

COST ESTIMATING

1.0 PURPOSE

- 1.1 This chapter provides specific guidance for the preparation of cost estimates for Military, Civil and HTRW construction projects. Construction cost estimates serve several purposes, to include establishing program/project funding, controlling costs during design, evaluating bids, negotiating contracts and modifications, and used as a guide for the review and approval of contractor proposed "schedule of values" for payment purposes during construction. As such, they must be consistent with the best estimating practices in the construction industry, as well as being current, complete, and accurate. Cost estimates must be prepared to reflect the expected cost to the Government to perform the work by contract and include all reasonable cost which a prudent experienced and well equipped contractor might anticipate in his/her bid.

2.0 REFERENCE PUBLICATIONS

- 2.1 MII Documentation, Latest Version
2.2 ER 111 0-1-1300, Cost Engineering Policy and General Requirements
2.3 ER 1110-3-1300, Military Programs Cost Engineering
2.4 ER 1110-2-1302, Civil Works Cost Engineering
2.5 ER 1110-3-1301, Cost Engineering Policy and General Requirements for HTRW Remedial Action Cost Estimates
2.6 UFC 3-740-05 Construction Cost Estimates
2.7 EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule-Region III

3.0 DEFINITIONS:

- 3.1 Program Amount (PA) Total escalated amount of project funds authorized by Congress, or the customer, to be charged to construction (excludes title II engineering and related project design cost). The PA includes the estimated construction contract cost and allowances for construction contingencies, supervision and administration, preparation of as-built drawings, engineering and design services during construction, commissioning and all other cost authorized by the directive or instructions to be charged to construction. Some typical "other" cost may include private utilities costs and costs that might be incurred by the Installation or using service to include furnishings, special equipment, troop labor, or similar related project costs. It is very important that the designer/cost engineer be aware of the PA and the various amounts and types of construction funds which comprise the PA, since the construction "contract" amount or construction cost estimate, plus all other allowances, must be within the PA.

3.2 Current Working Estimate (CWE)

The most current working estimate of the total projected project cost at a specific stage of design necessary to provide a complete and usable facility. It, like the PA, includes the Estimated Construction Cost (ECC) and all other allowances provided for in the PA. It is important to note that if a portion of the work authorized by directive is to be accomplished by a future contract, by other means, or otherwise withheld from the final design, requests for bids or contract award, then a proper allowance for the cost of this work shall also be included in the CWE. The CWE is continually updated during the life of the project (35%-Final) to reflect progressively more detailed levels of design effort which determine more accurately the expected final cost.

3.3 Construction Cost Limit (CCL)

The amount of funds, based on the PA, actually available for construction contract award, i.e., the Program Amount less contingencies, supervision and administration, and other allowances. It establishes the ceiling for the Government Estimate (including escalation). If the IGE should exceed the CCL, the project must be either redesigned, additional funds authorized, or bid additives, options established. **When the A-E negotiates the design contract it has accepted the responsibility for producing a design that will result in a project that can be awarded within the PA and CCL.**

3.4 Government Estimate (IGE)

A formal approved construction cost estimate prepared for contracting purposes. It represents the latest estimate of actual construction contract cost including escalation but excludes contingencies, supervision and administration and other allowances. An A-E prepared construction cost estimate does not become an "Official" IGE until approved by SAS Cost Engineering; however, the A-E shall treat the A-E prepared cost estimate as a "For Official Use Only" document regardless of its approval status.

3.5 Primary Facilities

These are the main facilities (buildings/structures/certain roads and pavements) in the project fulfilling the mission essential functions. The total estimated cost of primary facilities shall be estimated to include all construction costs (including earthwork) within five-feet of the structure(s), commonly referred to as the "five-foot line". Each facility shall have a separate quantity take-off and the facility costs estimated as a separate primary facility. Identical facilities may share the same "quantity takeoff"; however (except for family housing), each structure shall still be identified in the MII cost estimate as a separate facility. Near identical facilities may also share the same takeoff with the takeoff for one (or more) referencing the detailed takeoff for the other and noting the quantity variations only.

3.6 Supporting Facilities

Includes all costs outside the five-foot line such as private utilities, site work and all site improvements. Support facility costs shall be taken-off and estimated separately for each associated primary facility. The construction cost of items which serve more than one prime facilities shall be included with the facility which is most critical to the project as a whole, i.e., least likely to be dropped from the project as a result of budget constraints.

3.7 Life Cycle Cost

The sum total of the direct, indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final position of a major system over its anticipated useful life span. Requirements for life cycle cost analysis are defined in the contract Statement of Work and/or AElS. The Architectural and Engineering Instructions specify which building systems require life cycle cost studies.

4.0 TECHNICAL SUPPORT SECTION FUNCTION

The cost engineering function in Savannah District is the responsibility of the Cost Engineer/Technician, Technical Support Section which reports directly to the Chief, Technical Specialties Branch. Responsibility and accountability for all cost engineering is centralized in this section. It is directly accountable and responsible for all cost engineering services provided on all military, environmental restoration and civil works projects designed in-house or under A-E Services contracts. A-Es are responsible for cost engineering services in accordance with the contract Statement of Work (SOW) and the instructions contained herein. The contract SOW takes precedence over these instructions in the event of a conflict. Cost Engineering's review, comments and or acceptance of A-E prepared cost estimates does not waive the Government's rights with regards to the A-E's responsibility for providing current, complete, and accurate cost engineering services, or the A-E's responsibility to provide a design within the CCL.

5.0 SCOPE OF COST ENGINEERING SERVICES

- 5.1 Planning, pre-concept, concept, and final design cost estimates shall be thoroughly documented to explain the basis of the estimate and to include contingencies associated with any unknowns or risk factors. If a portion of the work authorized by directive, and included in the PA, is to be accomplished by a future contract, by other means, or, otherwise withheld from the concept or final design, invitation for bids (IFB) or contract award, a proper allowance for the cost of this "deferred" work shall also be included in the CWE.
- 5.2 Estimates shall be based on the most recent design and site information available, and shall follow the format of the appropriate Work Breakdown Structure (WBS) to the assembly level (Level 6). Strict adherence to the specified work breakdown structure cannot be overemphasized as estimates must be developed in the required format in order to export or, import between the various software applications. Deviations from the specified WBS structure may be permitted for special applications, such as unit priced contracts.

There are three (3) separate Work Breakdown Structures, i.e., Military, Environmental Restoration, and Civil Works. The Military WBS shall be used for all vertical building construction whether Military Environmental Restoration or Civil Works funded. Environmental Restoration projects shall use the Hazardous, Toxic, Radioactive Waste (HTRW) WBS (funded by DERA, Superfund, DOE etc). The Civil Works WBS shall be used for civil funded projects such as beach nourishment, pump stations and large earth moving/dredging projects normally funded with non-military funds. Any questions concerning the proper format, application or work breakdown structure shall be directed to the Chief, Technical Support Section.

- 5.3 The final design estimate shall reflect the expected cost to the Government for performing the work by contract and be prepared in the same careful manner as if the cost engineer were bidding in competition with prudent, experienced, and well-equipped Contractors. All reasonable costs which a Contractor might be expected to anticipate and include in his proposals shall be included in the cost estimate.
- 5.4 The estimate shall reflect the local labor market (Davis Bacon wage rates are a minimum) and material prices anticipated or forecast to prevail in the vicinity of the project at the time the project is scheduled to be constructed. Davis Bacon rates are available on the network at the following address: www.wdol.gov. **A-E shall coordinate with Savannah District Technical Support Section for specific MII Labor Library prior to developing an estimate.**
- 5.5 The method used for preparing the estimate shall be in conformance with the requirements in section 6 below.
- 5.6 Should any question or clarification arise concerning procedures, the Savannah District Technical Support Section shall be contacted for clarification. Phone (912) 652-5521.

6.0 COST ESTIMATING METHODS

6.1 Tri-Services Automated Cost Engineering System (TRACES)

TRACES, comprised of several subsystems/modules provides a user friendly cost engineering platform, in a windows environment, with all the necessary subsystems and databases required to prepare, analyze, review and maintain all types of construction estimate and schedules. The U.S. Army Corps of Engineers currently mandates the use of some TRACES modules for specific cost engineering applications. Those subsystems currently on-line, including the applications which are mandatory, are described below. Estimates must be prepared following the specified WBS in order to facilitate the transfer of files between subsystems/modules. TRACES are available to A-Es and the Construction industry within the Construction Criteria Base (CCB) information system, which is available from the National Institute of Building Sciences, 1201 L Street, N. W., Suite 400. Washington D. C. 20005, (202) 289-7800; however, on request by A-E firm to the District Project Architect or Engineer (PA-E), The A-E must purchase the MII Cost book. Cost Engineering will furnish the latest version of any of the subsystems or databases not currently available in the CCB. In addition to the support databases (models, assemblies, crews, MII cost book, labor and equipment) provided with TRACES

6.1.1 Micro-Computer Aided Cost Engineering System (MII)

A standalone detailed cost estimating system with the ability to estimate costs by creating or incorporating pre-defined models, assemblies and crews; or, by drawing from a unit price book, labor and equipment databases. It is a complete and comprehensive estimating program for the preparation of detailed or parametric construction cost estimates. MII is mandatory and shall be used by all in-house and A-E cost engineers for all concept and final design cost estimates unless specifically exempted by the Chief, Technical Support Section or the Commander. As of the publication of these instructions.

