US Army Corps
of Engineers®
Directory of Expertise for Civil
Works Cost Engineering

Agency Technical Review Guidance for Cost Engineering Products

May 2011

QUICK REFERENCE GUIDE

- *Cost DX ATR certification is required for all funding level documents going to MSC and above.*
- *For CAP and non-CAP projects, Cost DX ATR certification is provided by the Walla Walla Cost DX.*
- *Home district provides latest necessary products: main report and appendices, QC record, quantities, estimate(s), schedule, contingencies, and TPCS (provide estimates, contingencies, and TPCS in native electronic format, e.g., MCACES).*
- *Risk-based contingencies are required for all TPCs.*
- *Formal CSRAs are required for all projects >$40M.*
- *Cost DX does not have waiver authority of HQ criteria; therefore, the reviews and comments are intended to reflect the regulation requirements of the cost products with the objective of formulating a confident TPC.*
- *Home district provides adequate labor funds. CAP review costs are approximately $2,000-$3,000 in labor funds; $4,000-$6,000 is typical for AFB estimates. For feasibility-level products, the labor costs vary from $5,000-$15,000 per estimate reviewed. Travel costs are funded separately.*
- *Cost DX web site: http://www.nww.usace.army.mil/html/OFFICES/Ed/C/default.asp*
- *Contact: James Neubauer, Walla Walla Cost DX (509) 527-7332*

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1. PURPOSE

The agency technical review (ATR) process for cost engineering products is a mandatory effort to improve and ensure the quality and credibility of U.S. Army Corps of Engineers (USACE) decision and implementation documents by employing an independent review from subject matter experts (i.e., ATR reviewers) outside the home district.

This document identifies the standard ATR process for cost engineering products. The USACE Cost Engineering Directory of Expertise (Cost DX) for Civil Works coordinates and performs ATRs, provides cost engineering guidance, and serves as consultants. The Cost DX's role in the ATR process is to determine if the Total Project Cost (TPC) value, based on the cost engineering products as provided by the home district in the report document, meets the regulations, policies, and guidance set forth by USACE. A successful outcome of a Cost DX review is certification of the TPC value.

Note that the processes used to obtain cost ATR reviewers for Continuing Authorities Program (CAP) versus non-CAP programs is different and is discussed further in section 6. Also refer to appendix A regarding CAP ATRs.

2. REFERENCES

Certain critical references are used to support the Cost DX ATR process. The listed references relate to report content, scope definition, estimates, schedules, risk analyses, contingencies, escalation, total project costs (TPCs), and respective decision document reports and associated report appendixes.

- Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook.
- ER 1110-2-1150, Engineering and Design for Civil Works Projects.
- ER 1110-2-1302, Civil Works Cost Engineering.
- Engineering Manual (EM) 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS).
- Engineer Circular (EC) 1165-2-209, Civil Works Review Policy dated 31 January 2010 and related Frequently Asked Questions (FAQs).
- Engineer Technical Letter (ETL) 1110-2-573, Construction Cost Estimating Guide for Civil Works.
- Directory of Expertise for Civil Works Cost Engineering, Cost and Schedule Risk Analysis Guidance, 17 May 2009.
- Memorandum CECW-P dated 19 January 2011, SUBJECT: Continuing Authorities Program Planning Process Improvements.

3. APPLICABILITY

An ATR is mandatory for all decision and implementation documents. It should be noted that the cost estimate itself is neither a decision document nor implementation document. For other work products, a case specific risk-informed decision shall be

made as to whether ATR is appropriate. This guidance is applicable to all USACE elements, major subordinate commands (MSC), districts, laboratories, and field operating activities having civil works planning, engineering, design, construction; and operations & maintenance (O&M) responsibilities.

4. POLICY

EC 1165-2-209 presents applicability, policy, types of reviews, and conduct of reviews, among other requirements. The types of reviews discussed include the District Quality Control (DQC), ATR, Independent External Peer Review (IEPR), and Policy and Legal Compliance Reviews.

EC 1165-2-209 states, "During the planning process, ATR will occur and be discussed in: the Feasibility Scoping Meeting (FSM), Intermediate Milestone and the Alternative Formulation Briefing (AFB) submittal materials, the draft decision and NEPA documents, and the final decision and NEPA documents. In addition, interim ATR reviews should occur for key technical products, such as hydrology, surveys, investigations, economic and environmental inventories, prior to performing subsequent analyses that depend on these products."

EC 1165-2-209, section 9, presents the required management and processes in conducting an ATR as:

"For ATR on decision documents, the RMO generally will be the appropriate Planning Center of Expertise (PCX), e.g. for flood risk management (FRM) decision documents, the FRM PCX would manage the effort. For dam or levee safety modification studies, the USACE Risk Management Center (RMC) will be the RMO, in close coordination with the FRM PCX or the Coastal Storm Damage Reduction PCX, as appropriate.

"ATR will be conducted by a qualified team from outside of the home district that is not involved in the day-to-day production of a project/product.

"For decision documents with multiple purposes (or project purposes not clearly aligned with the PCXs), the home MSC should designate a lead PCX to conduct the review after coordinating with each of the relevant Centers.

"There shall be appropriate consultation throughout the review with the allied Communities of Practice (CoPs) such as engineering and real estate, other relevant CXs, and other relevant offices to ensure that a review team with appropriate expertise is assembled and a cohesive and comprehensive review is accomplished.

"There shall be coordination with the Cost Engineering Directory of Expertise (Cost DX) located in the Walla Walla District, which will provide the cost engineering review and resulting certification."

Once the Cost DX has been contacted, the ATR will be resourced with one or more qualified senior cost engineers experienced in the construction estimating field of study.

The home district will provide the needed funding and required documents. Funding guidance for a Cost DX review is discussed further in section 6.

Note: EC 1165-2-209, section 5, establishes that "All civil works planning, engineering, and O&M products must undergo review . . . all products shall undergo District Quality Control/Quality Assurance (DQC) . . . ." For cost engineering products the DQC shall occur prior to the ATR process. Documentation verifying DQC of the cost engineering product submitted for ATR shall be provided by the responsible district.

5. BACKGROUND

EC 1165-2-209 was developed to address OMB peer review requirements under the Information Quality Act and the Final Information Quality Bulletin for Peer Review by the Office of Management and Budget (referred to as the OMB Peer Review Bulletin). It also provides guidance for the implementation of both Sections 2034 and 2035 of the Water Resources Development Act (WRDA) of 2007 (Public Law (P.L.) 110-114). Periodically, clarification notices are published through forms such as engineering and construction bulletins, FAQs, etc. Therefore, consulting current requirements is highly recommended.

6. GUIDANCE

6.1 Cost DX Support

HQ established the Cost DX through initiatives by the Assistant Secretary of the Army for Civil Works. The ATR process follows the regulations, guidance, policies, and intent expressed by HQ, i.e., to improve accuracy of TPCs for decision documents. The TPC development is a result of the various critical cost products that serve as a basis for TPC calculations.

The Cost DX does not have waiver authority of HQ criteria; therefore, the reviews and comments are intended to reflect the regulation requirements of the cost products with the objective of formulating a confident TPC. When in doubt regarding an ATR application and process, HQ's intent is to ensure that confident and defensible cost estimate products are provided in support of decision documents related to authorization or appropriations or to make informed decisions at the MSC level, HQ, or higher authority.

The Cost DX is committed to supporting the districts in developing quality cost products, prepared by USACE or its contracted estimating services. The two flowcharts below (figures 1 and 2) depict the Cost ATR processes for non-CAP and CAP projects. Note the differences between non-CAP and CAP are in review costs and cost reviewer assignments.

