



Design Consultant Cost Estimating Guidelines

Sacramento Regional County Sanitation District

Version 1.0



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Contents

| | |
|--|----------|
| 1.0 Purpose | 1 |
| 2.0 Definitions..... | 1 |
| 2.1 Work Breakdown Structure | 1 |
| 2.2 Program Management Office..... | 1 |
| 2.3 Program Management Information System | 1 |
| 2.4 Prevailing Wage Rates..... | 2 |
| 3.0 Detailed Procedures | 2 |
| 3.1 Construction Cost Estimates | 2 |
| 3.2 Prerequisites to Starting Work on an Estimate | 2 |
| 3.2.1 Scope..... | 2 |
| 3.3 Estimate Report | 3 |
| 3.4 Documentation to Accompany Construction Cost Estimates | 3 |
| 3.5 Basis of Estimate Report..... | 3 |
| 3.6 Estimate Format..... | 4 |
| 3.6.1 Work Breakdown Structure..... | 4 |
| 3.6.2 Title/Header | 5 |
| 3.7 General Details | 5 |
| 3.8 Project Labor Rates..... | 5 |
| 3.9 Contingencies | 5 |
| 3.10 Cost Estimate Classification | 6 |
| 3.10.1 Delivery Format and Approval Process | 6 |
| 3.11 Estimating Software..... | 7 |
| 4.0 References..... | 7 |

Tables

| | |
|-------------------------------|---|
| Table 1. Submittals List..... | 3 |
|-------------------------------|---|

Attachments

- Attachment A. AACEi Classifications Tables
- Attachment B. Variance/Cost History Log
- Attachment C. Estimate Layout for Summary and Detailed Estimates, and Markups
- Attachment D. Questions and Comments Log

1.0 Purpose

The purpose of this document is to provide scope, guidelines and procedures for design consultants to create Estimates of Probable Construction Cost (estimates) for Sacramento Regional County Sanitation District (District) projects. An estimate will be produced for all projects and will be developed and submitted along with other required deliverables at each of the major milestones during the life of the project. It is intended to be used in response to Requests for Proposal (RFPs) for all contract design services. Consultants shall apply these procedures during the preparation of construction cost estimates to achieve uniformity in the development of estimates and to facilitate review by various project participants. The consultant shall apply the best estimating practices of the engineering and construction industries in preparing these cost estimates and associated documents.

2.0 Definitions

2.1 Work Breakdown Structure

The Work Breakdown Structure (WBS) provides a mechanism to organize the project into categories and sub-categories that presents a logical organization of the scope and data, as well as providing a check-and-balance of the components of the project under consideration. In general terms, the quantities are to be organized in at least three levels or groups: (1) by the project, (2) by major facility, process, or conveyance segment, and (3) Construction Specification Institute (CSI) divisional categories, depending upon the level of estimate detail. The consultants are responsible to provide adequate definition of the project and its major components so that the WBS can be developed with the program team.

2.2 Program Management Office

The District has formed a Program Management Office (PMO) team responsible for the overall planning and control of the EchoWater Projects. It consists of the District's Director of Operations and Program Manager, and other District staff, as well as consultant program advisors, project managers and staff.

2.3 Program Management Information System

The District has implemented PMWeb as the program management information system. PMWeb is an internet-based documentation and project control system to be used on this program. The system will be used to upload, review, and manage documents and approvals. The PMWeb "Workflow" is a process set up in advance by the PMO's program administrator to process estimates for approval. The design consultant is expected to interface with PMWeb to upload documents, receive comments, keyboard in attributes, etc.

2.4 Prevailing Wage Rates

Wages imposed on federal and state funded projects. This program shall be assumed to be governed by California State prevailing wage rates. These rates can be found at <http://www.dir.ca.gov/dlsr/PWD/index.htm>

3.0 Detailed Procedures

3.1 Construction Cost Estimates

Construction costs typically account for 70 to 80 percent of the total project cost and are therefore the most extensive and exhaustive cost estimates to produce. The American Association of Cost Estimators (AACE) International definition of Cost Estimates Types/Classes is to be used to derive the estimate, refer to Attachment A for details.

Each estimate will be titled to correspond with the phase of the project and the estimate classification as described in Section 1. The estimate will include an assessment of the difficulties inherent in the construction work and will document the determination of productivity, production, and pricing for preparing the estimate. This includes such factors as labor conditions, construction equipment, construction supervision, material costs, and equipment installation costs. All reasonable costs a construction contractor can expect to incur must be included.

Estimates must take into account the current climate of the construction industry in and around Sacramento, California.

