\_1\_\_ OF \_\_2\_\_

				PROJE	CT:			
Alterna	ative i	No. 3C			Salt	on Sea	a Restoration	Study
Conce	ntric	Lakes		WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal
Cell Di	vider	s Earthfill Dik	res With Geotubes®	REGION	LC	PRICE	LEVEL:	Oct-06
				FILE:				
							0.1101.11.01.10.11	
⊢	-			(	C:\ALL\SEA\2007\[FIN	AL Geotube	eCellDividerCosts 12-5-06	6.xls]Alternative 3C
PLANT ACCOUNT	РАУ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Cell Dividers -	Total Length 1.5 Miles					
	1	Borrow Area Stripp	ping		215,000	CY	\$3.50	\$752,500
		Strip borrow area us	ing suction dredge and discharge					
		waste 0.25-mile awa	ay on Sea bottom, assume 1/3 no mud					
		volume, 1/3 shallow	mud, & 1/3 deep mud volume cases					
	2	Construct Geotube	Foundation Bund					
		Foundation Bund 13	0 ft wide by 2 ft thick, geotextile tube filled with					
		soil material suction	dredged near ring dike alignments - assume soil					
		material consists of	clay, silt, and sand - assume two tube fillings					
		required						
	2A	Geotextile - assume	e 10% waste, assume five tubes joined together		1,108,000	SF	\$1.90	\$2,105,200
		horizontally, assume	e five tubes horizontally, perform stitching of					
		geotextile to form tul	bes					
	2B	Tube Filling - assur	me two tube fillings and 10% loss, material		40,000	CY	\$14.50	\$580,000
		suction dredged from	n adjacent borrow area, assume 0.25-mile					
		pumping of filling so	il material					
	3	Construct Geotube						
			circumference geotube filled with soil material					
			r ring dike aligments - assume soil material					
	0.4		and sand - assume three tube fillings required		252.000	SF	<b>C4.00</b>	<b>\$500,000</b>
	3A		e 10% waste, assume geotube formed by		350,000	31	\$1.60	\$560,000
	a D	stitching geotextile to			24.000	CY	¢44.50	¢440.500
	3B	_	me three tube fillings and 10% loss, material		31,000	Ci	\$14.50	\$449,500
			n adjacent borrow area, assume 0.25-mile					
		pumping of filling so	ıl material					
	4	Canataurat Dika Far	ALCHI Cavar					
	4	Construct Dike Ear	using soil material suction dredged near ring dike					
			e soil material consists of clay, silt, and sand -					
		_	ents required, allowing soil to consolidate, shape					
			arthfill cover has consolidated					
	4A		and Placement - assume a 1 cy loss for every		155,000	CY	\$25.00	\$3,875,000
	471		to slope runoff. Material placed w/3 cy clamshell	·	100,000	01	Ψ20.00	ψο,στο,σσο
			operation. Bucket fill factor assumed at 65%.					
	4B		ing - shape final dike surface to 5:1 (H:V) slopes		702,000	SF	\$0.30	\$210,600
		Dino Gui lago Gilapi	onapo iniai ante sariace te c. i (i i. v) diopos		7 02,000	0.	φυ.σσ	Ψ210,000
		SUBTOTAL (Sheet	1 of 2)					\$8,532,800
			IANTITIES			PR	ICES	
вү			CHECKED	вү		ı	CHECKED	
M. Spears			R. Wiltshire	ī	D. Donaldson			
DATE PREPA	RED		PEER REVIEW	DATE PREPAR	ED		PEER REVIEW	
	12/05/06				01/25/07			

SHEET	2	OF	2

				PROJE	CT:			
Altern	ative	No. 3C			Salt	on Se	ea Restoration	Study
Conce	entric	Lakes		WOID:		ESTI	MATE LEVEL:	Appraisal
Cell D	ivide	rs Earthfill Dik	es With Geotubes®	REGION	l:	PRIC	E LEVEL:	Oct-06
				FILE:				
				1122.	C:\ALL\SEA\2007\IFIN	AL Geotul	peCellDividerCosts 12-5-06	5.xls1Alternative 3C
μË	Σ							•
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNI	T UNIT PRICE	AMOUNT
	_							
	5	Slope Protection			14,000	TN	\$32.50	\$455,000
		Place rock riprap 2 ft	thick and 4 ft high on upstream slope, assume					
		rock size 6-inch to 2	feet, rock 1.60 tons/cubic yard, assume 10%					
		loss, purchase rock f	rom Coolidge Mountain source, transport 5 miles					
		to Sea shore, transfe	er to barge, transport to dike alignment - average					
		barge transport of 20	miles, place from barge onto upstream slope of					
		dike						
		SUBTOTAL (S	heet 2 of 2)					\$455,000
		SUBTOTAL (Sh						\$8,532,800
		SUBTOTAL (Sh	neet 2 of 2)					\$455,000
		Subtotal Co	nstruction Costs					\$8,987,800
	Techni	ical concerns with th	is alternative: It is Reclamation's opinion that of	conetructing	Concentric Lake	dikas us	ing Geotubes	
	-		smic, static, and constructability problems. Also,					
	-	-	dentified problems, the Geotube approach is	-		JC 3 abii	ity to control	
				_				
	Becau	se of the technical co	oncerns noted, this appraisal level cost estima	ate should	be considered w	th caut	ion.	
		<b>6</b> 11	ANTITIES			Dr	NCE8	
-W			ANTITIES			Ph	RICES	
BY M. Spears			CHECKED  R. Wiltshire	BY	D. Donaldson		CHECKED	
DATE PREP	ARED		PEER REVIEW	DATE PREPA			PEER REVIEW	
	12/05/06				01/25/07			

SHEET\_\_1\_\_ OF \_\_1\_\_

A 140		No. 24 2B 9 2C	PROJE		ea Resto	ration Feas	ibility Study
		Nos. 3A, 3B & 3C Lakes	WOID:				
		nds and Deep Areas	WOID:	1.	PRICE L	TE LEVEL:	Appraisal
Πανιιά	at 151a	nus and Deep Areas		li.	PRICEL	EVEL:	
			FILE:				
<b>-</b>	-			C:\ALL\SEA\2006new	[HabitatIslandsCosts.xls]Alternative 3A		
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		Habitat Islands and Deep Areas					
	1	Dredging		22,402,488	CY	\$6.70	\$150,096,668
		Sea floor deposits and soft lacustrine materials suction dredged					
		and placed on adjacent Sea floor to create islands.					
						-	
						<del>                                     </del>	
						<del>                                     </del>	
						-	
						-	
						<del>                                     </del>	
		Subtotal Construction Costs					\$172,499,163
		Custotal Construction Costs					ψ172,433,103
		Mobilization 5% (+/-)					\$8,620,000
		Subtotal Contract Costs					\$181,119,163
				1		<del>                                     </del>	. , -,
		QUANTITIES			PRIC	ES	
вү		CHECKED					
	M. Spear	s J. Cunningham					
DATE PREP	ARED 10/12/06	PEER REVIEW	Unit prices are from the September 2006 Restoration of the Salton Sea Volume 2: Embankmen Designs and Optimization Study Administrative Draft by Klleinfelder, Inc.				

SHEET\_\_1\_\_ OF \_\_2\_\_

Altern	rnative Nos. 3A, 3B and 3C centric Lakes		and 3C	PROJE		ea Resto	ration Feasi	ibility Study	
				WOID:		ESTIMATE LEVEL:		Appraisal	
Conve	eyand	e Canals		REGION	l:	PRICE L	EVEL:		
				FILE:					
					C:\ALL\SEA\2007\[Co	ncentricLakesC	onveyanceCosts-12-29	9-06.xls]Alternative 3	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Concentric Lak	ces Conveyance Canals						
	1	Dredging			12,683,336	CY	\$6.70	\$84,978,352	
	2	Type A Sand			9,613,344	CY	\$31.99	\$307,530,873	
	3	Type B Sand/Grave	I		859,142	CY	\$31.80	\$27,320,729	
	4	Filter Rock (Fine an	d Coarse)			CY			
			,						
	5	Riprap			2,550,338	CY	\$50.70	\$129,302,135	
	6	Stone Columns			2,172,970	FT	\$45.92	\$99,782,791	
	7	Soil-cement-bentoni	ite slurry wall without membrane		7,898,918	SF	\$6.00	\$47,393,511	
	8	Wick Drains			6,969,600	FT	\$5.17	\$36,032,832	
		SUBTOTAL (S						\$732,341,222	
		QL	JANTITIES			PRIC			
	BY CHECKED  M. Spears J. Cunningham  DATE PREPARED PEER REVIEW  10/18/06			Restoration o Administrativ	s, except for Item 9, an of the Salton Sea Volur re Draft by Klleinfelder Item 9 is from Reclam	me 2: Embankı , Inc.	ment Designs and Op	timization Study	

SHEET\_2\_ OF \_2\_

FEAT	URE:			PROJI	ECT:			
Altern	ative	Nos. 3A, 3B á	and 3C		Salton Se	ea Resto	ration Feas	ibility Study
•		Lakes		WOID:		ESTIMA	TE LEVEL:	Appraisal
Conve	evanc	e Canals		REGION: PRICE LEVEL:				
	,			FILE:				
					C:\ALL\SEA\2007\[Co	ncentricl akesC	onvevanceCosts-12-2	9-06 xls1Alternative 3
⊢	-							
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	9	3.5" Unreinforced C	oncrete Canal Lining		58,967	CY	\$500.00	\$29,483,462
			-					
		SUBTOTAL (S	Sheet 2 of 2)					\$29,483,462
		SUBTOTAL (S						\$732,341,222
		Subtotal Cons	struction Costs					\$761,824,684
		Mobilization	5% (+/-)					\$38,090,000
		Alternative 3A	A Subtotal Contract Costs					\$799,914,684
		Alternative 3E	3 Subtotal Contract Costs (77% of Alternative	3A Costs)				\$617,309,280
		Alternative 30	Subtotal Contract Costs (25% of Alternative	3A Costs)				\$202,783,291
		Note: Specific quar	ntities and costs calculated for Alternative 3A. Al	ternative 3B	and 3C costs		+	
		calculated relative to	o that of Alternative 3A. Percentages applied (77	'% and 25%				
		on the ratio of the 3	B and 3C total dike embankment costs to that of	JA.				
	<u> </u>	QL	JANTITIES			PRIC	ES	
вү	M. Spears		CHECKED  J. Cunningham		es, except for Item 9, ar of the Salton Sea Volui	e revised (Dec	ember 20, 2006) from	
DATE PREP			PEER REVIEW	Administrati	ve Draft by Klleinfelder r Item 9 is from Reclam	, Inc.		·

### **Attachment 4**

Cost Estimate Worksheets for Alternative No. 4: North-Sea Dam with North Marine Lake – Sand Dam with Stone Columns