Figure 1. ATR Guidance for Cost Engineering Products for Non-CAP Projects

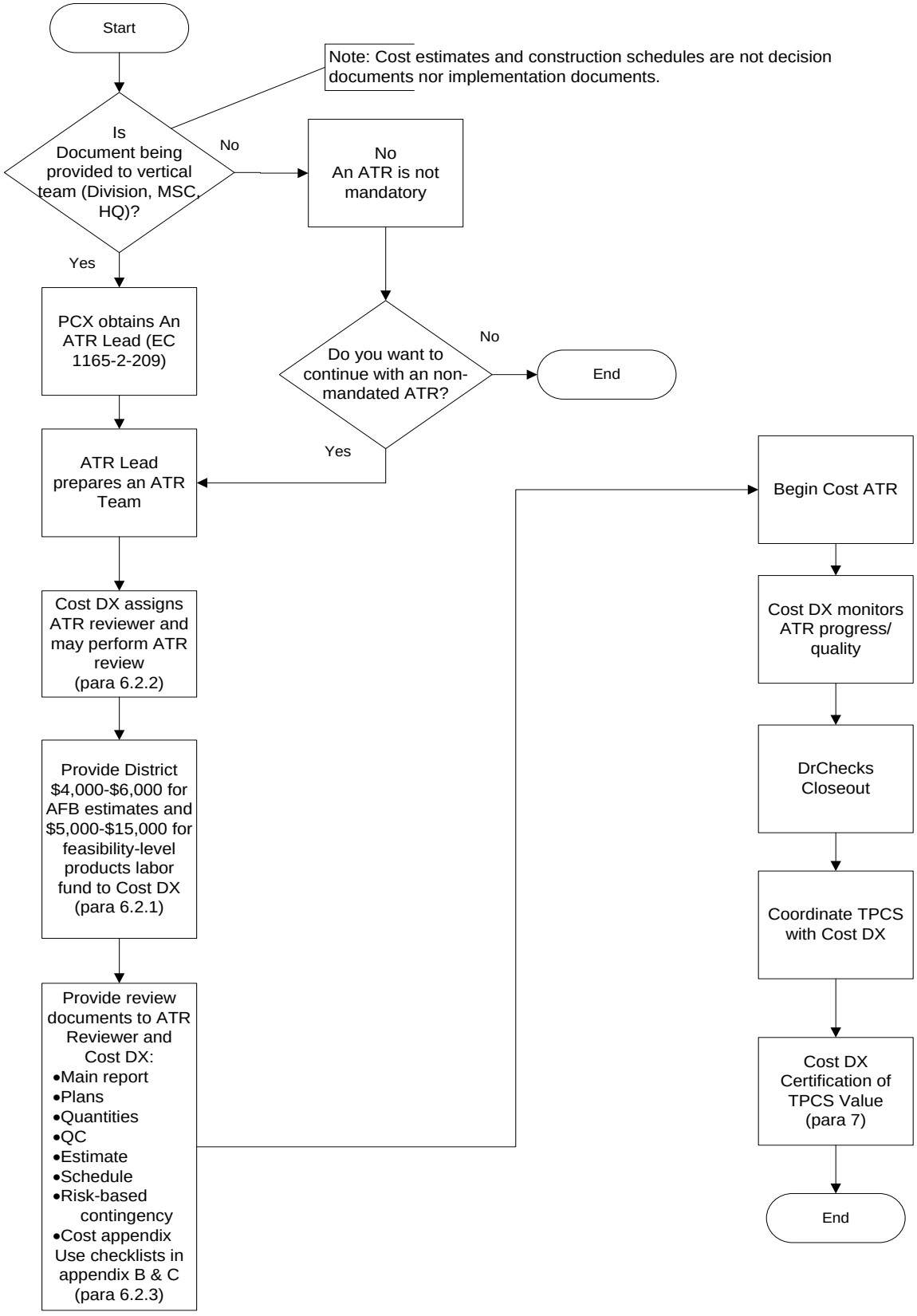
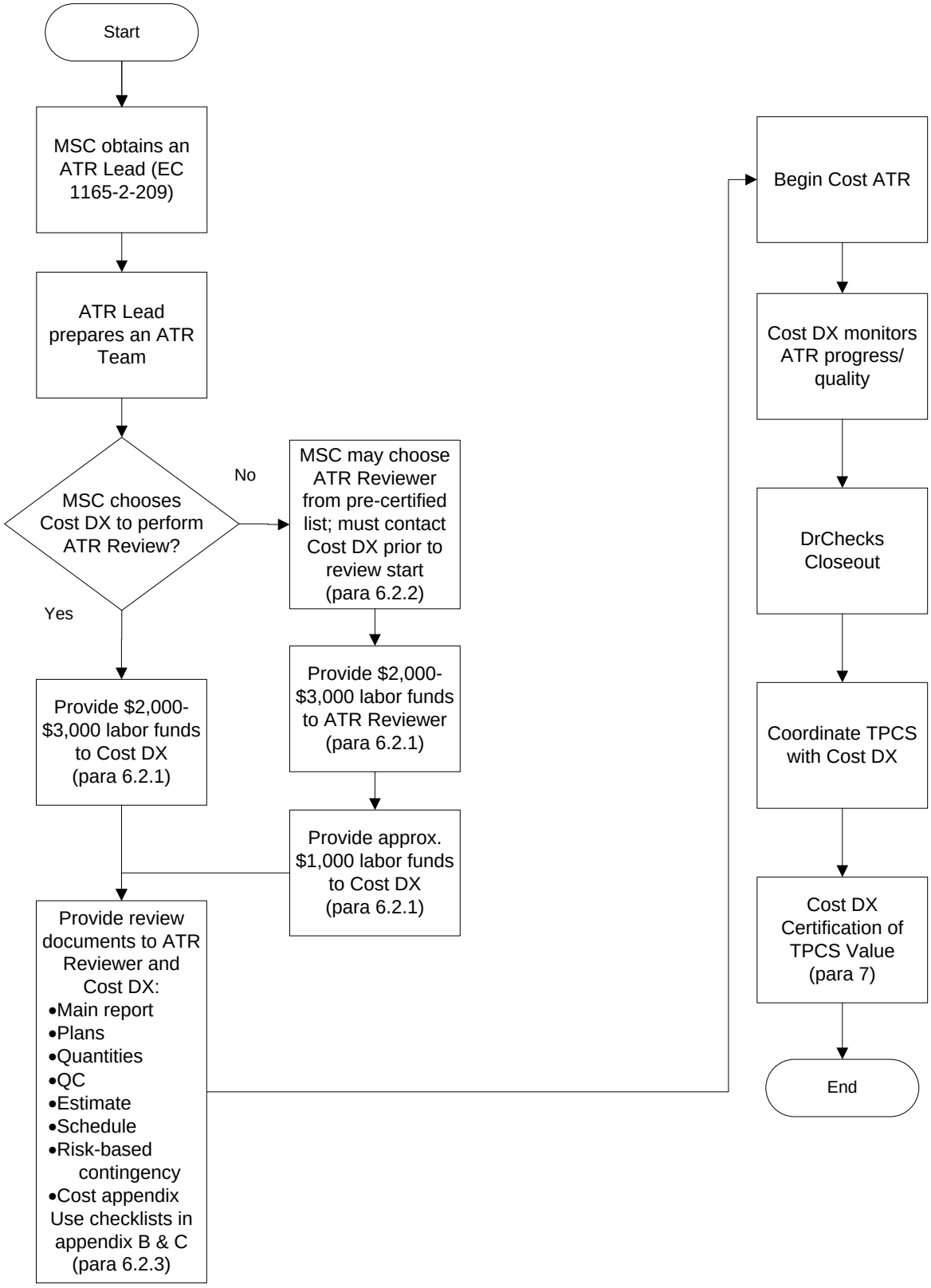


Figure 2. ATR Guidance for Cost Engineering Products for CAP Projects



The Cost DX has established DQC checklists that serve as guides for quality reviews (see appendixes B and C). The two checklists make distinction between AFB level, feasibility, and later decision document estimates. The Cost DX maintains a web site that provides access to cost-related processes, products, and many of the referenced regulatory documents.

http://www.nww.usace.army.mil/html/OFFICES/Ed/C/default.asp

The web site also provides several support sections related to:

- Construction Equipment Ownership and Operating Expense Schedule (Engineer Pamphlet 1110-1-8).
- Civil Works Construction Cost Index System (CWCCIS) (EM 1110-2-1304).
- Cost Engineering Dredge Estimating Programs (CEDEP).
- ATR Guidance.
- Cost Schedule Risk Analysis Guidance.
- National IDIQs for cost services **http://www.nww.usace.army.mil** "National Civil Works Cost Engineering Center."

6.2 Preparation and Coordination

6.2.1 Funding of Cost DX Review

The following provides some budgetary guidance on anticipated ATR costs for both AFB and feasibility-level documents. CAP review costs are approximately $2,000-$3,000 labor funds. Approximately $4,000-$6,000 is typical for AFB estimates. For feasibility-level products, the labor costs vary considerably, typically from $5,000 to $15,000 per estimate reviewed. Travel costs are funded separately.

The Cost DX attempts to streamline the process and minimize cost impacts. The estimated cost ranges are based upon a number of issues:

- Home district providing adequate labor funds, DrChecks access, and the latest necessary products in a timely manner.
- Home district communication and support in managing the project delivery team (PDT), review responses, and timely revised products for back check.
- Number of product iterations, complexity, and project size.
- Number of estimates under review.

6.2.2 Obtaining an ATR Reviewer

For CAP projects, the MSC may request the Cost DX to perform the review or choose an ATR reviewer from a pre-certified list of qualified reviewers that have been trained, tested, and approved by the Cost DX. The Cost DX maintains that list and should be

consulted prior to review start since final certification comes from the Cost DX. Pre-certified ATR reviewers ARE NOT allowed to review projects from their respective district. The list is maintained at:

https://kme.usace.army.mil/EC/cost/CostAtr/default.aspx

For non-CAP projects, the ATR reviewer is assigned by the Cost DX based on availability, technical knowledge and skills, and geographical locale. Coordination is required from the PCX and the respective district planning or project manager.

6.2.3 Documents Required for ATR

In order to establish a confident TPC, the Cost DX relies heavily on the respective USACE regulations and guidance as well as the DQC checklists found in appendixes B and C. The following documents are needed to perform a Cost DX ATR. Generally, distinction is made between the alternative estimate stage (parametric estimates that are presented in the AFB document) and the feasibility-level documents that include detailed cost estimates using the HQ required Microcomputer-Aided Cost Estimating System (MCACES):

AFB Level – Parametric based products:

- Record of a DQC process.
- Scoping documents (reports, plans, and investigations) that support quantities.
- Quantity development.
- Alternative estimates – parametric-based development.
- Dredging CEDEP estimates in electronic software (if applicable).
- Basis of contingencies.
- Project costs (base cost, contingency, and escalation if significantly differing schedules).
- Draft report document, engineering, and cost.
- Points of contact: project manager, cost estimator, and chief of cost engineering.

Feasibility Level – detail based products (includes CAP selected plan):

- Record of a DQC process.
- Scoping documents (reports, plans, and investigations) that support quantities.
- Quantity development.
- Microcomputer Aided Cost Estimating System (MCACES) estimate(s) in the MCACES electronic software for the recommended plan and, if applicable, the locally preferred plan.
- Dredging CEDEP estimates in electronic software (if applicable).
- Total project schedule and construction schedule to support escalation calculations.
- Risk-based processes used to establish basis of contingencies, a formal risk analyses and risk report for projects greater than the established cost threshold.

- Total project cost summary presenting base cost, contingency, and escalation.
- Spent costs for CAP.
- Draft report document and engineering, cost, and risk appendixes.
- Points of contact: project manager, cost estimator, and chief of cost engineering.

Post-Authorization/Appropriation – Detail based products:

- Record of a DQC process.
- Scoping documents (reports, plans, and investigations) that support quantities.
- Expended Funds, obligations, and remaining costs.
- Quantity development.
- MCACES estimate(s) in the MCACES electronic software.
- Dredging CEDEP estimates in electronic software (if applicable).
- Total project schedule and construction schedule to support escalation calculations.
- Risk-based processes used to establish basis of contingencies, a formal risk analyses, and risk report for projects greater than the established cost threshold.
- Total project cost summary presenting base cost, contingency, escalation, and spent costs.
- Draft report document and engineering, cost, and risk appendixes.
- Points of contact: project manager, cost estimator, and chief of cost engineering.

