CHAPTER 8

Capital Improvements Program

Recommended capital improvements from Chapters 6 and 7 are summarized in this chapter, along with order-of-magnitude cost estimates.

8.1 Cost Estimating

The cost estimates presented in this WFP were calculated based on standards developed by the American Association of Cost Engineers (AACE). The AACE established the definitions commonly used in cost estimating and collected and published the statistical limits of confidence associated with three AACE-defined levels of cost estimates described in the following sections: order-of-magnitude, budget, and definitive.

8.1.1 Order-of-Magnitude Estimate

An order-of-magnitude estimate is made without detailed engineering data; some examples include:

- An estimate based on cost capacity curves
- An estimate based on scale-up or scale-down factors
- An approximate ratio estimate

An order-of-magnitude estimate typically is prepared at the end of the schematic design phase of the design delivery process. It is normally expected that an estimate of this type will be accurate within plus 50 percent to minus 30 percent of the actual construction cost.

8.1.2 Budget Estimate

A budget estimate requires, at a minimum, the use of flow sheets, layouts, and major equipment quantity, type, and sizing details. A budget estimate is used to establish the Owner's budget; it is not to be confused with an estimate used to control the budget on a project.

A budget estimate typically is prepared at the end of the design development phase of the design delivery process. An estimate of this type is expected to be accurate within plus 30 percent to minus 15 percent of the construction cost.

8.1.3 Definitive Estimate

A definitive estimate is prepared from very well-defined engineering data. At a minimum, the estimator requires plot plans that are 85 to 95 percent complete, along with elevations, piping and instrumentation diagrams, one-line electrical diagrams, equipment data sheets, vendor quotations, structural sketches, soil data, drawings of major foundations and buildings, and a complete set of specifications. At a minimum, definitive estimates are prepared from design documents that are "approved for construction."

A definitive estimate typically is prepared at the end of the construction documents preparation phase of the design delivery process. An estimate of this type should be accurate to within plus 15 percent to minus 5 percent of the construction cost.

8.2 Capital Improvements Program for Sandpoint Water System

Tables 8-1 and 8-2 summarize the estimated total capital costs (construction plus contingency, engineering, and financial/administrative) for the recommended supply and treatment improvements described in Chapter 6. Table 8-3 summarizes the estimated total capital costs for the recommended distribution system improvements described in Chapter 7. The capital cost estimates presented in Tables 8-1, 8-2, and 8-3 are order-of-magnitude estimates.

The *Engineering News-Record* Construction Cost Index used for the construction cost estimates in Tables 8-1, 8-2, and 8-3 is 7690.72 (May 2006). The construction cost estimates presented in these tables are, for the most part, based on costs for similar facilities in the region. The contingency, engineering, and financial/administrative costs included in Tables 8-1, 8-2, and 8-3 are estimated by multiplying estimated construction costs by a factor that covers contingency and engineering and financial/administrative costs. This factor varies based on the perceived accuracy of the construction cost estimate. For the Lake WTP treatment upgrades and improvements, a 40 percent factor is used, which allows for 15 percent contingency and 20 percent engineering and financial/administrative costs. For proposed improvements with less well-defined scope, a 60 percent factor is used, which allows for 30 percent construction contingency and 25 percent for engineering and financial and administrative costs. Permitting and right-of way acquisition costs are not included in total project costs.

The order-of-magnitude capital cost estimates have been prepared for guidance in project evaluation and implementation and are based on information available at the time of the estimate. The actual final costs of the project depend on its final scope, actual labor and material costs, competitive market conditions, implementation schedule, and other variable factors. As a result, the final project costs can be expected to vary from the estimates presented herein. Because of this likely variation in costs, project feasibility and funding needs must be carefully reviewed before specific financial decisions are made, to help ensure proper project evaluation and adequate funding. One item in particular that could influence actual final project costs is the recent escalation of structural material (steel, concrete, etc.) prices. Because many of the projects recommended in this WFP include significant amounts of concrete and steel piping and equipment, excessive escalation in the price of these materials will result in project costs higher than those anticipated and presented in the following sections.

8.2.1 Water Supply and Treatment Capital Improvements

The recommended water supply and treatment capital improvements are discussed in Chapters 2 and 6, and are designed to satisfy the City's projected 2025 demand.