6.1.2 Parametric Cost Engineering System (PACES)

This is a stand alone cost estimating system that uses pre-defined models and assemblies. The user has the ability to change or create models and assembly algorithms, and the added capability of transferring line items to and from a "quantity takeoff system", i.e., MII. Coordinate with the Chief of Cost Estimating (EN-ET) prior to use of the PACES.

6.1.3 Historical Analysis Generator (HII – 2nd Edition)

A stand alone system that is capable of collecting, manipulating and extracting historical data. The HII database for each project includes a description of building systems, the cost estimate, and bid results in the required work breakdown structure. HAG is mandatory but is available for the cost engineer to compare current project costs with the estimate and bid results of similar projects. Coordinate with the Chief of Cost Estimating (EN-ET) as this data should be used a back check on the overall building unit cost and only accessed by the government.

6.1.4 Life Cycle Costs (LCC)

A stand alone system capable of calculating the total cost of ownership (LCC) of one or more alternative (buildings, dams, etc.) facility systems (structural, mechanical, electrical, etc.), or components, and remedial clean-up efforts.

6.1.5 PC Cost (PCC)

A stand alone cost estimating system which utilizes unit cost (\$/SF). It is used for preparing DD Form 1391 and ENG Form 3086. It will also convert parametric estimates to 1391 and 3086 formats and upload estimates to the PAX system.

6.1.6 Cost Engineering Dredge Estimating Program (CEDEP)

A stand alone system used to produce cost estimates for dredging projects, in a standard format, for pipeline, hopper and mechanical dredging operations. This program is only available by the government.

6.1.7 Risk Analysis (RA)

A stand alone system used to calculate cost estimating risks and determine needed contingencies during the planning phase or as directed. It has the capability to upload data from MCACES and includes a separate system for calculating contingencies factors for HTRW projects. A cost risk analysis shall be prepared for cost plus contracts and for contracts where quantities and or scope are not clearly defined. A Risk Analysis is required for all civil works projects over \$40 million. "Crystal Ball" software is used to produce a schedule/cost risk analysis.

6.1.8 Remedial Action Cost Engineering and Requirements System (RACER)

A U.S. Air Force developed parametric model, windows based system for programming HTRW projects, which is required for project programming on U.S. Air Force HTRW projects. Optional for U.S, Army Corps of Engineers HTRW projects; otherwise, use MCACES or other cost estimating system approved by Chief, Technical Support Section. RACER is primary software for developing formerly used defense sites (FUDS) cost to complete (CTC) estimates.

6.1.9 HAZRISK

Risk assessment software for HTRW projects based on historical data.

6.1.10 HCAS -Historical Cost Analysis System

Database of completed HTRW projects to include cost associated with studies, design, remedial action and operations and maintenance related cost.

6.2 Manual Method of Cost Estimating

The manual method is rarely utilized anymore; however, if proposed for an SAS project, it shall be approved, in writing and in advance, by the Chief, Technical Support Section. Be advised that this is an exception rarely approved. When the manual procedure is approved for a project or specific submittal of a project, the estimate shall be prepared organized, and formatted using the appropriate TRACES template and work breakdown structure, i.e., Military, Civil, HTRW, etc.

The estimate shall be prepared utilizing the appropriate forms prescribed in UFC 3-740-05. At the ready to advertise submittal, the estimate forwarded to the Savannah District shall be the original prepared in pencil, in order that any necessary revisions by the Government may be readily incorporated.

6.3 Excel Spreadsheet Method of Cost Estimating

The spreadsheet method is also rarely approved; however, if proposed for an SAS project it shall be approved, in writing and in advance, by the Chief, Technical Support Section. Be advised that this is a rare exception. When the spreadsheet procedure is approved for a project or specific submittal of a project, the estimate shall be prepared, organized, and formatted using the appropriate TRACES template and work breakdown structure, i.e., Military, Civil, HTRW, etc. The format shall be for a "detailed" estimate to include, as a minimum, labor and equipment hours, rates and extended costs, and material quantities, unit and extended costs. Where appropriate, i.e., unit pricing/cost data is not available in Government or commercial estimating guides, lump sum amounts may be used.

At the ready to advertise submittal, the estimate forwarded to the Savannah District shall include the excel file on a compact disk (cd), in order that any necessary revisions by the Government may be readily incorporated.

7.0 COST ENGINEERING PERSONNEL REQUIREMENTS AND TRAINING

7.1 Personnel Qualifications

The designers cost estimating staff shall consist of dedicated full-time cost engineering specialist(s) for each required design discipline, such as architectural, structural, civil, mechanical, electrical, fire protection, corrosion engineering, etc. It is imperative that estimates be prepared and reviewed under the direct supervision of personnel who are competent in construction cost estimating. Estimators must possess a working knowledge of construction and be capable of making professional judgments based on experience. If the designer determines his staff does not possess all these qualification, he shall obtain assistance from a qualified firm whose specialty is cost estimating. Estimates prepared by a consultant must be reviewed by the designer before submission to insure accuracy, completeness, coordination and compliance with these instructions, and the contract SOW. A-Es shall assure that cost engineers have access to and are trained in the required computer hardware and software applications required to accomplish the cost engineering function. Where applicable, this includes life cycle cost analysis, cost risk analysis and parametric estimating techniques.

7.2 Training

The Corps of Engineers and software vendors sponsor training in the required systems. Corps sponsored training classes are also available to A-E firms. A-E's are encouraged to utilize either Corps or vendor training where necessary to ensure satisfactory performance in the cost engineering function. The required software systems are complicated requiring either formal training or extensive practical experience to achieve an acceptable level of proficiency. Unless cost engineers proficient in the systems are used, submittal delays and re-submissions as a result of estimating errors are very likely.

8.0 GENERAL INSTRUCTIONS

8.1 Additional Instructional Publications

Cost estimates for all construction projects shall be prepared in accordance with the instructions and exhibits contained in this A-E Services Manual, UFC 3-740-05 Construction Cost Estimates and applicable TRACES Subsystem/Module User Manuals.

8.2 Cost Estimate Overruns

It is the A-E's responsibility to design the project for a Current Working Estimate (CWE) that is equal to or less than the Programmed Amount. Proposed additives, options, etc., shall be identified at the concept design level and included, both in the quantity take-off and the cost estimate, as separate bid items accordingly. Should the project CWE exceed the programmed amount, the A-E shall provide a written narrative explaining the reasons why the CWE exceeds the programmed amount and offer proposals which would reduce the CWE within available funds. A written narrative shall also be submitted whenever the current estimate has changed more than 5% (plus or minus) from the previous estimate. In the case of concept estimates, variations of 5% from the DD Form 1391 shall be explained in narrative form.

8.3 Failure to Comply with Procedures

Failure of the A-E to conform to the procedures contained in this and referenced manuals will result in the estimate being rejected and resubmitted with the deficiencies corrected. If time is a critical factor, the A-E may be required to visit the District office within 48 hours for a face-to-face meeting and may be required to furnish a corrected cost estimate before leaving the District office.

8.4 Cover Sheet - Checklist

THE CHECKLIST SHOWN IN EXHIBIT A, "COST ESTIMATE SUBMITTAL CHECKLIST" SHALL BE COMPLETED AND USED AS THE COVER SHEET FOR EACH COST ESTIMATE SUBMITTAL. Failure to complete and transmit this checklist will result in the estimate being returned.

8.5 Estimates with More Than One Line Item

When the A-E's design contract includes more than one "Line Item Number," preparation of a separate detailed cost estimate and associated summaries for each line item is mandatory on all submittals. Site work associated with each line item shall also be estimated separately. This procedure facilitates the separation of cost in the event that a line item is deferred into another fiscal year or another program/project/bid package, etc.

8.6 Proposed Bid Schedule

8.6.1 Bid Schedule

The A-E shall submit a proposed bid Schedule and IAW ECB 2007-19 submittal of Construction Data via the Historical Analysis Generator, paragraph 3; See Exhibit G, with each final and corrected final submittal. This schedule shall list all primary and support facilities separately.

8.6.2 Additives and Options

When either additives, options are being considered, first consult with the EN-ET to determine the most advantageous to the Government or User. There are certain FAR requirements that have to be followed in the award process that causes one to be more advantageous than the other under certain conditions. A clearly defined (detailed) Scope of Work statement shall be included in the contract specifications, on the drawings or both for each additive/option to insure that all contractors are bidding on the same basis and to preclude varying interpretations between the Government and construction contractor concerning the scope of base bid and or alternates during construction. The "alternate" scope definition shall also be reproduced and provided to each cost engineer (for take-off and estimating purposes) and submitted to SAS with the proposed bid schedule for review purposes.

8.6.3 Multiple Funding Sources

It may also be necessary to breakout items of different funding sources. The SAS USACE should be contacted in regards to this requirement. As with alternate bid items, a clearly defined (detailed) scope of work statement shall be included in the contract specifications, on the drawings or both for bid items covering different funding sources to insure that all contractors are bidding on the same basis, and to preclude

varying interpretations between the Government and construction contractor during construction.