6.2.4 Record of DQC Process

A DQC is referenced in numerous regulations and engineering circulars such as ER 1105-2-100, ER 1110-2-1302, ETL 1110-2-573, and EC 1165-2-209. HQ has placed greater emphasis on the DQC in an effort to improve quality, since the documents are made open to the public, internal and external reviews, HQ, and Congress. An ATR is not meant to serve as the DQC. The DQC must be performed prior to starting the ATR process. If an adequate DQC is not performed and the products are of a lesser quality than required by regulation, the ATR becomes an external quality control. The lesser quality products are then returned to the proponent for rework and corrections. This can result in lost time, added costs, and PDT frustration. Quality is the responsibility of all PDT members.

Appendixes B and C provide the current DQC checklists used by the Cost DX. The Cost DX recommends this guidance document be consulted when preparing the cost products for DQC and ATRs.

6.2.5 Scoping Documents

Scoping documents generally include project reports and narratives, plans, and investigations. Project scope is one of the primary set of documents that establishes a confident estimate and budget. Scope is also one of the greater risk areas that can result in inadequate budgets and appropriations if not adequately captured. It is the responsibility of project management and the technical design functions to capture

scope and quality. The cost engineering ATR focuses on the scoping documents; using ER 1110-2-1150 for guidance related to quality and completeness at the various study and design phases. The scoping documents are the source information that is used to help establish quantities and risks that support the estimate(s), schedule(s), and contingencies. Unclear scope lacking adequate planning, investigations, and preliminary design result in less quality and confidence in the quantity development. Lesser quality also influences risks, thereby, increasing project contingencies. If scope is uncertain and not captured within the estimates, there is a good likelihood that uncaptured scope is not included and a much greater likelihood that the budget development is short of the needed funds.

Generally speaking, higher contingencies indicate a possibility of unclear or uncertain scope, poor estimates, and/or poor risk/contingency development. They serve as an indicator related to quality and cost confidence.

6.2.6 Estimate(s)

ER 1110-2-1150, ER 1110-2-1302, and ETL 1110-2-573 govern the civil works estimating requirements and provide detailed guidance for the estimate development. Of particular interest ER 1110-2-1302 states, “Special consideration is required for projects with cost estimates more than two years old without an update in pricing. In these situations, it is the responsibility of the cost engineer to perform an appropriate analysis to ensure that the project estimate is based on the current design and schedule. The construction cost estimates for major or unique projects will be repriced using current labor and material rates.”

ETL 1110-2-573 states, “Project cost estimates shall be prepared as though the Government were a prudent and well-equipped contractor estimating the project. Therefore, all costs, which a prudent, experienced contractor would expect to incur, should be included in the cost estimate. This philosophy prevails throughout the entire project cycle--from planning through completion of the project. Without an accurate estimate or schedule, successful project management can be compromised. Each estimate shall be developed as accurately as funding and time constraints allow, in as much detail as can be assumed, and based upon the best information available. The objective through all phases of project planning, design, and construction is to develop cost estimates to serve as a project management tool as well as establish a “fair and reasonable” cost to the Government.”

Given the ERs mentioned above, the Cost DX gives important consideration to the following during the cost development and ATR regarding:

- Full scope inclusion.
- Sufficient folder notes and narrative.
- Confident and defensible quantity and cost development also referred to as basis of costs.
- Traceability from scope to quantity to cost estimate.
- Estimate quality beginning at the AFB (appendix B) and feasibility stage

(appendix C) of project development for the alternatives and the recommended or preferred alternative.
- Civil Works Work Breakdown Structure.
- Appendix and estimate narrative summary and folder level notes serving as a basis of the estimate related to assumptions, high-risk elements, quotes, historical data, crews and productivity, and contract acquisition strategy.
- Detailed estimate development (direct and indirect costs).
- Measured use of generic Cost Book items, allowances, and lump sum costs.
- "Most Likely" estimate that serves as the basis for a risk analysis.
- Risk based contingency development.
- Accurate Total Project Cost Summary (TPCS).

6.2.7 Schedule(s)

ER 1110-2-1150, ER 1110-2-1302, and ETL 1110-2-573 govern the civil works scheduling requirements. Since schedules are used to calculate the total project escalation through the life of the project, the products for consideration are the total project schedule and the construction schedule.

The total project schedule includes the project life costs that support the appropriation request, including the study and design phase, contract acquisition phase, the construction phase, and possibly the operations and maintenance phase. The construction schedule is the responsibility of the cost engineering office and should reflect the cost estimate related to major construction activities and productivities. The two schedules should adequately depict the critical milestones and durations in a logical manner related to staff functions, investigations and processes, productivities, major concurrent activities, and construction sequencing. Leniency is considered for small projects of short duration of less than one year. In those cases, a P2 project schedule may be sufficient.

6.2.8 Risk Based Contingencies

ER 1110-2-1150, ER 1110-2-1302, and ETL 1110-2-573 govern the civil works contingency development using risk-based principles. Established contingency values must be risk based. ER 1110-2-1302 requires involvement of the PDT with the cost engineer. The Cost DX has developed two accepted methods for determining contingency base:

- Abbreviated risk analysis (project costs < $40M).
- Crystal Ball computer software (project costs > $40M).

The Cost DX developed and maintains a risk analysis process and samples for both possibilities. A more formal Cost DX guidance document presents an acceptable CSRA process for project costs >$40M. The CSRA serves as the basis for establishing contingencies for all work breakdown structure features presented within the TPCS. The CSRA process includes the efforts of the PDT and considers risks and opportunities, both internal and external, which can potentially affect the project

execution success related to budget and schedule. The risk-based process includes four critical items:

- PDT active involvement and respective risk potentials.
- All project features of the civil works work breakdown structure.
- Internal and external risk factors.
- Report presentation and reflection in the TPCS.

6.2.9 Total Project Cost Summary

ER 1110-2-1150, ER 1110-2-1302, and ETL 1110-2-573 govern the development and presentation of the TPC. A TPCS sample is maintained by the Cost DX and made available. The TPCS accompanying the feasibility report is used for project authorization and appropriations and is the basis for allowable cost increases without reauthorization (ER 1110-2-1150). The TPC at the time the project is authorized by Congress becomes the baseline cost estimate (BCE). The BCE represents the scope and schedule established in the feasibility report. The cost estimate based on constant dollars is used for authorization purposes (ER 1105-2-100). The TPCS is a critical final cost document screened by the Cost DX in providing its approval certification. A sample of a TPCS is provided in appendix D.

6.2.10 Report Document and Appendixes

During the Cost ATR process, certain portions of the report are consulted; generally the main report, economics, real estate, engineering, cost, risk, and schedule. ER 1110-2-1150, appendix C, requires an engineering appendix. Cost is part of that appendix and many times displayed under a separate appendix. It includes estimate narrative and assumptions, MCACES report (excludes detailed quantities and unit prices), construction schedule, risk-based contingency development, and the TPCS. Larger CSRAs are commonly provided under separate cover to support the PDT as part of the risk management plan. The report documents are reviewed by the Cost DX to:

- Understand project scope and schedule that supports the review of the cost products.
- Determine whether the cost appendix is appropriately completed and includes any required CSRA report.
- Ensure the main report and executive summary correctly present the costs developed by the cost engineer and within the TPCS related to base costs, contingencies, and escalation.

7. COST DX CERTIFICATION

A separate Cost DX certification is provided for funding level documents. At AFB level, where no funding requests are yet made, the Cost DX signature within the PCX record of review document is sufficient.

For the funding level documents, a separately signed certification is provided by the Cost DX signifying that the Cost DX accepts the final estimated value from the TPC that reflects the project scope. Should there be outstanding or unresolved critical comments that impact cost confidence, a certification may not be issued.

The Cost ATR comments are processed through DrChecks as required by certain engineering circulars such as EC 1165-2-209. Before comment closure, the Cost DX requires the revised products to complete the back-check process and confirm the products were corrected for comments that affect a confident TPC. Occasionally, the revised documents can result in additional critical comments that also require closure. Upon successful conclusion of the resolved comments, the final TPC serves as the basis and document that is recorded within the certification. The certification will state the program budget year amount and the fully funded amount within the certification to ensure integrity and correctness from the TPC to the final report. The certification is signed and dated by the Chief of the Cost DX.

APPENDIX A

CONTINUING AUTHORITIES PROGRAM PLANNING PROCESS IMPROVEMENTS

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

JAN 19 2011

CECW-P

DIRECTOR OF CIVIL WORKS' POLICY MEMORANDUM # 1

SUBJECT: Continuing Authority Program Planning Process Improvements

1. The U.S. Army Corps of Engineers (USACE) seeks to be more flexible and agile in the execution of the Continuing Authority Program (CAP). The goal is to fund and execute the projects that can move forward and remove funds from projects that cannot be executed. Districts and Major Subordinate Commands (MSC) must make these decisions more quickly so we do not have, literally, hundreds of millions of dollars assigned to projects that are not proceeding. This memorandum modifies existing guidance with the goal of implementing improvements to the CAP planning process to facilitate program execution and simplifying policy requirements for this program. Accountability for compliance with existing policy and these modifications remains with the MSC. Inspections will be conducted to ensure that the program is being executed in accord with guidance.