The priority improvements to the Sand Creek WTP, listed in Table 8-1, include various upgrades and improvements to the Little Sand Creek supply system. The Sand Creek WTP was recently upgraded and is capable of producing high-quality water meeting current regulations. Recommended improvements to the sedimentation basins are intended to improve operational efficiency and reduce maintenance; however, they are considered low priority upgrades.

TABLE 8-1
Proposed Little Sand Creek Water Supply and Treatment Capital Improvements (2006 Dollars)

Improvement	Description	Construction	Contingency Engineering Administrative (60%)	Total
1	Reconstruct upper diversion structure on Little Sand Creek.	$50,000	$30,000	$80,000
2	Permanently anchor 12-inch bypass pipeline between upper diversion and raw water pipeline below main diversion dam.	$36,000	$22,000	$58,000
3	Miscellaneous upgrades at diversion dam: install grating, replace gates, install screen.	$30,000	$18,000	$48,000
4	Install strainer upstream of plant flow control valve.	$25,000	$15,000	$40,000
5	Cover sedimentation basins	$175,000	$105,000	$280,000
6	Add sludge removal mechanisms in sedimentation basins.	$80,000	$48,000	$128,000
7	South canyon bank stabilization.	$50,000	$30,000	$80,000
8	Add backwash water dechlorination system	$25,000	$15,000	$40,000
	Total	**$471,000**	**$283,000**	**$754,000**

It is recommended that the Lake Pend Oreille water supply and treatment system be expanded and upgraded to meet future demand. A Phase 1 upgrade to increase the capacity of the Lake WTP to 10 mgd will result in a total treatment capacity (Sand Creek WTP and Lake WTP combined) of 10.5 mgd, which will provide the projected 2025 demand of 10.4 mgd. An immersed membrane filtration technology is recommended for the future Lake WTP process. Although there may be opportunities to retrofit this technology in the existing filter basins, this is not the alternative selected for planning purposes. The principal upgrades, listed in Table 8-2, include increasing the raw and finished water pumping capacity, rehabilitating the existing Chemical and Operations buildings to accommodate some of the ancillary membrane systems, upgrade the Surge Basin pumping, and add gravity thickeners and recycle pumping. The site is planned to accommodate future dewatering with vacuum-assisted drying beds or alternative mechanical dewatering.

TABLE 8-2
Proposed Lake Pend Oreille Water Supply and Treatment Phase 1 Capital Improvements (2006 Dollars)
(to serve projected 2025 demands as discussed in Chapters 2 and 6)

Improvement	Description	Construction	Contingency Engineering Administrative (40%)	Total
1	Raw water pumping.	$120,000	$48,000	$168,000
2	Increase capacity of raw water transmission pipeline.	$450,000	$180,000	$630,000
3	10 mgd membrane filtration facilities.	$10,247,000	$4,099,000	$14,346,000
4	Rehabilitate chemical building.	$72,000	$29,000	$101,000
5	Chemical system upgrades	$787,000	$315,000	$1,102,000
6	Yard piping Improvements.	$409,000	$164,000	$573,000
7	High service pumping.	$360,000	$144,000	$504,000
8	Plant Residuals Handling.	$314,000	$126,000	$440,000
9	I&C/Electrical/Site Civil.	$1,898,000	$759,000	$2,657,000
	Total	**$14,657,000**	**$5,864,000**	**$20,521,000**

8.2.2 Water Supply and Treatment Capital Improvements Program

Capital improvements anticipated for the Sandpoint water supply and treatment systems during the 20-year planning period are summarized in Tables 8-1 and 8-2. The capital improvements in Table 8-1 cover the improvements to the Little Sand Creek water supply and treatment system. Table 8-2 provides a breakdown of the Lake WTP water supply and treatment improvements.

8.2.3 Distribution System Capital Improvements

Pipelines

The costs for pipelines are based on PVC for pipe up to 12-inch diameter and DI for pipe larger than 12-inch. The project costs include:

- PVC pipe up to 12-inch and DI for all pipe larger than 12-inch
- Trench excavation and backfill for 4 feet of cover assuming native backfill can be used.
- Buried valves at 1,000-foot interval.
- Fire hydrants at 1,000-foot interval.
- Air valves and blow-offs at 2,000-foot interval on 14-inch and larger pipelines.
- Surface restoration of 4-inch AC and 12-foot wide for improved areas and hydro-seeding for unimproved areas. Full width overlays are not included.
- No service connections