8.7 Design Stage Identification

All sheets of the cost estimate shall be clearly marked as to the design stage (study, pre-concept, concept, preliminary, final, corrected final, etc.). The quantity take-off sheets shall be dated with any subsequence revisions annotated by date and initials. The design stage identity shall be entered in the "REPORT TITLE" field of the "PRINT SELECTED REPORTS" entry screen from the Report Menu of MCACES Software.

8.8 Copy Requirements

The summary and detailed cost estimate and all other exhibits and/or information required by this or referenced manuals/instructions shall be submitted electronically to the Chief, Technical Support Section, Savannah District and the Project Manager (unless the contract SOW specifies otherwise). Only one copy of the quantity take-off sheets need be submitted. It shall be organized by discipline and transmitted in a manner that will facilitate separation by discipline for review purposes. **Too often the cost estimate is transmitted without the take-off. The take-off is extremely valuable to the reviewer as it precludes our in-house cost engineers from having to perform redundant and separate take-offs to verify selected quantities. It also serves as a valuable tool when conducting VE studies. Due to time constraints, and the need to minimize review costs, the cost estimate will not be reviewed without the take-off and the omission of the take-off from the submittal will result in delaying the review process.** This requirement includes all submittal levels, including cost estimates for construction contract modifications. Electronic copies (compact disks) of the project and supporting databases shall also be provided for all submittals and transmitted in the same envelope. Access to all the databases allows SAS cost engineers to directly incorporate design changes, and corrections necessary to establish the CWE reported to higher command or addendum's prior to bid opening when there is insufficient time for returning the estimate to the A-E for this purpose.

8.9 Budgetary

The budgetary data furnished to the A-E is not to be considered restrictive, i.e., if the project scope of work, site conditions and design criteria result in a CWE in excess of the PA. The A-E is responsible for providing an economical design in the development of the site, structures and systems as well as the functional arrangements necessary to satisfy the scope of work, comply with the design criteria and user requirements for the project. Should the budget however be exceeded as a result of choosing poor economic systems, exceeding the scope or design criteria in general, the A-E shall be responsible for redesign without compensation. The District shall be notified of any proposed changes in project scope or design criteria as soon as the need for the change has been firmly established.

8.10 Quantity Take-off-General

8.10.3 Safeguarding

The quantity take-off, like the cost estimate, shall be treated in a confidential manner and only those personnel concerned with the preparation and/or review of the project shall have access. The take-off will be classified "FOR OFFICIAL USE ONLY." Such material cannot be divulged to other than accredited Government

personnel with a need to know. Information contained within estimates shall not be divulged to prospective bidders.

8.10.4 Accuracy

The importance of an accurate and concise quantity take-off for the estimate cannot be overstressed, The quantity take-off for each bid item, except as defined herein, shall follow one of the following Work Breakdown Structures (WBS).

8.10.4.1 Military WBS

Description: Except as provided herein, the Military WBS to Level 6 as provided in MII shall be used on all Military Construction Projects. This Military WBS is a hierarchy structure comprised of six levels: 1) Primary/Supporting Facility; 2) Facility; 3) System; 4) Subsystem; 5) Assembly Category; 6) Assembly, and followed by line item detail. Each system is divided into one or more subsystem which is further divided into assembly categories, then assemblies. Assemblies are made up of construction line items. The System, Subsystem, and Assembly Category Titles are rigidly defined and shall not be changed. Level 1 (same Level as Project Information Record) shall not be changed, i.e., two titles, Primary Facilities and Secondary Facilities.

Exception: The only exception to strict adherence to the specified WBS is in the development of unit price bid items, where the cost of an item might be spread over several systems, subsystems, assemblies, etc. and Means based cost estimates described in paragraph 6. Therefore, for some unit price items, it may be necessary to deviate somewhat from the WBS in order to capture all cost associated with that item under the appropriate bid item title. For example, a deep sewer utility project consisting of various size sewer pipes would include all cost associated with excavation, backfill, dewatering, shoring and laying pipe under each of the separate titles for each 8", 10", 12" pipe size, etc. For significant projects it will be necessary to further divide these titles into subtitles to account for varying materials and depths, i.e. 8" PVC Gravity 8' to 10' deep; 8" PVC 10' to 12' deep; 8" D.I. Force Main 8' to 10' deep; 4' Diameter Manhole, 8' to 10' deep; etc.

WBS Guidance. Each building/structure support facilities, unit price item or bid alternate shall be taken off separately and defined at title level 2 in the MII estimate. By utilizing the separate building and support system take-off procedure it would be easier for Savannah District or the A-E, if necessary, to separate from the Base Bid the appropriate quantities and cost associated with unit price and Alternate bid items that might be identified late in the project Common support facilities shall be included with the building least likely to be identified as an additive or optional bid item. In no case, except for unit price items, shall the WBS title descriptions be changed for levels three through five. New titles for Subsystems or Assembly Categories shall be entered under the "Other" category. See the Military WBS. Note that the 01 through 15 Systems are for the interior of the building (5-foot line outside the building) and System 16 Selective Building Demolition fall under Primary facilities.

Systems 17 through 20 are exterior systems and fall under Support Facilities. For projects bid almost entirely by unit price, the A-E will likely have to revise the military WBS in order to create a WBS tailored to the proposed bid schedule. Consult with SAS Cost Engineer first.

8.10.4.2 HTRW Projects

HTRW (Hazardous, Toxic, or Radioactive Waste) Environmental Restoration Projects shall use the HTRW WBS. The HTRW WBS provides the framework for preparing cost estimates, modeling development, and collecting historical data for all remediation projects. The WBS consists of a numbering and title system that details the work to four levels of the WBS to organize the HTRW estimate. The quantity take-off shall be prepared following the WBS to the same level. In no case shall the WBS title descriptions be changed for levels one through four. Levels five and six shall be created to further break down systems of work into Assembly Categories and Assemblies, respectively. New titles for work not covered in the WBS may be added under numbers 90 through 99. Maintaining this rigid structure for the first four levels will allow systematic collection of historical HTRW costs. Any vertical building construction required within the HTRW project shall be a separate estimate from the environmental work and shall follow the Military WBS. HTRW projects will likely have two distinct phases; construction of a treatment facility and operation and maintenance of the facility over a period of time that may range from months to years. Construction and operation wage rates, escalation rates, and other cost may be different for construction vs. long-term plant operation. Therefore, construction cost will be prepared in a separate estimate from the "after construction" operations costs. Depending on the project scope, it is possible the A-E will be required to prepare three (3) separate estimates for each submittal one for the vertical building construction, one for the HTRW construction, and one for plant operations.

8.10.4.2.1 Assemblies

An Assembly is a collection of individual cost items that function together as a single building/construction unit. For example, a 300 mm (12-inch) storm drainage line consists of excavation, backfill, compaction, layer of drainage gravel/bedding, 300 mm (12-inch) concrete pipe, etc. One unit of assembly contains a specified quantity and unit of measure of each included item. The Assembly has its own unit of measure. When the assembly is "linked" and the assembly quantity is changed, all included item quantities are changed proportionately. **The estimator shall maximize the use of Assemblies for all building and site work construction features. Estimating without Assemblies shall be the exception.**

9.0 DETAILED INSTRUCTIONS FOR QUANTITY TAKE-OFFS

9.1 General

The following procedures and exhibits must be followed in order for the A-E to present an acceptable quantity take-off and estimate. If a spot check of quantities by the District reveals inaccuracies, or the required WBS format has not been used in the preparation of the estimate, the estimate will be rejected and returned for resubmission with the deficiencies corrected.

9.2 Organization

Organization of Quantity Take-off is extremely important. It is essential that the take-off be started and organized based on the anticipated bid schedule, type of funds and the required Work Breakdown Structure; otherwise, much time will be lost attempting to transfer take-off quantities to the appropriate cost estimate bid item, primary or support facility, system, subsystem, assembly and detail item. The lead cost engineer, in coordination with the project manager, architect, and lead engineers must begin the take-off process by becoming thoroughly familiar with the WBS, then setting up the required MII Project Database title structure, i.e., one that will result in satisfying requirements to produce the estimated cost for each separate lump-sum and unit price bid item for each primary and support facility, different funding sources, additive and or options. Distribute this title structure in hard copy or electronic format to all cost engineer disciplines involved in the take-off and cost estimate. Unless you start in this manner you will face some real challenges later in trying to merge or otherwise

Consolidate the individual discipline take-off or cost estimates. It is recommended that, until you become highly proficient with the required WBSs that a hard copy of WBS be used as a guide during the take-off phase.

Quantity take-offs shall not be written and submitted on the drawings. The quantity take-off shall be prepared in a manner that is clearly legible, indicating the calculations involved in determining the quantity and any assumptions the cost engineer has made in determining the quantity. The take-off shall contain back-up or supporting sheets, if necessary, to support the breakdown of all material quantities contained in the design drawings and specifications.