2. The individual authorities known collectively as the CAP are:

a. Section 14, Flood Control Act of 1946 (PL 79-526), as amended, for emergency streambank and shoreline erosion protection for public facilities and services;

b. Section 103, River and Harbor Act of 1962 (PL 87-874), as amended, amends PL 727, an Act approved August 13, 1946 which authorized Federal participation in the cost of protecting the shores of publicly owned property from hurricane and storm damage;

c. Section 107, River and Harbor Act of 1960 (PL 86-645), as amended, for navigation;

d. Section 111, River and Harbor Act of 1968 (PL 90-483), as amended, for mitigation of shoreline erosion damage caused by Federal navigation projects;

e. Section 204, Water Resources Development Act of 1992 (PL 102-580), as amended, for beneficial uses of dredged material;

f. Section 205, Flood Control Act of 1948 (PL 80-858), as amended, for flood control;

g. Section 206, Water Resources Development Act of 1996 (PL 104-303), as amended, for aquatic ecosystem restoration;

h. Section 208, Flood Control Act of 1954 (PL 83-780), as amended, originally Section 2, Flood Control Act of August 28, 1937 (PL 75-406) for snagging and clearing for flood control; i. Section 1135, Water Resources Development Act of 1986 (PL 99- 662), as amended, project modifications for improvement of the environment.

3. For CAP projects, EC 1165-2-209 - CIVIL WORKS REVIEW POLICY is hereby modified as follows:

a. All CAP projects are excluded from Type I Independent External Peer Review (IEPR) except Section 205 and Section 103 or those projects that include an EIS or meet the mandatory triggers for Type I IEPR as stated in EC 1165-2-209.

b. Exclusions from Type I IEPR for Section 205 and Section 103 projects will be approved on a case by case basis by the MSC Commander, based upon a risk informed decision process as outlined in the EC 1165-2-209 and may not be delegated.

c. Type II IEPR is still required for those CAP projects where life safety risk is significant as documented in the approved Review Plan.

d. The home MSC should establish an appropriate review procedure in keeping with the principles established in EC 1165-2-209. As per EC 1165-2-209, Review Plans are required for all projects. MSC's are strongly urged to adopt a programmatic approach to review of CAP projects, such as use of programmatic or model review plans. Appendix B of EC 1165-2-209 is modified such that CAP programmatic or model review plans shall be approved by the MSC Commander.

e. The Review Management Organization (RMO) for ATR for CAP projects may be the home MSC in lieu of a National Planning Center of Expertise (PCX). The PCXs will continue to serve in their roles of providing advice and may serve as the RMO under appropriate agreements with an MSC. Per EC 1165-2-209, paragraph 9c, the ATR lead is to be outside the home MSC unless the CAP review plan justifies an exception and is explicitly approved by the MSC Commander.

f. For CAP projects, ATR of the cost estimate will be conducted by pre-certified district cost personnel within the region or by the Walla Walla Cost DX. The pre-certified list of cost personnel has been established and is maintained by the Cost DX. The cost ATR member will coordinate with the Cost DX for execution of cost ATR and cost certification. The Cost DX will be responsible for final cost certification and may be delegated at the discretion of the Cost DX.

g. Per EC 1165-2-209, paragraph 9-2, review by the Risk Management Center is only required for dam and levee safety projects which are unlikely in the CAP. However, the MSC commander will insure that all decision documents involving flood and coastal related risk reduction measures are fully and appropriately reviewed and all issues resolved and that a consistent and appropriate level of communicating risk and uncertainty is reflected in the study documents.

4. Approval of planning models under EC 1105-2-412 is not required for CAP projects. MSC commanders remain responsible for assuring the quality of the analyses used in these projects. ATR will be used to ensure that models and analyses are compliant with Corps policy, theoretically sound, computationally accurate, transparent, described to address any limitations of the model or its use, and documented in study reports.

5. The limit during the Design and Implementation Phase to comply with the requirement to execute a PPA is changed from $50,000 to $100,000.

6. Additional process improvements are being considered and will be implemented under separate Memorandum.

FOR THE COMMANDER:

STEVEN L. STOCKTON, P.E.
Director of Civil Works

APPENDIX B

DISTRICT QUALITY CONTROL CHECKLIST FOR ALTERNATIVE FORMULATION BRIEFING

Documents

Project Title & Location:					**Test Title**	
Project Review Phase:					**Reconnaissance Level Alternatives & AFB Parametric Estimates**	
Project Report Date:					**13-Aug-09**	
Reviewer Name & Phone:					**John Doe 1-800-555-1234**	
Review Date:					**28-Aug-09**	
					KEY DOCUMENTS SUPPORTING ATR AND COMMENTS	**COMMENTS**
					ER 1105-2-100, Planning Guidance Notebook.	
					ER 1110-2-1150, Engineering and Design for Civil Works Projects.	
					ER 1110-1-1300, Cost Engineering Policy and General Requirements.	
					ER 1110-2-1302, Civil Works Cost Engineering.	
					EM 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS).	
					ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works.	
					EC 1105-2-410, Review of Decision Documents.	
					Cost Dx Website: http://www.nww.usace.army.mil/html/OFFICES/Ed/C/csra.asp	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	
				DOC	**DOCUMENTS PROVIDED FOR ATR**	
				DOC 1	Report: As a minimum, the Main Report, the Engineering Appendix, Cost Appendix.	
				DOC 2	Scoping documents such as drawings, presentations, photos for each alternative under serious study.	
				DOC 3	Record of DQC - District Quality Control form.	
				DOC 4	Quantity Take-offs.	

N/P not provided
N/A not applicable

Project Title & Location:					Test Title	
Project Review Phase:					**Reconnaissance Level & AFB Parametric Estimates**	
Project Report Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	**COMMENTS**
				NOTE	**PROJECT NOTES - (General Construction Details and Narrative)**	
				NOTE	**Basis of Cost Estimate Notes**	
				NOTE 1	Project notes provide a clear presentation of the alternative and scope.	
				NOTE 2	Estimate products clearly depict author and estimate date.	
				NOTE 3	Each alternative is dated to the same point in time and date.	
				NOTE 4	Notes and element titles are adequate to convey project scope and estimate assumptions.	
				NOTE 5	Costs include any potential Hazardous, Toxic, and Radioactive Waste (HTRW) concerns.	
				NOTE 6	Cost Basis notes provided for significant project costs (>1% of construction value)	
				EST	**GENERAL ESTIMATE LAYOUT**	
				EST 1	Alternative estimates developed in accordance with guidelines established in ETL 1110-2-573.	
				EST 2	The alternative estimates reflect a reasonable consistency in development related to estimate software, methodolgy, assumptions, processes and cost date.	
				EST 3	WBS adequately reflects all project scope and makes distinction of major construction elements.	
				EST 4	Major Folder quantity units and unit prices appear reasonable.	
				EST 5	Unit priced titles clearly indicate the scope of the unit price (labor, equipment, materials, delivery, mobilization, sub and prime contractor, haul, placement, discposal, etc.)	
				EST 6	Major construction features supported by quantity take-offs and appear reasonable.	
				EST 7	Total mobilization and demobilization costs applied and reasonable.	
				EST 8	Overuse of Cost Book unit prices for critical cost items that could undermine the total cost accuracy.	
				EST 9	Overuse of Lump Sum, Each or Allowance items that do not accurately convey scope or pricing.	

					Construction Estimate Details - Class 4 Estimate Data	
				EST 11	Current labor database used that match the location where the work is occurring.	
				EST 12	Current equipment manual and fuel prices utilized.	
				EST 13	Adequate crews and productivities that reflect the work being performed.	
				EST 14	Unit prices appear reasonable based on crew assembly and productivity.	
				EST 15	Clarification of unit price and what it includes: direct & indirect costs, sub and prime contractors, markups.	
				EST 16	Markups appear reasonable.	
				EST 17	Handling methods adequately considered related to demolition or excavation, load and transport, placement or disposal.	
				EST 18	Earthwork quantities make reasonable adjustments between BCY, LCY and ECY.	
					Parametric or Unit Priced Items - Class 5 Estimate Data	
				EST 19	Unit prices appear reasonable based upon the element title.	
				EST 20	Major cost elements include note of cost bases, such as historical, trends, bid data, etc.	
				EST 21	Handling methods adequately considered related to demolition or excavation, load and transport, placement or disposal.	
				EST 22	Earthwork quantities make reasonable adjustments between BCY, LCY and ECY.	
				EST 23	Cost basis provided for special systems and equipment such as pumping stations, navlock gates, etc.	
				EST 24	Dredging – Unit price appears reasonable based on historical costs, locale, type of dredge, fuel prices, productivity.	
				EST 25	Cost basis provided for estimated allowances.	
				MAT	**Materials**	
				MAT 1	Major quantities supported by a quantity take-off document.	
				MAT 2	Estimate correctly includes State Sales Tax or Gross Receipts Tax to materials and supplies purchased for the contract.	
				MAT 3	Line item note description for material purchase indicates if shipping is included for major items.	

Schedule

Project Title & Location:					Test Title	
Project Review Phase:					**Reconnaissance Level & AFB Parametric Estimates**	
Project Report Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	**COMMENTS**
					SCHEDULES	
				SCH	**Construction Schedule**	
				SCH 1	Construction schedule adequate to reflect the estimate of each alternative.	
				SCH 2	Schedule used to establish constant dollar basis as needed.	
				SCH 3	Construction schedule used to calculate the construction escalation based on current OMB rates.	

Contingency

Project Title & Location:					Test Title	
Project Review Phase:					**Reconnaissance Level & AFB Parametric Estimates**	
Project Report Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	**COMMENTS**
					RISK-BASED CONTINGENCY	
				CONT	**Contingency Value**	
				CONT 1	Contingency values reasonable for each alternative.	
				CONT 2	Contingency development basis provided for determining values.	
				CONT 3	Considers other factors other than just technical design and construction.	
				CONT 4	Considers external risk potentials.	