TABLE 8-3
Proposed Distribution System Capital Improvements (2006 Dollars)

Improvement	Description	Construction	Contingency Engineering Administrative (60%)	Total
1[1]	Install a 2.0-MG reservoir in the northeast part of the system. Assumed 4,500 feet of 18-inch transmission main is needed to connect the system to the reservoir.	$2,394,500	$1,436,700	$3,831,200
2	Run parallel 12-inch pipe along Kootenai Cutoff Road and McGhee Rd, approximately 3,290 feet.	$358,600	$215,200	$573,800
3	Run 36-inch pipe from Lake WTP to west side of Montana Rail Link, approximately 150 feet. Run parallel 24-inch transmission main along Montana Rail Link from the Lake WTP to Eastgate Drive, approximately 7,370 feet.	$1,177,200	$706,300	$1,883,500
4	Install Woodland Reservoir altitude valve in 18-inch supply pipe.	$80,000	$48,000	$128,000
5	Upsize 6-inch main along Eastgate Drive to a 12-inch main, approximately 1,060 feet. Install approximately 2,000 feet along the west side of the Union Pacific Railroad to Fontaine Drive.	$346,600	$208,000	$554,600
6	Run parallel 12-inch main one block north of Kootenai Cutoff Road from US 95 to Highway 200, approximately 4,320 feet	$470,900	$282,500	$753,400
7	Loop with 8-inch main to connect the large commercial area near Wal-Mart, approximately 500 feet.	$45,500	$27,300	$72,800
8	Installed approximately 1,300 feet of 16-inch main from Woodland Drive north to Schweitzer Cutoff Rd along N Boyer Rd.	$204,100	$122,500	$326,600
9	Installed approximately 1,300 feet of 12-inch main from Woodland Drive south to the airport.	$218,000	$130,800	$348,800
10	Upsize approximately 2,650 feet of 8-inch pipe to 12-inch on Baldy Mountain Road.	$289,900	$173,900	$463,800
11	Install approximately 3,150 feet of 8-inch main to create loop around Farmin School.	$107,100	$64,300	$171,400
12	Install 8-inch main along W Lake St from 2nd Ave to 1st Ave, approximately 350 feet.	$31,900	$19,100	$51,000
13	Install approximately 1,300 feet of 12-inch main along McGee Road to 8-inch main from Kootenai Point on the south side of the Montana Rail Link. Upsize 6-inch main along Ponder Point Dr to 8-inch to connect 8-inch main to 6-inch grid, approximately 300 feet.	$182,100	$109,300	$291,400
14	Install 8-inch main along 2nd St from Birch Ave to Cedar Ave, approximately 250 feet.	$22,800	$13,700	$36,500

TABLE 8-3
Proposed Distribution System Capital Improvements (2006 Dollars)

Improvement	Description	Construction	Contingency Engineering Administrative (60%)	Total
	Total	**$5,929,200**	**$3,557,600**	**$9,486,800**
	Future Proposed Capital Improvements			
15[1]	Install a 2.0-MG reservoir in the west part of the system. Assumed 6,750 feet of 18-inch transmission main is needed to connect the system to the reservoir.	$2,779,300	$1,667,600	$4,446,900
16[1]	Install 5.9 MG of reservoir storage capacity within new development areas.	$4,875,000	$2,925,000	$7,800,000
17[2]	Run parallel 24-inch transmission main along Montana Rail Link from the Lake WTP to Bridge St across to 1st Ave to Pine St and over to 4th Ave, approximately 4,670 feet. Additionally, run 8-inch across Sand Creek at Bridge St, approximately 820 feet.	$1,139,400	$683,600	$1,823,000
18	Run parallel 18-inch transmission main along Pine St from 4th Ave. to Division Ave, approximately 4,050 feet.	$692,600	$415,600	$1,108,200
19	Run parallel 18-inch transmission main along Montana Rail Link and Elm St from Bonner Mall Way to Kootenai Cut Off Rd, approximately 4,500 feet.	$769,500	$461,700	$1,231,200
20	Replace coal tar lined pipe 14-inch 5,750 feet 16-inch 20,350 feet 18-inch 13,750 feet	$6,374,200	$3,824,500	$10,198,700
21[3]	Booster Pump Station SCADA Upgrades	$50,000	$30,000	$80,000
	Total	**$16,680,000**	**$10,008,000**	**$26,688,000**
	Grand Total	**$22,609,200**	**$13,565,600**	**$36,174,800**

[1] An exact facility location is not known and further analysis of the supply piping size and length will be required. Cost for property is assumed to be approximately an additional $500,000.

