

Clean Water Nashville Overflow Abatement Program

GUIDANCE FOR DESIGN

ESTIMATING

Version 2.0

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Section 1

Estimating Introduction

This guidance to Designers addresses the expectations for preparing a standardized, consistent, and traceable cost estimate that is substantiated with appropriate documentation. Deviation from this procedure requires prior written approval from the Project Manager.

The Designer shall utilize its internal estimating process and software to develop accurate estimates during the design. Each Designer shall follow the Association for the Advancement of Cost Engineering International (AACEi) *Recommended Practice No. 34 R – 0 5, Basis of Estimate*, to define the elements included in the design estimates and ensure that detailed comparisons can be made with planning estimates. Costs for construction should be estimated in current dollars at the time of the estimate and shall not be escalated.

It is expected that, based on the cost information developed, including resources and productivity estimates, the Designer will also provide an estimate of construction project duration at each milestone. The Designer shall identify the construction project's mid-point and the number of months from the estimate date to this mid-point.

1.1 Exception to Designer OPCCs

For rehabilitation projects, it is anticipated that Designers will provide estimates of quantities at specific design milestones instead of Opinions of Probable Construction Costs (OPCCs). In this case, the Project Manager will prepare the OPCCs utilizing current unit rates.

Section 2

Cost Estimate Guidance

Developing project cost estimates at the major design milestones within the project life cycle is required to confirm overall project costs, project budget adherence, and the validity of previous estimates calculated at lesser degrees of project development. For each design milestone, the generally accepted estimating methods, expected level of accuracy, level of scope definition, and the key scope content requirements necessary to develop the estimate shall be used. As design progresses, it is expected that the level of accuracy will increase incrementally from (+ / -) 40% at preliminary engineering to (+ / -) 10% at 90% design.

2.1 Estimating Guidelines

This guidance applies to Opinions of Probable Construction Costs (OPCCs) prepared for facility modifications or renovations; new construction including pump stations, equalization/storage tanks, force mains, gravity sewers; pipeline rehabilitation (typically by the Program Management team); associated marine work; and demolition or removing existing features to facilitate improvements.

OPCCs are prepared periodically throughout the detailed design phases. Each shall include, in addition to facility construction costs, all applicable procurement, contractor-obtained permits and fees, and necessary off-site work. The Designer shall also clearly identify the format or layout for each estimate and reference the data used to generate the cost estimate to readily accessible and referenced industry cost data sources. Costs for construction shall be estimated in current dollars at the time of the estimate and not be escalated.

For reference, the Designer may be provided with the Program's baseline estimated cost totals for the project. The Designer shall not assume that the baseline estimate is all-inclusive in its scope definition. The Designer shall not rely on, or in any manner use, information or calculations developed during the project's planning phase to size structures, features, appurtenances, buildings, pipe, pumps, tanks, etc. It is the Designer's responsibility to confirm all equipment sizes, stated tank capacities, pipe and pump sizes, and motor horsepower ratings. While preparing the respective design, should the Designer's estimate deviate significantly from the planning estimate's cost, the Project Manager will request further discussion and written documentation regarding the cause for the cost deviation and options for containing cost growth. The Project Manager shall issue guidance to the Designer for resolving the deviation, if warranted.

To ensure consistency across the Program, the percentages to be used for mark-ups on direct construction costs in the OPCCs are set as provided in Table 2-1.

Table 2-1 Mark-up Percentages of Direct Construction Costs

Mark-up Condition	Percentages
General Contractor General Conditions	10% - Facility Projects 8% - Conveyance Projects
General Contractor Overhead & Profit	7%
Permitting Multiplier	0.1%
Builders Risk Insurance (Facility Only)	0%
General Liability Insurance	1%
Contractor Bond	1%
Sales Tax	0% - Wastewater items
Design Development Contingency *	Varies*
Construction Contingency **	Varies**
Escalation***	Identified by Program Management Consultant***

Notes:

*The Designer shall provide input on the recommended design development contingency factor to the Project Manager for his consideration. This element of contingency shall define the expected construction cost changes for scope increases/decreases that can be anticipated during all future stages of design. It is expected that these costs, expressed as a percent of the OPCC, will decrease as the design matures and the level of accuracy of that design increases. The Designer shall provide substantiated information to the Project Manager as to the basis of project design development contingency presented, especially if the suggested design development contingency at the preliminary engineering stage exceeds 20%.

**The Designer shall provide input about the recommended construction contingency factor to the Project Manager for his consideration. This factor will be provided as a percent of the OPCC calculation and shall represent the Designer's expectation for changes during construction. This factor is based primarily on the complexity of the work and the Designer's experience with construction contingency use on similar projects. Information will be provided by the Designer to substantiate the suggested construction contingency percentage especially if that percentage exceeds 10%.

***The Designer shall identify the construction project's mid-point of construction for his respective project in number of months to mid-point. Application of an escalation percentage to this duration shall be performed by the Designer from a value provided by the Program Management Consultant.

For the respective project, the Designer shall prepare and submit to the Project Manager for review OPCCs developed at the 30%, 60%, 90%, and 100% design stages, excluding rehabilitation projects. Designers responsible for rehabilitation projects will coordinate with the Project Manager regarding the general format and units of measure for the bid quantities and will develop and submit a list of quantities as required in the Designer's Scope of Work. OPCCs for rehabilitation projects shall be completed by the Program Design Management Team resources from these Designer quantities.