Project Title & Location:					Test Title	
Project Review Phase:					**Reconnaissance Level & AFB Parametric Estimates**	
Project Report Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	**COMMENTS**
				TPCS	**PROJECT COST SUMMARY in Current Dollars (first column set)**	
				TPCS 1	Price level date shown is consistent with the estimate preparation date.	
				TPCS 2	All project-related Civil Works WBS Features depicted.	
				TPCS 3	Base costs reflects the esitmate development in current dollars.	
				TPCS 4	Costs reasonable for PED (30 Feature). Note: percentages are sometimes used to develop these costs.	
				TPCS 5	Costs reasonable for Construction Management (31 Feature Code). Note: percentages are sometimes used to develop these costs.	
				TPCS 6	Contingency application reasonable for each alternative.	

Project Title & Location:					Test Title	
Project Review Phase:					**Reconnaissance Level & AFB Parametric Estimates**	
Project Report Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	**COMMENTS**
					REPORTS - Basic Information for Reviewer – Scope and Form	
				MR	**Draft Main Report, General**	
				MR 1	Complete report document provided for ATR. As a minimum: Main Report, Engineering Appendix, Cost Appendix, cost tables and project schedule.	
				MR 2	Package meets the requirements within ER 1105-2-100, Exhibit G of the Planning Guidance Notebook?	
				MR 3	Presents the various estimate scopes, technical/design data, method of construction, and assumptions used for developing the comparative estimates included and described (ER 1110-2-1302).	
				MR 4	Comparative cost estimates developed at the same price level.	
				MR 5	TPC of each comparative estimate accurately used in the economic analysis comparisons, such as costs and benefits at the same price level (ER 1105-2-100).	

APPENDIX C

DISTRICT QUALITY CONTROL CHECKLIST FOR FEASIBILITY THROUGH INDEPENDENT GOVERNMENT ESTIMATE REVIEWS

Documents

ESTIMATE PRODUCTS **Review for decision document estimates, Feasibility estimates thru IGE**

Project Title & Location:					Test Title	**REVIEW COMMENTS**
Project Review Phase:					document phase related to design, report, estimate	
Product Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
					KEY DOCUMENTS SUPPORTING ATR AND COMMENTS	
					ER 1105-2-100, Planning Guidance Notebook.	
					ER 1110-2-1150, Engineering and Design for Civil Works Projects.	
					ER 1110-1-1300, Cost Engineering Policy and General Requirements.	
					ER 1110-2-1302, Civil Works Cost Engineering.	
					EM 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS).	
					ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works.	
					EC 1105-2-410, Review of Decision Documents.	
					Cost Dx Website: http://www.nww.usace.army.mil/html/OFFICES/Ed/C/default.asp	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	
				DOC	**DOCUMENTS PROVIDED FOR ATR**	
				DOC 1	Report: As a minimum, the Main Report, the Engineering Appendix, Cost Appendix.	
				DOC 2	Scoping documents such as drawings, presentations, photos.	
				DOC 3	Supporting Detailed Estimates in MCACES MII and CEDEP dredge estimates in electronic format.	
				DOC 4	Construction Schedule.	
				DOC 5	Total Project Schedule, all Features (PED, Acquisiton, and Construction).	
				DOC 6	Cost and Schedule Risk Analysis (>$40M) or basis for contingency when <$40M.	
				DOC 7	CSRA Report documenting the process.	
				DOC 8	Total Project Cost Summary (TPCS).	
				DOC 9	Summarizes and describes the basis and development of TPC. For example, the source and basis of engineering and design (E&D) (Feature 30), construction management (Feature 31), other pertinent feature costs, the price level of the constant dollar estimates (preparation date and program year date), and basis of cost indexes for inflating the project costs (inflated dollar basis) through the project schedule.	
				DOC 10	Quantity Take-offs (details and summary).	
				SC	**SCOPING DOCUMENTS**	
				SC 1	Scoping documents are adequately developed to the design phase in accordance with ER 1110-2-1150, presenting the Main Report, plan formulation and recommended plan, related scope and cost appendixes, risk analyses, etc.	

Documents

				SC 2	Adequate scoping documents have been provided to convey a thorugh and confident understanding of the project scope.	
				SC 2	The scoping documents are accurately portrayed within the estimates.	
				SC 3	Reviewer is confident of scope captured within the estimate, schedule and risk review.	

Estimate

Project Title & Location:					Test Title	REVIEW COMMENTS
Project Review Phase:					document phase related to design, report, estimate	
Product Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	N	N/P	N/A		REVIEW CATEGORIES	
					PROJECT NOTES - (General Construction Details and Narrative)	
				NOTE	**Basis of Cost Estimate Notes**	**REVIEW COMMENTS**
				NOTE 1	Project and Top Folder notes notes present a clear understanding and scope definition.	
				NOTE 2	Scope presented in the project notes is consistent with the scope of the documents for the corresponding plan.	
				NOTE 3	Major project construction features clearly identified in the estimate subfolders.	
				NOTE 4	Top Folder notes clarify major assumptions such as acquisition strategy, expected bid competition, prime and subcontractor assignments, major cost quotes, major construction processes, construction phasing and/or sequencing.	
				NOTE 5	Top Folder notes address significant or high-risk cost items in the project scope.	
				NOTE 6	Notes are adequate to convey project scope and estimate assumptions.	
					Construction Estimate Notes on Critical Costs	**REVIEW COMMENTS**
				NOTE 8	General assumptions noted in the project notes and whether they seem reasonable.	
				NOTE 9	Folder notes provide basis of estimate related to assumptions, quotes, and historical data?	
				NOTE 10	Site and project access considered and presented in the notes.	
				NOTE 11	Critical material sources identified and supported by research.	
				NOTE 12	Unusual construction conditions considered and documented (e.g., studies, geotechnical data, borrow sources, water and water diversion, and weather).	
				NOTE 13	Unique construction techniques considered, documented and reasonable.	
				NOTE 14	Environmental concerns addressed impacting construction activities.	
				NOTE 15	Acquisition Plan identified and matches the estimate structure.	
				NOTE 16	Subcontracting plan and subcontract crafts identified.	
				NOTE 17	Effective dates for pricing labor, equipment, and material are current.	
				EST	Summarizes and describes the basis and development of TPC. For example, the source and basis of engineering and design (E&D) (Feature 30), construction management (Feature 31), other pertinent feature costs, the price level of the constant dollar estimat**es (preparation date and program year date), and basis of cost indexes for inflating the project costs (inflated dollar basis) through the project schedule.**	
				EST 1	Estimate developed in proper Work Breakdown Structure (WBS) format in accordance with all guidelines (ETL 1110-2-573).	
				EST 2	Folder title structure and the descriptions adequate to determine what is being estimated.	
				EST 3	WBS adequately reflects all project scope.	
				EST 4	Prime and subcontractor assignments appear reasonable.	
				EST 5	Major Folder quantity units and unit proces appear reasonable.	
				EST 6	Major folders developed to support a coherent construction schedule development.	
				EST 7	Major construction features supported by quantity take-offs and appear reasonable.	

					CONSTRUCTION ESTIMATE DETAILS	
				MISC	Miscellaneous Estimate Details	REVIEW COMMENTS
				MISC 1	Estimate covers the many minor cost items, that together, can add significantly to the project.	
				MISC 2	Costs include any potential Hazardous, Toxic, and Radioactive Waste (HTRW) concerns.	
				MISC 3	Limited use of generic Cost Book unit prices for critical cost items that could undermine the total cost accuracy.	
				MISC 4	Limted use of Lump Sum, Each or Allowance items that do not accurately convey scope or pricing.	
				MISC 5	Limited use of over-ridden unit or detailed costs that results in lost confidence and greater risks.	
				LAB	Labor	REVIEW COMMENTS
				LAB 1	Current labor rates used that match the estimate date and location where the work is occurring.	
				LAB 2	Actual labor rates determined to be reasonable, considering the type of work and other site factors.	
				LAB 3	Overtime application appears justified, reasonable and logical for major work items.	
				LAB 4	If overtime is used, the direct cost markup factors correctly entered and applied.	
				LAB 5	Application of Payroll Tax and Insurance (PT&I) for the selected Contractors: State Unemployment Insurance (SUI) based on the state in which the work is occurring vs. using the AVG default.	
				LAB 6	Under PT&I for Workmen's Compensation Insurance (WCI), was the selected Contractor Class based on the actual work to be performed vs. using the default for Concrete Work?	
				LAB 7	Labor rates take into consideration potential labor shortages and includes any necessary subsistence or per diem for critical labor elements.	
				LAB 8	Labor consideration made in mobilization and demobilization efforts.	
				LAB 9	Correct labor rates used for Building, Heavy, Highway, Residential.	
				LAB 10	Marine Work – Work performed on or over navigable waterways addresses Longshoreman and Harbor Workers Act insurance, if required by the state.	
				LAB 11	Dredging – Labor rate database updated to reflect the latest wage rates available for dredging work at the location.	
				LAB 12	Dredging – Labor rates appear reasonable, based on the location and type of plant performing the work.	
				EQ	Equipment	REVIEW COMMENTS
				EQ 1	Correct regional equipment rates used for the location where the work is occurring.	
				EQ 2	Database updated to reflect the latest fuel prices for the work site.	
				EQ 3	Critical equipment choices, size and rates appear reasonable, considering work type and site conditions.	
				EQ 4	Rates for Average, Difficult, Severe or Standby are correctly applied and justified within the notes.	
				EQ 5	Standby rates used, in order to ensure that Ownership Costs for equipment were covered for the normal 40 hour work week.	
				EQ 6	Standby rates included for equipment mobilization and demobilization.	