[2] This improvement may need to be scheduled sooner based on when the US 95 Bypass project moves forward.

[3] Cost is assumed; further information is required to develop an order-of-magnitude estimate.

Cost estimates for installed pipe (in 2006 dollars) are:

Diameter	Unimproved Area Cost per foot	Improved Street Area Cost per foot
8-inch	$34	$91
12-inch	$52	$109
14-inch	$86	$144
16-inch	$98	$157
18-inch	$114	$171
24-inch	$152	$228
36-inch	$228	$342

Bored/jacked railroad crossings are estimated at three times the unit cost listed above.

Pipeline improvements are identified in Section 7 (Tables 7-3 and 7-4); these improvements are shown in Figures 7-6 and 8-1. Most of the pipeline improvements enable the distribution system to provide the supply required to meet fire flows.

Reservoirs

Reservoir improvements are identified in Table 7-3 and Table 7-4. The cost estimates for the reservoirs are based on welded steel tanks. Both 2.0 MG reservoirs are assumed to be ground level type tanks. The reservoir cost estimates include site work and landscaping, foundations, piping, controls, and miscellaneous appurtenances. The reservoir costs do not include permitting and land acquisition costs. It is recommended Sandpoint consider a two acre lot for each reservoir site to allow for an adequate buffer for future development and potential for expansion of facilities with either a booster pump station or a second reservoir. The current cost of land in and around Sandpoint is approximately $250,000 per acre. Based on this land cost and assuming property values remain steady, Sandpoint should expect to pay approximately $500,000 in 2006 dollars for each reservoir site.

The altitude valve proposed at the Woodland Drive Reservoir (to replace the Pine Street Booster Pump Station) is assumed to be installed on the existing supply line to the reservoir. The cost for the altitude valve includes an 8-inch altitude valve, 18-inch bypass, and vault.

It is assumed there will be three storage facilities making up the additional 5.9 MG of storage required for the 20-year planning period. The capital costs for these three future storage facilities have been grouped in one line item in Table 8-3 because the size and location of each facility is unknown at this time.

8.2.4 Distribution System Capital Improvements Program

Table 8-3 summarizes capital improvements anticipated for the Sandpoint water distribution system during the 20-year planning period. Figure 8-1 shows the location of these improvements within the water system. The capital improvements in Table 8-3 are listed in approximate chronological order based on immediacy of need. Also included in

Table 8-3 are distribution system improvements that were specifically identified in the hydraulic modeling effort.

Costs for other improvements required for developments are anticipated to be borne by the developer. Also, as discussed in Chapter 3, the City would like to replace existing coal tar-lined steel pipe within the system to minimize T&O complaints. A cost has been included for this at the end of Table 8-3 for replacement. Slip lining is an option that is assumed to be less costly, but development of costs requires detailed examination of where access points would be required. Additionally, the integrity of the pipeline being lined needs to be evaluated to determine that it is still structurally sound and has an adequate remaining life of service. Replacement of coal tar-lined pipes are not listed in chronological order because the T&O problems associated with coal tar- lined pipe are aesthetic and thus are not priority projects.

8.2.5 Distribution System Operations and Maintenance Improvements Program

Table 8-4 summarizes the O&M improvements recommended in Chapter 3. These improvements focus on general maintenance of the distribution system. Costs have not been developed for these recommendations because they focus on O&M and not capital improvements.

TABLE 8-4
Operations and Maintenance Improvements

Recommended Improvement
Regular maintenance of the pump station facilities.
Regular inspection of reservoir facilities. Recommend immediate inspection of the interiors to assess condition.
Maintain a clear area of vegetation around Syringa Reservoir.
Calibrate level sensors at reservoirs.
Develop a program to exercise valves and hydrants.
Collect leak repair information to develop database to use for future condition assessment of pipelines.

8.3 Funding Options

Possible funding mechanisms for the projects recommended in this WFP Report include locally generated sources (rates), system development charges (SDCs), local improvement districts (LIDs), bonds, and available external (i.e., state and federal) funds. Typical funding option evaluation criteria include:

- Equity (among existing customers, and between current and future customers)
- Legality (there are limitations on how SDC revenue may be collected and expended)
- Public acceptance
- Economic development/business retention