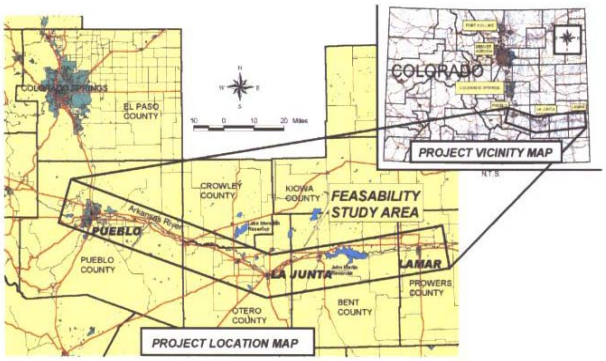
R e p o r t

Arkansas Valley Conduit
Financial Feasibility Review Study



prepared for

Southeastern Colorado
Water Conservancy District

October 2004

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Arkansas Valley Conduit
Financial Feasibility Review Study

Purpose of Study

The key objectives of the project are to:

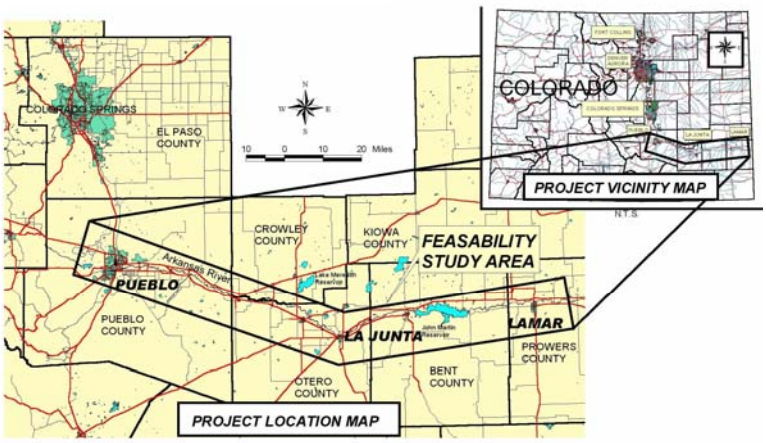
- Assist the Enterprise in verifying the accuracy of the construction cost estimate provided in the 2003 Feasibility Report (2003 Study). A reliable cost analysis will establish the project funding requirements.

- Analyze the water provider's preliminary cost of service and ability to pay for the project.

Project Background

In 2002, a study was conducted to evaluate the feasibility of constructing a raw water pipeline to supply water from Pueblo Reservoir to municipalities and water providers in the counties along the Arkansas River from east of Pueblo Reservoir to Lamar, Colorado.

A construction cost estimate was prepared for the selected alignment. The Enterprise is currently pursuing Federal funding of the project. In order to secure sufficient funding, the previous cost estimate must be verified or updated based on the conceptual level of design.



In addition, the previous study identified the raw water transmission system required to deliver raw water to the water providers. However, additional facilities may be needed by some of the providers to treat the raw water and deliver the treated water to the existing water systems.

Scope of Services

The scope of services will include the following tasks:

Task 1 – Gather Data

Existing feasibility study background and supporting information was gathered from the Enterprise.

Task 2 – Review Data

Existing data was reviewed and pipeline quantities determined.

Task 3 – Conduct Brainstorming

The Black & Veatch (B&V) key team members met and conducted a brainstorming session to identify and confirm the cost review methodologies. Results of the session and the approach were conveyed to the Enterprise and participants at a meeting on August 3, 2004.

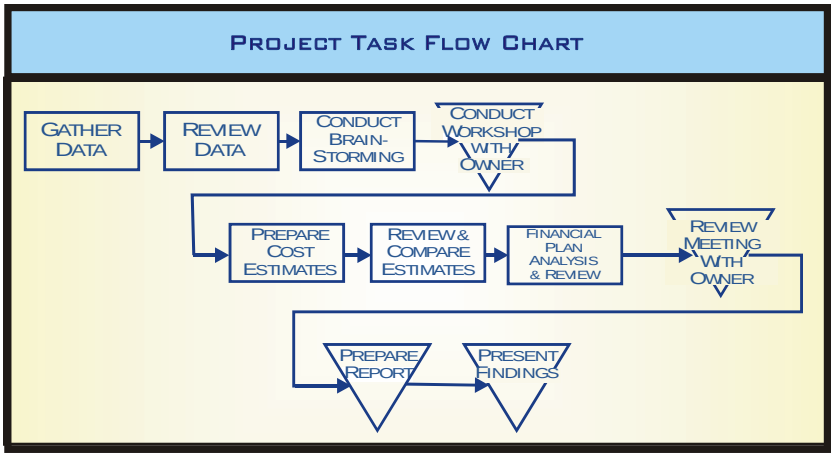
Task 4 – Conduct Workshop No. 1

A workshop was conducted at the Enterprise's office to discuss team members, confirm project objectives, and establish communication methods.

