



# *Appendix B: Cost Estimating Assumptions*



# APPENDIX B. COST ESTIMATING ASSUMPTIONS

This appendix provides the assumptions used by WYA to estimate the construction costs for planning and design of future water system facilities for the San Juan Water District. The costs were developed based on data supplied by manufacturers, published industry standard cost data and curves, construction costs for similar facilities built by the District and/or other public agencies, and construction costs previously estimated by WYA for similar facilities with similar construction cost indexes. All construction costs have been adjusted to reflect January 2006 costs at an Engineering News Record (ENR) Construction Cost Index (CCI) of 7660 (20 Cities Average). These costs are to be used for conceptual cost estimates only, and should be updated regularly.

Additionally, these costs are for construction only and do not include estimating uncertainties or unexpected construction costs (e.g., variations in final quantities) or cost estimates for land acquisition, engineering, legal costs, environmental review, inspections and/or contract administration. These additional cost items are referred to as contingency costs and project allowances and are further described in the last section of this appendix.

Construction cost data presented in this appendix are not intended to represent the lowest prices in the industry for each type of construction; rather they are representative of average or typical construction costs. The planning level cost estimates have been prepared for guidance in evaluating various options, and are intended for budgetary purposes only, within the context of this master planning effort.

## FACILITY COSTS

### Pipelines

Unit construction costs for water pipelines 6- through 36-inches in diameter are provided in Table B-1. These costs are to be used for typical pipeline construction in developed areas (developed) and construction across open fields or areas that are not yet developed (undeveloped). These costs generally include pipe materials, trenching, placing and jointing pipe, valves, fittings, hydrants, service connections, placing imported pipe bedding, native backfill material, and asphalt pavement replacement, if required. The costs presented in Table B-1 do not include the cost of boring and jacking pipe. The costs shown in Table B-2 should be added where required for this purpose.

**Table B-1. Unit Construction Costs for Pipelines<sup>(a)</sup>**

Pipe Diameter, inches	Unit Construction Cost, \$/linear foot	
	Developed Areas	Undeveloped Areas
6	100	91
8	130	110
10	150	130
12	180	150
14	205	170
16	230	190
18	255	215
20	275	235
24	320	265
30	385	325
36	450	375

<sup>(a)</sup> Based on the January 2006 ENR index of 7660.

**Table B-2. Unit Construction Costs for Jack & Boring<sup>(a)</sup>**

Size	Unit Construction Cost \$/linear foot <sup>(b)</sup>
8-inch pipe (16-inch casing)	355
12-inch pipe (21-inch casing)	405
16-inch pipe (24-inch casing)	470
20-inch pipe (30-inch casing)	580
54-inch pipe (66-inch casing)	1,165
Tunnel	2,430

<sup>(a)</sup> Based on the January 2006 ENR index of 7660.

<sup>(b)</sup> Conductor pipe not included in cost.

### Treated Water Storage Tanks

Table B-3 lists the estimated total construction costs for water storage tanks in the size ranges of 1.0 to 6.0 MG. As previously stated, these costs are representative of construction conducted under normal excavation and foundation conditions, and would be significantly higher for special or difficult foundation requirements. Because Granite Bay has difficult foundation conditions, the costs were increased by 20 percent include consideration of these conditions.



**Table B-3. Construction Costs for Treated Water Storage Reservoirs<sup>(a,b)</sup>**

Capacity, MG	Estimated Construction Cost Pre-Stressed Concrete Storage Reservoir, million dollars	Estimated Construction Cost Steel Storage Reservoir, million dollars
1.0	1.6	1.3
2.0	3.0	2.0
3.0	4.1	2.6
4.0	5.4	3.3
5.0	6.7	4.1
6.0	8.0	4.7

<sup>(a)</sup> Based on the January 2006 ENR index of 7660.

<sup>(b)</sup> Estimated costs include a 20 percent increase to account for difficult foundation requirements.

### Treated Water Booster Pump Stations

Distribution pumping station costs vary considerably, depending on such factors as architectural design, pumping head, and station capacity. Estimated average construction costs for distribution pumping stations, as shown in Table B-4 are based on enclosed stations with architectural and landscaping treatment suitable for residential areas. Pump station cost estimates include backup/standby generators and SCADA, and are based on the typical District configuration, which includes 4 to 5 pumps at 1 to 5 mgd.

**Table B-4. Construction Costs for Booster Pump Stations<sup>(a)</sup>**

Capacity, mgd	Estimated Construction Cost, million dollars
0.5	0.3
1	0.4
2	0.6
3	0.9
5	1.3
10	2.4

<sup>(a)</sup> Based on the January 2006 ENR index of 7660.

### CONTINGENCIES AND OTHER PROJECT COSTS

Contingency costs must be reviewed on a case-by-case basis because they will vary considerably with each project. However, to assist the District in budgeting for these future construction projects, contingency costs have been added to the planning budget as percentages of the

estimated construction cost, divided into two categories: Construction Contingency Costs and Other Project Cost Allowances.

### **Construction Contingency Costs**

The construction costs presented above are representative of the construction of water system facilities under normal construction conditions and schedules; consequently, it is appropriate to allow for estimating and construction uncertainties unavoidably associated with the conceptual planning of projects. Such factors as unexpected construction conditions, the need for unforeseen mechanical items, and variations in final quantities are a few of the items that can increase project costs for which it is wise to make allowances in preliminary estimates. An allowance of 25 percent of the base construction cost will be included to cover such project related construction contingencies.

### **Other Project Cost Allowances**

Other project costs allowances are divided into three subcategories, totaling 35 percent:

- Engineering services associated with new facilities include preliminary investigations and reports, right-of-way acquisition, foundation explorations, preparation of drawings and specifications for construction, surveying and staking, sampling of testing material, and start-up services. For this study, engineering costs are assumed to be 15 percent of the construction cost estimates after construction contingencies have been applied.
- Construction management covers such items as contract management and inspection during construction. The cost of these items can also vary, but for the purpose of this study, it is assumed that construction management charges will equal approximately 10 percent of the construction costs after construction contingencies have been applied.
- Program implementation costs cover such items as legal fees, environmental/CEQA compliance requirements, financing expenses, administrative costs, and interest during construction. The cost of these items can also vary, but for the purpose of this study, it is assumed that program implementation costs will equal approximately 10 percent of the construction costs after construction contingencies have been applied.

An example application of these items to a project with an assumed construction cost of \$1.0 million is shown in Table B-5. As shown, the total cost of all project construction contingencies (construction, engineering services, construction management, and program implementation) is approximately 70 percent of the base construction costs for each project.

**Table B-5. Example Application of Construction Contingency Costs and Other Project Cost Allowances**

Cost Component	Percent	Cost	Total Cost
Estimated Base Construction Cost before Contingencies		\$1,000,000 <sup>(a)</sup>	
Construction Contingency Costs	25%	250,000	
Estimated Construction Cost with Contingencies			\$1,250,000
Other Project Cost Allowances:			
Engineering	15%	\$187,500	
Construction Management	10%	125,000	
Program Implementation	10%	125,000	
Total Project Cost Allowances			\$437,500
Estimated Project Cost			\$1,687,500

<sup>(a)</sup> Assumed cost of example project.