3.2 Prerequisites to Starting Work on an Estimate

Prior to beginning the quantity takeoff, a kick-off meeting is to be arranged between the consultant and the PMO teams to solidify the approach, gain insight into the particular project, and clarify expectations of the estimating effort. The consultant should be prepared at that time to provide some initial information so that it can be discussed and agreed upon. The consultant project manager shall confirm agreement on WBS headings, markups, and the equipment worksheet.

In addition, the consultant shall provide a sample format to be used for the baseline estimate (PDR Phase) for program team review and comment.

3.2.1 Scope

Consultants will create four cost estimates at the times specified in Table 1 below. A default range of contingencies are provided for reference, but the design consultant is expected to recommend a contingency based on the actual completeness of the project documents and as described in the AACEi RP-18R-97. In addition, the consultant shall provide the effort necessary to meet the accuracy range specified in Table 1.

Table 1. Submittal List

| Submittal | AACE Class | Expected Accuracy Range | Estimating and Bid Contingency |
|---------------------------------|------------|-------------------------|--------------------------------|
| Preliminary Design Report (PDR) | 3 | -20% to +30% | 15% to 25% |
| Design Submittal 1 (DS-1) | 2 | -15% to +20% | 10% to 20% |
| DS-2 | 2 | -15% to +20% | 10% to 15% |
| DS-3 | 1 | -10% to +15% | 5% to 10% |

The estimate completed by the Consultant at the PDR Phase shall become the “baseline estimate” for the project. All subsequent estimates (DS-1, etc.) shall be compared to the baseline estimate, and the consultant shall reconcile changes from the baseline estimate with changes to the project elements, and/or changes to unit prices over time.

3.3 Estimate Report

All documentation will be neatly bound in a report, or compiled in a single electronic file, and comply with the detailed procedures in Section 3. The estimate report will include the following:

- Estimate transmittal letter
- Basis of Estimate Narrative (BOE)
- Total Project Cost Summary Estimate with all markups allocated to the line items
- Detailed Project Cost Estimate
- Documentation including vendor quotes, estimate calculation and takeoffs, assumptions, allowances and any other documentation gathered and/or utilized in the development of the estimate

3.4 Documentation to Accompany Construction Cost Estimates

The basis of each estimate must be documented. This documentation includes lists of drawings and specifications, quantities, equipment lists, qualifications, assumptions, inclusions, exclusions, a brief narrative of the cost estimate variances for the current design completion, and the construction approach used in developing the cost estimate.

The accompanying documentation will identify all major material and equipment costs, backing up each estimate with supporting written price quotations.

3.5 Basis of Estimate Report

The Basis of Estimate (BOE) shall include but not be limited to a detailed report on the following:

- **SCOPE:** A detailed description of the full scope of construction.
- **ESTIMATE HISTORY:** A short description of the history of the estimate(s) generated to date for the project.
- **SOURCE DOCUMENTS:** A detailed list/description of the documents used to generate the estimate (drawings, specifications, etc.), including revision numbers and issue dates.
- **CLASS:** The AACE class level and expected range of accuracy.
- **INDIRECTS/MARKUPS:** A discussion of all indirect costs and markups used, including the basis for estimating them. These include contingency, overhead and profit, taxes, material shipping and handling, contractor general conditions, start-up training, and operation and maintenance (O&M), insurance, bonds, and escalation.
- **ASSUMPTIONS:** This should address such things as minimum number of bidders, overtime requirements, sharing a work space with an operating facility, protection of existing structures, stormwater pollution prevention plan, special requirements and other non-technical issues. In addition, technical requirements not easily apparent in the source technical documents should be addressed including, but not limited to, piling, dewatering, shoring, etc.
- **ESCALATION:** A description of the escalation calculation including the assumed start, end and mid-point dates of construction, the annual escalation rate used and the resulting total escalation. The PMO team may provide the annual rate.
- **EXCLUSIONS:** Such as hazardous materials remediation, programming of computers and displays, commissioning beyond manual labor support.
- **ALLOWANCES:** A list of allowances made for known requirements not yet specified in the source documents. Include the basis for calculating the cost (e.g. X percent of net total).
- **VARIATIONS:** The Variation/Cost History report (see sample in Attachment B). The variance in cost (over or under) from the previous estimate shall be identified at CSI division level for each WBS process area. This shall include any changes in design scope, with identification of cost increase for each change.
- **EXCEPTIONS:** To these requirements.

3.6 Estimate Format

An example has been provided in Attachment C to illustrate the format described below.

3.6.1 Work Breakdown Structure

The WBS to be used for the cost estimate shall conform to the program approved WBS at the time of contract award and as revised during the contract execution.