SHEET\_\_1\_\_ OF \_\_2\_\_

				PROJE	CT:			
Altern	ative	No. 4			Salton Se	a Res	storation Feas	ibility Study
North-	-Sea	Dam/NorthMa	rine Lake	WOID:		ESTI	MATE LEVEL:	Appraisal
Sand	Dam	with Stone Co	lumns Embankment Design	REGION	:	PRIC	E LEVEL:	
				FILE:				
					C:\ALL\SEA\2007\[Cos	t Estimate	by Kleinfelder 12-18-06.xls	]Alternative 4
∟ ½	M							
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	T UNIT PRICE	AMOUNT
A		North-Sea Dam						
	1	Dredging			41,925,400	CY	\$6.70	\$280,900,180
	2	Type A Sand-Truck	s Haul		91,770,800	CY	ý \$24.06	\$2,208,005,448
	3	Type B Sand/Grave	el-Truck Haul		20,625,000	CY	\$23.88	\$492,525,000
	4	Filter Rock (Fine a	nd Coarse)-Truck Haul		3,138,300	CY	\$23.88	\$74,942,604
	5	Riprap-Truck Haul			11,471,900	CY	\$40.94	\$469,659,586
	6	Stone Columns			15,675,000	FT	\$45.92	\$719,796,000
	7	Soil-cement-bento	nite slurry wall without membrane		13,208,800	SF	\$6.00	\$79,252,800
	8	Wick Drains			37,478,100	FT	\$5.20	\$194,886,120
		SUBTOTAL (S	heet 1 of 2)					\$4,519,967,73
			JANTITIES			PR	RICES	
BY			CHECKED	вү			CHECKED	
J. Yu			R. Allen/C. Spandau	M. Pauletto			P. Martinson	
DATE PREP	ARED 08/25/06		PEER REVIEW	DATE PREPAI	RED 01/25/07		PEER REVIEW	

SHEET\_2\_ OF \_2\_

FEAT	JRE:			PROJE	ECT:			
Altern					Salton Se			sibility Study
		Dam/North Ma		WOID:		ESTIM <i>A</i>	TE LEVEL:	Appraisal
Sand	Dam	with Stone Co	olumns Embankment Design	REGION	l:	PRICE LEVEL:		
				FILE:				
					C:\ALL\SEA\2007\[Cos	t Estimate by I	Kleinfelder 12-18-06.xl	s]Alternative 4
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
В		Habitat Ponds						
	1	Habitat Ponds			37,200	ACRE	\$13,473.00	\$501,195,600
			ation geogrid replacement and embankment		0.,200	710112	ψ10, 11 0.00	φου.,.ου,ουο
		SUBTOTAL (S	heet 2 of 2)					\$501,195,600 \$4,519,967,738 \$5,021,163,338
		QL	JANTITIES			PRIC	_	
BY J. Yu			CHECKED R. Allen/C. Spandau	BY M. Pauletto			ECKED Martinson	
DATE PREP			PEER REVIEW	DATE PREPA		PE	ER REVIEW	
	08/25/06				01/25/07			

### BUREAU OF RECLAMATION

FE/	<b>ATU</b>	RE:		PROJECT:					
Alte	erna	tive No. 4			Salton S		storation F Study	easibility	
Noi	rth-S	Sea Dam/No	rth Marine Lake	WOID:		ESTIM/	ATE LEVEL	Appraisal	
Hab	oitat	<b>Ponds Dee</b>	p Excavation	REGION:		PRICE	LEVEL:		
	=			FILE:					
					C:\ALL\SEA\2006	new∖[HabitatP	ondDeepExc.xls]Alt	4	
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Habitat Pond	ds Deep Excavation						
		Excavation			84,022,400	CY	\$6.50	\$546,145,600	
		Assumes uniform	7-foot excavation in the dry using						
			vation techniques to remove soft						
		,	acres deep excavation per 2,500						
		(acres of ponds)							
		Subtotal Co	nstruction Costs					\$546,145,600	
		Mobilization	5% (+/-)					\$27,310,000	
		Subtotal Co	ntract Costs					\$573,455,600	
		<u> </u>	ANTITIES			PRICE	9		
		QU				FRICE	J		
BY			CHECKED					_	
	M. Spe		J. Cunningham		n September 30, 20 Alternatives and 0		ea Restoration Projes	ect, Feasibility	
DATE F			PEER REVIEW						
	10/12/0	16							

SHEET\_\_1\_\_ OF \_\_6 \_\_

FEA	TU	RE:	PROJECT:								
	_		333			Salton Sea					
		tive No. 4	WOID		FOTIN						
		Sea Dam/North Marine Lake	WOID:	L165C		IATE LEVEL:	Appraisal				
		am with Stone Columns	REGION:	·							
Wat	er (	Conveyance Components	FILE:								
				C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 4	NS est				
PLANT ACCOUNT	РАУ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT				
		SW Left Quadrant River Diversion									
		Diversion structure									
		48" Rock riprap		1,050	CY	\$90.00	\$94,500.0				
		Sheet pile cutoff		3,250	SF	\$35.00	\$113,750.0				
		New River settling basin		•		·	· · · · · · · · · · · · · · · · · · ·				
		Excavation		28,220	CY	\$8.00	\$225,760.0				
		Embankment		51,235	CY	\$5.00	\$256,175.0				
		Unreinforced concrete canal I	ining	1,285	CY	\$500.00	\$642,500.0				
		River Water Channel, 271 cfs, 10.0 m	ni								
		Excavation	••	355,800	CY	\$7.00	\$2,490,600.0				
		Compacted embankment		18,530	CY	\$6.00	\$111,180.0				
		Unreinforced concrete canal lining		13,805	CY	\$500.00	\$6,902,500.0				
		12 Siphons, 50' head class		13,003	01	ψ300.00	ψ0,302,300.0				
		8.5' dia Precast reinf conc pip	Δ	2,400	LF	\$1,200.00	\$2,880,000.0				
		Excavation		72,220	CY	\$8.00	\$577,760.0				
		Backfill		65,350	CY	\$6.00	\$392,100.0				
		Reinforced concrete		435	CY	\$1,000.00	\$435,000.0				
		2 Cross drainage structures		400	Ci	Ψ1,000.00	Ψ+33,000.0				
		48" dia Precast reinforced concrete	oino	255	LF	\$300.00	\$76,500.0				
		River Water Distrib'n Channel, 115 c		200	L1	ψ300.00	Ψ10,000.0				
		Excavation	13, 12.0 1111	268,700	CY	\$7.00	\$1,880,900.0				
		Compacted embankment		15,800	CY	\$6.00	\$94,800.0				
		Unreinforced concrete canal lining		11,455	CY	\$500.00	\$5,727,500.0				
		11 Siphons, 50' head class		11,400	01	ψ300.00	ψ3,727,300.0				
		5.5' dia Precast reinf conc pip	Δ	2,200	LF	\$400.00	\$880,000.0				
		Excavation	,,,	42,865	CY	\$8.00	\$342,920.0				
		Backfill		40,225	CY	\$6.00	\$241,350.0				
		Reinforced concrete		170	CY	\$1,000.00	\$170,000.0				
		5 Cross drainage structures		170	01	Ψ1,000.00	Ψ170,000.0				
		48" dia Precast reinforced concrete	nine	555	LF	\$300.00	\$166,500.0				
		21 Bridges	Sipe	000		φοσσ.σσ	Ψ100,000.0				
		Reinforced concrete		825	CY	\$1,000.00	\$825,000.0				
		Pup Fish Channel, 0 cfs, 10.0 mi									
		Excavation		108,800	CY	\$7.00	\$761,600.0				
		Compacted embankment		8,555	CY	\$6.00	\$51,330.0				
		Unreinforced concrete canal lining		6,880	CY	\$500.00	\$3,440,000.0				
						PRIORE					
- V		QUANTITIES	<b>5</b> V			PRICES					
ВҮ	N- ·	Landy Store Bahartan	BY Dan Mar			CHECKED					
		Leavitt Steve Robertson	Dan Mar	_							
	E PREPARED		DATE PREPARE	D		PEER REVIEW					

SHEET\_2\_ OF \_\_6 \_\_

FEA	TUI	RE:	PROJEC	T:						
Alte	rna	tive No. 4				Salton Sea				
Nort	h-S	Sea Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Sand	d D	am with Stone Columns	REGION:	LC		LEVEL:	Apr-06			
		Conveyance Components	FILE:		- 1110-					
22020			C:\ALL\SEA\2007\[Conveyance_Worksheets1-10.xls]Alternative 4 NS est							
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SW Right Quadrant								
		River Diversion								
		Diversion structure								
		48" Rock riprap		890	CY	\$90.00	\$80,100.00			
		Sheet pile cutoff		3,170	SF	\$35.00	\$110,950.00			
		New River settling basin								
		Excavation		4,960	CY	\$10.00	\$49,600.00			
		Embankment		10,110	CY	\$5.00	\$50,550.00			
		Unreinforced concrete canal	ining	250	CY	\$500.00	\$125,000.00			
		River Water Distrib'n Channel, 227 c	fc 6 1 mi							
		Excavation	15, 0.4 1111	201,950	CY	\$7.00	\$1,413,650.00			
		Compacted embankment		11,050	CY	\$6.00	\$66,300.00			
		Unreinforced concrete canal lining		8,100	CY	\$500.00	\$4,050,000.00			
		10 Siphons, 50' head class		0,100	Ci	ψ500.00	ψ+,030,000.00			
		7.5' dia Precast reinf conc pip	ne	2,000	LF	\$650.00	\$1,300,000.00			
		Excavation	,,,	52,605	CY	\$8.00	\$420,840.00			
		Backfill		48,150	CY	\$6.00	\$288,900.00			
		Reinforced concrete		300	CY	\$1,000.00	\$300,000.00			
		1 Bridges		000	01	Ψ1,000.00	Ψοσο,σσο.σσ			
		Reinforced concrete		55	CY	\$1,000.00	\$55,000.00			
						, , , , , , , ,	****			
		QUANTITIES			_	PRICES				
BY	Υ		BY Dan Mar			CHECKED				
DATE PR			DATE PREPARE	D		PEER REVIEW				
	April :	20, 2006								