				EQ 7	Rental rates used for equipment not normally owned by the selected contractor. Were operating costs for rented equipment included?	
				EQ 8	If warranted, were other factors (such as the Cost of Money) updated to reflect current conditions?	
				EQ 9	Dredging – Based on the actual site conditions, quantities, disposal areas, and schedule: was the selected dredge plant determined to be appropriate for the contract at hand?	
				EQ 10	work.	
				EQ 11	Dredging – Dredge plant costs based on the current CEDEP database.	
				EQ 12	Dredging - Was the dredge plant database, contained in CEDEP, reviewed and were plant costs determined to be reasonable based on the proposed work?	
				EQ 13	Dredging – Include costs for dredge plant during periods of standby or non-working hours and weather impacts.	
				CP	**Crews & Productivity**	**REVIEW COMMENTS**
				CP 1	Critical crew composition and productivity appear reasonable for the major work items.	
				CP 2	Productivity efficiencies or inefficiencies considered and explained.	
				CP 3	Critical project productivity rates appear reasonable. Notes describe logic.	
				CP 4	Heavy equipment crews include the supporting labor and equipment necessary to perform the task at the selected productivity.	
				CP 5	For large earthwork projects, crew assemblies and productivities for excavation, load, haul, placement, compaction and disposal correlate.	
				CP 6	Dredging – crew productivity and any applied efficiency factors adequately justified in the estimate.	
				MAT	**Materials**	**REVIEW COMMENTS**
				MAT 1	Major quantities supported by a quantity take-off document.	
				MAT 2	Major, critical or volatile materials and quantities identified at the detail level.	
				MAT 3	Estimate correctly includes State Sales Tax or Gross Receipts Tax to materials and supplies purchased for the contract.	
				MAT 4	Estimate notes identify the source of major material quotes, with source, name and date of quote (escalation concern).	
				MAT 5	Estimate makes adjustments for loss due to handling, placement, cutting, transportation, contamination, etc. Notes document adjustments.	
				MAT 6	Earthwork quantities indentified based on BCY for excavated material, LCY for hauled material, ECY for placed material.	
				MAT 7	Earthwork quantities make reasonable adjustments between BCY, LCY and ECY.	
				MAT 8	Line item note description for material purchase indicates if shipping is included for major items.	

				MOB	**Mobilization - Preparatory Work, Demobilization – Cleanup**	**REVIEW COMMENTS**
				MOB 1	Mobilization and demobilization costs are detailed or appropriate.	
				MOB 2	Total mobilization and demobilization cost appear reasonable.	
				MOB 3	Multiple mobilizations considered for longer projects impacted by weather or environmental restrictions.	
				MOB 4	Dredge work: Estimate includes preparation of dredge attendant plant for transfer, the cost to move all plant and equipment return of tug or towing vessel, and preparation of the plant to start work.	
				MOB 5	Dredge Work: Project and estimate clearly include a construction support site.	
				MOB 6	Dredge Work: Estimate includes all costs to secure machinery and equipment for storage.	
				MOB 7	Dredging - Pipeline mobilization, assembly and relocation for surface and underwater appropriately considered.	
				SUB	**Subcontracting**	**REVIEW COMMENTS**
				SUB 1	Subcontractor assignments and markups reasonable for the tasks assigned.	
				SUB 2	Estimate identifies subcontract quotes and addresses markup applications with the quotes.	
				SUB 3	Appropriate consideration has been made in addressing multi-tier subcontracting for specialty items.	
				PR	**Prime Contractor**	**REVIEW COMMENTS**
				PR 1	Prime contractor(s) has been aptly assigned with reasonable markups.	
				PR 2	Are appropriate taxes included or excluded as may be required?	
				PR 3	Field office overhead reasonable for this project?	
				PR 4	Field Office Overhead includes mobilization if not identified elsewhere.	
				PR 5	Home office overhead appears reasonable for the type of prime contractor specialty.	
				PR 6	Profit appears reasonable and based on the weighted guideline method or justified by other means.	
				PR 7	Bond appears reasonable.	

Schedule

Project Title & Location:					Test Title	**REVIEW COMMENTS**
Project Review Phase:					document phase related to design, report, estimate	
Product Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	
				SCH	**SCHEDULES**	
				CS	**Construction Schedule**	**REVIEW COMMENTS**
				CS 1	Reflects the estimate and identifies critical aspects of the project scope and construction activities.	
				CS 2	Key milestones are depicted.	
				CS 3	Reflects reasonable logic of activities performed.	
				CS 4	Indicates a likely critical path.	
				CS 5	Reflects the estimate productivities for critical path items.	
				CS 6	Presents sequential and parallel activities where reasonable.	
				CS 7	Makes distinction between single shift, and double shift.	
				CS 8	Takes into consideration overtime where applicable.	
				CS 9	Depicts critical or time-sensitive orders or procurements.	
				CS 10	Considers weather issues, environmental restrictions, winter construction.	
				CS 11	Considers project ramp up, mobilization and demobilization.	
				PS	**Project Schedule**	**REVIEW COMMENTS**
				PS 1	The Project Schedule in the decision document report includes all FEATURE activities; i.e. review and approval, planning, engineering and design, procurement, construction, close-out and turn-over.	
				PS 2	The project schedule clearly presents reasonable dates to determine inflation based on escalation indexes, i.e., the activity beginning date or the activity midpoint?	

CSRA-Contingency

Project Title & Location:					Test Title	**REVIEW COMMENTS**
Project Review Phase:					document phase related to design, report, estimate	
Product Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	
					RISK-BASED CONTINGENCY	
				CSRA	**Formal Cost and Schedule Risk Analysis (CSRA for >$40M)**	**REVIEW COMMENTS**
				CSRA 1	CSRA structure and process follows the Cost Dx guidance.	
				CSRA 2	CSRA model provided in electronic format using Excel and Crystal Ball softwares.	
				CSRA 3	CSRA Report follows Cost Dx template.	
				CSRA 4	CSRA considers total cost and total schedule, all features.	
				CSRA 5	Risk Register developed by major PDT members for all project Features.	
				CSRA 6	Organizational and PM risks considered.	
				CSRA 7	Contract Acquisition risks considered.	
				CSRA 8	Technical risks considered.	
				CSRA 9	Scope quality and detail addressed.	
				CSRA 10	Lands and Damages and Relocations considered.	
				CSRA 11	Regualtory and Environmental risks considered.	
				CSRA 12	Construction risks considered.	
				CSRA 13	Estimate and schedule accuracy risks considered.	
				CSRA 14	Volatile pricing and extreme escalation considered.	
				CSRA 15	Material availability and transport considered.	
				CSRA 16	External risks: funding, stakeholders, labor, weather, opposition, bidding competition considered.	
				CSRA 17	Does the CSRA consider opportunities such as VE and alternatives?	
				CSRA 18	Summarizes and describes the basis and development of TPC. For example, the source and basis of engineering and design (E&D) (Feature 30), construction management (Feature 31), other pertinent feature costs, the price level of the constant dollar estimates (preparation date and program year date), and basis of cost indexes for inflating the project costs (inflated dollar basis) through the project schedule.	

				CSRA 19	Risk model considers any risk duplications and correlations between cost and schedule risk events?	
				CSRA 20	Risk event correlations have been minimized.	
				CSRA 21	CSRA model includes the moderate and high risks.	
				CSRA 22	CSRA considers both internal and external risks.	
				CSRA 23	CSRA supported by market research and documented assumptions.	
				CSRA 24	CSRA results traceable back to the PDT Risk Events.	
				CSRA 25	CSRA model variance distributions appear reasonable w/ backup assumptions.	
				CSRA 26	Contingency value based upon an 80% confidence level.	
				CSRA 27	Contingencies appear reasonable based on project complexity and ATR findings.	
				RB	**Risk Based Contingency Development for <$40M**	**REVIEW COMMENTS**
				RB 1	Supported by a studied development per major Feature (not just a value w/o basis).	
				RB 2	Developed as a weighted aggregate of major construction features.	
				RB 3	Considers other factors other than just technical design and construction (see CSRA above).	
				RB 4	Considers external risk potentials (see CSRA External Risks above)	
				CV	**Contingency Value**	**REVIEW COMMENTS**
				CV 1	Rates appear reasonable for each major Feature item?	
				CV 2	Overall rate appears reasonable based on reviewers knowledge of project scope and estimates.	

TPCS

Project Title & Location:					Test Title	REVIEW COMMENTS
Project Review Phase:					document phase related to design, report, estimate	
Product Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	N	N/P	N/A		REVIEW CATEGORIES	
				TPCS	**TOTAL PROJECT COST SUMMARY in Current Dollars (first column set)**	
				TPCS 1	Proper TPCS format (ETL 1110-2-573).	
				TPCS 2	Price level date shown is consistent with the estimate preparation date.	
				TPCS 3	All project-related Civil Works WBS Features depicted.	
				TPCS 4	Base costs reflects the esitmate development in current dollars.	
				TPCS 5	Summary page roll up supported by sub-project calculations.	
				TPCS 6	Costs reasonable for PED (30 Feature). Note: percentages are sometimes used to develop these costs.	
				TPCS 7	30 Feature clearly includes costs for PM, P&E, E&D, Reviews & VE, Contracting, reprographics, EDC, Planning during construction.	
				TPCS 8	Costs reasonable for Construction Management (31 Feature Code). Note: percentages are sometimes used to develop these costs.	
				TPCS 9	Contingencies shown separately for each Feature.	
				TPCS 10	Contingency rates match the risk based contingency results (commonly the 80 percent confidence level).	
					TOTAL PROJECT COST SUMMARY in Current Dollars (second column set)	
				TPCS 11	Depicts budget year for decision document funding request.	
				TPCS 12	Includes escalation from estimate date to budget year: EM 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS).	
				TPCS 13	Captures total project cost for all Featrures to budget year.	
					TOTAL PROJECT COST Inflated to Fully Funded Estimate (third column set)	
				TPCS 14	Escalation dates and rates shown for each inflated Feature.	
				TPCS 15	Escalation dates consistent with the project schedule.	
				TPCS 16	Escalation based on price indexes from the current CWCCIS, EM 1110-2-1304 and correctly applied.	
				TPCS 17	Summarizes and describes the basis and development of TPC. For example, the source and basis of engineering and design (E&D) (Feature 30), construction management (Feature 31), other pertinent feature costs, the price level of the constant dollar estimates (preparation date and program year date), and basis of cost indexes for inflating the project costs (inflated dollar basis) through the project schedule.	