3.6.2 Title/Header

Each page of the BOE and estimate shall reference the current revision number and design basis to eliminate potential confusion between similar deliverables

3.7 General Details

The goal of the consultant estimate is to predict the successful contractor's bid; estimate all specification requirements.

All costs for construction management, legal, finance or other "soft" costs shall be excluded from the cost estimate. However, the consultant shall independently recommend cost allowances for these costs so the program team can assess their estimate of overall total project costs.

Estimate items shall all have the most recently available unit costs for labor, equipment and material.

Consultants shall participate in cost estimate review meetings prior to starting an estimate and before or during the PMO review of the estimate, to review requirements, processes, reconcile costs, etc.

The cost estimate shall be prepared by a qualified cost estimator. For projects with a construction cost of \$10,000,000 or more, the person preparing the estimate shall have a minimum of 5 years of cost estimating experience and shall have prepared estimates for at least four projects of similar size and complexity.

3.8 Project Labor Rates

Labor rates used will be the valid rates as of the time the estimate is generated. The labor rates used in the detail cost estimate will include the base rate (paid wages plus fringe benefits) plus burden (employer taxes: social security, Medicare/Medicaid, workers compensation and unemployment insurance). The labor rates are to exclude field or office overhead and profit which instead are to be added as a markup to the net total cost.

3.9 Contingencies

Contingencies are used to cover unknowns and unanticipated conditions that are not possible to adequately evaluate from the data at the time a cost estimate is prepared, but must be represented by a sufficient cost to cover identified risks. A construction contingency is assigned to cover design incompleteness, detail changes, alternative design changes, and associated costing inaccuracies during the construction cost estimating portion of the design phase of the project. Contingency specifically excludes major scope changes such as changes in end product specification, capacities, building sizes, and location of the project; extraordinary events such as major strikes and natural disasters. As detailed design progresses and design information becomes known, the construction contingency is reduced.

3.10 Cost Estimate Classification

Estimates will be developed at all milestones in the project life-cycle as identified in Section 1.1. Projects are classified based on the current phase of the project which, in turn, determines the level of detail that is expected in the cost estimate. The cost estimate classification system is based on the American Association of Cost Estimators (ACE) International Recommended.

The consultant is expected to identify all major material and equipment costs on a worksheet organized by WBS. Supporting written price quotations from suppliers will be included as backup to each estimate. These quotations are to be supplied in written form by manufacturers and/or suppliers. Minor equipment cost quotations may be documented from telephone conversations. All backup information shall be neatly bound and sorted by WBS. Major equipment, for the purposes of this effort, is defined as any single process item greater than \$5,000 in value. However, all pieces of equipment, whether it is quoted or not, should be listed on the worksheet to assist in the definition of the project. It is important that quotes clearly describe what is included and excluded in the price. This includes information such as shipping, start-up assistance, spares, and also ancillary equipment, interconnecting piping, etc.

3.10.1 Delivery Format and Approval Process

- An electronic PDF file of the estimate, the BOE and supporting documentation along with three paper copies.
- An Excel spreadsheet version of the summary and detail cost estimate. Spreadsheets shall clearly label the item, quantity, and unit price applied. They shall have summarization, sorting and selecting capabilities.
- PMWeb will be used for coordination and upload of electronic files as introduced in Section 2.3. While emails can be used as needed, the PMWeb upload of the full estimate report is considered the official document delivery date. Training in the use of PMWeb and clarification on the details of the submittals will take place during the pre-estimate meetings between the PMO and design consultant staff.
- The estimates will be reviewed by the PMO, and comments and questions formalized in a comments list (Attachment D). The consultant will officially receive the log and any backup documentation through PMWeb. The consultant will respond to each comment and question and provide a revised cost estimate for approval as required.
- Note: Construction cost estimates prepared under contract with the PMO are strictly confidential and distribution is prohibited beyond that specified in the project scope of work.

3.11 Estimating Software

While the use of a computerized cost estimating software package to generate cost estimates is preferable, the use of spreadsheets is acceptable. The software will provide the detailed breakdown of each of the cost estimate types. Summary reports must be in the same format as described herein and shown in the attached example cost estimate. The system should clearly identify the various cost categories, types, codes, standard calculations, and defaults. A written description of the system should be included as a reference to further explain the technical functions and calculations of the software.