SHEET\_3\_ OF \_\_6 \_\_

FEA	ATURE:		PROJEC	T:				
Altei	rna	tive No. 4				Salton Sea		
		Sea Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal	
Sand	d D	am with Stone Columns	REGION:	LC		LEVEL:	Apr-06	
		Conveyance Components	FILE:				7.6. 00	
SE Q				C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 4	NS est	
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		River Diversion						
		Diversion structure						
		48" Rock riprap		5,120	CY	\$90.00	\$460,800.00	
		Sheet pile cutoff		13,575	SF	\$35.00	\$475,125.00	
		Alamo River settling basin			<u> </u>	•		
		Excavation		6,590	CY	\$10.00	\$65,900.00	
		Embankment		10,990	CY	\$5.00	\$54,950.00	
		Unreinforced concrete canal	ining	285	CY	\$500.00	\$142,500.00	
		River Water Channel, 334 cfs, 6.7 mi		075.050	0)/	<b>Ф7.00</b>	Φ4 00E 0E0 00	
		Excavation		275,050	CY	\$7.00	\$1,925,350.00	
		Compacted embankment		13,450 10,260	CY CY	\$6.00 \$500.00	\$80,700.00 \$5,130,000.00	
		Unreinforced concrete canal lining 12 Siphons, 50' head class		10,260	Cf	φου.υυ	\$5,130,000.00	
		9.0' dia Precast reinf conc pip	.0	2,400	LF	\$1,300.00	\$3,120,000.00	
		Excavation	e e	77,000	CY	\$8.00	\$616,000.00	
		Backfill		69,300	CY	\$6.00	\$415,800.00	
		Reinforced concrete		540	CY	\$1,000.00	\$540,000.00	
		6 Cross drainage structures		340	Ci	ψ1,000.00	Ψ340,000.00	
		48" dia Precast reinforced concrete	nine	785	LF	\$300.00	\$235,500.00	
		River Water Distrib'n Channel, 334 c		700		ψοσο.σσ	Ψ200,000.00	
		Excavation		328,400	CY	\$7.00	\$2,298,800.00	
		Compacted embankment		16,050	CY	\$6.00	\$96,300.00	
		Unreinforced concrete canal lining		12,250	CY	\$500.00	\$6,125,000.00	
		5 Siphons, 50' head class		,		·	. , ,	
		9.0' dia Precast reinf conc pip	е	1,000	LF	\$1,300.00	\$1,300,000.00	
		Excavation		32,080	CY	\$8.00	\$256,640.00	
		Backfill		28,875	CY	\$6.00	\$173,250.00	
		Reinforced concrete		225	CY	\$1,000.00	\$225,000.00	
		5 Cross drainage structures						
		48" dia Precast reinforced concrete p	oipe	655	LF	\$300.00	\$196,500.00	
		1 Bridges						
		Reinforced concrete		65	CY	\$1,000.00	\$65,000.00	
		River Water Distrib'n Channel, 115 c	ts, 8.4 mi	4=0 :	2	<b>^-</b>	<b>4.070</b>	
		Excavation		179,125	CY	\$7.00	\$1,253,875.00	
		Compacted embankment		10,530	CY	\$6.00	\$63,180.00	
		Unreinforced concrete canal lining		7,650	CY	\$500.00	\$3,825,000.00	
		5 Siphons, 50' head class		4 000	. –	¢400.00	<b>#400 000 00</b>	
		5.5' dia Precast reinf conc pip	е	1,000	LF	\$400.00	\$400,000.00	
		Excavation		19,500	CY	\$8.00	\$156,000.00 \$100.710.00	
		Backfill Reinforced concrete		18,285 80	CY CY	\$6.00 \$1,000.00	\$109,710.00 \$80,000.00	
		QUANTITIES		00	Ci	PRICES	Ψου,υυυ.υυ	
вү		QUARTITIEU	BY CHECKED					
Βī	Meri	Lagritt Stone Bahartaan				CHECKED		
DATE		Leavitt Steve Robertson	Dan Mar	D		DEED DEVIEW		
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SHEET\_\_4\_\_ OF \_\_6 \_\_

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Altei	rnat	tive No. 4				Salton Sea				
Nort	h-S	Sea Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Sand	d D	am with Stone Columns	REGION:	LC	PRICE	LEVEL:	Apr-06			
Wate	er C	Conveyance Components	FILE:							
		,	C:\ALL\SEA\2007\[Conveyance_Worksheets1-10.xls]Alternative 4 NS est							
PLANT ACCOUNT	РАУ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SE Quadrant								
		River Water Distrib'n Channel, 115 c	fs, 8.4 mi							
		6 Cross drainage structures				•	•			
		48" dia Precast reinforced concrete	pipe	670	LF	\$300.00	\$201,000.00			
		2 Bridges Reinforced concrete		80	CY	\$1,000.00	\$80,000.00			
		Pup Fish Channel, 0 cfs, 6.7 mi		70.075	0)/	<b>Ф7.00</b>	<b>#540.405.00</b>			
		Excavation Compacted embankment		72,875 5,735	CY CY	\$7.00 \$6.00	\$510,125.00 \$34,410.00			
		Unreinforced concrete canal lining		4,610	CY	\$500.00	\$2,305,000.00			
		Official indiced concrete carial infinite	<u> </u>	4,010	Ci	φ300.00	Ψ2,303,000.00			
						+				
		_								
		QUANTITIES	PRICES							
вү		COARTITIEO	ву			CHECKED				
			BY Dan Mar			OHLONED				
DATE PR	EPAR	ED	DATE PREPARE	D		PEER REVIEW				
	April 2	20, 2006								
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SHEET\_5\_ OF \_\_6\_

FEA	TU	RE:	PROJEC	CT:				
Alte	rna	tive No. 4				Salton Sea		
Nort	h-S	Sea Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal	
San	d D	am with Stone Columns	REGION:	LC	PRICE	LEVEL:	Apr-06	
		Conveyance Components	FILE:					
	-			C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alternative 4	NS est	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
		Divon Divoncion						
		River Diversion						
		Diversion structure		1 1 1 0	CY	<b>የ</b> ስስ ስስ	\$400 COO OC	
		48" Rock riprap Sheet pile cutoff		1,140 7,500	SF	\$90.00 \$35.00	\$102,600.00 \$262,500.00	
		Whitewater River settling basin		7,500	SF	φ35.00	φ202,300.00	
		Excavation		2,855	CY	\$10.00	\$28,550.00	
		Embankment		8,775	CY	\$5.00	\$43,875.00	
		Unreinforced concrete canal	ining	205	CY	\$500.00	\$102,500.00	
		Official forced concrete cariar	iiiiig	203	Ci	φ500.00	\$102,500.00	
		Zero grade channel, 0 cfs, 4.2 mi						
		Excavation		58,460	CY	\$7.00	\$409,220.00	
		Compacted embankment		3,600	CY	\$6.00	\$21,600.00	
		Unreinforced concrete canal lining 2 Siphons, 50' head class		3,470	CY	\$500.00	\$1,735,000.00	
		4.0' dia Precast reinf conc pip	e e	400	LF	\$300.00	\$120,000.00	
		Excavation		6,015	CY	\$8.00	\$48,120.00	
		Backfill		5,760	CY	\$6.00	\$34,560.00	
		Reinforced concrete		30	CY	\$1,000.00	\$30,000.00	
		5 Cross drainage structures				<b>¥</b> 1,000100	<del>*************************************</del>	
		48" dia Precast reinforced concrete	oipe	525	LF	\$300.00	\$157,500.00	
		1 Bridges				·		
		Reinforced concrete		35	CY	\$1,000.00	\$35,000.00	
		QUANTITIES				PRICES		
BY	Y Mark Leavitt Steve Robertson					CHECKED		
DATE PR	REPAR	ED	DATE PREPARE	D		PEER REVIEW		
	April	20, 2006						

SHEET\_6\_ OF \_\_6 \_\_

FEA	EATURE:			T:						
Alte	rna	tive No. 4				Salton Sea				
Nort	h-S	Sea Dam/North Marine Lake	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal			
Sand	d D	am with Stone Columns	REGION:	LC	PRICE	LEVEL:	Apr-06			
Wate	er C	Conveyance Components	FILE:							
		,		C:\ALL\SEA\2007\[	Conveyance	e_Worksheets1-10.xls]Alternative 4	NS est			
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT			
		SW Left Quadrant								
		Sea Water Pipeline, 91 cfs, 177' head	1	447	N 4:	<b>#0.000.000.00</b>	<b>#</b> 00,000,000,00			
		4.8' dia Steel pipe 3.1' dia Steel pipe		14.7 6.7	Mi Mi	\$2,600,000.00 \$900,000.00	\$38,220,000.00			
		• •		1.0	Ea.	φ900,000.00	\$6,030,000.00 \$990,000.00			
		Regulating tank tower (200,000 gal,		1.0	⊏a.		φ990,000.00			
		180 ft tall) Sea Water Pumping Plant, 91 cfs, 22	3' TDH		LS		\$11,000,000.00			
		Structure Improvements	.5 1011		LO		\$11,000,000.00			
		Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		Ownerryard								
		SE Quadrant								
		Sea Water Pipeline, 74 cfs, 14.7 mi, 1	125' head							
		4.3' dia Steel pipe		14.7	Mi	\$1,900,000.00	\$27,930,000.00			
		Regulating tank tower (200,000 gal, 125 ft tall)		1.0	Ea.	, , ,	\$975,000.00			
		Sea Water Pumping Plant, 74 cfs, 17	'1' TDH		LS		\$8,150,000.00			
		Structure Improvements Waterways								
		Pumps and motors								
		Access electrical								
		Misc. equipment								
		Switchyard								
		,								
		Subtotal					\$167,534,555.00			
		Alternative Specific Unlisted Items (+/-	10%)				\$16,753,456.00			
		Total w/ Alt. Specific Unlisted Items					\$184,288,011.00			
		Mobilization (+/-5%)					\$9,200,000.00			
		Subtotal w/Mobilization					\$193,488,011.00			
		OHANITITIES				DDICES				
DV.		QUANTITIES	DV.			PRICES				
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DATE		Leavitt Steve Robertson	Dan Mar			DEED DEVIEW				
DATE PR			DATE PREPARE	U		PEER REVIEW				
	Aprii 2	20, 2006								

### **Attachment 5**

**Cost Estimate Worksheets for Alternative No. 5: Habitat Enhancement without Marine Lake** 

SHEET\_\_1\_\_ OF \_\_1\_\_

FEAT	FEATURE:			PROJECT:						
Altern	ative	No. 5			Salton Se	a Res	toration Feas	sibility Study		
Habita	at Enl	nancement W	ithout Marine Lake	WOID:		ESTIN	IATE LEVEL:	Appraisal		
				REGION			PRICE LEVEL:			
				FILE:						
					C:\ALL\SEA\2007\[Cos	t Estimate	by Kleinfelder 12-18-06.x	ls]Alternative 5		
∟ ½	Σ									
PLANT ACCOUNT	PAY ITEM		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
Α		Habitat Ponds								
	9	Habitat Ponds			42,200	ACR	E \$13,473.00	\$568,560,600		
			ation geogrid replacement and embankment		,		<b>V</b> 10, 11 0100	<del>,</del>		
			gg							
		SUBTOTAL (S	Sheet 1 of 1)					\$568,560,600		
		,	•							
		Subtotal Cons	struction Costs					\$568,560,600		
		Ql	JANTITIES			PR	ICES			
BY			CHECKED	BY M. Pauletto			CHECKED			
J. Yu	ADED		R. Allen/C. Spandau		nen.		P. Martinson			
DATE PREP	08/25/06		PEER REVIEW	DATE PREPA	01/25/07		PEER REVIEW			