Task 5 – Prepare Cost Estimates

Based on the background data provided and system quantities used in the 2003 Study, cost estimates were prepared to reflect new information or revised background data. Three independent reviews were conducted concurrently by the following B&V team members:

- Water Division (Design).
- Construction Division.
- Federal Services Division.



Task 6 – Review and Compare Estimates

Upon completion of the cost reviews, the three team groups compared results. A composite estimate was established for review and presentation to the Enterprise.

Task 7 – Financial Plan Analysis and Review

A preliminary cost of service analysis was performed. The financial analysis consisted of the following subtasks:

- Review water providers' financial and billing information.
- Determine typical single family bill.
- Estimate typical single family bill needed to finance project.
- Summarize findings.

Task 8 – Conduct Review Workshop No. 2

A meeting was conducted to review the preliminary findings of Tasks 6 and 7 and to update the participants on the study status.

Task 9 – Prepare Report

A report summarizing the findings and recommendations of Tasks 1 - 8 was prepared and submitted to the Enterprise on September 10, 2004. Review comments received form the Enterprise will be addressed and incorporated into the final draft report.

Task 10 – Present Findings

Results, findings, and recommendations of the report were presented to the Enterprise Board on September 16, 2004. The presentation was reviewed with the Enterprise on September 10 prior to the Board presentation. The final draft report was presented to the Board on October 21, 2004.

Cost Criteria and Assumptions

At the conceptual level of cost estimating certain criteria and assumptions were established as a basis for preparing the updated cost opinion. The criteria included the following:

- The gravity flow alternative from the 2003 Study was used for the cost update and comparison.
- The pipeline was assumed to convey raw water to the participants.
- The Bessemer Ditch alignment as identified in the 2003 Study was used for the cost update.

- The pipeline was sized to deliver the projected year 2020 maximum day demand of 35.7 million gallons per day (mgd). Maximum day demands are based on 2.2 times average day demands. Projected 2020 average day demand is 16.23 mgd.

- The project will be a federally designed and administered project.

- All costs will be in 2004 dollars.

- All construction work is expected to be performed in a five-year period.

- Costs do not include additional water rights acquisition or additional infrastructure needed to treat and deliver treated water from the pipeline to the participant.

Various assumptions were made in establishing quantities. They included:

- Main line isolation valves were assumed every mile.

- Man-way accesses were assumed every 2,000 feet for construction purposes.

- Air release and blow offs were assumed every mile.

- Pipeline lengths and diameters were based on the 2003 Study, June 2003.

- Easements were assumed to 50 feet wide for permanent and an additional 100 feet wide for temporary easements.

- Easement valuations were based on an average of $5,000 per acre. Permanent easements were based on 50 percent of property value. Temporary easement costs were based on 10 percent of property value.

- Cover over the pipeline was assumed to be 5 feet.

- Pipe design was based on the 2003 Study criteria using AWWA C200 classification.

- An Environmental Impact Statement (EIS) will be required for the project.

Existing Feasibility Study drawings and figures were used for the cost review. In addition, current USGS mapping was obtained to assist in estimating physical features such as creek, road, railroad, and other special crossings.

Review Methodology

Participant Survey Update

Potential participants were surveyed to obtain updated information on population and existing and projected water needs. The results of the survey are summarized in Appendix A. In summary:

- Twenty-eight of the 36 potential participants (78 percent) responded to the survey.
- The respondents represented approximately 96 percent of the service area population.
- Projected 2020 water demands were essentially equal to the projected demands identified in the 2003 Study, which indicates that the current projections are still valid.

