



# Memorandum

Date: September 21, 2024  
To: J. P. Semper, San Diego  
From: Catherine Dummer, Portland  
Reviewed by: William Agster, Denver  
Project No.: 156443.108.010  
Subject: Vista Irrigation District, Flume Replacement Alignment Study  
Planning Level Design Completion  
Basis of Estimate of Probable Construction Cost

The Basis of Estimate Report and supporting estimate reports for the subject project are attached. Please call me if you have questions or need additional information.

Enclosures (2):

1. Basis of Estimate Report
2. Alt 1 Summary Estimate

## Basis of Estimate Report

# Vista Irrigation District, Flume Replacement Alignment Study

## Introduction

Brown and Caldwell (BC) is pleased to present this opinion of probable construction cost (estimate) prepared for the Vista Irrigation District, Flume Replacement Alignment Study, in San Marcos and Escondido, California.

## Estimated Project Costs

Based on the typical accuracy of a Class 5 estimate, the expected range of costs is:

	Upper Range	Estimated Cost	Lower Range
	+100%		-50%
Alt 1: South Central	\$519,778,000	\$259,889,000	\$129,944,500

## Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Allowances for known but undefined work
- Contractor and other estimate markups

## Scope of Work

The Vista Irrigation District utilized an existing flume to convey the District's local water supply to a storage reservoir. The flume consists of above-grade unpressurized gunite bench structures, buried pressurized steel or concrete pipelines, and unpressurized rock tunnels. The purpose of these estimates is to assist in the evaluation of multiple alignment alternatives for replacement of the flume. The selected alternative is Alternative 1: South Central.

## Background of this Estimate

In previously submitted planning level estimates dated June 2021 and July 2022, BC's estimating team presented an estimate of probable cost for two preliminary alternatives based on documents furnished to the Estimating and Scheduling Group (ESG), and on the overall market conditions at that time.

The attached estimate of probable construction cost is based on documents received by the Estimating and Scheduling Group (ESG) dated November 2021, updated in July 2022 and August 2023 with more current project information. These documents are described as planning level documents and include a summary of assumptions, Google Earth pipe alignments, geotechnical risks along each alignment, a verbal summary of the features and things to consider for each alignment, and trenchless alignments and costs.

## Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 5 estimate. A Class 5 estimate is defined as a Conceptual Level or Project Viability Estimate. Typically, engineering is from 0 to 2 percent complete. Class 5 estimates are used to prepare planning level cost scopes or evaluation of alternative schemes, long range capital outlay planning and can also form the base work for the Class 4 Planning Level or Design Technical Feasibility Estimate.

Expected accuracy for Class 5 estimates typically ranges from -50 to +100 percent, depending on the technological complexity of the project, appropriate reference information and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

## Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes and equipment pricing furnished either by the project team or by the estimator. The estimate includes direct labor costs and anticipated productivity adjustments to labor and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of Sage Construction and Real Estate 300 estimating software engine (formerly Timberline) using RS Means database, historical project data, the latest vendor and material cost information, and other costs specific to the project location.

## Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel) and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and worker's compensation insurance are included in the labor rates. No trade discounts were considered.

## Indirect Cost Development

Local sales tax has been applied to material and equipment rentals. A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data.

The contractor's cost for builder's risk, general liability and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost and are added after the net markups have been applied to the appropriate items.

## Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Contractor's credentials, applicable to the type of project.
2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions or any other unplanned costs.
3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.
4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except that which will be performed by traditional specialty subcontractors as identified here:
  - Hauling
  - Paving
  - Traffic control
  - Jack/bore trenchless construction
  - Cathodic protection

## Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Pipeline will be welded steel, AWWA C200, cement mortar lined and coated, 36" diameter, 0.25" thickness, double lap welded.
2. Pipe trench will be 24" wider than pipe and consist of 6" pipe bedding, pipe zone extending to 12" above pipe, and backfill 6.5 ft deep average. Bedding, pipe zone, and backfill will be crushed rock/engineered fill.
3. Trench asphalt will be removed and replaced with 6" thick asphalt on 12" base rock above the trench section only, and 1.5" thick mill/overlay is included for full lane width (12').
4. A gravel access road, 8" thick, will be provided above the pipeline where asphalt is not required.
5. Corrosion protection will be impressed current system.
6. Pipeline appurtenances will be per district standard details and will be spaced as follows:
  - a. Air relief valves – 4 per mile
  - b. Blow-offs – 4 per mile