### BUREAU OF RECLAMATION

Without Marine Lake Habitat Ponds Deep Excavation    File:	FE/	<b>ATU</b>	RE:		PROJECT:						
Without Marine Lake Habitat Ponds Deep Excavation  FILE:  CMALISEA:0006-ew/[HabitatPondDeepExc.sis/M 5]  DESCRIPTION  CODE QUANTITY UNIT UNIT PRICE AMOUNT  Habitat Ponds Deep Excavation  Habitat Ponds Deep Excavation  Excavation Assumes uniform 7-foot excavation in the dry using conventional excavation techniques to remove soft wet material (500 acres deep excavation per 2,500 [acres of ponds)  Gardes of ponds)  Subtotal Construction Costs  Subtotal Contract Costs  QUANTITIES  PRICE LEVEL:  HABITAT COMES AMOUNT  UNIT UNIT UNIT PRICE AMOUNT  UNIT UNIT PRICE AMOUNT  UNIT PRICE AMOUNT  UNIT UNIT PRICE AMOUNT  UNIT UNIT UNIT PRICE AMOUNT  AMOUNT  UNIT UNIT UNIT PRICE AMOUNT  OCIDE QUANTITY  UNIT UNIT UNIT UNIT PRICE AMOUNT  AMOUNT  UNIT UNIT UNIT UNIT UNIT UNIT PRICE AMOUNT  AMOUNT  SECURITY UNIT UNIT UNIT UNIT UNIT UNIT UNIT UNIT	Alte	erna	tive No. 5			Salton S			easibility		
Habitat Ponds Deep Excavation  FILE:  C:ALLISEA/2008nov/likabitinPondsDeepExc.atalplat 5  DESCRIPTION  CODE  QUANTITY  UNIT UNIT PRICE  AMOUNT  Habitat Ponds Deep Excavation  Excavation  Sexuration  Assumes uniform 7-foot excavation in the dry using conventional excavation techniques to remove soft wet material (500 acres deep excavation per 2,500 (acres of ponds)  Subtotal Construction Costs  Mobilization  Subtotal Construction Costs  QUANTITIES  PRICES  PRICES  PRICES  PRICES  PRICES  PRICES  PRICES	Hab	bitat	Enhancem	ent	WOID:		ESTIMATE LEVEL Appraisal				
CALLISEA102006newl/HabitatPondDeepExc.shipkt 5    Habitat Ponds Deep Excavation	Wit	hou	t Marine Lal	ke	REGION:		PRICE	LEVEL:			
Habitat Ponds Deep Excavation  Excavation  Assumes uniform 7-foot excavation in the dry using conventional excavation techniques to remove soft wet material (500 acres deep excavation per 2,500 (acres of ponds)  Subtotal Construction Costs  Subtotal Contract Costs  OUANTITIES  PRICES  PUBLISHED  J. Cunningham  Junint prices from September 30, 2005 Salton See Restoration Project, Feasibility Study. Phase 1, Atternatives and Cost Estimates	Hab	oitat	Ponds Dee	p Excavation	FILE:	C:\ALL\SEA\2006i	new\[HabitatP	ondDeepExc.xls]Alt	5		
Excavation  Assumes uniform 7-foot excavation in the dry using conventional excavation techniques to remove soft wet material (500 acres deep excavation per 2,500 (acres of ponds)  Subtotal Construction Costs  Subtotal Construction Costs  Mobilization 5% (+/-) \$30,980,1 \$10,000	PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT		
Excavation  Assumes uniform 7-foot excavation in the dry using conventional excavation techniques to remove soft wet material (500 acres deep excavation per 2,500 (acres of ponds)  Subtotal Contract Costs  Subtotal Contract Costs  Subtotal Contract Costs  Subtotal Contract Costs  PRICES  WI. Spears  CHECKED J. Cunningham  95,315,733  CY \$6.50 \$619,552,  \$6.50 \$619,552,  \$6.50 \$619,552,  \$6.50											
Assumes uniform 7-foot excavation in the dry using conventional excavation techniques to remove soft wet material (500 acres deep excavation per 2,500 (acres of ponds)    Conventional excavation per 2,500 (acres of ponds)			Habitat Pon	ds Deep Excavation							
conventional excavation techniques to remove soft wet material (500 acres deep excavation per 2,500 (acres of ponds)    Conventional excavation per 2,500   Conventional excav			Excavation			95,315,733	CY	\$6.50	\$619,552,267		
wet material (500 acres deep excavation per 2,500 (acres of ponds)  (acres of ponds)  Subtotal Construction Costs  Mobilization 5% (+/-)  Subtotal Contract Costs  Subtotal Contract Costs  Subtotal Contract Costs  PRICES  WA Spears  Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates											
(acres of ponds)											
Subtotal Construction Costs   \$619.552;   Mobilization 5% (+/-)   \$30.980.    Subtotal Contract Costs   \$650,532;   Mobilization 5% (+/-)   \$30.980.    Subtotal Contract Costs   \$650,532;   Wild				acres deep excavation per 2,500							
Mobilization 5% (+/-) \$30,980,4  Subtotal Contract Costs \$650,532,3  A Substitution 5% (+/-) \$30,980,4  A Substitution 5%			(*** * * * * * * * * * * * * * * * * *								
Mobilization 5% (+/-) \$30,980,4  Subtotal Contract Costs \$650,532,3  A Substitution 5% (+/-) \$30,980,4  A Substitution 5%											
Mobilization 5% (+/-) \$30,980,4  Subtotal Contract Costs \$650,532,3  A Substitution 5% (+/-) \$30,980,4  A Substitution 5%											
Mobilization 5% (+/-) \$30,980,4  Subtotal Contract Costs \$650,532,3  A Substitution 5% (+/-) \$30,980,4  A Substitution 5%											
Mobilization 5% (+/-) \$30,980,4  Subtotal Contract Costs \$650,532,3  A Substitution 5% (+/-) \$30,980,4  A Substitution 5%											
Mobilization 5% (+/-) \$30,980,4  Subtotal Contract Costs \$650,532,3  A Substitution 5% (+/-) \$30,980,4  A Substitution 5%											
Mobilization 5% (+/-) \$30,980,4  Subtotal Contract Costs \$650,532,3  A Substitution 5% (+/-) \$30,980,4  A Substitution 5%									<b>.</b>		
Subtotal Contract Costs \$650,532,3			Subtotal Co	nstruction Costs					\$619,552,267		
QUANTITIES  QUANTITIES  PRICES  BY  CHECKED  M. Spears  J. Cunningham  Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates			Mobilization	5% (+/-)					\$30,980,000		
BY CHECKED  M. Spears J. Cunningham Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates			Subtotal Co	ntract Costs					\$650,532,267		
BY CHECKED  M. Spears J. Cunningham Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates											
BY CHECKED  M. Spears J. Cunningham Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates											
BY CHECKED  M. Spears J. Cunningham Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates											
BY CHECKED  M. Spears J. Cunningham Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates											
BY CHECKED  M. Spears J. Cunningham Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates											
M. Spears  J. Cunningham  Unint prices from September 30, 2005 Salton Sea Restoration Project, Feasibility Study - Phase 1, Alternatives and Cost Estimates		_	QU	ANTITIES			PRICE	S			
Study - Phase 1, Alternatives and Cost Estimates	вү			CHECKED							
DATE PREPARED PEER REVIEW		M. Spe	ars	J. Cunningham					ect, Feasibility		
10/12/06	DATE F			PEER REVIEW	Study - Phase 1,	Alternatives and C	osi estimate	; <b>3</b>			

BUREAU OF RECLAMATION

### **ESTIMATE WORKSHEET**

SHEET\_1\_ OF \_8\_

FEAT	ΓUR	E:	PROJEC	T:			
		-				Salton Sea	
		ive No. 5					
		Enhancement	WOID:	L165C		IATE LEVEL:	Appraisal
		Marine Lake	REGION:	LC	PRICE	LEVEL:	Apr-06
Wate	er Co	onveyance Components	FILE:				
				C:\ALL\SEA\2007\[0	Conveyance	_Worksheets1-10.xls]Alternative	5 HE est
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SW Left Quadrant					
		River Diversion					
		Diversion structure		885	CY	\$90.00	\$79,650.00
		48" Rock riprap Sheet pile cutoff		3,170	SF	\$35.00	\$110,950.00
		New River settling basin		3,170	Oi	ψ33.00	ψ110,930.00
		Excavation		24,800	CY	\$8.00	\$198,400.00
		Embankment		49,370	CY	\$5.00	\$246,850.00
		Unreinforced concrete canal	lining	1,220	CY	\$500.00	\$610,000.00
		River Water Channel, 225 cfs, 10.0 m	ni				
		Excavation		315,020	CY	\$7.00	\$2,205,140.00
		Compacted embankment		17,185	CY	\$6.00	\$103,110.00
		Unreinforced concrete canal lining		12,620	CY	\$500.00	\$6,310,000.00
		12 Siphons, 50' head class					
		7.5' dia Precast reinf conc pip	e	2,400	LF	\$650.00	\$1,560,000.00
		Excavation		63,125	CY	\$8.00	\$505,000.00
		Backfill		57,780	CY	\$6.00	\$346,680.00
		Reinforced concrete		360	CY	\$1,000.00	\$360,000.00
		2 Cross drainage structures  48" dia Precast reinforced concrete	nino	245	LF	\$300.00	\$73,500.00
		46 dia Frecast remiorced concrete	pipe	243	LI	φ300.00	Ψ7 3,300.00
		River Water Distrib'n Channel, 69 cfs	s. 12.6 mi				
		Excavation	.,	186,225	CY	\$7.00	\$1,303,575.00
		Compacted embankment		13,770	CY	\$6.00	\$82,620.00
		Unreinforced concrete canal lining		9,025	CY	\$500.00	\$4,512,500.00
		8 Siphons, 50' head class					<b>*</b> 100 000 00
		4.0' dia Precast reinf conc pip	e	1,600	LF	\$300.00	\$480,000.00
		Excavation Backfill		24,045	CY	\$8.00	\$192,360.00
		Reinforced concrete		23,035 80	CY CY	\$6.00 \$1,000.00	\$138,210.00 \$80,000.00
		5 Cross drainage structures		00	O1	\$1,000.00	\$60,000.00
		48" dia Precast reinforced concrete	nine	505	LF	\$300.00	\$151,500.00
		9 Bridges				4000.00	ψ.σ.,σσσ.σσ
		Reinforced concrete		285	CY	\$1,000.00	\$285,000.00
		5 5 1 01 1 0 6 400 1					
		Pup Fish Channel, 0 cfs, 10.0 mi		100 770	CV	¢7.00	<b>\$764.300.00</b>
		Excavation Compacted embankment		108,770 8,555	CY CY	\$7.00 \$6.00	\$761,390.00 \$51,330.00
		Unreinforced concrete canal lining		6,880	CY	\$500.00	\$3,440,000.00
			,	2,000		\$230.00	+-,,555.50
	QUANTITIES					PRICES	
вү			вү			CHECKED	
	Mark L	eavitt Steve Robertson	Dan Mar				
DATE PRE			DATE PREPARE	D		PEER REVIEW	
	April 2	0, 2006					

SHEET\_2\_ OF \_8 \_

FEA	ΓUR	E:	PROJEC	T:			
Alter	nati	ive No. 5				Salton Sea	
		Enhancement	WOID:	L165C	ESTIN	NATE LEVEL:	Appraisal
		Marine Lake	REGION:	LC		LEVEL:	Apr-06
		onveyance Components	FILE:				. ф. ос
77 0.33				C:\ALL\SEA\2007\[i	Conveyance	e_Worksheets1-10.xls]Alternative	5 HF act
. '>	Σ			O. WILLIOLI RIZOOT (	Conveyance	_vverkeneete+ re.xiej/weimawe	o rie cot
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SW Right Quadrant					
		River Diversion					
		Diversion structure		705	0)/	Ф00.00	<b>#00.450.00</b>
		48" Rock riprap		735	CY SF	\$90.00	\$66,150.00
		Sheet pile cutoff New River settling basin		3,100	5F	\$35.00	\$108,500.00
		Excavation		4,250	CY	\$10.00	\$42,500.00
		Embankment		9,690	CY	\$5.00	\$48,450.00
		Unreinforced concrete canal	linina	235	CY	\$500.00	\$117,500.00
		Chicking add concrete darian	9	200	0.	φοσσ.σσ	Ψ117,000.00
		River Water Distrib'n Channel, 181 c	fs, 6.4 mi				
		Excavation		176,165	CY	\$7.00	\$1,233,155.00
		Compacted embankment		10,015	CY	\$6.00	\$60,090.00
		Unreinforced concrete canal lining		7,255	CY	\$500.00	\$3,627,500.00
		10 Siphons, 50' head class					
		7.0' dia Precast reinf conc pip	e	2,000	LF	\$600.00	\$1,200,000.00
		Excavation		49,005	CY	\$8.00	\$392,040.00
		Backfill		45,125	CY	\$6.00	\$270,750.00
		Reinforced concrete		240	CY	\$1,000.00	\$240,000.00
		1 Bridges		50	CV	£4,000,00	ФEО 000 00
		Reinforced concrete		50	CY	\$1,000.00	\$50,000.00
		QUANTITIES				PRICES	
вү			вү			CHECKED	
	Mark L	eavitt Steve Robertson	Dan Mar				
DATE PRI	EPAREI	)	DATE PREPARE	D		PEER REVIEW	
	April 2	0, 2006					
	•						