4.0 References

- "Reviewing, Validating and Documenting the Estimate." AACE International. Recommended Practice 31R-03. TCM Framework 7.3. Morgantown, WV, 2009
- "Cost Estimate Classification System - as Applied In Engineering, Procurement, and Construction for the Process Industries. AACE International. Recommended Practice 18R-97. TCM Framework 7.3. Morgantown, WV, 2011
- "Contingency Estimating - General Principles". AACE International. Recommended Practice 40R-08. TCM Framework 7.6. Morgantown, WV, 2008"Contingency
- "Development of Cost Estimating Plans - As Applied In Engineering, Procurement, and Construction for the Process Industries." AACE International. Recommended Practice 36R-08. TCM Framework 7.3. Morgantown, WV, 2008

ATTACHMENT A
AACEi CLASSIFICATIONS TABLES

CONDENSED FROM 18R-97: THE FOLLOWING IS CONDENSED FROM THE FULL RECOMMENDED PRACTICE. THE FULL RP CAN BE FOUND ONLINE AT AAACEI.ORG

18R-97: Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries

COST ESTIMATE CLASSIFICATION MATRIX FOR THE PROCESS INDUSTRIES

| ESTIMATE CLASS | Primary Characteristic | Secondary Characteristic | | |
|----------------|--|--|--|--|
| | MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES Expressed as % of complete definition | END USAGE Typical purpose of estimate | METHODOLOGY Typical estimating method | EXPECTED ACCURACY RANGE Typical variation in low and high ranges ^[a] |
| Class 5 | 0% to 2% | Concept screening | Capacity factored, parametric models, judgment, or analogy | L: -20% to -50% H: +30% to +100% |
| Class 4 | 1% to 15% | Study or feasibility | Equipment factored or parametric models | L: -15% to -30% H: +20% to +50% |
| Class 3 | 10% to 40% | Budget authorization or control | Semi-detailed unit costs with assembly level line items | L: -10% to -20% H: +10% to +30% |
| Class 2 | 30% to 75% | Control or bid/tender | Detailed unit cost with forced detailed take-off | L: -5% to -15% H: +5% to +20% |
| Class 1 | 65% to 100% | Check estimate or bid/tender | Detailed unit cost with detailed take-off | L: -3% to -10% H: +3% to +15% |

Notes: [a] The state of process technology, availability of applicable reference cost data, and many other risks affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

For each table, the following information is provided:

- **Description:** a short description of the class of estimate, including a brief listing of the expected estimate inputs based on the maturity level of project definition deliverables. The “minimum” inputs reflect the range of industry experience, but would not generally be recommended.
- **Maturity Level of Project Definition Deliverables (Primary Characteristic):** Describes a particularly key deliverable and a typical target status in stage-gate decision processes, plus an indication of approximate percent of full definition of project and technical deliverables. For the process industries, this correlates with the percent of engineering and design complete.
- **End Usage (Secondary Characteristic):** a short discussion of the possible end usage of this class of estimate.
- **Estimating Methodology (Secondary Characteristic):** a listing of the possible estimating methods that may be employed to develop an estimate of this class.
- **Expected Accuracy Range (Secondary Characteristic):** typical variation in low and high ranges after the application of contingency (determined at a 50% level of confidence). Typically, this represents about 80% confidence that the actual cost will fall within the bounds of the low and high ranges. The estimate confidence interval or accuracy range is driven by the reliability of the scope information available at the time of the estimate in addition to the other variables and risk identified above.
- **Alternate Estimate Names, Terms, Expressions, Synonyms:** this section provides other commonly used names that an estimate of this class might be known by. These alternate names are not endorsed by this Recommended Practice. The user is cautioned that an alternative name may not always be correlated with the class of estimate as identified in Tables 2a-2e.

| CLASS 5 ESTIMATE | |
|---|--|
| <p>Description: Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. As such, some companies and organizations have elected to determine that due to the inherent inaccuracies, such estimates cannot be classified in a conventional and systematic manner. Class 5 estimates, due to the requirements of end use, may be prepared within a very limited amount of time and with little effort expended—sometimes requiring less than an hour to prepare. Often, little more than proposed plant type, location, and capacity are known at the time of estimate preparation.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: Block flow diagram agreed by key stakeholders. 0% to 2% of full project definition.</p> <p>End Usage: Class 5 estimates are prepared for any number of strategic business planning purposes, such as but not limited to market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.</p> | <p>Estimating Methodology: Class 5 estimates generally use stochastic estimating methods such as cost/capacity curves and factors, scale of operations factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, and other parametric and modeling techniques.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 5 estimates are -20% to -50% on the low side, and +30% to +100% on the high side, depending on the technological complexity of the project, appropriate reference information and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Ratio, ballpark, blue sky, seat-of-pants, ROM, idea study, prospect estimate, concession license estimate, guesstimate, rule-of-thumb.</p> |