- c. Isolation valves – 3 per mile
7. Pipe laying productivity is assumed as:
    - a. 60 lf/day in streets with utilities
    - b. 80 lf/day in rural areas or streets with no utilities
    - c. Add 2 days for each intersection
    - d. Add 1 day for each school
  8. Adjust for geotechnical risks as follows:
    - a. High Rippability Risk - Reduce trenching rate by 20 lf/day
    - b. Soil Contamination Risk – 50% of excavated soils are contaminated with petroleum byproducts or similar and will be handled and disposed of accordingly
    - c. Groundwater Depth within 10 ft of Surface – Trench will be over-excavated by 1 ft and this volume replaced with 1-1/2” rock wrapped in filter fabric, and sump pumps will be used in the trench.
  9. Trenchless construction will be by jack/bore with 36” carrier pipe and 54” casing pipe.
  10. Flow Control Facilities: Alt 1 will require a standpipe at the Pechstein Reservoir site. The standpipe will be a 6’ x 6’ concrete box with dividing wall/weir, approximately 50 ft tall total.
  11. Demolition of the existing flume:
    - a. Where not replaced with pipe the existing bench structures will be demolished, removed, and replaced with native material.
    - b. Siphons to be reused will be lined with an HDPE compressed fit lining sized to match the existing siphon diameter. Lining access pits will be constructed every 500 ft and at bends.
    - c. Siphons not reused will be filled with grout and abandoned in place.
  12. Contractor performs the work as regular shift work, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift except as noted.
    - a. An allowance has been made for additional shift work compensation assuming that the labor rate differential for 2<sup>nd</sup> shift is 9.3% higher than 1<sup>st</sup> shift. (The shift differential labor rate increase is based on the 2022-1 Prevailing Wage Determinations for San Diego County, Plumber Industrial and General Pipefitter.)
      - i. Alt 1 – 35% of the open cut labor will be night work
    - b. Night work windows will be long enough such that the time available for pipe trenching and installation is similar to daytime work.
  13. Contractor has complete access for lay-down areas and mobile equipment.
  14. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates, and/or rates contained in the estimating database.
  15. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.
  16. Major piping costs are based on vendor supplied price quotes obtained by the project design team and/or estimators and on historical pricing of like equipment.
  17. Bulk material quantities are based on manual quantity take-offs.

## Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.
2. O&M costs for the project except for the vendor supplied O&M manuals.
3. Utility agency costs for incoming power modifications.
4. Permits beyond those normally needed for the type of project and project conditions.

## Allowances for Known but Undefined Work

The following allowances were made in the development of this estimate.

1. Cathodic protection - \$40/lf (with markups)

## Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

Table 1. Estimate Markups	
Item	Rate (%)
<b>Net Cost Markups</b>	
Night Work Labor Adjustment (see Estimating Assumption 12)	3.3
Labor (employer payroll burden)	15
Materials and process equipment	10
Equipment (construction-related)	10
Subcontractor	10
Sales Tax (State and local for materials, process equipment and construction equipment rentals, etc.)	7.75
Material Shipping and Handling	6
<b>Gross Cost Markups</b>	
Contractor General Conditions	15
Start-up, Training and O&M	2
Undesigned/Undeveloped Detail Contingency	30
Scope Contingency	10
Builders Risk, Liability and Auto Insurance	2
Performance and Payment Bonds	1.5
<b>Non-Construction Costs</b>	
Environmental	5
Easement	5
Design and Administrative	25
3 <sup>rd</sup> Party Inspection - CM Services and Environmental Monitoring	5
<b>Escalation</b>	
Escalation to Midpoint of Construction	38.0

## **Labor Markup**

The labor rates used in the estimate were derived from RS Means latest national average wage rate tables. These include base rate paid to the laborer plus fringes. A labor burden factor is applied to these such that the final rates include all employer paid taxes. These taxes are FICA (which covers social security plus Medicare), Workers Comp (which varies based on state, employer experience and history) and unemployment insurance. The result is fully loaded labor rates. In addition to the fully loaded labor rate, an overhead and profit markup is applied at the back end of the estimate. This covers payroll and accounting, estimator's wages, home office rent, advertising and owner profit.

These fully loaded national labor rates were then adjusted for local conditions using the RS Means City Cost Index for San Diego, California.