9.4 Quantity Take-Off Sheet Heading

The top of each quantity take-off sheet shall contain the following information: 1) project information; 2) the design stage; 3) the plate number and/or specification number from which the quantity was derived; 4) facility name, quantity, and UOM; 5) WBS assembly code where the quantity should be located in the cost estimate; 6) the date and signature of the cost engineer who prepared them as well as the initials of the cost engineer who checked them.

9.5 Quantities at Five-Foot Line

The quantity take-off for each building and/or structure shall include quantities of materials to a line 5 feet outside the building line. Include site preparation and grading for the building area within this line. Include all cost outside the five-foot line in Support Facilities in the appropriate subsystem.

9.6 Earthwork Quantities

Compute earthwork quantities for site grading, roads, drives, utilities, etc., by the methods of cross sections or end area, or by utilizing software specifically designed for this purpose. For large earthmoving projects, cross sections, etc. for earthwork quantities shall be prepared and submitted with the quantity take-off sheets at concept, preliminary and final design submittal. For minor earthmoving projects, describe method and show calculations for cut and fill quantities. Copies of the cross sections shall be submitted with the concept and preliminary designs, while the originals will be submitted with the final design submittal.

9.7 Exceptions

The estimator shall coordinate with the Chief Technical Support Section for all exceptions to the above take-off requirements.

10.0 DETAILED INSTRUCTIONS FOR DETERMINING APPLICABLE WAGE RATES

10.1 Wage Rate Calculations

Either the current Davis Bacon wage rates or current prevailing wage rates, whichever is greater, shall be used. The wage rate database provided will reflect the most current Davis Bacon hourly rate for the specific installation and includes most wage classifications and basic labor mark-ups for workman's compensation, taxes, insurance and benefits for a 40-hour construction week. It does not however include some highly specialized wage classifications nor does it take into consideration any abnormal circumstances such as a short term shortage of manpower in a specific trade in a local market which may have driven up rates, working in secure area, working in hazardous waste areas, or construction schedules requiring overtime or shift work, etc. The A-E shall be responsible for adjusting wage rates where appropriate and addressing any abnormal circumstances required by the project or local market and making corrections to the database rates provided reference Chapter 5 of UFC 3-740-05. Insurance and taxes on direct labor could be 20% or higher depending on project location and discipline.

10.2 Wage Rate Modifications

If the project requires that the A-E make changes to the Labor Database provided, the A-E shall modify the Labor Database provided to a new Labor Database for this specific project. An explanation of changes to the Labor Database shall be entered in a separate paragraph under PROJECT NOTES – titled EXECUTIVE SUMMARY. A printed copy of the wage rates used in the project will accompany the submission of each estimate. If a new Labor Database is created, it shall be saved when saving the MII project library and transmitted with the formal submittal.

11.0 OBTAINING EQUIPMENT/MATERIAL QUOTES

Formal (written) or informal (telephone call memo) price quotes (preferred) or budget quotes shall be obtained on all principal items of equipment (such as concrete, cranes, elevators, kitchen equipment, pumps, compressors, unit heaters, air conditioners, fans, transformers, switchgear, etc.) and any specialty items (such as glazed acrylic canopies, metal pan ceilings, etc.) and all other large dollar items in the estimate and submitted as part of the estimate backup. These price quotations shall include a sufficient description (size, capacity, etc.)

of the item for evaluation purposes, the name of manufacturer, the date and the name, address, and phone number of the company supplying the quote. Price quotations shall contain the name of the company representative who supplied the quote and the time range for which the quote remains valid. A copy of all quotes/memos used to obtain pricing information shall be attached to the construction cost estimate.

12.0 DETAILED INSTRUCTIONS FOR DETERMINING INDIRECT COST OR FIELD OVERHEAD AND HOME OFFICE OVERHEAD

12.1 Prime Contractors Field Office Overhead Mark-Up

Indirect costs are divided into two categories, Field Overhead and Home Office Overhead (G & A), for field office overhead, the calculated (itemized breakdown) method of determining field overhead is required for 100% to RTA estimates. Percentages can be used for all others. It is essential that Division 1000 specification requirements be factored into field overhead requirements, i.e., requirements for Supervision, QC, Scheduling, As-Built, Project Signs, Temp Utilities, Safety, Portable Toilets, Trailers, Clean-Up (include dumpsters and disposal fees), Site Survey/Layout, Vehicles, etc. Items not applicable to this project shall be deleted and new items shall be added as required.

12.2 Subcontractor's Field Overhead

A subcontractor's field overhead usually bears a fairly direct relationship to the subcontractor's portion of the work and can be estimated on a percentage basis. However, detailing of subcontractor's field overhead costs will be required for very large projects, where the subcontracted work has unique requirements, or where the cost impact of the subcontracted item is 25% or more of the total project direct cost. These percentages shall be used to determine when itemized overhead on subcontracted work is required and in assigning the weighted guide line factors to the Contractor's profit.

12.3 Typical Field Overhead Items

UFC 3-740-05, Chapter 5, lists typical items of indirect costs. This list is to be used as a guide for evaluating particular project requirements.

12.4 Prime and Subcontractor's Home Office Overhead

Home office costs are typically included in Government estimates as an average experienced percentage rate of the expected contract amount. It is important to understand that home office costs are not standard and fixed. The rate for a specific contractor varies from period to period. It is a function of total home office costs divided by the total volume of business during a specific period. A reasonable range of rates for general contractors subcontracting a large percentage of the work may average for estimating from 2% for larger to 7% for smaller contracts. A specialty subcontractor performing most of the subcontracted work will experience a higher G & A rate, from 8% for larger to 15% for smaller contracts. The amount of G & A is computed by multiplying selected percentage by the sum of the total direct cost plus field overhead. The Home Office Overhead shall be entered as a contractor markup.

13.0 DETAILED INSTRUCTIONS FOR DETERMINING PROFIT

Allocation of Profit in Cost Estimates: The estimate will include allowances for prime contractor and subcontractor profit. For the prime Contractor and major subcontractors the rates for profit shall be determined by the weighted guideline method or percentages based on judgment of the estimator or Chief of Cost Estimating(EN-ET). Figure 11-1 of UFC 3-

740-05 is an example of the profit factor sheet. The applicable factors for use in preparing this form are shown in UFC 3-740-05, Chapter 11. The reason for the A-E selecting each factor shall be determined in the "Notes" of each Contractor.

14.0 DETAILED INSTRUCTIONS FOR DETERMINING BOND

The costs of performance and payment bonds will be included in the estimate. The rates shall be calculated using Class B bond. See UFC 3-740-05, Chapter 12 for setting instructions. No bonding shall be included for subcontractors.

15.0 DETAILED INSTRUCTIONS FOR DETERMINING SUBCONTRACT WORK

15.1 Use of Subcontractors in Cost Estimate

Estimates will be prepared for subcontractor work using the same methodology and degree of detail as outlined for the general contractor. The cost of subcontracted work is the amount charged by the subcontractor for the work performed, including costs for direct labor, materials, equipment, and second tier subcontracts as well as his charges for overhead and profit. The list of subcontractors indicated on the sample estimate for illustration only.

15.2 Use of Subcontractor Quotations

The Government Estimate will be prepared initially independent of subcontract quotes. When subcontractor quotes are obtained and validated, they may then be used to verify the reasonableness of the estimated subcontract work.

16.0 SUBMITTAL REQUIREMENTS

Civil Works and HTRW Estimates have unique submittal requirements A-E's should reference their Statement of Work for additional submittal requirements.

16.1 Design Build Estimate for Request for Proposals

A-E's under contract to provide Design Build Request for Proposals shall provide an estimate based on a 10%-35% level of design. The building shall be estimated based on the level of available cost information since there is not a completed design to develop a Class 5 MII estimate. Accepted methods to estimate the building included unit cost from the following sources or combination of: historical bid information, Historical Analysis Generator (HII), adapt-build models, parametric estimating, and PACES Estimate. The supporting facilities should be estimated based on a detailed MII estimate from the provided design. Design Build Estimates should follow the work flow in 16.3 below. These estimates should be prepared and updated for each submittal based on the latest design changes, assumptions, and updated information.

16.2 Pre-concept Submittal Requirements

16.2.1 Code 3 –Pre-Concept Design Program / Project Definition Report (PDR) The Code 3 Design Program (implemented for selected projects) will accelerate project design, intensify customer involvement, and produce a more accurate project budget utilizing parametric cost estimating techniques. It has been selected for application on certain types of suitable projects, such as those utilizing standard designs. The goal of Code 3 is to produce an accurate project definition which will result in a functional, durable,

economical and safe facility that meets the requirements of the customer, within pre-defined budget constraints and supported with a parametric estimate that can be submitted quickly to Congress using minimum funds. Once a project is approved it proceeds directly to final design (no pre-concept, concept or preliminary designs). Reference Architectural and Engineering Instructions for Project Engineering with Parametric Estimating.