Table 2a – Class 5 Estimate

| CLASS 4 ESTIMATE | |
|---|--|
| <p>Description: Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 15% complete, and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams (PFDs) for main process systems, and preliminary engineered process and utility equipment lists.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: Process flow diagrams (PFDs) issued for design. 1% to 15% of full project definition.</p> <p>End Usage: Class 4 estimates are prepared for a number of purposes, such as but not limited to, detailed strategic planning, business development, project screening at more developed stages, alternative scheme analysis, confirmation of economic and/or technical feasibility, and preliminary budget approval or approval to proceed to next stage.</p> | <p>Estimating Methodology: Class 4 estimates generally use stochastic estimating methods such as equipment factors, Lang factors, Hand factors, Chilton factors, Peters-Timmerhaus factors, Guthrie factors, the Miller method, gross unit costs/ratios, and other parametric and modeling techniques.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 4 estimates are -15% to -30% on the low side, and +20% to +50% on the high side, depending on the technological complexity of the project, appropriate reference information, and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Screening, top-down, feasibility (pre-feasibility for metals processes), authorization, factored, pre-design, pre-study.</p> |

Table 2b – Class 4 Estimate

| CLASS 3 ESTIMATE | |
|---|--|
| <p>Description: Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. As such, they typically form the initial control estimate against which all actual costs and resources will be monitored. Typically, engineering is from 10% to 40% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, preliminary piping and instrument diagrams, plot plan, developed layout drawings, and essentially complete engineered process and utility equipment lists.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: Piping and instrumentation diagrams (P&IDs) issued for design. 10% to 40% of full project definition.</p> <p>End Usage: Class 3 estimates are typically prepared to support full project funding requests, and become the first of the project phase control estimates against which all actual costs and resources will be monitored for variations to the budget. They are used as the project budget until replaced by more detailed estimates. In many owner organizations, a Class 3 estimate is often the last estimate required and could very well form the only basis for cost/schedule control.</p> | <p>Estimating Methodology: Class 3 estimates generally involve more deterministic estimating methods than stochastic methods. They usually involve predominant use of unit cost line items, although these may be at an assembly level of detail rather than individual components. Factoring and other stochastic methods may be used to estimate less-significant areas of the project.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 3 estimates are -10% to -20% on the low side, and +10% to +30% on the high side, depending on the technological complexity of the project, appropriate reference information, and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Budget, scope, sanction, semi-detailed, authorization, preliminary control, concept study, feasibility (for metals processes) development, basic engineering phase estimate, target estimate.</p> |

Table 2c – Class 3 Estimate

| CLASS 2 ESTIMATE | |
|--|--|
| <p>Description: Class 2 estimates are generally prepared to form a detailed contractor control baseline (and update the owner control baseline) against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the bid estimate to establish contract value. Typically, engineering is from 30% to 75% complete, and would comprise at a minimum the following: process flow diagrams, utility flow diagrams, piping and instrument diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: All specifications and datasheets complete including for instrumentation. 30% to 75% of full project definition.</p> <p>End Usage: Class 2 estimates are typically prepared as the detailed contractor control baseline (and update the owner control baseline) against which all actual costs and resources will now be monitored for variations to the budget, and form a part of the change management program.</p> | <p>Estimating Methodology: Class 2 estimates generally involve a high degree of deterministic estimating methods. Class 2 estimates are prepared in great detail, and often involve tens of thousands of unit cost line items. For those areas of the project still undefined, an assumed level of detail takeoff (forced detail) may be developed to use as line items in the estimate instead of relying on factoring methods.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 2 estimates are -5% to -15% on the low side, and +5% to +20% on the high side, depending on the technological complexity of the project, appropriate reference information, and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Detailed control, forced detail, execution phase, master control, engineering, bid, tender, change order estimate.</p> |