Cost Opinion Update

It was critical for this review that the estimated costs be reliable based on the information available. Therefore, multiple methods of cost analysis were used to verify the current cost estimate. We used four cost review methods by B&V team members with specialized expertise in three areas:

- Cost estimating expertise with water facilities and pipeline design.
- Cost estimating expertise with U.S. Army Corps of Engineers' methodology.
- Cost estimating using team members with actual field construction backgrounds.
- Cost estimating using a current cost database of similar facilities in the region.

By using this multiple approach, we estimated and reviewed costs from three independent perspectives, compared results, and established the cost needed to fund the project.

The cost estimate contains numerous items with quantities based on conceptual facilities design. A limited number of these items including the pipe materials and installation cost, engineering, and contingency costs accounted for over 80 percent of the total project cost. Therefore, with the review schedule constraints, we focused on the critical "big ticket" items making sure that we had reliable data to support the large item costs. For instance, updated pipe material costs were obtained for the estimate. The remaining cost items were reviewed based on available information and further verified as time permitted.

Conclusions and Recommendations

Water Demand Projections

The projected water demands based on the updated survey results were approximately equal to the 2003 Study findings. The revised projection was 16.23 mgd. Table 1 summarizes the projected annual demands by County. The projected 2020 maximum day demand was 35.70 mgd based on a 2.2 peaking factor and an average day demand of 16.24 mgd. The updated survey results indicated a peaking factor closer to 2.00. If the peaking factor was revised to 2.0, then the maximum day demand projection would be reduced to 32.9 mgd as summarized in Table2 below. The reduced peaking factor may be due to lower irrigation demands due to the drought. It should be noted that space has been allocated at Pueblo Reservoir for a 20 mgd tap. Since the proposed maximum day demand is 32.90 mgd, the additional capacity required at Pueblo Reservoir will have to be addressed.

Table 1
Updated Water Demand Projections

County	2020 Water Demand (acre-feet/year)	
	2003 Study	Update
Pueblo	4,100	4,478
Otero	6,809	6,430
Crowley	1,510	1,557
Bent	1,750	1,310
Prower	3,820	4,183
Kiowa	214	214
Total	***18,203***	***18,172***
	16.24 mgd	16.22 mgd

Table 2
Projected Water Demands

	2003 Feasibility Study	Survey Update
Average Day, mgd	16.24	16.22
Maximum Day, mgd	35.70	32.90
Maximum Day/Average Day Factor	2.20	2.02

Water Resources

The 2003 Feasibility Study indicated that 9,643 acre-feet per year of water is available for the Fyingpan-Arkansas project. This assumes that the total allocation of projected water to municipalities east of Pueblo will be utilized. Based on information computed by the Southeastern Colorado Water Conservancy District, the actual potential allocation of water would be approximately 6,671 acre-feet per year based on a 25-year average from 1978 through 2003. The additional deficit of 2,972 acre-feet per year must be addressed in future evaluations. Table 3 summarizes the water resource quantities.

Table 3
Water Resources

	2003 Feasibility Study (acre-feet)	Update (acre-feet)
Annual Water Demand	18,203	18,172
Average Available Project Water	9,643	6,671
Additional Water Required	8,560	11,501
Return Flow		2,935
Municipal Return Flow Exchanges	4,200	4,200
Water Rights Exchanges	4,360	4,360
Additional Deficit	0	6

Project Costs

The updated project cost opinion of estimated construction cost is $252,000,000 based on the current recommended pipeline alignment and delivery method. As noted earlier in the report, this cost does not include any costs of acquiring additional water rights or costs for additional infrastructure that may be needed by the participants to deliver treated water from the raw water pipeline to the customer.

The revised estimate represents an increase of $69.6 million or 38 percent. Table 4 summarizes the comparison of the updated estimate with the 2003 Study estimate. The 2003 Study estimate was adjusted to reflect 2004 dollars for comparison purposes. The adjusted 2003 Study estimate is $196.2 million based on a construction cost index factor of 1.074 between June, 2003 and August, 2004. Table 5 shows the