SHEET\_3\_ OF \_8 \_

FEA1	EATURE:		PROJEC	T:			
Alter	Alternative No. 5 Habitat Enhancement					Salton Sea	
Habi	tat E	nhancement	WOID:	L165C	ESTIN	NATE LEVEL:	Appraisal
With	out	Marine Lake	REGION:	LC	PRICE	LEVEL:	Apr-06
Wate	r Co	onveyance Components	FILE:				•
Trate	. •	SE Quadrant		C:\\\    \\SE\\\2007\[i	Convovance	e_Worksheets1-10.xls]Alternative	5 HE oct
5	Σ	er quadrant		C.IALLISEA (2007)[I	Jonveyance		3 HE est
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		River Diversion					
		Diversion structure					
		48" Rock riprap	86-68140	4,570	CY	\$90.00	\$411,300.00
		Sheet pile cutoff	86-68140	13,365	SF	\$35.00	\$467,775.00
		Alamo River settling basin					
		Excavation	86-68140	6,000	CY	\$10.00	\$60,000.00
		Embankment	86-68140	10,680	CY	\$5.00	\$53,400.00
		Unreinforced concrete canal	86-68140	270	CY	\$500.00	\$135,000.00
		River Water Channel, 288 cfs, 6.7 mi					
		Excavation	86-68140	249,650	CY	\$7.00	\$1,747,550.00
		Compacted embankment	86-68140	12,720	CY	\$6.00	\$76,320.00
		Unreinforced concrete canal lining	86-68140	9,565	CY	\$500.00	\$4,782,500.00
		12 Siphons, 50' head class					
		8.5' dia Precast reinf conc pip	86-68140	2,400	LF	\$1,200.00	\$2,880,000.00
		Excavation	86-68140	72,200	CY	\$8.00	\$577,600.00
		Backfill	86-68140	65,350	CY	\$6.00	\$392,100.00
		Reinforced concrete	86-68140	455	CY	\$1,000.00	\$455,000.00
		6 Cross drainage structures					
		48" dia Precast reinforced co	86-68140	770	LF	\$300.00	\$231,000.00
		River Water Distrib'n Channel, 288 c	fs, 8.0 mi				
		Excavation	86-68140	298,090	CY	\$7.00	\$2,086,630.00
		Compacted embankment	86-68140	15,180	CY	\$6.00	\$91,080.00
		Unreinforced concrete canal lining	86-68140	11,420	CY	\$500.00	\$5,710,000.00
		5 Siphons, 50' head class					
		8.5' dia Precast reinf conc pip	86-68140	1,000	LF	\$1,200.00	\$1,200,000.00
		Excavation	86-68140	30,090	CY	\$8.00	\$240,720.00
		Backfill	86-68140	27,230	CY	\$6.00	\$163,380.00
		Reinforced concrete	86-68140	190	CY	\$1,000.00	\$190,000.00
		5 Cross drainage structures					
		48" dia Precast reinforced co	86-68140	640	LF	\$300.00	\$192,000.00
		1 Bridges					
		Reinforced concrete	86-68140	60	CY	\$1,000.00	\$60,000.00
		River Water Distrib'n Channel, 69 cfs	s, 7.4 mi				
		Excavation	86-68140	109,375	CY	\$7.00	\$765,625.00
		Compacted embankment	86-68140	8,090	CY	\$6.00	\$48,540.00
		Unreinforced concrete canal lining	86-68140	5,300	CY	\$500.00	\$2,650,000.00
		12 Cross drainage structures					
		48" dia Precast reinforced co	86-68140	1,205	LF	\$300.00	\$361,500.00
		9 Bridges					
		Reinforced concrete	86-68140	285	CY	\$1,000.00	\$285,000.00
	CHANTITIC					DDICEC	
		QUANTITIES				PRICES	
вү			BY			CHECKED	
			Dan Mar	_			
DATE PRE	E PREPARED		DATE PREPARED PEER REVIEW				
	April 20, 2006						

SHEET\_4\_ OF \_8 \_

FEA1	ΓUR	E:	PROJECT:								
Alter	nati	ve No. 5				Salton Sea					
Habi	tat E	nhancement	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal				
With	out	Marine Lake	REGION:	LC		LEVEL:	Apr-06				
		onveyance Components	FILE:								
Trate	,	mvoyumoo oomponomo	C:\ALL\SEA\2007\[Conveyance_Worksheets1-10.xls]Alternative 5 HE est								
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT				
		SE Quadrant									
		Pup Fish Channel, 0 cfs, 6.7 mi									
		Excavation	86-68140	72,875	CY	\$7.00	\$510,125.00				
		Compacted embankment	86-68140	5,735	CY	\$6.00	\$34,410.00				
		Unreinforced concrete canal lining	86-68140	4,610	CY	\$500.00	\$2,305,000.00				
		QUANTITIES				PRICES					
вү	Mark L		BY Dan Mar			CHECKED					
DATE PRE	Mark Leavitt Steve Robertson  DATE PREPARED  April 20, 2006		DATE PREPARED PEER REVIEW								

SHEET\_5\_ OF \_8 \_

FEA	TUR	E:	PROJEC	T:			
Alter	nati	ive No. 5				Salton Sea	
Habi	tat E	Enhancement	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal
With	out	Marine Lake	REGION:	LC		LEVEL:	Apr-06
		onveyance Components	FILE:				- 4
Trace	,, 0	onveyance components		C:\ALL\SEA\2007\[0	Convevance	e_Worksheets1-10.xls]Alternative	5 HE est
μĘ	Σ			•	,	,	
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		NW Quadrant					
		River Diversion					
		Diversion structure	00.004.40	4.440	0)/	Фоо оо	<b>#</b> 400 000 00
		48" Rock riprap	86-68140	1,140	CY	\$90.00	\$102,600.00
		Sheet pile cutoff	86-68140	7,500	SF	\$35.00	\$262,500.00
		Whitewater River settling basin	00 00440	2.055	CY	<b>#40.00</b>	<b>\$20.550.00</b>
		Excavation	86-68140 86-68140	2,855	CY	\$10.00	\$28,550.00
		Embankment		8,775	CY	\$5.00	\$43,875.00
		Unreinforced concrete canal	86-68140	205	Ci	\$500.00	\$102,500.00
		River Water Distrib'n Channel, 102 c	fs. 4.2 mi			+	
		Excavation	86-68140	83,520	CY	\$7.00	\$584,640.00
		Compacted embankment	86-68140	4,950	CY	\$6.00	\$29,700.00
		Unreinforced concrete canal lining		3,680	CY	\$500.00	\$1,840,000.00
		3 Cross drainage structures		-,		***************************************	+ //
		48" dia Precast reinforced co	86-68140	33	LF	\$300.00	\$9,900.00
		2 Bridges				·	. ,
		Reinforced concrete	86-68140	75	CY	\$1,000.00	\$75,000.00
		River Water Distrib'n Channel, 69 cfs	s, 10.5 mi				
		Excavation	86-68140	155,200	CY	\$7.00	\$1,086,400.00
		Compacted embankment	86-68140	11,475	CY	\$6.00	\$68,850.00
		Unreinforced concrete canal lining 12 Siphons, 50' head class	86-68140	7,520	CY	\$500.00	\$3,760,000.00
		4.0' dia Precast reinf conc pip	86-68140	2,400	LF	\$300.00	\$720,000.00
		Excavation	86-68140	36,070	CY	\$8.00	\$288,560.00
		Backfill	86-68140	34,500	CY	\$6.00	\$207,000.00
		Reinforced concrete	86-68140	115	CY	\$1,000.00	\$115,000.00
		1 Cross drainage structures					
		48" dia Precast reinforced co	86-68140	100	LF	\$300.00	\$30,000.00
		13 Bridges					
		Reinforced concrete	86-68140	410	CY	\$1,000.00	\$410,000.00
		QUANTITIES				PRICES	
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	Mark L	eavitt Steve Robertson	Dan Mar				
DATE PR			DATE PREPAREI	0		PEER REVIEW	
	April 2	0, 2006					

SHEET\_6\_ OF \_8 \_

FEA	TUR	E:	PROJEC	T:			
Altei	nati	ve No. 5				Salton Sea	
Habi	tat E	nhancement	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal
With	out	Marine Lake	REGION:	LC	PRICE	LEVEL:	Apr-06
Wate	er Co	onveyance Components	FILE:				·
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		NE Quadrant		C:\ALL\SEA\2007\[0	Conveyance	e_Worksheets1-10.xls]Alternative	5 HF est
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PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		River Diversion					
		Diversion structure					
		48" Rock riprap	86-68140	1,140	CY	\$90.00	\$102,600.00
		Sheet pile cutoff	86-68140	7,495	SF	\$35.00	\$262,325.00
		Whitewater River settling basin	00 004 40	0.050	0)/	040.00	<b>#</b> 00 <b>F</b> 00 00
		Excavation	86-68140	2,850	CY	\$10.00	\$28,500.00
		Embankment	86-68140	8,775	CY	\$5.00	\$43,875.00
		Unreinforced concrete canal River Water Channel, 102 cfs, 4.2 mi	86-68140	205	CY	\$500.00	\$102,500.00
		· · · · · · · · · · · · · · · · · · ·		02.500	CV	<b>Ф7</b> ОО	ΦΕΩ4 C4O OO
		Excavation	86-68140 86-68140	83,520	CY CY	\$7.00 \$6.00	\$584,640.00
		Compacted embankment Unreinforced concrete canal lining		4,930	CY	· ·	\$29,580.00
		5 Siphons, 50' head class	00-00140	3,580	UΥ	\$500.00	\$1,790,000.00
		5.0' dia Precast reinf conc pip	06 60140	1,000	LF	\$380.00	\$380,000.00
		Excavation	86-68140	17,935	CY	\$8.00	\$143,480.00
		Backfill	86-68140	16,945	CY	\$6.00	\$143,480.00
		Reinforced concrete	86-68140	70	CY	\$1,000.00	\$70,000.00
		1 Cross drainage structures	00 00140	10	01	ψ1,000.00	Ψ70,000.00
		48" dia Precast reinforced col 3 Bridges	86-68140	110	LF	\$300.00	\$33,000.00
		Reinforced concrete	86-68140	115	CY	\$1,000.00	\$115,000.00
		River Water Channel, 69 cfs, 11.0 mi				. ,	
		Excavation	86-68140	162,580	CY	\$7.00	\$1,138,060.00
		Compacted embankment	86-68140	12,020	CY	\$6.00	\$72,120.00
		Unreinforced concrete canal lining	86-68140	7,880	CY	\$500.00	\$3,940,000.00
		4 Siphons, 50' head class					
		4.0' dia Precast reinf conc pip	86-68140	800	LF	\$300.00	\$240,000.00
		Excavation	86-68140	12,025	CY	\$8.00	\$96,200.00
		Backfill	86-68140	11,520	CY	\$6.00	\$69,120.00
		Reinforced concrete	86-68140	40	CY	\$1,000.00	\$40,000.00
		5 Cross drainage structures					
		48" dia Precast reinforced co	86-68140	505	LF	\$300.00	\$151,500.00
		7 Bridges	00.004.40	222	0)/	<b>#</b> 4 000 00	#000 000 <u>00</u>
		Reinforced concrete	86-68140	220	CY	\$1,000.00	\$220,000.00
		River Water Distrib'n Channel, 69 cfs		46.000	CV/	67.00	¢442.000.00
		Excavation Compacted embankment	86-68140	16,260	CY CY	\$7.00 \$6.00	\$113,820.00
		Unreinforced concrete canal lining	86-68140 86-68140	1,205	CY	\$500.00	\$7,230.00 \$395,000.00
		1 Cross drainage structures	00-00140	790	Οĭ	φυυ.υυ	და <del>აა</del> ,000.00
		48" dia Precast reinforced co	86-68140	100	LF	\$300.00	\$30,000.00
		- dia i recast reliniorceu co	00 00 140	100	L1	ψουσιου	ψ50,000.00
		QUANTITIES				PRICES	
вү			вү			CHECKED	
	Mark L	eavitt Steve Robertson	Dan Mar				
DATE PR	EPARED	)	DATE PREPAREI	)		PEER REVIEW	
	April 2	0, 2006					