Each submittal shall include the appropriate cover page, index page, a well-defined narrative (Basis of Estimate) describing each OPCC's development, references to sources for costs, and explanations of assumptions. The Program Management Consultant used Timberline Construction Estimating Software to develop the baseline project estimates for the Program. While the Designer is not required to use Timberline, the comparison of Designer estimates to the baseline will be facilitated if the formats of all estimates are similar.

All facility OPCCs shall be prepared in a spreadsheet format by activity (consistent with CSI MasterFormat 2004) with the following breakdown of total costs. Less complex pipe installation work will have fewer activities to cost but should categorize work in a similar breakdown and describe productivity assumptions for these activities.

- Description
- Takeoff quantity including unit definition
- Labor amount
- Material amount
- Sub-contracting amount
- Equipment amount
- Other including allowances

All allowances contained in the estimate shall also be identified. The allowances recommended shall be explained with substantiation for the amount/percentage used and added to the direct costs to define the basis for direct costs in the OPCC. As discussed previously, 1) percentages for indirect costs shall be applied to direct costs and 2) General Conditions and Overhead and Profit percentages shall be applied to direct plus indirect costs to define the complete OPCC. Each element of contingency (project development and construction) shall be presented separately, as a percentage (with substantiation) but shall not be extended into the cost calculation for OPCC.

The entire Program OPCC was initially developed in 2011 dollars and escalated, as appropriate, by the Program Management Consultant. OPCCs prepared in future years for design projects will be awarded to Designers in future present-day costs and will not be readily comparable to the original or escalated Program's OPCCs. The Project Manager is responsible for identifying the required adjustments to the Designer's OPCC to accommodate escalation based on the Designer's presentation of suggested contingency and the duration from estimate date to mid-point of construction. All OPCCs prepared at each stage in the project development – 30%, 60%, 90% and 100% – shall include a comprehensive basis of estimate narrative that is consistent with ACEi No. 34 R – 0 5. The basis of estimate narrative communicates the rationale, assumptions, pricing sources, and other inputs to the estimating process to be used by the engineer when developing each cost estimate level. This document consolidates information prepared from the multiple sources that may be used to determine the basis of the cost estimate. Each basis of estimate shall address the topics, as applicable, described in this section. If there are no applicable items for the section, or if for any reason the section does not apply, the section heading should still be included in the document, and the text should read N/A (not applicable). It is expected that the final Designer estimate will become the basis for change management during the construction phase of the work.

2.1.1 Project Scope Description

The Designer shall provide a brief narrative describing the major project components. The section should be limited to no more than one page.

2.1.2 Estimating Methodology

The Designer shall indicate the primary estimating methodology used to prepare the cost estimate. Where different methodologies may have been used for major estimate elements in preliminary OPCCs (i.e., 30%, 60%), the Designer shall briefly describe each, organized by CSI code. The Designer shall identify the method used to estimate quantities.

The methods may be identified as being developed from the following:

- Detailed takeoff from design drawings
- “Forced” takeoff from partially completed design drawings
- Takeoff from a “go-by” design (design drawings from a previously-designed facility similar in size and nature)
- Factored using a cost estimating relationship
- Assumed by estimator (no drawings or cost estimating relationship available)

2.1.3 Design and Cost Basis

The Designer is to reference all documents provided to the estimating team to convey the project scope. At a minimum, the following documents should be referenced in the basis of estimate narrative, and attachments should be provided where noted.

- All reports, design drawings, specifications, equipment lists, and other design information used in preparing the estimate. This list should be prepared and kept up to date by the design team.
- A comparison of the required design content summarized in the planning development documents to the actual design content delivered to the estimating team including comments about the documents’ completeness and adequacy for the class of estimate proposed
- All meeting minutes from pre-estimate development and other meetings, as appropriate, held with the Program team, wherein direction was received regarding construction cost or schedule
- Pricing sources for equipment, material, and labor
- A discussion of the utilization of indirect costs as well as Overhead and Profit and General Conditions identified in this Appendix and the Program’s Estimating Guidelines in the *Program Management Plan, Volume III*
- An identification and discussion of allowances, assumptions, exclusions, and exceptions
- OPCCs for rehabilitation projects shall be completed using unit price bid data compiled from similar Program projects or comparable MWS and Metro area projects.

2.2 Estimate Development

As stated above, the Designer shall prepare and submit construction OPCCs as required in the Designer’s Scope of Work. These OPCC submittals allow the Program team to review and compare the Designer’s OPCC with the base planning OPCC. As the project design advances to completion, subsequent estimate reviews will allow the following:

- Verification of capacities and flows
- Identification of the project components rejected or omitted by the Program team in the planning stage
- The highlighting of project design components that might be considered candidates for cost savings or value engineering efforts

- A discussion of the complexity of the work envisioned and an appropriate construction contingency
- An expansion of the complexity narrative to identify all risk issues that may be encountered including pointing out not only the high-risk issues but also the opportunities available and the value to MWS of pursuing these opportunities in the design