TABLE 4
COMPARISON OF COST OPINIONS

	Updated Cost Opinion	2003 Study Cost Opinion	Variance	2003 Study Cost Index Adjusted Cost (2003 Study x 1.074)	Variance
Pueblo Reservoir to St. Charles Mesa (48")					
Pipe Material	$7,009,750	$5,898,085	*$1,111,665*	$6,334,543	*$675,207*
Pipe Installation	$6,999,000	$10,101,916	*($3,102,916)*	$10,849,458	*($3,850,458)*
St. Charles Mesa to Fowler (42")					
Pipe Material	$14,758,000	$11,640,114	*$3,117,886*	$12,501,482	*$2,256,518*
Pipe Installation	$15,499,300	$10,784,886	*$4,714,414*	$11,582,968	*$3,916,332*
Fowler to Rocky Ford (42")					
Pipe Material	$8,084,000	$5,918,021	*$2,165,979*	$6,355,955	*$1,728,045*
Pipe Installation	$8,500,160	$7,751,979	*$748,181*	$8,325,625	*$174,535*
Rocky Ford to LaJunta (36")					
Pipe Material	$4,348,300	$3,097,604	*$1,250,696*	$3,326,827	*$1,021,473*
Pipe Installation	$4,701,920	$5,718,396	*($1,016,476)*	$6,141,557	*($1,439,637)*
LaJunta to Las Animas (30")					*$0*
Pipe Material	$6,138,000	$3,759,837	*$2,378,163*	$4,038,065	*$2,099,935*
Pipe Installation	$6,650,210	$6,818,163	*($167,953)*	$7,322,707	*($672,497)*
Las Animas to Lamar (21")					
Pipe Material	$8,891,488	$5,135,888	*$3,755,600*	$5,515,944	*$3,375,544*
Pipe Installation	$12,198,700	$6,248,112	*$5,950,588*	$6,710,472	*$5,488,228*
Pipe Spurs (12")					
Pipe Material	$8,720,498	$2,424,000	*$6,296,498*	$2,603,376	*$6,117,122*
Pipe Installation	$8,720,498	$2,424,000	*$6,296,498*	$2,603,376	*$6,117,122*
Pipe Appurtances	$12,153,000	$16,150,000	*($3,997,000)*	$17,345,100	*($5,192,100)*
Site Restoration and Special Crossing	$18,226,760	$12,500,000	*$5,726,760*	$13,425,000	*$4,801,760*
Storage	$16,230,000	$13,800,000	*$2,430,000*	$14,821,200	*$1,408,800*
SCADA Control	$1,276,500	$500,000	*$776,500*	$537,000	*$739,500*
Connection to Pueblo Reservoir	$100,000	$0	*$100,000*	$0	*$100,000*
Subtotal	$169,206,084	$129,671,000	*$39,535,084*	$140,340,655	*$28,865,429*
Contingency	$42,301,521	$26,554,000	*$15,747,521*	$28,068,131	*$14,233,390*
CONSTRUCTION SUBTOTAL	$211,507,605	$156,225,000	*$55,282,605*	$168,408,786	*$43,098,819*
Engineering and Administration	$27,000,000	$19,119,000	*$7,881,000*	$20,209,054	*$6,790,946*
Surveying	$1,063,750	$1,000,000	*$63,750*	$1,074,000	*($10,250)*
Geotechnical Evaluations	$500,000	$0	*$500,000*		
Legal @ 1%	$2,115,076	$1,593,000	*$522,076*	$1,684,088	*$430,988*
Permitting @ 1.5%	$3,172,614	$2,390,000	*$782,614*	$2,526,132	*$646,482*
Right-of-Way/Easements	$2,640,955	$2,100,000	*$540,955*	$2,255,400	*$385,555*
EIS	$4,000,000	$0	*$4,000,000*	$0	*$4,000,000*
TOTAL CONSTRUCTION COST	**$252,000,000**	**$182,427,000**	*$69,573,000*	**$196,157,460**	*$55,842,540*

key variances in cost between the two estimates. The following key items should be noted when comparing the estimates:

1. Pipe materials and installation account for 48 percent of the total project cost. This percentage was consistent between the two estimates.

2. Over 80 percent of the project cost contains four major items which include:

   a. Pipe 48 percent.

   b. Contingencies 17 percent.

   c. Engineering and Administration Costs 10 percent.

   d. Crossings and Site Restoration 7 percent.

3. Pipe material costs have significantly increased in cost during the last 12 months. This increase in costs represents $11.2 million of the cost increase.