	5con SHEET_7_ OF _8 _
	Appraisal
	Apr-06
ativ	re 5 HE est
	AMOUNT
1	\$1,157,275.00
) ) )	\$78,030.00
)	\$5,227,500.00

FEA7	ΓUR	E:	PROJEC	T:			
Alter	nati	ve No. 5				Salton Sea	
Habi	tat E	nhancement	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal
With	out	Marine Lake	REGION:	LC		LEVEL:	Apr-06
		onveyance Components	FILE:	-			P. S.
mate	,, ()	inveyance components		C-\ALL\SEA\2007\[i	Convovance	Worksheets1-10.xls]Alternativ	o 5 HE act
. 5	Σ			C.MLLIGLA (2007)	Conveyance	_worksheets1-10.xisjAlternativ	e o nic est
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		NE Quadrant					
		Pup Fish Channel, 0 cfs, 15.2 mi	00 00440	405.005	CV	<b>Ф7</b> ОО	Φ4 4EZ 2ZE 00
		Excavation Compacted embankment	86-68140 86-68140	165,325 13,005	CY CY	\$7.00 \$6.00	\$1,157,275.00 \$78,030.00
		Unreinforced concrete canal lining		10,455	CY	\$500.00	\$5,227,500.00
		Official infinity	00-00140	10,433	Ci	φ500.00	φ5,227,500.00
		QUANTITIES				PRICES	
вү			вү			CHECKED	
	Mark L	eavitt Steve Robertson	Dan Mar				
DATE PRE	PARE		DATE PREPARE	D		PEER REVIEW	
	April 2	0, 2006					

FEA		E.	PROJEC				SHEE1_8_ OF _8
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Λlto	rnat	ive No. 5				Salton Sea	
		enve No. 5 Enhancement	WOID:		COTIA	4 A T E   E \ / E   .	
				L165C		MATE LEVEL:	Appraisal
		Marine Lake	REGION:	LC	PRICE	E LEVEL:	Apr-06
Wate	er C	onveyance Components	FILE:				
				C:\ALL\SEA\2007\[	Conveyance	e_Worksheets1-10.xls]Alternativ	e 5 HE est
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SW Left Quadrant					
		Sea Water Pipeline, 91 cfs, 22.2 mi,					
		4.8' dia Steel pipe	86-68140	22.2	Mi	\$2,700,000.00	\$59,940,000.00
		Regulating tank tower (200,000 gal,	86-68140	1.0	Ea.		\$985,000.00
		160 ft tall)	41. TD11				<b>#</b> 40 <b>5</b> 00 000 00
		Sea Water Pumping Plant, 91 cfs, 20	11. IDH	1	LS		\$10,500,000.00
		Structure Improvements Waterways					
		Pumps and motors					
		Access electrical					
		Misc. equipment					
		Switchyard					
		SE Quadrant					
		Sea Water Pipeline, 74 cfs, 16.4 mi,	135' head				
		4.3' dia Steel pipe	86-68140	16.4	Mi	\$1,900,000.00	\$31,160,000.00
		Regulating tank tower (200,000 gal,		1.0	Ea.	<b>V</b> 1,000,000	\$980,000.00
		135 ft tall)					<del>*************************************</del>
		Sea Water Pumping Plant, 74 cfs, 17	'9' TDH	1	LS		\$8,150,000.00
		Structure Improvements					. , ,
		Waterways					
		Pumps and motors					
		Access electrical					
		Misc. equipment					
		Switchyard					
		NE Quadrant					
		Sea Water Pipeline, 22 cfs, 27.4 mi,					
		3.1' dia Steel pipe	86-68140	27.4	Mi	\$1,200,000.00	\$32,880,000.00
		Regulating tank tower (200,000 gal,	86-68140	1.0	Ea.		\$980,000.00
		135 ft tall)					40.000.000.00
		Sea Water Pumping Plant, 22 cfs, 17	7. IDH	1	LS		\$2,800,000.00
		Structure Improvements					
		Waterways Pumps and motors					
		Access electrical					
		Misc. equipment					
		Switchyard					
		Subtotal					\$235,711,055.00
		Alternative Specific Unlisted Items (+/-	10%)				\$23,571,106.00
		Total w/ Alt. Specific Unlisted Items	1070)				\$259,282,161.00
		Mobilization (+/-5%)					\$13,000,000.00
		Subtotal w/Mobilization					\$272,282,161.00
		QUANTITIES				PRICES	
BY			вү			CHECKED	
_	Mark L	eavitt Steve Robertson	Dan Mar				
DATE PR	EPAREI	<u></u>	DATE PREPAREI	D		PEER REVIEW	
	April 2	0, 2006					

### **Attachment 6**

**Cost Estimate Worksheets for Alternative No. 6: No-Project** 

FEATU	IRE:		PROJEC	CT:			
Alterna	ative N	o. 6				Salton Sea	
No-Pro	ject Al	lternative	WOID:	L165C	ESTIN	IATE LEVEL:	Appraisal
Water	Conve	yance Components	REGION:	LC	PRICE	LEVEL:	Apr-06
		•	FILE:				
				C:\ALL\SEA\2007\[0	Conveyance	_Worksheets1-10.xls]Alterr	native 6 NP est
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SW Left Quadrant River Diversion					
		Diversion structure					
		48" Rock riprap		330	CY	\$90.00	\$29,700.00
		Sheet pile cutoff		2,875	SF	\$35.00	\$100,625.00
		New River settling basin					
		Excavation		2,235	CY	\$10.00	\$22,350.00
		Embankment		8,315	CY	\$5.00	\$41,575.00
		Unreinforced concrete canal	lining	190	CY	\$500.00	\$95,000.00
		River Water Distrib'n Channel, 69 cf	s, 22.7 mi				
		Excavation		335,505	CY	\$7.00	\$2,348,535.00
		Compacted embankment		24,810	CY	\$6.00	\$148,860.00
		Unreinforced concrete canal lining		16,260	CY	\$500.00	\$8,130,000.00
		20 Siphons, 50' head class					
		4.0' dia Precast reinf conc pip	e	4,000	LF	\$300.00	\$1,200,000.00
		Excavation		60,115	CY	\$8.00	\$480,920.00
		Backfill		57,585	CY	\$6.00	\$345,510.00
		Reinforced concrete		190	CY	\$1,000.00	\$190,000.00
		7 Cross drainage structures					
		48" dia Precast reinforced co	ncrete pipe	705	LF	\$300.00	\$211,500.00
		9 Bridges					
		Reinforced concrete		285	CY	\$1,000.00	\$285,000.00
		QUANTITIES				RICES	
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	Mark Leavit	tt Steve Robertson	Dan Mar				
DATE PREPA	RED		DATE PREPARE	D		PEER REVIEW	
	April 20, 20	06					

FEATU	RE:		PROJEC	CT:			0.121_2_ 00
,						Caltan Cas	
Alterna	ative N	o. 6				Salton Sea	
No-Pro	ject Al	ternative	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal
Water (	Conve	yance Components	REGION:	LC	PRICE	LEVEL:	Apr-06
			FILE:				
				C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alter	rnative 6 NP est
PLANT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SW Right Quadrant					
		River Diversion					
		Diversion structure					
		48" Rock riprap		330	CY	\$90.00	\$29,700.00
		Sheet pile cutoff		2,875	SF	\$35.00	\$100,625.00
		New River settling basin					
		Excavation		2,235	CY	\$10.00	\$22,350.00
		Embankment		8,320	CY	\$5.00	\$41,600.00
		Unreinforced concrete canal	lining	190	CY	\$500.00	\$95,000.00
		River Water Distrib'n Channel, 69 cfs	s, 6.3 mi				
		Excavation		93,115	CY	\$7.00	\$651,805.00
		Compacted embankment		6,885	CY	\$6.00	\$41,310.00
		Unreinforced concrete canal lining		4,515	CY	\$500.00	\$2,257,500.00
		10 Siphons, 50' head class					
		4.0' dia Precast reinf conc pip	e	2,000	LF	\$300.00	\$600,000.00
		Excavation		30,055	CY	\$8.00	\$240,440.00
		Backfill		28,800	CY	\$6.00	\$172,800.00
		Reinforced concrete 1 Bridges		95	CY	\$1,000.00	\$95,000.00
		Reinforced concrete		35	CY	\$1,000.00	\$35,000.00
		QUANTITIES			P	RICES	
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FEATU	RE:		PROJEC	T:			<u> </u>
Alterna		o. 6				Salton Sea	
		Iternative	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal
		yance Components	REGION:	LC		LEVEL:	Apr-06
	•	•	FILE:				·
				C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alter	native 6 NP est
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		SE Quadrant					
		River Diversion					
		Diversion structure		4.0==	0) (	<b>#</b>	<b>*</b> • • • • • • • • • • • • • • • • • • •
		48" Rock riprap		1,355	CY	\$90.00	\$121,950.00
		Sheet pile cutoff Alamo River settling basin		11,775	SF	\$35.00	\$412,125.00
		Excavation		2,235	CY	\$10.00	\$22,350.00
		Embankment		8,315	CY	\$5.00	\$41,575.00
		Unreinforced concrete canal	linina	190	CY	\$500.00	\$95,000.00
		00	9		<u> </u>	ψουσιου	<del>400,000.00</del>
		River Water Distrib'n Channel, 69 cfs	s, 19.8 mi				
		Excavation		292,645	CY	\$7.00	\$2,048,515.00
		Compacted embankment		21,640	CY	\$6.00	\$129,840.00
		Unreinforced concrete canal lining		14,180	CY	\$500.00	\$7,090,000.00
		17 Siphons, 50' head class	_	0.400		#200.00	£4,000,000,00
		4.0' dia Precast reinf conc pip	e	3,400	LF	\$300.00	\$1,020,000.00
		Excavation Backfill		51,100 48,950	CY CY	\$8.00 \$6.00	\$408,800.00 \$293,700.00
		Reinforced concrete		46,930	CY	\$1,000.00	\$165,000.00
		23 Cross drainage structures		100	01	ψ1,000.00	Ψ103,000.00
		48" dia Precast reinforced concrete	pipe	2,305	LF	\$300.00	\$691,500.00
		10 Bridges		_,=,==		¥000100	<b>~</b> • • • • • • • • • • • • • • • • • • •
		Reinforced concrete		315	CY	\$1,000.00	\$315,000.00
		QUANTITIES			Р	RICES	
BY			BY			CHECKED	
DATE PREPA	Mark Leavit	tt Steve Robertson	Dan Mar DATE PREPARE	D		DEED DEVIEW	
DATE PREPAI	KED April 20, 20	06	DATE PKEPAKE	U		PEER REVIEW	