- 16.2.2 On receipt of the Code 3 Directive a design team, including cost engineer(s), is assembled for the purpose of defining project scope and cost. The customer is also very much involved in this process. The cost engineer's role in this programming phase is twofold; 1) to provide quick cost estimates of the various alternatives that the team might consider while defining the final project scope; and; 2) to provide a final budget estimate. The cost engineer(s) involved in this process must be senior, i.e., with a thorough knowledge of parametric cost estimating and costs of various types of construction on a unit price, square foot or systems basis, in the vicinity of the project. Cost engineering requirements for this submittal will be defined in more detail in the scope of work.
- 16.2.3 Other Pre-Concept Level Study/Design Submittals. The pre-concept estimate shall be an MII or Parametric (PACES) estimate, and the format of the estimate shall conform to the appropriate Work Breakdown Structure. The pre-concept estimate will generally be used to compare life cycle cost or first cost of a number of alternatives prior to proceeding to concept design.

16.3 Concept (35%) Full Design Submittal

- 16.3.1 Concept Estimate. The concept estimate shall be an MII estimate and the format of the estimate shall follow the appropriate Work Breakdown Structure, proper allowances/contingencies shall be made for WBS systems and subsystems not completely defined in the concept drawings, outline specifications or design analysis.
- 16.3.2 **Funds. The concept estimate will be used to determine if the proposed design is within the amount of funds programmed for the project, and, if over budget, if redesign will be required, a reduction in scope required, or if the customer must pursue additional funding. Frequently these funds, once appropriated, cannot be increased. It is, therefore, imperative that this estimate include costs for every item that will be in the project, or a contingency amount provided for items not clearly defined at this point in the design. The A-E must be absolutely certain that the project can be built for the CWE developed from the concept estimate. During the concept design period, close cost control, consisting of coordination between designer and cost engineer, shall be exercised to achieve an accurate estimate.**
- 16.3.3 Quantity Take-Off. A complete and detailed quantity take-off and accompanying cost estimate shall be submitted with design. The quantity take-off and cost estimate shall be an accurate representation of the completed design submitted.
- 16.3.4 Corrected Concept Cost Estimate. Corrected concept cost estimates will generally be required to incorporate Technical Support Section review comments and scope changes occurring during the review process. The A-E

shall submit a corrected concept estimate if any design or other revisions have been made effecting scope of bid items or project cost. This estimate shall be prepared utilizing all the above described instructions and incorporating all the corrections, revisions, review comments, etc. All changes to the estimate shall be described and identified in the PROJECT NOTES. This estimate will be submitted in duplicate.

16.4 Sixty- percent (60%) Design Submittal Requirements

16.4.1 General. Cost estimates for all construction projects shall be an MII type estimate generated by MII Software and prepared in accordance with instructions contained herein. Proper allowances shall be made for WBS systems and subsystems not completely defined in the preliminary drawings, outline specifications or design analysis.

16.4.2 Preparation. The cost engineer shall show all assumptions as to scope and design used in the preparation of the estimate.

16.4.3 Quantity Take-Off. A complete and detailed quantity take-off and accompanying cost estimate shall be submitted with the final design. The quantity take-off and cost estimate shall be an accurate representation of the completed design submitted.

16.4.4 Principal Equipment. In addition to the quantity take-off, the A-E's shall submit a list of the principal items of equipment and source of pricing (such as cranes, elevators, kitchen equipment, pumps, compressors, unit heater, air conditioners, fans, etc.), indicating the name of manufacturers and positive identification of items selected.

16.4.5 Evaluation. Special attention shall be given to the evaluation of the item General/Prime Contractor's Indirect Costs.

16.5 Final (95% -100%) Design Submittal Requirements

16.5.1 General. Final design cost estimate for all construction projects shall be a detailed estimate generated by MII and prepared in accordance with instructions contained herein and in accordance with Exhibits A through E of this manual. Utilizing Assemblies of construction features.

The MII estimate format should match the Bid Schedule.

16.5.2 Quantity Take-Off. A complete and detailed quantity take-off and accompanying cost estimate shall be submitted with the final design. The quantity take-off and cost estimate shall be an accurate representation of the completed design submitted.

16.5.3 Principal Equipment. In addition to the quantity take-off the A-E's shall submit a list of the principal items of equipment and source of pricing (such as cranes, elevators, kitchen equipment, pumps, compressors, unit heaters, air conditioners, fans, etc.) and any specialty items (such as glazed acrylic canopies, metal pan ceilings, etc.) indicating the name of manufacturers and positive identification of item selected. Price quotations on all items listed above and on all other large dollar items in the estimate will be submitted as part of the estimate backup.

16.5.4 Indirect Field Overhead Costs. An itemized detailed list of field overhead costs shall be part of the final design estimate.

16.5.5 Profit Weighted Guide. The A-E shall use the profit weighted guide to prepare a detailed profit for the prime Contractor and major subcontractors.

16.6 Corrected Final Design Submittal Requirements

16.6.1 Notice. Corrected final submittals are not considered a normal design level and are required only when final submittals must be revised or corrected due to error or omission.

16.6.2 When to Submit. The A-E shall submit a corrected final estimate and bid schedule if any design or other revisions have been made effecting scope of bid items or project cost. This estimate shall be prepared utilizing all the above described instructions and incorporating all the corrections, revisions, final design comments, etc., made to the design since the final design submission. All changes to the estimate shall be described and identified in the PROJECT NOTES. This estimate will be submitted in duplicate with the corrected final design-submittal.

17.0 CWE SUMMARY CALCULATIONS REPORT(MILCON)

17.1 Preparation of CWE Summary Calculation Report. **Exhibit C** shows example of the format for a CWE Summary Calculations report. This summary report shall be prepared for all concepts, preliminary, final and corrected final submittal. The report shall be completed in accordance with instructions contained below.

17.2 Price Level. Use a price level of present day contract costs. The cost summary shall be escalated to the midpoint of construction. Army and/or Air Force escalation factors will be provided by the Technical Support Section.

17.3 Estimated Construction Time. The estimated construction time in calendar days, for the total project shall also be shown. Calendar days are entered in the "EST CONSTRUCTION TIME" field of the "REPORT TITLE PAGE" screen from the REPORTS Menu.

17.4 Contingencies. Exhibit D shows Contingencies at 5% of the Escalated Contract Cost, SIOH at 5.7% of the subtotal of the Escalated Contract Cost and Contingencies of the Escalated Contract Cost (ECC). The percentages vary from program to program and are subject to change. Currently the SIOH rate for MCA funded projects is 5.7%. All OMA funded projects will use a 10% Contingency factor, unless it involves "new" construction and currently use a 6.5% SIOH factor.

18.0 ADDENDUM TO BID SOLICITATION

18.1 During the bid period, any clarifications, redesigns, or other revisions to the plans and or specifications, which affect the final estimated construction cost by either increase or decrease in price, shall be analyzed for cost impact and submitted to Technical Support Section for appropriate adjustment in the GE. These revisions to the estimate may be either MCACES generated, Excel or manually prepared estimates as appropriate.

19.0 ACTION WHEN ALL BIDS EXCEED GOVERNMENT ESTIMATE

- 19.1 After bid opening, if the bids received (to include apparent low bidder) are significantly higher than the Government's Estimate suggesting an unreasonable GE, there is a high probability that one or more bidders will protest the reasonableness of the Government Estimate.

Another situation occurs when the designer/cost consultants' final estimate is not within 15% of the low responsive bid at bid opening. If either situation occurs, the designer has a contractual responsibility to assist the Government in a detailed review and evaluation of the Government's estimate. The designer/cost consultant will promptly conduct an independent view of the GE at no additional cost to the Government. This includes a detailed review to determine if the GE contains any omissions, discrepancies (errors in calculations, et.), quantity takeoff errors, or errors in cost and pricing data. In addition, the reviewer should further analyze any unusual conditions or circumstances that may affect or complicate the work. If the reasonableness of the GE is protested, the analysis will consist of in-depth, point-by-point response to all issues raised by the protester or contractor. The review analysis will consist of the GE, including all backup and supporting data, complete explanation about assumptions made and, if available, historical data from previous similar projects which support the estimate. The GE should be revised immediately if an error is found, and an explanation of the error should accompany the revised estimate. If the revised estimate brings an offer's price within range of a fair and reasonable price, the Contracting Officer will review the situation and determine final contracting action.

20.0 CATEGORY CODES

- 20.1 AR 415-28 identifies both Primary and Support Facility Category Codes. If the A-E contract scope of work requires that the Draft DD Form 1354 be prepared under the contract, then the Category Code Fields shall be completed and the Title quantities and UOM shall be consistent with AR 415-28. Otherwise, these fields need not be completed. Completing the Category Code Fields allows MCACES to interface with the software program which generates the DD Form 1354.

21.0 SCHEDULEING

- 21.1 Project schedules will be provided for all projects with a project amount above \$40M. The A-E shall provide the schedule to the building system level or Work Break Down Structure Level 3 or 4. The schedule will be part of each submittal. Schedules will be submitted in PDF and raw format. The only acceptable programs to create the schedules Microsoft Project or P6 Primavera.