Table 5
Cost Variances

Item	Millions of Dollars ($)	Percent (%)
Contingencies	14.2	20
Construction Cost Index Adjustment	13.8	20
Pipe Spurs	12.2	18
Pipe Material	11.2	16
Engineering and Administration	6.8	10
Environmental Impact Statement	4.0	6
Pipe Installation	3.6	5
Storage	1.4	2
Other	2.4	3
Total	69.6	100

4. Pipe installation costs were within 1 percent between the two estimates.

5. Pipe appurtances and site restoration were within 1.5 percent between the two estimates.

6. The difference in cost for the Pipe Spurs was $12.2 million. Approximately $6 million of this cost could be accounted for if the 2003 Study assumed 8-inch diameter pipes instead of 12-inch diameter.

7. Items not included in the 2003 Study included:

   a. Connection to Pueblo Reservoir.

b. Costs for conducting an Environmental Impact Statement.

c. Geotechnical evaluations and testing for design.

8. The recommended contingency factor was increased from 20 to 25 percent. At the conceptual design level, a minimum 25 percent is recommended due to the amount of design unknowns at this stage of the project. The additional contingency accounts for $8.5 million.

Operation and Maintenance Costs

The operation and maintenance costs for the gravity pipe system should be less than $500,000 per year. The cost is minimal since there are no power costs associated with pumping that usually accounts for a majority of the annual operating costs.

Present Worth Costs

The 2003 Study compared the present worth costs between the Preferred Alternative and a No Action Alternative. The No Action Alternative includes water treatment facilities and infrastructure needed to service the individual water providers. Table 6 summarizes the updated present worth cost comparison between the alternatives. The No Action costs were reviewed briefly. The water treatment unit costs used in the 2003 Study are still valid since the costs of most of the treatment technology proposed have remained the same or come down in cost.

As stated in the 2003 Study, even though the Preferred Alternative present worth costs are higher than the No Action costs, there are other factors to consider that could negatively impact the No Action costs. These factors include:

- Unknowns regarding future water quality regulations.
- Continued degradation of water quality requiring additional treatment.
- Stringent regulation pending regarding disposal of waste streams from the water treatment processes.

Table 6 Present Worth Costs			
Alternative	Capital Cost (Million $)	Annual O&M Cost (Million $)	Present Worth Cost[(1)] (Million $)
No Action	36.73	9.00	252.68
Gravity Alignment	252	.50	264.00
[(1)]Present worth cost based on 50 years at 3.375 percent.			

Potential Cost Impact

Table 7 summarizes the development of potential cost impacts on participants in the Arkansas Valley Conduit. The following assumptions are included in this calculation:

- Participant's share of cost is 25 percent.
- Participants share is funded from debt issue.
- Debt service terms are 5 percent rate and 30-year term.

The potential cost to participants, based on these assumptions, is either $16.96 per tap per month (each tap's share is same regardless of water usage) or $2.26 per thousand gallons. The volume-based cost is preferred since it more closely aligns each participant's water demands with the cost.

Table 7 Development of Potential Cost Impacts on Participants	
Total Conduit Cost	$252,000,000
Participants Cost Share	63,000,000
Annual Costs	
Debt Service	$4,098,240
Operation and Maintenance	500,000
Total	***4,598,240***
Number of Taps	22,600
Monthly Cost per Tap	16.96
Annual Usage, 1,000 gals	2,033,050
Cost per 1,000 gals	2.26

Additional Evaluations

Additional evaluations that were beyond the scope of this study, but are recommended to further refine the project include the following:

- An evaluation to determine if it would be more cost-effective to deliver treated water to some or all of the participants.

- Consider a treated water connection to the Board of Water Works of Pueblo Colorado east of Pueblo to eliminate the need for constructing a pipeline through the City of Pueblo.

- Consider impacts on the pipe sizing and project costs for varying delivery capacities including maximum month or some volume less than maximum day. For example, if the maximum month demand is supplied through the pipeline, 75 to 80 percent of the maximum demand can still be met but the pipeline can be downsized and substantial cost savings realized. The additional 20 percent of demand could be supplied by additional storage or with existing wells.

- Consider construction phasing including parallel pipes or converting to a pumped system in the future to deliver future capacity needs.

- Establish water delivery quantities based on historical water availability and review impacts on pipe sizing and costs.

- Evaluate the availability of leasing agriculture water and the ability to exchange the water upstream into Pueblo Reservoir.

The focus of the additional evaluations would be to determine the most affordable project with optimized, delivery capacity of water to the customer.

Appendix A -
Survey Update Summary

Appendix B –
Cost Opinion Spreadsheets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B 2 Page 3.jpg


B 2 Page 4.jpg

Appendix C –
Additional Cost Backup Information


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