Table 2d – Class 2 Estimate

| CLASS 1 ESTIMATE | |
|--|---|
| <p>Description: Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. The parts of the project estimated at this level of detail will typically be used by subcontractors for bids, or by owners for check estimates. The updated estimate is often referred to as the current control estimate and becomes the new baseline for cost/schedule control of the project. Class 1 estimates may be prepared for parts of the project to comprise a fair price estimate or bid check estimate to compare against a contractor's bid estimate, or to evaluate/dispute claims. Typically, overall engineering is from 65% to 100% complete (some parts or packages may be complete and others not), and would comprise virtually all engineering and design documentation of the project, and complete project execution and commissioning plans.</p> <p>Maturity Level of Project Definition Deliverables: Key deliverable and target status: All deliverables in the maturity matrix complete. 65% to 100% of full project definition.</p> <p>End Usage: Generally, owners and EPC contractors use Class 1 estimates to support their change management process. They may be used to evaluate bid checking, to support vendor/contractor negotiations, or for claim evaluations and dispute resolution.</p> <p>Construction contractors may prepare Class 1 estimates to support their bidding and to act as their final control baseline against which all actual costs and resources will now be monitored for variations to their bid. During construction, Class 1 estimates may be prepared to support change management.</p> | <p>Estimating Methodology: Class 1 estimates generally involve the highest degree of deterministic estimating methods, and require a great amount of effort. Class 1 estimates are prepared in great detail, and thus are usually performed on only the most important or critical areas of the project. All items in the estimate are usually unit cost line items based on actual design quantities.</p> <p>Expected Accuracy Range: Typical accuracy ranges for Class 1 estimates are -3% to -10% on the low side, and +3% to +15% on the high side, depending on the technological complexity of the project, appropriate reference information, and other risks (after inclusion of an appropriate contingency determination). Ranges could exceed those shown if there are unusual risks.</p> <p>Alternate Estimate Names, Terms, Expressions, Synonyms: Full detail, release, fall-out, tender, firm price, bottoms-up, final, detailed control, forced detail, execution phase, master control, fair price, definitive, change order estimate.</p> |

Table 2e – Class 1 Estimate

ESTIMATE INPUT CHECKLIST AND MATURITY MATRIX

Table 3 maps the extent and maturity of estimate input information (deliverables) against the five estimate classification levels. This is a checklist of basic deliverables found in common practice in the process industries. The maturity level is an approximation of the completion status of the deliverable. The completion is indicated by the following letters.

- **None (blank):** development of the deliverable has not begun.
- **Started (S):** work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- **Preliminary (P):** work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- **Complete (C):** the deliverable has been reviewed and approved as appropriate.

| | ESTIMATE CLASSIFICATION | | | | |
|--|-------------------------|------------------|-------------------|-------------------|--------------------|
| | CLASS 5 | CLASS 4 | CLASS 3 | CLASS 2 | CLASS 1 |
| MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES | 0% to 2% | 1% to 15% | 10% to 40% | 30% to 75% | 65% to 100% |
| General Project Data: | | | | | |
| Project Scope Description | General | Preliminary | Defined | Defined | Defined |
| Plant Production/Facility Capacity | Assumed | Preliminary | Defined | Defined | Defined |
| Plant Location | General | Approximate | Specific | Specific | Specific |
| Soils & Hydrology | None | Preliminary | Defined | Defined | Defined |
| Integrated Project Plan | None | Preliminary | Defined | Defined | Defined |
| Project Master Schedule | None | Preliminary | Defined | Defined | Defined |
| Escalation Strategy | None | Preliminary | Defined | Defined | Defined |
| Work Breakdown Structure | None | Preliminary | Defined | Defined | Defined |
| Project Code of Accounts | None | Preliminary | Defined | Defined | Defined |
| Contracting Strategy | Assumed | Assumed | Preliminary | Defined | Defined |
| Engineering Deliverables: | | | | | |
| Block Flow Diagrams | S/P | P/C | C | C | C |
| Plot Plans | | S/P | C | C | C |
| Process Flow Diagrams (PFDs) | | P | C | C | C |
| Utility Flow Diagrams (UFDs) | | S/P | C | C | C |
| Piping & Instrument Diagrams (P&IDs) | | S/P | C | C | C |
| Heat & Material Balances | | S/P | C | C | C |
| Process Equipment List | | S/P | C | C | C |
| Utility Equipment List | | S/P | C | C | C |
| Electrical One-Line Drawings | | S/P | C | C | C |
| Specifications & Datasheets | | S | P/C | C | C |
| General Equipment Arrangement Drawings | | S | C | C | C |
| Spare Parts Listings | | | P | P | C |
| Mechanical Discipline Drawings | | | S/P | P/C | C |
| Electrical Discipline Drawings | | | S/P | P/C | C |
| Instrumentation/Control System Discipline Drawings | | | S/P | P/C | C |
| Civil/Structural/Site Discipline Drawings | | | S/P | P/C | C |

Table 3 – Estimate Input Checklist and Maturity Matrix (Primary Classification Determinate)