22.0 ORGANIZATION OF COST ESTIMATE SUBMITTALS & NO. COPIES

The submittal package shall consist of (depending on type submittal) and be submitted in the following order:

DOCUMENT(S)	NO. COPIES.
22.1 Title Page	2
22.2 Cost Engineering Checklist for A-E Estimate	2
22.3 Current Working Estimate	2
22.3 Statement of Cost Estimate Review	2
22.4 Quantity Take-Off Sheets (Separated by Facility & Discipline in Excel file)	2
22.5 Principal Equipment & Material Quotes	2
22.6 Other Back-Up Information	2

----END OF CHAPTER---

CHAPTER 9
TECHNICAL SUPPORT
SECTION EXHIBITS
DESCRIPTION

- A. COST ENGINEERING CHECKLIST FOR A-E ESTIMATES
- B. CURRENT WORKING ESTIMATE NARRATIVE TEMPLATE
- C. CURRENT WORKING ESTIMATE TEMPLATE
- D. STATEMENT OF COST ESTIMATE REVIEW
- E. DETAILED PROCEDURES/INSTRUCTIONS FOR MII ESTIMATES

Exhibit A

Cost Engineering Checklist for A-E Estimates

2019 March 16

1. **General.** – The A-E shall prepare all planning, design, and final construction cost estimates, as specified below, utilizing Micro-Computer Aided Cost Engineering System (MII) Cost Estimating Software latest version.
2. **Detailed Work Tasks.** The A-E shall accomplish the following tasks:

Kickoff Meeting.

- Coordinate a one hour cost engineering kick-off meeting in within 14 days of NTP. Attendees will include USACE PM, USACE and A-E cost engineers, and cost peer reviewers. The agenda will include discussion of: estimate development, assumption documentation, quality control, acquisition strategy, and potential project cost constraints. For projects less than \$10,000,000, a conference call is acceptable. For projects greater than \$10,000,000, the meeting shall be held in person at the SAS District Office. The A-E shall send out meeting minutes following the meeting.

Prepare and Check Quantities.

- Develop a draft bid schedule for review and compute estimated construction quantities, including quantities for work that may be bid as lump sum items.
- Submit all computations necessary to support the bid schedule quantities and lump sum bid item work quantities in a report format.
- Prepare all cost estimates on the basis of calculated quantities and unit prices that are commensurate with the degree of design detail known or assumed. Building SF cost can be utilized for 35%-65% submittals if design is not far enough to support detail cost estimate (Level 5 and greater).
- Utilize project notes, added at the appropriate level in MII to explain the basis for quantity calculations, to clearly show contingency allowances, and to note quantities determined by cost engineering judgment that will be reconciled upon design refinement.
- Check quantities through an independent peer review procedure.

Prepare Cost Estimates.

- **Provide a copy of the A-E design team lead and cost peer reviewer comments and cost engineer responses with each submittal (comments/responses in email or Word are acceptable).**

- **Utilizing the 80/20 rule, 80% of the costs come from 20% of the items. Obtain current local quotes for these cost drivers. For remaining items, utilize MII to the fullest capability so that the government has the ability to adjust costs as appropriate in the future without contacting the A-E. Transferring cost estimates prepared using other cost estimating software or methods into MII as a lump sum is not acceptable and is cause for rejection of the estimate.**
- **Show source of cost information for all non-MII items (overrides, USR items, etc). Quotes should state company, phone #, date of quote and copy of quote. All data used for overrides and USR items must be well documented and obtained within 1 year of the estimate date. Include copy of quotes in each cost submittals.**
- Provide unique CSI numbers for user created items and back up quotes or costing support back up information. If used there must be auditable trail for the cost.
- The CWE scope items shall match the Section 00 11 00 - Solicitation/Contract Form bid schedule.
- Prepare detailed estimates for all aspects of the project utilizing MII estimating software. Utilize the latest version of MII with the latest Cost Book Library.
- Prepare the MII cost estimate utilizing HTRW, Civil Works, or Military templates as guides provided by the Chief of Cost Estimating.
- Assure the items in the Bid Schedule and cost estimate are the same, making it possible to cross- reference between the two and to easily determine the cost of each item on the bid schedule.
- Use labor, crew, and equipment databases and/or unit price book costs in the MII software program to develop a cost estimate for each bid item in the Bid Schedule. Most of the detailed items in the estimate should primarily be based on crews rather than the Unit Price Book (UPB).
- Provide notes in the MII estimate to document the assumptions and background information. The Estimator shall provide a list of assumptions that supports how the estimate was developed. This includes but is not limited to: derivation of profit and overhead markups for prime contractor and subcontractors, any design contingency included in the estimate, production and crew development methodology, labor, equipment, quantity take-off information, subcontractor quotes, and all other data used and identified in the MII estimate.
- Document and add distributive costs (i.e. overhead, bonds, profit) to each bid schedule item. Do not include as a separate activity in the MII estimate. Guidance for developing distributive costs can be found in Chapter 5 of ETL 1110-2-573 for Civil Works projects and Chapter 10 of UFC 3- 740-05 for Military projects. Clearly document the percentage assumed and rationale for each distributive cost. MII will calculate bond costs.
- Determine and document reasonable percentages for both field and home office overhead.
- Detail the costs for Civil Works mobilization and demobilization

- Determine and document a reasonable design and construction contingency percentage that will accurately reflect uncertainties in quantities and pricing. Guidance for design contingency development can be found in Chapter 6 of ETL 1110-2-573 for Civil Works projects and Chapter 13.5 of UFC3-740-05 for Military projects.
- Escalate the estimate to the expected midpoint of construction using the latest actual escalation rates(Turner CCI, ENR, etc) for Military Construction Projects or Civil Works Construction Cost Index System (CWCCIS) as appropriate.
- Consider site specific construction conditions during preparation of the estimate.
- Estimate major cost items which comprise a high percentage of the total job cost in detail using labor and equipment crews, production rates and supplier and subcontractor quotes, as applicable.
- Use current Davis-Bacon construction wage rates from <http://www.wdol.gov/>. or District provided
MII Labor Data Base.
- Include the table of contents, summary pages, detail pages, backup pages for labor, crew, and equipment with the hard copy MII submittal.
- Provide an electronic version of the estimate (MII files plus all backup support).
- Wholesale escalation of the MII Cost Book and Equipment Library shall not be authorized. Utilize material quotes for Cost Book adjustments and equipment quotes Equipment Library adjustments. Any quotes received in development of the Project Estimate become property of the Government and shall be include in the project cost submittal.
- Utilization of prior project bid/proposal's shall not be authorized unless full disclosure is available to the Government and the hard copies are submitted as part of the cost submittal. If the A-E would like to utilize these bid/proposal's coordinate with the Cost Engineering Chief prior to submittal.
- Escalate the estimate to the expected midpoint of construction using the latest actual escalation rates(Turner CCI, ENR etc) for Military Construction Projects or Civil Works Construction Cost Index System (CWCCIS) as appropriate.
- Consider site specific construction conditions during preparation of the estimate.
- Estimate major cost items which comprise a high percentage of the total job cost in detail using labor and equipment crews, production rates and supplier and subcontractor quotes, as applicable.
- Use current Davis-Bacon construction wage rates from <http://www.wdol.gov/>. or District provided MII Labor Data Base.
- Include the table of contents, summary pages, detail pages, backup pages for labor, crew, and equipment with the hard copy MII submittal.

- Provide an electronic version of the estimate (MII files plus all backup support).
- Wholesale escalation of the MII Cost Book and Equipment Library shall not be authorized. Utilize material quotes for Cost Book adjustments and equipment quotes Equipment Library adjustments. Any quotes received in development of the Project Estimate become property of the Government and shall be included in the project cost submittal.
- Utilization of prior project bid/proposal's shall not be authorized unless full disclosure is available to the Government and the hard copies are submitted as part of the cost submittal. If the A-E would like to utilize these bid/proposal's coordinate with the Cost Engineering Chief prior to submittal.

Exhibit B

CWE Narrative Template

Project Title

1. Project information

- Project Location:
- Owner:
- Designer:
- Estimator:
- Estimate date:
- Estimator System:
- Date of Report:
- Cost book:
- Equipment Library:

2. Project Background

3. Project Markups

- Prime Contractor
- Field Office Overhead (FOOH) Calculated or %
- Home Office Overhead (HOOH):
- Profit:
- Bond:

- Sub- Contractor
- Field Office Overhead (FOOH):
- Home Office Overhead (HOOH):
- Profit:
- Bonds:

- Construction Start Date:
- Estimated Construction Midpoint:
- Estimated Construction Duration (Days):
- Escalation:
- Design/Estimating Contingency:
- Sales Tax:
- Specialty Mark-ups (Example: high security):

4. Construction Duration.

How was it determined?

5. Cost Drivers

Is there a secure area, etc.

6. Assumptions

Please address Productivity

Exhibit C

Current Working Estimate Template

U.S. ARMY ENGINEER DIVISION, SOUTH ATLANTIC
CORPS OF ENGINEERS
19-Dec-17

REVISED CORRECTED FINAL (RTA) ESTIMATE OF TOTAL PROJECT COST
FOR
Training Facility
FY - 2016 PN - xxxxx
FORT BRAGG, NC

This estimate is based on a Corrected Final (RTA) design package prepared by USACE Savannah District, dated December 2017 and a detailed MII Construction Cost Estimate prepared by USACE Savannah District Technical Support Section.