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April 20, 2006

FEATURE:

IMATE WORKSHEET		6con SHEET_4_ OF _5 _
PROJECT:		
	Salton Sea	

Alterna	ative N	lo. 6				Salton Sea	
	-	Iternative	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal
	•	yance Components	REGION:	LC		LEVEL:	Apr-06
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			· ILL.	C:\ALL\SEA\2007\[	Conveyance	_Worksheets1-10.xls]Alterr	native 6 NP est
PLANT ACCOUNT	РАҮ ІТЕМ	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		NW Quadrant					
		River Diversion  Diversion structure  48" Rock riprap		840	CY	\$90.00	\$75,600.00
		Sheet pile cutoff		7,300	SF	\$35.00	\$255,500.00
		Whitewater River settling basin Excavation		2,235	CY	\$10.00	\$22,350.00
		Embankment		8,315	CY	\$5.00	\$41,575.00
		Unreinforced concrete canal	lining	190	CY	\$5.00 \$500.00	\$95,000.00
		River Water Distrib'n Channel, 69 cfs		190	Ci	φ300.00	\$95,000.00
		Excavation		233,525	CY	\$7.00	\$1,634,675.00
		Compacted embankment		17,270	CY	\$6.00	\$103,620.00
		Unreinforced concrete canal lining 12 Siphons, 50' head class	)	11,315	CY	\$500.00	\$5,657,500.00
		4.0' dia Precast reinf conc pip	ре	2,400	LF	\$300.00	\$720,000.00
		Excavation		36,075	CY	\$8.00	\$288,600.00
		Backfill		34,550	CY	\$6.00	\$207,300.00
		Reinforced concrete		115	CY	\$1,000.00	\$115,000.00
		4 Cross drainage structures					
		48" dia Precast reinforced concrete	pipe	405	LF	\$300.00	\$121,500.00
		15 Bridges					
		Reinforced concrete		470	CY	\$1,000.00	\$470,000.00
		QUANTITIES			Р	RICES	
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	Mark Leav	itt Steve Robertson	Dan Mar				
DATE PREPA	RED		DATE PREPARE	D		PEER REVIEW	

FEATU	IRE:		PROJEC	T:			
Alterna	ative N	o. 6				Salton Sea	
No-Pro	ject Al	ternative	WOID:	L165C	ESTIM	ATE LEVEL:	Appraisal
	-	yance Components	REGION:	LC	PRICE	LEVEL:	Apr-06
		•	FILE:				·
				C:\ALL\SEA\2007\[0	Conveyance	_Worksheets1-10.xls]Alte	rnative 6 NP est
PLANT ACCOUNT	PAY ITEM	DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		NE Quadrant River Diversion					
		Diversion structure					
		48" Rock riprap		840	CY	\$90.00	\$75,600.00
		Sheet pile cutoff		7,305	SF	\$35.00	\$255,675.00
		Whitewater River settling basin			2) (		
		Excavation		2,235	CY	\$10.00	\$22,350.00
		Embankment	linin a	8,320	CY CY	\$5.00	\$41,600.00
		Unreinforced concrete canal	ining	190	CY	\$500.00	\$95,000.00
		River Water Distrib'n Channel, 69 cfs	s, 18.9 mi				
		Excavation		279,340	CY	\$7.00	\$1,955,380.00
		Compacted embankment		20,655	CY	\$6.00	\$123,930.00
		Unreinforced concrete canal lining		13,535	CY	\$500.00	\$6,767,500.00
		9 Siphons, 50' head class					
		4.0' dia Precast reinf conc pip	e	1,800	LF	<b>*</b>	<b>A</b>
		Excavation		27,055	CY	\$8.00	\$216,440.00
		Backfill		25,915	CY CY	\$6.00	\$155,490.00
		Reinforced concrete 7 Cross drainage structures		85	CY	\$1,000.00	\$85,000.00
		48" dia Precast reinforced concrete	nine	705	LF	\$300.00	\$211,500.00
		10 Bridges	Pipo	700		φοσο.σσ	Ψ211,000.00
		Reinforced concrete		315	CY	\$1,000.00	\$315,000.00
		Subtotal					\$50,996,745.00
		Alternative Specific Unlisted Items (+/-	10%)				\$5,099,675.00
		Total w/ Alt. Specific Unlisted Items	/				\$56,096,420.00
		Mobilization (+/-5%)					\$2,800,000.00
		Subtotal w/Mobilization					\$58,896,420.00
		OHANTITIES				DICES	
DV.		QUANTITIES	DV.		Р	RICES	
BY	Mark Leavit	t Steve Robertson	BY Dan Mar			CHECKED	
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	April 20, 20	06	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			<b></b>	

### **Attachment 7**

**Air Quality Mitigation Project Feature Construction Costs** 

# Salton Sea Restoration Exposed Lake Playa Surface Areas and Associated Estimated Air Quality Mitigation Costs<sup>1/</sup> (Based on Mean Future Stochastic Model Results for year 2040)

Alternative Description	Exposed Lake Playa Surface Areas (acres)	Air Quality Mitigation Construction Costs by WEV (Millions \$)	Air Quality Mitigation Construction Costs by Other Methods (Millions \$)	Total Air Quality Mitigation Construction Costs (Millions \$)
Alternative 1A - Mid-Sea Dam/North Marine Lake (Salton Sea Authority Alternative)	103,800	727	145	872
Alternatives 1B, 1C & 1D - Mid-Sea Dam/North Marine Lake (Salton Sea Authority Alternative)	61,433		9.9	9.9
Alternatives 2A & 2B Mid-Sea Barrier/South Marine Lake	73,600	515	103	618
Alternatives 3A, 3B & 3C Concentric Lakes (Imperial Group Alternative)	65,000	455	6	546
Alternative 4 - North-Sea Dam/ North Marine Lake	91,800	643	129	771
Alternative 5 Habitat Enhancement Without Marine Lake	81,200	568	114	682
Alternative 6 No-Project with Air Quality Mitigation	92,200	645	129	774
Progressive Habitat Development <sup>2/</sup>	92,200	645	129	774

<sup>1/</sup> Water conveyance costs associated with AQM are not included.

All costs, except those for Alternatives 1B, 1C and 1D, do not include 5% adjustment for mobilization and are based on the DWR Plan which assumes 50% exposed playa AQM by WEV at \$14,000/acre and 20% by other at \$7,000/acre.

Costs for Alternatives 1B, 1C and 1D include 5% adjustment for mobilization as shown in the attached cost estimate worksheet.

<sup>2/</sup> Estimated as being the same as No-Project Alternative and will be revised as PHDA is further developed.

SHEET 1 OF	1

FEAT	JRE:			PROJE	CT:			
Altern	ative	Nos. 1B, 1C,	& 1D			Salto	n Sea Resto	oration
		Authority Alte		WOID:		ESTIN	MATE LEVEL:	Appraisal
			onstruction Costs	REGION	:		E LEVEL:	
	•	J		FILE:				
					C:\ALL\SEA\2003	7\[A O M   E	ntimata Warkahaat 110	07.xls]Alternative 1 Salt Ponds
⊢	>				C.IALLISEAI2001	NACINI - ES	sumate Worksheet - 1-10-	07.xisjAllemative i Sait Fonds
PLANT ACCOUNT	РАҮ ІТЕМ		DESCRIPTION	CODE	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		AQM - Salt Pon	nd Embankments					
	1	Construct salt pond	embankments - use low ground		2,024,000	CY	\$3.25	6,578,000
		pressure bulldozer t	o strip adjacent surficial soil,					
			nt alignment, place, and compact					
		by crawler-tracking (	6-inch layers. Embankments					
		have 5-foot crest wid	dth, 2:1 (H:V) side slopes, are					
		2.5 feet high and tot	al length of 414 miles.					
		Subtotal (includes El	0/ mobilization)					6 579 000
		Subtotal (includes 5	% ITIODIIIZation)					6,578,000
		01141	TITIEO				PRIOCO	
		QUAN	TITIES				PRICES	
BY	M Cosses		CHECKED R. Wiltshire	вү			CHECKED	
	M. Spears							
DATE PREPA	ARED	January 10, 2007	PEER REVIEW	DATE PREPA	RED		PEER REVIEW	

### **Attachment 8**

**Annual Operations, Energy, Maintenance, and Replacement Costs for Restoration Alternatives** 

# Salton Sea Restoration Estimated Embankment and Conveyance O&M Costs

### **Baseline Estimated Dam/Dike/Barrier/Canal Operations and Maintenance Costs:**

6 Employees =	\$	600,000	Assume 50k per year for 6 people with a 2.0 multiplier
2 Vehicles =	\$	7,200	Assume lease at \$300/month for 2 vehicles for 12 months
Boat =	\$	3,600	Assume lease at \$300/month for 1 boat for 12 months
Office Space =	\$	12,000	Assume rent at \$1000/month for 12 months
Marina =	\$	900	Assume rent at \$75/month for 12 months
Materials/Contract Budget =	\$	250,000	Assume Materials and Supplies at \$10000/month for 12 months
Total	Ф	072 700	

Total \$ 873,700 Rounded (\$million) **0.9** 

### Total Estimated Alternative Dam/Dike/Barrier/Canal Operations and Maintenance Costs<sup>1/</sup>:

Alternative	Multiplier	Costs (\$M)
Alternatives 1A,1B,1C&1D: Mid-Sea Dam/North Marine Lake (SSA Alternative)	2*baseline	1.75
Alternative 2A: Mid-Sea Barrier with Stone Coulmns and with Habitat Enhancements	1*baseline	0.87
Alternative 2B: Mid-Sea Barrier without Stone Columns and with Habitat Enhancements	1*baseline	0.87
Alternative 3A: Concentric Lakes Dikes Without Stone Columns (Imperial Group Alternative)	4*baseline	3.49
Alternative 3B: Concentric Lakes Dikes With Stone Columns (Imperial Group Alternative)	4*baseline	3.49
Alternative 3C: Concentric Lakes Dikes with Geotubes (Imperial Group Alternative)	6*baseline	5.24
Alternative 4: North-Sea Dam with Habitat Enhancements	1*baseline	0.87
Alternative 5: Habitat Enhancement Without Marine Lake	1*baseline	0.87
Alternative 6: No Project		0.00