ATTACHMENT B
VARIANCE/COST HISTORY LOG

**COMPARTMENT B
NORTH BUILD-OUT
STA**

| Description | 90% Total w/ Markups Nov-09 | 100% Total w/ Markups Jan-10 | Variance w/ Markups (Nov-09 - Jan-10) | Comments |
|--|--------------------------------------|---------------------------------------|---|--|
| COMPARTMENT B NNRC LEVEE BRIDGES | \$ 2,542,500 | \$ 1,828,300 | \$ (714,200) | |
| 6001 - CONTRACTORS GENERAL CONDITIONS | | | | |
| 01 - General Requirements | \$ 279,000 | \$ 225,000 | \$ (54,000) | Reduced markups and general conditions to match current market |
| GENERAL CONDITIONS TOTAL | \$ 279,000 | \$ 225,000 | \$ (54,000) | |
| 6003 - CIVIL/SITE WORK | | | | |
| 02 - SITE CONSTRUCTION | \$ 376,000 | \$ 349,000 | \$ (27,000) | Reduced markups and general conditions to match current market |
| CIVIL/SITE WORK | \$ 376,000 | \$ 349,000 | \$ (27,000) | |
| 6004 - STRUCTURAL | | | | |
| 01 - GENERAL CONDITIONS | \$ 13,500 | \$ 12,400 | \$ (1,100) | Reduced markups and general conditions to match current market |
| 02 - SITE CONSTRUCTION | \$ 951,000 | \$ 582,000 | \$ (369,000) | Reduced markups and general conditions to match current market. Reduced number of piles. Sheet pile from 40' tall assumed to 20' tall confirmed. Less sheet pile width. Updated material quotes |
| 03 - CONCRETE | \$ 812,500 | \$ 557,500 | \$ (255,000) | Reduced markups and general conditions to match current market. Deleted stem walls, reduced size of end bents and wing bents. Modified concrete and rebar material cost to match current market. Updated material quotes |
| 06 - WOODS AND PLASTICS | \$ 110,500 | \$ 102,400 | \$ (8,100) | Reduced markups and general conditions to match current market |
| STRUCTURAL | \$ 1,887,500 | \$ 1,254,300 | \$ (633,200) | |

ATTACHMENT C

ESTIMATE LAYOUT FOR SUMMARY AND DETAILED ESTIMATES,
AND MARKUPS

90% Design

| Description | Total w/ Markups Allocated |
|---|-------------------------------|
| CIVIL IMPROVEMENTS | 623,148 |
| 1150 - CIVIL-DEMO-YARD PIPE- MITIGATION | |
| 01 - General Requirements | 21,400 |
| 02 - Site Construction | 356,684 |
| 03 - Concrete | 27,151 |
| 08 - Doors & Windows | 10,685 |
| 15 - Mechanical | 207,229 |
| 1150 - CIVIL-DEMO-YARD PIPE- MITIGATION Total | 623,148 |
| PUMP STATION | 1,185,991 |
| 1300 - STRUCTURAL - ARCHITECTURAL | |
| 01 - General Requirements | 15,407 |
| 02 - Site Construction | 10,543 |
| 03 - Concrete | 79,054 |
| 04 - Masonry | 77,059 |
| 05 - Metals | 22,246 |
| 06 - Wood & Plastics | 2,890 |
| 07 - Thermal & Moisture Protection | 36,679 |
| 08 - Doors & Windows | 21,512 |
| 09 - Finishes | 12,536 |
| 10 - Specialties | 2,765 |
| 13 - Special Construction | 2,557 |
| 15 - Mechanical | 16,976 |
| 1300 - STRUCTURAL - ARCHITECTURAL Total | 300,223 |
| 1500 - PROCESS EQUIPMENT - MECHANICAL | |
| 01 - General Requirements | 13,251 |
| 02 - Site Construction | 22,991 |
| 05 - Metals | 1,135 |
| 09 - Finishes | 2,240 |
| 10 - Specialties | 19,957 |
| 11 - Equipment | 271,751 |
| 15 - Mechanical | 394,076 |
| 16 - Electrical | 160,368 |
| 1500 - PROCESS EQUIPMENT - MECHANICAL Total | 885,768 |
| 24" WATER MAIN | 307,345 |
| 0200 - PUMP MAIN | |
| 01 - General Requirements | 24,684 |
| 02 - Site Construction | 88,231 |