## **Materials and Process Equipment Markup**

This markup consists of the additional cost to the contractor beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

## **Equipment (Construction) Markup**

This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all the equipment needed for the job, but to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is like the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

## **Subcontractor Markup**

This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

## **Sales Tax (Materials, Process Equipment and Construction Equipment)**

This is the tax that the contractor must pay according to state and local tax laws. The percentage is applied to both the material and equipment the GC purchases as well as the cost for rental equipment. The percentage is based on the local rates in place at the time the estimate was prepared.

## **Contractor Startup, Training, and O&M Manuals**

This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup and O&M manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and troubleshoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel,

filters, etc.), startup drawings and schedules, startup meetings and coordination with the plant personnel in other areas of the plant operation.

### **Builders Risk, Liability, and Vehicle Insurance**

This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity and contractor's requirements and history. Instead of using numbers from a select few contractors, we believe it is more prudent to use a combined 2 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and the contractor's insurability at the time the project is bid.

### **Material Shipping and Handling**

This can range from 2 to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paper work, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies, e.g., oil, gaskets and bolts that may be missing from the equipment or materials shipped.

### **Escalation to Midpoint for Labor, Materials and Subcontractors**

In addition to contingency, it is customary for projects that will be built over several years to include an escalation to midpoint of anticipated construction to account for the future escalation of labor, material and equipment costs beyond values at the time the estimate is prepared. For this project, the anticipated rate of escalation is 3.5 percent per annum.

The estimated construction time for this project is 77 months (6.4 years), exclusive of unusual weather or site conditions delays. Construction is anticipated to start January 2030 and be completed by July 2036. The escalation factors used in this estimate are calculated from the date of this estimate to the anticipated midpoint of construction which is approximately 111 months from the date of this estimate. January 2024 is used as the date of the estimate, which is the approximate date of the RSMeans pricing used in the estimate.

### **Undesigned/Undeveloped Contingency**

The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that cannot be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage and area factors, construction contingency can range from 10 to 50 percent.

### **Performance and Payment Bonds**

Based on historical and industry data, this can range from 0.75 to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, contractor's historical

record on similar projects, complexity and current bonding limits. BC uses 1.5 percent for bonds, which we have determined to be reasonable for most heavy construction projects.



# Estimate Summary Report

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BC Project Number: 156443.108.010  
Estimate Version Number: 9  
Estimate Date: 9/21/2024  
Lead Estimator: Catherine Dummer

## FLUME REPLACEMENT ALIGNMENT STUDY, ALTERNATIVE 1: SOUTH CENTRAL

### VISTA IRRIGATION DISTRICT FLUME REPLACEMENT ALIGNMENT STUDY, ALTERNATIVE 1: SOUTH CENTRAL CLASS 5 ESTIMATE

<b>Estimator</b>	Catherine Dummer
<b>BC Project Manager</b>	J. P. Semper
<b>BC Office</b>	San Diego
<b>Est Version Number</b>	9
<b>QA/QC Reviewer</b>	William Agster
<b>QA/QC Review Date</b>	01/18/2022
<b>BC Project Number</b>	156443.108.010



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## FLUME REPLACEMENT ALIGNMENT STUDY, ALTERNATIVE 1: SOUTH CENTRAL

Phase	Description	Takeoff Quantity	Grand Total Price	Gross Total Cost with Markups
<b>01 ALTERNATIVE 1: SOUTH CENTRAL</b>				
<b>01 Existing Flume Demolition or Abandonment</b>				
	01 Bench Demolition	30,270.00 If	196.10 /If	5,935,819
	02 Siphon/Pipe Demolition or Abandonment	22,958.00 If	107.90 /If	2,477,102
	01 Existing Flume Demolition or Abandonment	53,228.00 If	158.05 /If	8,412,921
<b>02 Bennett Service Area Extension</b>				
	02 Siphon/Pipe Demolition or Abandonment	5,280.00 If	22.85 /If	120,663
	08 Structures, Appurtenances and Cathodic Protection	10.00 Is	20,733.42 /Is	207,334
	02 Bennett Service Area Extension	1.00 Is	327,997.62 /Is	327,998
<b>03 Boot Service Area Extension</b>				
	03 Steel Pipe	2,640.00 If	306.49 /If	809,134
	05 Open Cut Trench	2,640.00 If	297.05 /If	784,216
	08 Structures, Appurtenances and Cathodic Protection	1.00 Is	296,496.72 /Is	296,497
	09 Surface Restoration	2,640.00 If	63.95 /If	168,834
	03 Boot Service Area Extension	1.00 Is	2,058,680.16 /Is	2,058,680
<b>11 Beginning/East Corridor</b>				
	03 Steel Pipe	8,450.00 If	540.86 /If	4,570,278
	05 Open Cut Trench	8,450.00 If	635.24 /If	5,367,813
	08 Structures, Appurtenances and Cathodic Protection	1.00 Is	128,868.18 /Is	128,868
	09 Surface Restoration	5,810.00 If	199.02 /If	1,156,289
	10 Traffic Control	1.00 Is	553,715.54 /Is	553,716
	11 Beginning/East Corridor	8,450.00 If	1,393.72 /If	11,776,965
<b>12 Middle Corridor</b>				
	03 Steel Pipe	30,480.00 If	524.85 /If	15,997,289
	04 Trenchless Construction	1,940.00 If	5,499.90 /If	10,669,810
	05 Open Cut Trench	30,480.00 If	709.76 /If	21,633,398
	09 Surface Restoration	30,430.00 If	216.28 /If	6,581,393
	10 Traffic Control	1.00 Is	3,007,374.01 /Is	3,007,374
	12 Middle Corridor	32,420.00 If	1,785.60 /If	57,889,264



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## FLUME REPLACEMENT ALIGNMENT STUDY, ALTERNATIVE 1: SOUTH CENTRAL

Phase	Description	Takeoff Quantity	Grand Total Price	Gross Total Cost with Markups
<b>13 End/West Corridor</b>				
	03 Steel Pipe	20,550.00 lf	523.61 /lf	10,760,198
	04 Trenchless Construction	360.00 lf	6,599.59 /lf	2,375,853
	05 Open Cut Trench	20,550.00 lf	699.90 /lf	14,382,852
	08 Structures, Appurtenances and Cathodic Protection	1.00 ls	128,868.18 /ls	128,868
	09 Surface Restoration	20,550.00 lf	184.99 /lf	3,801,634
	10 Traffic Control	1.00 ls	1,780,721.80 /ls	1,780,722
	13 End/West Corridor	<u>20,910.00 lf</u>	<u>1,589.20 /lf</u>	<u>33,230,126</u>
<b>14 Appurtenances and Cathodic Protection</b>				
	08 Structures, Appurtenances and Cathodic Protection	1.00 ls	12,839,538.47 /ls	12,839,538
	14 Appurtenances and Cathodic Protection	1.00 ls	12,839,538.47 /ls	12,839,538
<b>20 EVWTP Modifications</b>				
	11 WTP and Reservoir Modifications	1.00 ls	7,191,772.67 /ls	7,191,773
	20 EVWTP Modifications	1.00 ls	7,191,772.67 /ls	7,191,773
<b>21 Pechstein Modifications</b>				
	11 WTP and Reservoir Modifications	1.00 ls	790,771.74 /ls	790,772
	21 Pechstein Modifications	1.00 ls	790,771.74 /ls	790,772
<b>01 ALTERNATIVE 1: SOUTH CENTRAL</b>		<b>61,780.00 lf</b>	<b>2,177.37 /lf</b>	<b>134,518,037</b>



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## FLUME REPLACEMENT ALIGNMENT STUDY, ALTERNATIVE 1: SOUTH CENTRAL

### Estimate Totals

Description	Rate	Hours	Amount	Totals
Labor		187,741 hrs	43,362,375	
Material			40,651,283	
Subcontract			26,532,875	
Equipment		543,279 hrs	20,878,479	
Other			3,093,025	
<b>Total Construction Cost</b>			<b>134,518,037</b>	<b>134,518,037</b>
Environmental	5.00 %		6,725,902	
Easement	5.00 %		6,725,902	
Design and Administrative	25.00 %		33,629,509	
3rd Party Insp - CM Svcs and Enviro Mntr	5.00 %		6,725,902	
<b>Total Non-Construction Costs</b>			<b>53,807,215</b>	<b>188,325,252</b>
Escalation	38.00 %		71,563,596	
<b>Total Escalated Cost</b>			<b>71,563,596</b>	<b>259,888,847</b>
<b>Total</b>				<b>259,888,847</b>