PROGRAMMED AMOUNT -----							\$28,265,000		
	QTY	UM	UC		BASE BID	OPTIONS	TOTAL		
CONTRACT COST - Present Day									
BASE BID (MCA Funded)									
0001	Construct Advanced Skills Training Facility, Complete	64,865	SF	\$250.57	\$ 16,253,223				
0002	Site Preparation and Development, D Area Site, Complete	1	LS	16.21%	\$ 2,634,074				
OPTIONS (MCA Funded)									
0004	1 Construct Upgrade of Ardennes, Complete	1	LS			\$ 821,696			
OPTIONS (OMA & OPA Funded) [Not in TOTAL]									
CONTRACT COST									
					\$ 18,887,297	\$ 821,696	\$ 19,708,993		
ESCALATION TO CONSTRUCTION MIDPOINT [2.0 x MCP Index]									
				4.24%					
	MIDPOINT OF CONSTRUCTION(MCP INDEX) -----	Dec-18		2935					
	CURRENT MCP INDEX -----	Dec-17		2874					
ESCALATED CONTRACT COST (ECC) -----					104.24%	\$ 19,689,054	\$ 856,577		
SUBTOTAL (EXPECTED PROPOSALS)									
					\$ 19,689,054	\$ 856,577	\$ 20,545,631		
Contingencies -----					5.00%	\$ 984,453	\$ 42,829		
	SUBTOTAL-----				\$ 20,673,507	\$ 899,406			
S&A(SIOH)-----					5.70%	\$ 1,178,390	\$ 51,266		
	SUBTOTAL-----				\$ 21,851,897	\$ 950,672			
E & D (Percentage of ECC + \$110,000)					ECC	X	0.25%	\$ 159,223	\$ 2,377
* Enhanced Commissioning (A/E) -----								\$ 200,000	\$ -
** Privatized Water and Sanitary Sewer Service (ONUS) -----								\$ 330,000	
** Privatized Electric Primary & Lighting (Sandhill, EMC) -----								\$ 250,000	
CWE								\$ 22,791,120	\$ 953,049
								\$ 23,744,169	
CWE / PA						80.63%		84.01%	

* These costs estimated by SAS Technical Support Section.
** These costs prorated from DD1391 by SAS Technical Support Section.

ESTIMATED CONTRACT DURATION - Construction 540 DAYS

PREPARED BY:

APPROVED BY:

xxx,xxxx, CCC
xxxEngineer
Technical Support Section

xxxx, P.E.
xxxx,
Civil Engineer

FOR OFFICIAL USE ONLY

Exhibit D

STATEMENT OF COST ESTIMATE REVIEW

Quantity takeoffs and the cost estimate have been completed for the project and phase stated below.

Notice is hereby given that (1) the design team lead was involved in developing quantity takeoffs and has performed a thorough review of all quantity takeoffs and (2) a peer review of the quantities and cost estimate has been performed by an independent (peer) cost estimator.

All items on the Cost Estimating Appendix for A-E Designs checklist have been completed and the completed checklist is attached.

Reviews included, but were not limited to: assumptions, quantities, methods, procedures, materials, alternatives evaluated, quotes received, the appropriateness of cost data used, and level of detail obtained.

During the development of the cost estimate, compliance with all required procedures and regulations was used.

QC peer review and technical review comments and responses on the cost estimate are attached.

PROJECT NAME

Project Phase (ex. 35%, 65%, 95%, 100%)

Design Team Lead* (printed) (signature) Date

Cost Peer Reviewer (printed) (signature) Date

Cost Estimator (printed) (signature) Date

*Design team lead review does not include price review (includes review of quantities, assumptions, etc. as stated above)

EXHIBIT E

DETAILED PROCEDURES/INSTRUCTIONS FOR MII ESTIMATES

NOTE: THESE INSTRUCTIONS ARE BASED ON MII 4.0. SEE MII USERS MANUAL.

1.0 Estimate Format

The format of all estimates shall follow the appropriate WBS (Military, HTRW, Civil) for the type estimate being created. The WBS should be studied in detail by all persons preparing the quantity take-off and the estimate. The WBS drives the way the quantity take-off will be prepared.

2.1 MII Software and Libraries

Current MII software and libraries can be provided by Savannah District. A-E must purchase a license to use the cost books. All libraries unique to Savannah District will have filename that begins with the first three characters "SAS" (South Atlantic Division Savannah District). All labor, equipment, and material costs provided in the cost libraries are a pricing guide only. It is the A-E's responsibility to check, verify and adjust labor rates, crew production material pricing and mark-ups where applicable for specific project conditions. All databases provided are FOR OFFICIAL USE ONLY and shall be protected accordingly.

2.2 Labor Rates Libraries

See paragraph 10 of this chapter for information about labor rates and any required change to rates. NOTE: Using the localized LABOR RATES will result in the correct hourly labor cost not necessarily the correct unit cost for labor. The correct unit cost for labor will be achieved after adjusting crew composition and crew productivity where applicable for specific project conditions. As the items of work are brought into the project database they are re-priced with the currently selected LABOR, EQUIPMENT, and cost library. The labor and unit cost shown in the cost library will not show the same cost when brought into the project because the library has not been re-priced to the localized LABOR RATES.

3.0 Templates

MII software includes templates. It contains specific project templates for each type of estimate. The appropriate project template shall be used to initiate the project.

Military Templates

For Military Estimates the Project-Template-Military-v3 shall be used to create the estimate format. This template includes most of the TRACES GENERIC WBS to the lowest title level. This printout, along with the Military WBS will help the Cost Engineer create the estimate in the required format.

3.1.1 Military Estimate Hierarchy

When creating a MII estimate it is important to recognize that the construction project consists of seven hierarchical levels, some coming from ENG Form 3086 and some from the Military WBS.

They are defined as:

- LEVEL 0 (Top Most Level)... "PROJECT INFORMATION RECORD" LEVEL
- LEVEL 1 PRIMARY/SUPPORT FACILITIES (ALSO VIEWED AT THE PROJECT INFORMATION LEVEL)
- LEVEL 2 INDIVIDUAL FACILITIES AND ASSOCIATED SUPPORT FACILITIES LEVEL 3 SYSTEMS
- LEVEL 4 SUBSYSTEMS
- LEVEL 5 ASSEMBLY CATEGORIES
- LEVEL 6 ASSEMBLY
- LEVEL 7 DETAIL

3.1.2 Project Level (LEVEL 0)

Level "0" is the Title "Project Information Record". All cost of the Primary Facilities and Support Facilities are accumulated to obtain a total project cost. This shall include all construction contract cost as well as Government-furnished materials and items furnished through funds other than construction funds, i.e., information systems.

3.1.3 Primary/Support Facilities (LEVEL 1)

Level 1 is accessed on the same screen as the Project Information Record; however, the Level 1 Titles are listed below "Project Information Record." Level 1 divides the project into Primary Facilities, Support Facilities, Category E Equipment, and Government-Furnished Equipment based on DD Form 1391 format for the project.

3.1.4 Individual Facilities (LEVEL 2)

Level 2 titles are included at the next "title level" below Levels 0 and 1, i.e., not the same screen. Individual Facilities/Buildings shall be listed under Primary Facilities and include all individual buildings identified by Category Codes in AR 415-28. If the project consists of more than one building in the same category code, each building shall be listed separately, even if the buildings are identical in size and scope. Support Facilities shall be listed separately for each primary facility. When Alternate bid items and items funded from different sources are required, they shall also be located at this level.

3.1.5 Systems (LEVEL 3)

Under Primary Facilities the Military WBS Systems 01 through 16 are titled at this level. If there are multiple Primary Facilities, each one shall be broken down by the 01 through 16 Systems. Under Support Facilities the Military WBS Systems 17 through 20 are broken down under the appropriate DD Form 1391/Eng Form 3086 titles.

3.1.6 Subsystem (LEVEL 4)

This level contains the Subsystem titles from the Military WBS for the above Systems. If there are subsystems in the project not identified by the Military WBS, they shall be identified using 90 through 99 under the appropriate System.

3.1.7 Assembly Category (LEVEL 5)

This level contains the Assembly Category titles from the Military WBS for the Subsystems above. If there are Assembly Categories in the project not identified by the Military WBS, they shall be identified using 90 through 99 under the appropriate subsystem.

3.1.8 Assemblies (LEVEL 6)

Assembly Titles shall be created at this level following the definitions contained in the Military WBS.

3.1.9 Detail (LEVEL 7)

Individual Cost Items are located at this lowest level in the estimate and reports at this level are referred to as the Detail Reports. These are the basic work tasks consisting of labor, equipment and material cost and is the same level of detail as that found in the Unit Price Book Database. Some of the basic work tasks can be modified by Modifiers from the UPB.

3.1.9.1 Modifiers

Modifiers are identified in the UPB database and provide a method of adding or reducing, for optional quality or scope to the work task costs. Each modifier acts solely on the basic cost item it is assigned.

3.2 Civil and HTRW Templates

For Civil and HTRW projects the Project-Template-Civil-v3 or Project-Template-HTRW-v3 Template shall be used to create the estimate format.

4.0 Required Services

The A-E shall supply the following Technical Support Section services.

5.1 Overall Project Analysis

The overall project shall be analyzed by all disciplines involved in preparing the cost estimate to consider the following procedure before making the detailed quantity take-off. This shall be done before preparing the concept estimate as it will dictate the final estimate format needed in the preparation of the quantity take-off.