SAMPLE DETAIL ESTIMATE SHEET

90% Design

| Item | Item Description | Qty | Unit | Labor \$/ Unit | Materials \$/Unit | Subs \$/Unit | Equip \$/Unit | Other \$/Unit | Total \$/Unit | Total Net Cost \$ |
|---|--|------|------|-------------------|----------------------|-----------------|------------------|------------------|------------------|-------------------------|
| CIVIL IMPROVEMENTS | | | | | | | | | | |
| 1150 - CIVIL-DEMO-YARD PIPE- MITIGATION | | | | | | | | | | 433,604 |
| 01500 - Temporary Facilities & Controls | | | | | | | | | | |
| 01510500 - Traffic Control | | | | | | | | | | |
| 0001 | Plan - Traffic Control/SWPPP | 1.0 | each | | | | | 5,000.00 | 5,000.00 | 5,000 |
| Temporary Facilities & Controls Total | | | | | | | | | | 5,000 |
| 01590 - Construction Aids | | | | | | | | | | |
| 01590400 - General equipment rental without operators | | | | | | | | | | |
| 5655B | Grout Pump - Rent per day | 2.0 | days | 385.20 | | | 100.00 | | 485.20 | 970 |
| 7070C | Rent trench box 12,000 pounds 10' x 20' - Rent per week | 3.0 | week | | | | 680.00 | | 680.00 | 2,040 |
| 7070C | Rent trench box 12,000 pounds 10' x 20' - Rent per week | 5.0 | week | 770.40 | | | 680.00 | | 1,450.40 | 7,252 |
| Construction Aids Total | | | | | | | | | | 10,262 |
| 02050 - Basic Site Materials & Methods | | | | | | | | | | |
| 02080400 - Utility Boxes Precast Concrete | | | | | | | | | | |
| 0520 | Utility structures, utility vaults precast concrete, meter pit, 6' x 6', 6' deep, excludes excavation and backfill | 1.0 | EA | 1,013.80 | 3,300.00 | | 274.73 | | 4,588.54 | 4,589 |
| Basic Site Materials & Methods Total | | | | | | | | | | 4,589 |
| 02200 - Site Preparation | | | | | | | | | | |
| 02220330 - Selective Demolition, Dump Charges | | | | | | | | | | |
| 9998 | Dump Charge, typical small town, fees only, bldg constr mat'ls | 1.0 | ton | | | | | 33.00 | 33.00 | 33 |
| 9998 | Dump Charge, typical small town, fees only, bldg constr mat'ls | 2.0 | ton | | | | | 33.00 | 33.00 | 66 |
| 02220381 - Selective Demolition, Water & Sewer Piping And Fittings | | | | | | | | | | |
| 0090 | Selective demolition, water & sewer piping & fittings, concrete pipe, 4"-10", diameter, excludes excavation | 50.0 | LF | 4.85 | | | 1.32 | | 6.17 | 308 |
| 02220422 - Selective Demolition, Misc Metal Fences & Gates | | | | | | | | | | |

SAMPLE ESTIMATE MARK-UP SHEET

90% Design

| Category | Percent | Amount | Hours |
|------------------------------------|---------|------------------|---------|
| PUMP STATION Totals | | | |
| Labor | 12.09 % | 223,337 | 3,665.4 |
| Material | 30.33 % | 560,317 | |
| Subcontractor | 1.20 % | 22,210 | |
| Equipment | 0.47 % | 8,663 | 1,154.3 |
| Other | 0.44 % | 8,208 | |
| User | | | |
| Net Costs | | 822,734 | |
| Labor Mark-up | 8.00 % | 17,867 | |
| Material/Process Equipment Mark-up | 5.00 % | 28,016 | |
| Subcontractor Mark-up | 5.00 % | 1,111 | |
| Construction Equipment Mark-up | 8.00 % | 693 | |
| Material Shipping & Handling | 2.00 % | 7,060 | |
| Escalation to Midpoint | 2.50 % | 20,363 | |
| Contractor General Conditions | 10.00 % | 89,784 | |
| Subtotal | | 987,629 | |
| Start-up, training, O & M | 2.00 % | 8,504 | |
| Subtotal | | 996,133 | |
| Construction Contingency | 15.00 % | 149,420 | |
| Subtotal | | 1,145,553 | |
| Bldg Risk, Liability Auto Ins. | 2.00 % | 22,911 | |
| Subtotal | | 1,168,464 | |
| Bonds | 1.50 % | 17,527 | |
| Subtotal | | 1,185,991 | |
| Total PUMP STATION | | 1,185,991 | |

ATTACHMENT D
QUESTIONS AND COMMENTS LOG

Date: _____

SRCSD AWTP COMMENTS LOG

Project: _____

Design Submittal: _____

Estimator: _____

| ITEM | DATE | LOCATION/REFERENCE | QUESTION/COMMENT | ESTIMATOR | RESPONDING PERSON | RESPONSE |
|------|------|--------------------|------------------|-----------|-------------------|----------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |