



Design Review Committee Briefing #8

Subject: Capital Cost Development Approach and Summary

Date: November 9, 2018

The Issue

The intent of this Design Review Committee (DRC) briefing is to provide context to the capital cost development methodology used during the facility planning process. Understanding this process is important in understanding the overall project costs and specifically, what the early estimates include.

Background and Analysis

The following sections are intended to bring context to the capital cost development approach. This includes discussion on the approach and assumptions used for the Phase II/III Upgrades.

Approach

Capital costs were developed during the facility planning process. These costs are estimated for the unit processes and systems to be built at the Nampa Wastewater Treatment Plant (WWTP). Overall cost estimates were built from raw cost estimates provided by equipment manufacturers, local commodity pricing, and local labor prices. Cost estimate markups for labor, construction equipment, materials, subcontractors, sales tax, contractor general conditions, contingency, insurance, performance and payment bonds, and soft costs (i.e. engineering and services during construction) are applied to the capital costs to provide the fully-loaded cost values.

Table 1. Facility Plan Cost Estimating Assumptions	
Item	Description
Cost estimate level of accuracy	Class 4 estimate (per AACE International)
Project definition level	1% to 15% complete
Annual escalation rate	4.94%
Cost estimate markups	
Labor, construction equipment, materials, and subcontractor (each)	10%
Sales tax	6%
Contractor general conditions	10%
Contingency	30%
Insurance	2%
Performance and payment bonds	1.5%
Soft costs	30%

The Association for the Advancement of Cost Engineering (AACE) International defines the cost estimate level of accuracy (i.e. Class V, IV, III, II, or I) on the level of project definition. Using this methodology, the costs provided by the *Facility Plan* were Class 4 Cost Opinions. For this type of estimate, the project definition is typically between 1- and 15-percent complete. The expected accuracy range of these cost opinions is -30 percent to +50 percent of the anticipated cost. This level of cost estimation is considered best for concept studies or feasibility analyses.

Facility Plan Phase II/III Upgrades

The following table (Table 2) summarizes the capital investment needed through 2031 that were prepared during the Facility Plan development. The estimates are presented both in 2017 dollars (when original estimates were conducted) and an escalated value representing the actual cost accounting for inflation based on the planned construction schedule for the improvements (future dollars).

Table 2. Phase II/III Upgrades Capital Cost Summary		
Actions	Capital Cost (2017 Dollars)	Capital Improvements Plan (Future Dollars)
Repair Headworks process equipment, HVAC system, and replace MCCs 1A and 1B	\$2,493,000	\$3,401,000
Repair Primary Clarifier 1 structure, mechanism, and sludge pumps	\$1,302,000	\$1,772,000
Repair Primary Clarifiers' 2 and 3 mechanisms	\$174,000	\$297,000
Construct Aeration Basin 4	\$8,316,000	\$11,678,000
Install Internal Mixed Liquor Recycle pumps and piping	\$2,758,000	\$4,929,000
Construct a new Blower Building	\$13,019,000	\$18,283,000
Replace Final Clarifiers' 1, 2, and 3 mechanisms	\$1,454,000	\$2,042,000
Construct Final Clarifier 4	\$5,689,000	\$7,989,000
Replace RAS Pumps 1, 2, 3, and 4	\$344,000	\$483,000
Replace WAS Pumps and RAS Piping	\$363,000	\$510,000
Construct a sidestream struvite treatment process	\$8,751,000	\$12,289,000
Construct a tertiary filtration system including a filter pump station	\$38,197,000	\$53,641,000
Construct an ultraviolet disinfection system to meet Class A recycled water standards	\$8,457,000	\$11,876,000
Construct an effluent pump station and forcemain to convey Class A recycled water to industrial users	\$3,725,000	\$5,231,000
Construct an effluent pump station and forcemain to convey Class A recycled water to irrigation users	\$9,161,000	\$16,373,000
Replace the Post Aeration Basin including structure and blower	\$2,405,000	\$3,377,000
Construct primary sludge thickening	\$9,153,000	\$12,854,000
Construct Primary Digester 5 and the corresponding relocation of the waste gas burner	\$9,100,000	\$12,779,000
Expand the Solids Handling Facility	\$4,187,000	\$5,880,000
Construct a new Laboratory Building with additional administrative space	\$2,525,000	\$3,546,000
Repair Primary Sludge Pumps 1, 2, and 3	\$48,000	\$82,000
Repair Primary Digester 1	\$550,000	\$1,283,000
Repair Digester Mixing Pumps 1, 2, and 3	\$66,000	\$112,000
Repair Digester Recirculation Pumps 3 and 4	\$44,000	\$75,000
Replace MCCs 4, 6, 7, and 10	\$2,140,000	\$3,005,000
ESTIMATED PROGRAM-LEVEL CAPITAL COSTS TOTAL	\$134,421,000	\$193,787,000
ESTIMATED PROGRAM-LEVEL CAPITAL COSTS RANGE	\$94,095,000 – \$201,632,000	\$135,651,000 – \$290,681,000
Programmatic Contingency	\$15,639,000	\$19,286,000
ESTIMATED PHASE II/III UPGRADES COST RANGE	\$109,734,000 – \$217,271,000	\$154,937,000 – \$309,966,500

Potential Consequences

Much of cost estimating is a rote exercise; however, there are several components of the capital cost estimates that are worth highlighting for the DRC's awareness.

- **Cost Estimating Contingency:** Cost estimating contingency is used to account for undefined scope of work and unforeseen conditions. The contingency is used to account for those factors that cannot be addressed in each of the labor and/or material installation costs based on the current level of project definition. The AACE provides guidance on the appropriate level of contingency relative to project definition, which was 30 percent for the Facility Plan. This value will decrease as the project is further defined.
- **Programmatic Contingency:** The cost of the Preferred Alternative (i.e. Program Costs) can be split into two categories: known costs (capital costs) and unknown costs (programmatic contingency). The contingency represents unknown risks that can occur over the duration of program delivery. This allocation provides flexibility for capital programs during the design and construction phases to address potential risks that may occur. The goal of a contingency budget is to provide adequate funding to complete planned work. The current Program established a contingency budget of \$19,286,000 (future dollars). These funds are only spent when they are needed. These were developed using a risk register, which considered Process, Regulatory, Repair and Replacement, Construction and Policy risks that could impact the Program. The methodology for developing and the justification for the programmatic contingency is included in TM T-52 Capital Improvements Plan, which is included as part of the Facility Plan
- **Inflation:** Table 2 demonstrates the effect of inflation on the overall project costs. The program-level capital costs increase \$59,366,000 when looking at future costs compared to 2017 values. This is a 44 percent increase due to inflation compounded over the assumed duration of this project. As shown in Table 1, the annual inflation rate is assumed at 4.94 percent per annum. With this inflation rate and given the project's funding method (i.e. low-interest State Revolving Funding loan), there may be benefits to accelerate construction to minimize the impacts of inflation.

Recommendation

This DRC briefing is intended to be informational to the Committee as the preliminary design process advances.