<sup>1/</sup> Total Estimated Alternative O&M Costs equal baseline times multiplier

# Salton Sea Restoration Annual Power Costs Calculations

Alt. No.	Description	Flowrate (cfs)	TDH (ft)	Inst. <sup>1</sup> Power Rqmt. (kW)	Annual Power Rqmt. (kW- hrs)	Annual <sup>2</sup> Power Cost
1	South Lake Pumping Plant	35	201	851	7,453,964	\$447,238
1	Circulation Pump Plant	967	34	3977	34,836,022	\$2,090,161
1	Deep Water Pumping Plant	608	33	2427	21,258,895	\$1,275,534
	Alternative 1 Total				63,548,881	\$3,812,933
2	Sea Water Pumping Plant	85	178	1830	16,031,055	\$961,863
2	Sea Water Pumping Plant	26	146	459	4,022,068	\$241,324
	Alternative 2 Total				20,053,122	\$1,203,187
4	Sea Water Pumping Plant	91	223	2455	21,501,533	\$1,290,092
4	Sea Water Pumping Plant	74	171	1531	13,407,599	\$804,456
	Alternative 4 Total				34,909,131	\$2,094,548
5	Sea Water Pumping Plant	91	201	2212	19,380,305	\$1,162,818
5	Sea Water Pumping Plant	74	179	1602	14,034,855	\$842,091
5	Sea Water Pumping Plant	22	177	471	4,125,904	\$247,554
	Alternative 5 Total				37,541,064	\$2,252,464

<sup>1 -</sup> Assumes 70% net pump/motor efficiency

<sup>2 -</sup> Assumes a power cost of **\$0.0600** per kW-hour (see below)

Average peak and off-peak monthly prices from Sept., 2003 thru Aug.,	2006	0.04762
(derived from Dow Jones data)	rounded up	0.048
Assumed allowance for transmission and other delivery costs at	20% rounded up	0.00960 0.010
	TOTAL rounded up	0.058 <b>0.060</b>

# Alternative No. 1A, 1B, 1C & 1D Salton Sea Authority Water Treatment Facilities Costs

<u>Source:</u> "Salton Sea Authority Plan For Multi-Purpose Project" Draft for TAC Review dated 6/9/06 Bob Hamilton spoke with Bill Brownlie of Tetra Tech, Inc. on 9/18/06 and the costs are the most current at that time; Mr. Brownlie stated that he believed these costs were expressed in \$2006 and were developed by Mr. Ron Entwiler

Construction Cost	<u>\$Million</u>
Treatment & Pumping Plant Costs in Report (page 72)	300
adjustment for unlisted items (10%) and contingencies (25	%) 1.375
Construction Cost for Reclamation Spreadsheet (includes 5% mobilization)	218.1818 ounded <b>218</b>

OM&R	<u>\$Million</u>
Phosphorus Removal Plant in Report (page 73)	31.1
Filtration/Ozone Plant in Report (page 73)	13.4
Pumping Plant in Report (page 73)	0.8
total from Report	45.3

### **Salton Sea Restoration**

# **Exposed Lake Playa Surface Areas and Associated Estimated Air Quality Mitigation Costs**

### **Annual Operation, Maintenance & Replacement Costs**

(Based on Mean Future Stochastic Model Results for year 2040)

Exposed Lake Playa Alternative Description Area (acres)	Annual <sup>1/</sup> OM & R Costs (Millions \$)
Alternative 1A - Mid-Sea Dam/North Marine Lake (Salton Sea Authority Alternative) 103,800	184.2
Alternatives 1B, 1C & 1D - Mid-Sea Dam/North  Marine Lake (Salton Sea Authority Alternative)  61,433	2.1
Alternatives 2A & 2B Mid-Sea Barrier/South Marine Lake 73,600	130.6
Alternatives 3A, 3B & 3C Concentric Lakes (Imperial Group Alternative) 65,000	115.3
Alternative 4 - North-Sea Dam/ North Marine Lake 91,800	162.9
Alternative 5 Habitat Enhancement Without Marine Lake 81,200	144.1
Alternative 6 No-Project with Air Quality Mitigation 92,200	163.6
Progressive Habitat Development <sup>2/</sup> 92,200	163.6

<sup>1/</sup> O&M costs for all alternatives, except 1B, 1C and 1D, are based on WEV (50%), gravel, SWB and paliatives (20%) low range O&M values in Summary tab of DCM cos ERS.xls (attached) and annual replacement assumed at 10 % of construction cost.

### Baseline Estimated Dam/Dike/Barrier/Canal Operations and Maintenance Costs:

6 Employees =	\$ 600,000	Assume 50k per year for 6 people with a 2.0 multiplier
2 Vehicles =	\$ 7,200	Assume lease at \$300/month for 2 vehicles for 12 months
Boat =	\$ 3,600	Assume lease at \$300/month for 1 boat for 12 months
Office Space =	\$ 12,000	Assume rent at \$1000/month for 12 months
Marina =	\$ 900	Assume rent at \$75/month for 12 months
Materials/Contract Budget =	\$ 250,000	Assume Materials at \$10000/month for 12 months
		_

Total \$ 873,700 Rounded (\$million) **0.9** 

<sup>2/</sup> O&M costs for Alternatives 1B, 1C and 1D are 2 times Reclamation's baseline embankment O&M cost estimate summarized below and annual replace cost is 1/20 of the construction cost.

From Summary Tab of DCM cos ERS.xis file provided by California Department of Water Resources Nater demand and rough order-of-magnitude costs for playa dust control

Water defination and fought of definition costs for playa dust contribute	ili ordel-ol-magi	IIIInnae costs IOI	piaya uusi t	DILLO																							
	8	Construction costs	sts	CO	Construction costs	costs		Ops and maintenance	tenance				Watera			Replace	ement Co	Replacement Cost in 10yrs <sup>c</sup>	2	Replacen	Replacement Cost in 20yrs <sup>c</sup>	7 20yrs		Replace	Replacement Cost in 30yrs <sup>c</sup>	t in 30yrs	
	Owens	SS es	SS estimate	Owens	SS	SS estimate																		L			
DCM		row	High	I	row	High	70w	High	row	High	Fow	High	row	High Source	onice	Tow F	High	row	High	Low High	wo7 4	v High	th Low	w High		row	High
		(\$M/sq mi)			(\$/acre)		\$/\$)	(\$/sq mi-year)	(\$/ac	(\$/acre-year)	(KJ)	()	(\$/a-y)			(\$M/sd mi)	(ir	(\$/acre)	(c	(\$M/sq mi)		(\$/acre)	_	(\$M/sd mi)		(\$/acre)	
Gravel		\$	12.0 \$ 21.3	3	\$ 18,82	\$ 18,822 \$33,342	12 \$ 602,311	1,066,951	1 \$ 941	1,667	0.0	ĺ	- \$			25 \$	43 \$	\$38,324 \$	\$67,889	40 \$	71 \$ 62,426	426 \$ 110,584	,584	\$ 59	115 \$ 10	\$ 101,686 \$	180,129
SF pond	\$ 7.0			\$ 10,938	38		\$ 180,000	00 \$ 250,000	0 \$ 281	\$ 394	1 4.2		\$ 1,680	Ā	Any	S	14	S	\$22,270	ss	23	\$ 36	36,276	s	38	S	59,089
SF simple	\$ 10.0			\$ 15,625	25		\$ 220,00	000'000 \$ 00	0 \$ 344	1 \$ 469	3.6	4.2	\$ 1,440	\$ 1,680 Ar	Any	89	20	\$	\$31,814	S	33	\$ 51	51,822	s	54	S	84,413
SF uniform	\$ 12.0	-		\$ 18,750	20		\$ 310,000	000'8 480'000	0 \$ 484	1 \$ 750	3.6	4.2	\$ 1,440	\$ 1,680 Any	λ	S	24	S	\$38,177	s	40	\$ 62	62,187	s	65	S	101,296
WEV	\$ 15.0	\$	9.0 \$ 14.	9.0 \$ 14.5 \$ 23,438 \$ 14,063	38 \$ 14,06	63 \$22,585	\$	000'000'1 \$ 00	0 \$ 1,250	\$ 1,563	3 1.0		\$ 400	<u>u</u>	nflow	18 \$	29	\$ 28,633 \$	\$45,986	\$ 08	48 \$ 46,640	340 \$ 74,906	906	49 \$	. \$ 87	75,972 \$	122,014
SWB		\$	0.9 \$ 1.	1	\$ 1,406	36 \$ 1,715	2 \$ 300,000	000'000 \$ 400'000	0 \$ 469	3 \$ 625	2 0.5	1.7	\$ 200	\$ 667 Any	γı	2 \$	2 \$	\$ 2,863 \$	3,491	3 &	4 \$ 4,664	s	2,687	\$ 9	\$ 9	\$ 165'1	9,263
Paliatives		s	0.1 \$ 31.1	1	\$ 23	233 \$48,564	\$	\$ 31,080,960 \$	0 \$ 233	3 \$48,564	4 0.003	0.045	1 8	\$ 18 Int	Inflow												
Sandhraakeil		6	30 9 60	0	0 254	2122 0 2126 0	9 0000000 9		245	000	350 000 \$ 343 \$ 304		400	-	lofton,												

Replacement cost Assumption - 5% yearly increase in Initial construction cost plus 25% of escalated cost as cost for taking down order racinities	v oc - nondu	eany II	ncrease in initis	al cons	TUCTR	on cost bins	25% OI eSC.	alated cost	as cost for	taking down old	er racilities	
												6.0 20.0
		0	Ops and maintenance	enance	•		L		Water	8		
DCM	row.		High	70M	_	High	MO7	High	MO7	High	Source	
	\S)	(\$/sq mi-year)	wear)	S	\$/acre	(\$/acre-year)	(4)	,	(%-e/\$)			
Grave	\$ 602,311	11 \$	1,066,951		941 \$	1,667	0.0		. \$			
SF pond	\$ 180,000	\$ 00	250,000	\$ 2	281 \$	\$ 391	4.2		\$ 1,680		Any	
SF simple	\$ 220,000	\$ 00	300,000	\$	344 \$	9 469	3.6	4.2	\$ 1,440	s	1,680 Any	
SF uniform	\$ 310,000	\$ 00	480,000	\$	484 \$	\$ 750	9.6	4.2	\$ 1,440	\$	,680 Any	
WEV	\$ 800,000	\$ 00	1,000,000	8	1,250 \$	1,563	1.0		\$ 400	c	Inflow	
SWB	\$ 300,000	\$ 00	400,000	s	469	\$ 625	9.0	1.7	\$ 200	s	667 Any	
Paliatives	\$ 149,3	149,349 \$	31,080,960 \$		233 \$	48,564	0.003	0.045	5	8	18 Inflow	
Sandbreaks	\$ 200,000	\$ 00	250,000 \$		313 \$	391	0.25		\$ 100	C	Inflow	

"Assumed water cost: \$ 400
Passumes 1/20 of gravelled area needs to be recovered with additional gravel each year
"Assumes WEV on 20% of the area, at 25% of the cost and water use

### **Attachment 9**

Total Costs of Restoration Alternatives: Implementation Costs, OME&R Costs, Annual Risk Costs, and Total OMER&R Costs