5.1.1 DD 1391

Review the drawings and DD Form 1391 for the project to determine the project scope, ensuring the authorized project scope is not exceeded. Should the DD Form 1391 contain vertical buildings that can be identified by AR 415-28 Category Codes (no matter how small), the A-E shall put these buildings under Primary Facilities in his estimate unless covered by a separate contract action and cost estimate. When multiple buildings are involved make each building as a separate Facility under the Primary Facilities. (Example: Tactical Equipment Shop which has POL, Storage, and Sentry Buildings). When multiple buildings are being constructed at different sites the A-E shall prepare a separate facility for each building in the Primary Facility and separate Supporting Facilities for each building site. The A-E shall prepare a proposed Bid Schedule based on the Facility (Level 2) of the Primary Facility and the Support Facilities (Level 2) for Site Work.

5.1.2 Buildings

When the number of buildings has been defined in the Primary Facility, each of the buildings shall follow the WBS of defined Systems, Subsystems, Assembly Categories, and Assemblies. The Detail Quantity Take-off shall follow this same format.

5.1.3 Funding

When projects are funded by more than one funding source, all work related to each funding source shall be segregated respectively. Funding sources shall be identified separately at Level 2 in the MII estimate and shall be identified separately on the proposed Bidding Schedule. All work associated with each funding source shall be described on the plans and/or specifications in narrative to facilitate contractors bidding on the same scope of work for each bid item.

5.1.4 Army Projects

For Army projects, all information systems that are funded by OPA shall be a separate Bid Item in accordance with AR 420-1 provided in other documents. These systems shall be identified as specified in paragraph 5.1.3 above. This is not required for Air Force Projects.

5.1.5 Cost Estimate

See Exhibit A, Create New Project Checklist for detailed start-up procedures. If the cost estimate is to be prepared by more than one person on more than one computer and then merged into one Prime Estimate, please contact EN-ET for procedure to merge Multiple Project Databases.

- 5.2 Sales Tax on Materials. Use the applicable state sales tax based on project location. For projects excluded from sales tax, i.e., certain environmental projects exclude taxes where appropriate and provide a note accordingly in the project information notes screen.

5.3 Owner Markups. Set Owner markups to be applied at Level 01. This precludes owner markups from being applied to project costs that may not incur owner mark-ups such as Army communications costs, Government Furnished\Government Installed Equipment, etc.

5.3.1 Contingencies and SIOH. The A-E shall include contingencies and SIOH in the CWE only, not in the MII (EN-ET) file.

5.3.2 Escalation. The estimate shall include appropriate escalation factor. Contact Technical Support Section for appropriate Indexes.

6.1 Starting the MII Project

MI software and libraries should be installed as described above. Activate the MII software following instructions from the MII Software Manual. Before starting the project ensure that the appropriate Project Templates and Databases are selected. Reference Exhibit A, Create New Project Checklist.

6.2 Military WBS projects

6.2.1 For Military WBS Projects the Project-Template-Military-v3 Template shall be selected and copied as described above in paragraph 3.1.

6.2.2 With the new project highlighted press Library Properties and enter the official description of the project title.

6.2.3 See Exhibit A; Create a New Project Checklist for Project Notes instructions.

6.3 Subcontractors

The subcontractors' profit may be either fixed or calculated by the Profit Weighted Guideline for the "OTHER" window as was done for the prime Contractor. In order for Contractors to be used in the estimate they must be assigned at the appropriate level within the Primary/Support Facilities.

6.4 Primary Facilities Title

On the Primary Facility Edit Screen the quantity shall be LS (Lump Sum). Usually the prime Contractor ID "Prime Contractor" is entered on this screen as he is usually the prime on all Facilities under Primary and support Facilities. Project Category Code (from DD Form 1391) is typed into the Category Code Field, unless there are more than one Primary Facility at level, in which case category codes should only be entered at Level 2 titles.

6.5 Facility Titles

Create the number of Primary Facilities that was determined from paragraph 5 above. To create another Facility highlight FACILITY if there are two or more identical or very similar facilities, recommend that you complete the detailed estimate for the first typical facility before you create a copy the next one. By doing this you will only need to make minor revisions (if any at all) to create the complete cost estimate for the similar facility. Continue this process for all Primary Facilities in the project. Type in the name of the Facility, and Gross Square Feet of the Building as the Facility Quantity, UOM, and insert the Facility Category Code (from DD Form 1391 or AR 415-28) into the Category Code Field. Also see the quantity and UOM consistent with AR 415-28. If the prime Contractor was defined on the PRIMARY FACILITIES TITLE leave the Contractor Field blank. Use the same basic procedure to define all the Support Facilities for each building at Level 2 under Level 1 Support Facilities title.

6.6 System Titles

System Titles and Selective Demolition System are pre-defined and the titles shall not be changed. Each shall be edited to enter, the appropriate quantity as defined in the WBS. Any SYSTEM TITLE not used in the project shall be deleted. Sometimes subcontractors can be identified at the Systems Title level as all work performed in the system is normally accomplished by one Contractor. For example System 11 - Electric Power and Lighting is normally installed by the Electrical Contractor "EL." By identifying the "EL" contractor at this title level you need not identify this subcontractor at any level below this, as it is done automatically by the program.

6.7 Subsystem Titles

The Subsystem Titles are pre - defined and the titles shall not b changed. Each title shall be edited to enter the appropriate quantity as defined in the WBS. When there are Subsystems in the project which are not defined in the WBS the A-E shall create them using 90 to 99 Identification code. Any SUBSYSTEM TITLE not used in the project shall be deleted. Subcontractors can also be identified at the Subsystem Title level if all work performed in the subsystem is normally accomplished by one Contractor.

6.8 Assembly Category Titles

The Assembly Category Titles are pre-defined and the titles shall not be changed. Each title shall be edited to enter the appropriate quantity as defined in the WBS. When there are Assembly Categories in the project which is not defined in the WBS the A-E s all creates them using 90 to 99 Identification codes. Any ASSEMBLY CATEGORY TITLE not used in this project shall be deleted. Sometimes subcontractors can be identified at the Assembly Category Title level as all work performed in the category is normally accomplished by one Contractor. For example System 6 - Interior Finishes; Subsystem 01 -Wall Finishes; Assembly Category 03 - Gypsum Wallboard Finishes is normally installed by GW-Contractor and Assembly Category 04 - Tile and Terrazzo Wall Finishes is normally installed by the - Contractor.

6.8.1 When Assemblies can be used multiple times within the project it is beneficial to the cost engineer to create the Assembly in the MODEL's DATABASE rather than in the project. Assemblies from the MODEL's DATABASE can be copied into the project as often as required. The A-E shall copy the SAS Generic Models Database using Copy a Database on the SERVICES Menu to the same six characters as was use to name the project. Select this new Model's Database and uses it to create new assemblies. This new Models Database shall be submitted along with the project database with each submittal. See paragraphs 8.9 and 16 of this chapter for submittal requirements.

6.9 Assembly Titles

The SAS project template contains typical Assembly Titles (without detail items) associated with military construction. The A-E shall revise the Assembly Titles by deleting inappropriate titles and adding titles based on the requirements of the project. The TRACES GENERIC WBS provides a description of detailed items found in the assemblies. If it is necessary to add Assembly Titles, follow the instructions in User Manual.

6.10 Support Facilities Title

In most projects there is only one set of Support Facilities (only one Primary Facility is constructed on the site). When there is only one set of Support Facilities these title record needs only to be edited to identify the Prime Contractor.

6.11 Adding Additional Support Facilities

Occasionally there are projects that contain multiple Primary Facilities, or a project may consist of more than one site and due to scope and or criteria changes or budget constraints, it is not uncommon that one or more buildings may be isolated as alternate bid items. For this reason it is necessary to takeoff and estimate support facilities for each primary facility separately. Therefore, when more than one primary facility occurs, Bldg. No. 1 Support Facilities Title shall be duplicated for each primary facility. To create another Support Facility highlight copy/paste and rename. Continue this process for all Support Facilities in the project. Edit each support facility title to mirror the primary facility title to the extent that the right support facility cost can be easily related to its primary facility.

6.12 Category Codes for Support Facilities. Refer to AR 415-28 to identify the category codes associated with support facilities, i.e., all applicable 800 and 900 Series numbers. Once all applicable codes for the project have been identified, enter the category code at the appropriate title or detail level which will result in capturing all related cost for that code. And make sure the quantity and UOM at this title level are consistent with AR 415-28.

7.1 Print Selected Reports

The following procedures shall be required by the A-E when creating the required printed reports for all submittals.

7.2 Select Required Reports

MII software includes standard Corps reports. Ensure project properties includes name AND telephone number of the cost engineer responsible for preparation.

7.3 Activate Reports Generator

From the REPORTS Menu open standard Report, type in the estimate design status (Concept, Final, etc.) in the Report Title Field.

7.2.1 Send Reports to Print

MII prints to .pdf

8.0 Compact Disk Labels

The following information shall be recorded on all compact disk submitted to Savannah District. Project Identification Code (6 character code) and the design status, i.e. "60% Estimate".

Project Title
Project No.

*** End of Section ***