					TOTAL PROJECT COST SUMMARY - Federal and Non-Federal Costs	
				TPCS 18	Federal and non-Federal cost share percentages shown.	
				TPCS 19	Project cost share percent consistent with the Cost Sharing Agreement?	
				TPCS 20	If applicable, is the cost/value of non-Federal in-kind services shown?	
				TPCS 21	Cost shares calculated correctly.	
				TPCS 22	Signature blocks for PM, Cost Chief, Real Estate Chief (ER 1110-2-1302)	

Reports

Project Title & Location:					Test Title	**REVIEW COMMENTS**
Project Review Phase:					document phase related to design, report, estimate	
Product Date:					13-Aug-09	
Reviewer Name & Phone:					John Doe 1-800-555-1234	
Review Date:					28-Aug-09	
Y	**N**	**N/P**	**N/A**		**REVIEW CATEGORIES**	
					REPORTS - Basic Information for Reviewer – Scope and Form	
				MR	**Draft Main Report, General**	**REVIEW COMMENTS**
				MR 1	Complete report document provided for ATR. As a minimum: Main Report, Engineering Appendix, Cost Appendix, cost tables and project schedule.	
				MR 2	Package meets the requirements within ER 1105-2-100, Exhibit G of the Planning Guidance Notebook?	
				MR 3	Executive Summary clearly presents the “Total Project Cost” (TPC) inflated through the project schedule. The TPC at the time the project is authorized by Congress becomes the Baseline Cost Estimate (BCE). The BCE is subject to cost limits of Section 902 Water Resources Development Act of 1986. (ER 1105-2-100)	
				MR 4	Reported costs for all project Features included in the TPC and reflect the estimating products.	
				MR 5	Report indicates the Total Project Schedule or duration (ER 1110-2-1150).	
				MR 6	Both required costs (budget constant dollars and fully funded) presented in the Executive Summary.	
				MR 7	Report makes distinction between the Federal and Non-Federal dollars.	
					Comparative Construction Cost Estimates	**REVIEW COMMENTS**
				MR 8	Presents the various estimate scopes, technical/design data, method of construction, and assumptions used for developing the comparative estimates included and described (ER 1110-2-1302).	
				MR 9	Comparative cost estimates developed at the same price level.	
				MR 10	TPC of each comparative estimate accurately used in the economic analysis comparisons, such as costs and benefits at the same price level (ER 1105-2-100).	
				MR 11	Contingencies adequate for each alternative in consideration for the alternative risks/complexity.	

					Cost Engineering Appendix	REVIEW COMMENTS
				CA 1	Summarizes the scope of the supporting documents and describes the basis of the estimate, such as method of construction, major assumptions and cost data resources used to cost the major cost elements (ER 1110-2-1302).	
				CA 2	Summarizes the uncertainties associated with major cost items (ER 1105-2-100, appendix E).	
				CA 3	Summarizes the cost risk and resulting contingency development for the recommended plan construction cost estimate. A risk analysis report is required for any project estimated to greater than $40M.	
				CA 4	Describes the development of the Plan construction schedule.	
				CA 5	Summarizes and describes the basis and development of TPC. For example, the source and basis of engineering and design (E&D) (Feature 30), construction management (Feature 31), other pertinent feature costs, the price level of the constant dollar estimates (preparation date and program year date), and basis of cost indexes for inflating the project costs (inflated dollar basis) through the project schedule.	

APPENDIX D

TOTAL PROJECT COST SUMMARY

PROJECT: Project X Major Rehabilitation
LOCATION: Somewhere WA

DISTRICT: NWW Walla Walla PREPARED: 12/1/2010
POC: CHIEF, COST ENGINEERING, xxx

This Estimate reflects the scope and schedule in report; Project X Major Rehabilitation Report Nov 2009

Program Year (Budget EC): 2012
Effective Price Level Date: 1 OCT 11

WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	BASE COST TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	FIRST COST TOTAL ($K)	Spent Thru: 1-Oct-10 ($K)	L	FULLY FUNDED PROJECT ESTIMATE COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
03	RESERVOIRS	$697	$160	23%	$857	1.4%	$707	$163	**$870**			$719	$165	$884
04	DAMS	$24,603	$6,643	27%	$31,246	1.4%	$24,957	$6,739	**$31,696**			$25,803	$6,967	$32,770
05	LOCKS	$19,475	$6,037	31%	$25,512	1.4%	$19,756	$6,124	**$25,880**			$20,772	$6,439	$27,212
06	FISH & WILDLIFE FACILITIES	$132	$26	20%	$158	1.4%	$134	$27	**$161**			$143	$29	$172
07	POWER PLANT	$2,301	$989	43%	$3,290	1.4%	$2,334	$1,004	**$3,338**			$2,507	$1,078	$3,585
	CONSTRUCTION ESTIMATE TOTALS:	$47,208	$13,856		**$61,064**	1.4%	$47,888	$14,056	**$61,944**			$49,944	$14,678	$64,623
01	LANDS AND DAMAGES	$25	$7	30%	$32	1.4%	$25	$8	**$33**			$26	$8	$33
30	PLANNING, ENGINEERING & DESIGN	$11,332	$3,326	29%	$14,658	3.2%	$11,689	$3,431	**$15,121**			$12,049	$3,538	$15,587
31	CONSTRUCTION MANAGEMENT	$6,847	$2,010	29%	$8,857	3.2%	$7,063	$2,073	**$9,136**			$7,410	$2,176	$9,586
	PROJECT COST TOTALS:	$65,412	$19,200	29%	**$84,612**	1.9%	$66,666	$19,568	**$86,233**			$69,429	$20,400	$89,829

CHIEF, COST ENGINEERING, xxx

PROJECT MANAGER, xxx

CHIEF, REAL ESTATE, xxx

CHIEF, PLANNING,xxx

CHIEF, ENGINEERING, xxx

CHIEF, OPERATIONS, xxx

CHIEF, CONSTRUCTION, xxx

CHIEF, CONTRACTING,xxx

CHIEF, PM-PB, xxxx

CHIEF, DPM, xxx

ESTIMATED FEDERAL COST: 50% **$44,915**
ESTIMATED NON-FEDERAL COST: 50% **$44,915**

ESTIMATED TOTAL PROJECT COST: $89,829

O&M OUTSIDE OF TOTAL PROJECT COST:

****** CONTRACT COST SUMMARY ******

PROJECT: Project X Major Rehabilitation
LOCATION: Somewhere WA
This Estimate reflects the scope and schedule in report; Project X Major Rehabilitation Report Nov 2009

DISTRICT: NWW Walla Walla PREPARED: 12/1/2010
POC: CHIEF, COST ENGINEERING, xxx

Estimate Prepared: 1-Jun-10
Effective Price Level: 1-Oct-10

Program Year (Budget EC): 2012
Effective Price Level Date: 1 OCT 11

		RISK BASED								FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1													
03	RESERVOIRS	$447	$103	23%	$550	1.4%	$453	$104	$558	2013Q1	1.7%	$461	$106	$567
04	DAMS	$23,128	$6,245	27%	$29,373	1.4%	$23,461	$6,335	$29,796	2014Q1	3.4%	$24,256	$6,549	$30,806
05	LOCKS	$17,421	$5,401	31%	$22,822	1.4%	$17,672	$5,478	$23,150	2015Q1	5.1%	$18,582	$5,760	$24,342
06	FISH & WILDLIFE FACILITIES	$63	$13	20%	$76	1.4%	$64	$13	$77	2016Q1	6.9%	$68	$14	$82
07	POWER PLANT	$982	$422	43%	$1,404	1.4%	$996	$428	$1,424	2016Q2	7.4%	$1,070	$460	$1,530
	CONSTRUCTION ESTIMATE TOTALS:	$42,041	$12,183	29%	**$54,224**		$42,647	$12,358	$55,005			$44,437	$12,889	$57,326
01	LANDS AND DAMAGES	$5	$1	29%	$6	1.4%	$5	$1	$7	2012Q3	0.8%	$5	$1	$7
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$1,051	$305	29%	$1,356	3.2%	$1,084	$314	$1,398	2012Q3	1.8%	$1,104	$320	$1,424
2.0%	Planning & Environmental Compliance	$841	$244	29%	$1,085	3.2%	$868	$251	$1,119	2012Q3	1.8%	$883	$256	$1,139
8.5%	Engineering & Design	$3,573	$1,035	29%	$4,608	3.2%	$3,686	$1,068	$4,754	2012Q3	1.8%	$3,753	$1,088	$4,841
2.0%	Engineering Tech Review ITR & VE	$841	$244	29%	$1,085	3.2%	$868	$251	$1,119	2012Q3	1.8%	$883	$256	$1,139
2.0%	Contracting & Reprographics	$841	$244	29%	$1,085	3.2%	$868	$251	$1,119	2012Q3	1.8%	$883	$256	$1,139
3.0%	Engineering During Construction	$1,261	$365	29%	$1,626	3.2%	$1,301	$377	$1,678	2013Q1	3.9%	$1,352	$392	$1,743
2.0%	Planning During Construction	$841	$244	29%	$1,085	3.2%	$868	$251	$1,119	2013Q1	3.9%	$901	$261	$1,163
2.0%	Project Operations	$841	$244	29%	$1,085	3.2%	$868	$251	$1,119	2012Q3	1.8%	$883	$256	$1,139
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$4,204	$1,218	29%	$5,422	3.2%	$4,337	$1,257	$5,593	2013Q1	3.9%	$4,506	$1,306	$5,812
2.0%	Project Operation:	$841	$244	29%	$1,085	3.2%	$868	$251	$1,119	2013Q1	3.9%	$901	$261	$1,163
2.5%	Project Management	$1,051	$305	29%	$1,356	3.2%	$1,084	$314	$1,398	2013Q1	3.9%	$1,127	$326	$1,453
	CONTRACT COST TOTALS:	$58,232	$16,875		**$75,107**		$59,348	$17,198	$76,546			$61,620	$17,868	**$79,488**

****** CONTRACT COST SUMMARY ******

PROJECT: Project X Major Rehabilitation
LOCATION: Somewhere WA
This Estimate reflects the scope and schedule in report; Project X Major Rehabilitation Report Nov 2009

DISTRICT: NWW Walla Walla PREPARED: 12/1/2010
POC: CHIEF, COST ENGINEERING, xxx

Estimate Prepared: 2-Feb-10
Effective Price Level: 1 OCT 11

Program Year (Budget EC): 2012
Effective Price Level Date: 1 OCT 11

WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 2													
03	RESERVOIRS	$124	$29	23%	$153	1.4%	$126	$29	$155	2013Q1	1.7%	$128	$29	$157
04	DAMS	$217	$59	27%	$276	1.4%	$220	$59	$280	2014Q1	3.4%	$228	$61	$289
05	LOCKS	$800	$248	31%	$1,048	1.4%	$812	$252	$1,063	2015Q1	5.1%	$853	$265	$1,118
06	FISH & WILDLIFE FACILITIES	$23	$5	20%	$28	1.4%	$23	$5	$28	2016Q1	6.9%	$25	$5	$30
07	POWER PLANT	$1,213	$522	43%	$1,735	1.4%	$1,230	$529	$1,760	2016Q2	7.4%	$1,321	$568	$1,890
	CONSTRUCTION ESTIMATE TOTALS:	$2,377	$861	36%	**$3,238**		$2,411	$874	$3,285			$2,555	$929	$3,484
01	LANDS AND DAMAGES	$5	$2	36%	$7	1.4%	$5	$2	$7	2012Q3	0.8%	$5	$2	$7
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$59	$21	36%	$80	3.2%	$61	$22	$83	2013Q3	6.0%	$65	$23	$88
2.0%	Planning & Environmental Compliance	$48	$17	36%	$65	3.2%	$50	$18	$67	2013Q3	6.0%	$52	$19	$72
8.5%	Engineering & Design	$202	$73	36%	$275	3.2%	$208	$76	$284	2013Q3	6.0%	$221	$80	$301
2.0%	Engineering Tech Review ITR & VE	$48	$17	36%	$65	3.2%	$50	$18	$67	2013Q3	6.0%	$52	$19	$72
2.0%	Contracting & Reprographics	$48	$17	36%	$65	3.2%	$50	$18	$67	2013Q3	6.0%	$52	$19	$72
3.0%	Engineering During Construction	$71	$26	36%	$97	3.2%	$73	$27	$100	2014Q3	10.2%	$81	$29	$110
2.0%	Planning During Construction	$48	$17	36%	$65	3.2%	$50	$18	$67	2014Q3	10.2%	$55	$20	$74
2.0%	Project Operations	$48	$17	36%	$65	3.2%	$50	$18	$67	2013Q3	6.0%	$52	$19	$72
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$238	$86	36%	$324	3.2%	$246	$89	$334	2014Q3	10.2%	$270	$98	$368
2.0%	Project Operation:	$48	$17	36%	$65	3.2%	$50	$18	$67	2014Q3	10.2%	$55	$20	$74
2.5%	Project Management	$59	$21	36%	$80	3.2%	$61	$22	$83	2014Q3	10.2%	$67	$24	$91
	CONTRACT COST TOTALS:	$3,299	$1,195		**$4,494**		$3,362	$1,218	$4,581			$3,583	$1,301	**$4,884**

PROJECT: Project X Major Rehabilitation
LOCATION: Somewhere WA
This Estimate reflects the scope and schedule in report; Project X Major Rehabilitation Report Nov 2009

DISTRICT: NWW Walla Walla PREPARED: 12/1/2010
POC: CHIEF, COST ENGINEERING, xxx

Estimate Prepared: 2-Feb-10
Effective Price Level: 1 OCT 11

Program Year (Budget EC): 2012
Effective Price Level Date: 1 OCT 11

WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 3													
03	RESERVOIRS	$71	$16	23%	$87	1.4%	$72	$17	$89	2013Q1	1.7%	$73	$17	$90
04	DAMS	$629	$170	27%	$799	1.4%	$638	$172	$810	2014Q1	3.4%	$660	$178	$838
05	LOCKS	$1,221	$379	31%	$1,600	1.4%	$1,239	$384	$1,623	2015Q1	5.1%	$1,302	$404	$1,706
06	FISH & WILDLIFE FACILITIES	$23	$5	20%	$28	1.4%	$23	$5	$28	2016Q1	6.9%	$25	$5	$30
07	POWER PLANT	$101	$43	43%	$144	1.4%	$102	$44	$147	2016Q2	7.4%	$110	$47	$157
	CONSTRUCTION ESTIMATE TOTALS:	$2,045	$613	30%	**$2,658**		$2,074	$622	$2,696			$2,170	$651	$2,821
01	LANDS AND DAMAGES	$5	$1	30%	$6	1.4%	$5	$2	$7	2014Q3	4.3%	$5	$2	$7
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$51	$15	30%	$66	3.2%	$53	$16	$68	2014Q3	10.2%	$58	$17	$75
2.0%	Planning & Environmental Compliance	$41	$12	30%	$53	3.2%	$42	$13	$55	2014Q3	10.2%	$47	$14	$61
8.5%	Engineering & Design	$174	$52	30%	$226	3.2%	$179	$54	$233	2014Q3	10.2%	$198	$59	$257
2.0%	Engineering Tech Review ITR & VE	$41	$12	30%	$53	3.2%	$42	$13	$55	2014Q3	10.2%	$47	$14	$61
2.0%	Contracting & Reprographics	$41	$12	30%	$53	3.2%	$42	$13	$55	2014Q3	10.2%	$47	$14	$61
3.0%	Engineering During Construction	$61	$18	30%	$79	3.2%	$63	$19	$82	2015Q3	14.3%	$72	$22	$94
2.0%	Planning During Construction	$41	$12	30%	$53	3.2%	$42	$13	$55	2015Q3	14.3%	$48	$14	$63
2.0%	Project Operations	$41	$12	30%	$53	3.2%	$42	$13	$55	2014Q3	10.2%	$47	$14	$61
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$205	$61	30%	$266	3.2%	$211	$63	$275	2015Q3	14.3%	$242	$72	$314
2.0%	Project Operation:	$41	$12	30%	$53	3.2%	$42	$13	$55	2015Q3	14.3%	$48	$14	$63
2.5%	Project Management	$51	$15	30%	$66	3.2%	$53	$16	$68	2015Q3	14.3%	$60	$18	$78
	CONTRACT COST TOTALS:	$2,838	$850		**$3,688**		$2,892	$867	$3,759			$3,088	$926	**$4,014**

****** CONTRACT COST SUMMARY ******

PROJECT: Project X Major Rehabilitation
LOCATION: Somewhere WA
This Estimate reflects the scope and schedule in report; Project X Major Rehabilitation Report Nov 2009

DISTRICT: NWW Walla Walla PREPARED: 12/1/2010
POC: CHIEF, COST ENGINEERING, xxx

Estimate Prepared: 2-Feb-10
Effective Price Level: 1 OCT 11

Program Year (Budget EC): 2012
Effective Price Level Date: 1 OCT 11

WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FULLY FUNDED PROJECT ESTIMATE Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 4													
03	RESERVOIRS	$55	$13	23%	$68	1.4%	$56	$13	$69	2013Q1	1.7%	$57	$13	$70
04	DAMS	$629	$170	27%	$799	1.4%	$638	$172	$810	2014Q1	3.4%	$660	$178	$838
05	LOCKS	$33	$10	31%	$43	1.4%	$33	$10	$44	2015Q1	5.1%	$35	$11	$46
06	FISH & WILDLIFE FACILITIES	$23	$5	20%	$28	1.4%	$23	$5	$28	2016Q1	6.9%	$25	$5	$30
07	POWER PLANT	$5	$2	43%	$7	1.4%	$5	$2	$7	2016Q2	7.4%	$5	$2	$8
	CONSTRUCTION ESTIMATE TOTALS:	$745	$199	27%	**$944**		$756	$202	$958			$782	$209	$991
01	LANDS AND DAMAGES	$10	$3	27%	$13	1.4%	$10	$3	$13	2012Q3	0.8%	$10	$3	$13
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$19	$5	27%	$24	3.2%	$20	$5	$25	2015Q3	14.3%	$22	$6	$28
2.0%	Planning & Environmental Compliance	$15	$4	27%	$19	3.2%	$15	$4	$20	2015Q3	14.3%	$18	$5	$22
8.5%	Engineering & Design	$63	$17	27%	$80	3.2%	$65	$17	$82	2015Q3	14.3%	$74	$20	$94
2.0%	Engineering Tech Review ITR & VE	$15	$4	27%	$19	3.2%	$15	$4	$20	2015Q3	14.3%	$18	$5	$22
2.0%	Contracting & Reprographics	$15	$4	27%	$19	3.2%	$15	$4	$20	2015Q3	14.3%	$18	$5	$22
3.0%	Engineering During Construction	$22	$6	27%	$28	3.2%	$23	$6	$29	2016Q3	18.5%	$27	$7	$34
2.0%	Planning During Construction	$15	$4	27%	$19	3.2%	$15	$4	$20	2016Q3	18.5%	$18	$5	$23
2.0%	Project Operations	$15	$4	27%	$19	3.2%	$15	$4	$20	2015Q3	14.3%	$18	$5	$22
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$75	$20	27%	$95	3.2%	$77	$21	$98	2016Q3	18.5%	$92	$25	$116
2.0%	Project Operation:	$15	$4	27%	$19	3.2%	$15	$4	$20	2016Q3	18.5%	$18	$5	$23
2.5%	Project Management	$19	$5	27%	$24	3.2%	$20	$5	$25	2016Q3	18.5%	$23	$6	$29
	CONTRACT COST TOTALS:	$1,043	$279		**$1,322**		$1,063	$285	$1,348			$1,138	$305	**$1,443**