CHAPTER 11 – COST ENGINEERING

11.1   GENERAL

11.1.1 *Purpose*

The purpose of this chapter is to provide specific guidance for the preparation of cost estimates for military construction projects. Estimates are prepared for programming, controlling costs during design, evaluating bids, assisting in negotiations, and to serve as a guide in establishing a schedule of payments. Often these estimates are also used to evaluate the reasonableness of the Contractor's proposal for negotiated procurement contracts. As such, estimates must be current, complete, and accurate.

The primary intent of this design guide is not to establish basic core estimating methods. It is written with the assumption that the reader has a working knowledge of general construction cost estimating. It provides specific guidance to facilitate cost engineering services and promote estimate uniformity using adopted tools and requirements specific to USACE.

11.1.2 *LRL ED-MC Function, Mission & POC*

The Cost Engineering Section is responsible for cost estimates for all military, civil works and environmental restoration projects assigned to the Louisville District. This Section reviews all prepared cost estimates submitted by A-E firms, contractors, installation support groups, and others. The Cost Engineering section provides a wide variety of support as cost consultants to the District for contractor proposal analyses, VE workshops, etc.

Cost Engineering questions or estimating requests can be directed to:

James J. Vermillion, CCC
Chief, Cost Engineering Section
LRL ED-MC
502-315-6384
James.J.Vermillion@usace.army.mil

11.1.3 *Current Software*

PACES Version 1.2
       Cost Book: 2012 DoD Cost Book

(MII) MCACES 2nd Generation Version 4.2 Build 3
       Cost Book: 2012-b
       Equipment: 2014
       WBS: Approved TRACES MII Template

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11.1.4 *Obtaining Software*

A-E firms or others under contract or providing services to LRL may request software installation packages from ED-MC Section Chief.   Software is generally distributed to A-E's free of charge, however accompanying database licenses must be purchased and licensed as appropriate by the user.

11.1.4.1 *PACES Purchase and Training*

The current version of PACES can be obtained directly from the software vendor via the following:

>   Sales/Support Phone: 1-800-499-2919
>   Sales/Support Email: paces@aecom.com

The requestor will receive a current License pricing list, order form and contractor verification form. The contractor verification form shall be filled and signed by the USACE design manager associated with the project that requires the use of PACES. The contractor verification form allows the A-E firm to purchase software at a discounted price when purchased for the purpose of providing support to USACE.

Software training may also be purchased directly from the software vendor and if conjunction with a software purchase, may be offered at a discounted rate. A-E firms can contact the software vendor for details.

Once purchase arrangements are completed, the A-E may receive disk media or download the software for installation from the vendor. After installation, the software must be registered with the software vendor in order to receive a license key to decrypt the cost book purchased.

11.1.4.2 *MCACES (MII) Purchase and Training*

The current version of MII (MCACES Second Generation) can be obtained via request through LRL ED-MC. The installation and setup software is distributed directly to the requestor.

After installing MII, the user must register the software following the prompt at program startup. During this process, record the email address and password provided. In order to activate the Cost Book Library, the user must login at:
http://www.miisoftware.com/Login.aspx using the registration email and password.
Once login is successful, the user can purchase the appropriate cost book by clicking "Products" choosing the appropriate option(s), providing billing information, and completing the ordering process. Once payment has processed the required activation

key will be emailed to the user. The user can then enter the activation key as prompted to use the library.

Support and training for software usage can also be purchased after login at:

http://www.miisoftware.com/Default.aspx

This site contains FAQ's and other resources for the MII user.

11.1.5 *Terms and Definitions*

Programmed Amount (PA): The Programmed Amount represents the total funds, excluding design, which are available for the project. The PA is for cost of construction in place, cost of supervision and administration during construction, contingencies, cost of communications over and above the basic contract, cost of as-built drawings, cost of energy monitoring and control system connections and other costs required to complete the construction scope of work. The PA is set by law for most projects and cannot be changed except by Congress (except for O&M). However, the Office of Chief of Engineers and the Secretary of the Army, Air Force, or DLA have limited authority to fund projects in excess of the PA provided funds are available in their departments.

Current Working Estimate (CWE): In accordance with ER 1110-3-1300, the CWE is the latest construction cost estimate, which includes the estimated contract cost (i.e. *NOT ECC* as defined below), construction contingency, and S&A costs. The CWE shall not exceed the PA.

Construction Cost Limit (CCL): The maximum cost of construction allowable within appropriated fund amounts for a complete and usable project.

Estimated Construction Cost (ECC): The ECC is defined as the expected cost to construct a project inclusive of all construction labor, materials, and equipment, site development, utility fees, permits, design fees, design or estimating contingency, escalation, contractor markups and other costs directly associated with the construction of the project that a reasonable and prudent contractor would incur during construction. The ECC does not include real estate, other appropriations, S&A (or SIOH) or construction contingency and thus is directly comparable to contractor's proposal or bid. The ECC shall not exceed the CCL.

Independent Government Estimate (IGE): The construction cost estimate prepared by the government for cost control and bid evaluation. The IGE is comprised of two parts: 1) The government estimate (Title and signature pages, and bid schedule) routed through multiple levels of approval and signature and 2) detailed estimate reports that comprise its basis. An estimate does not comprise the IGE without both components of the document. The term "fair and reasonable

cost estimate" is used when referring to the IGE. Access to the IGE shall be limited to government personnel who require knowledge of the subject and the IGE preparer shall mark the IGE "For Official Use Only."

Construction Contingency: An estimated amount or cost to account for unforeseen problems beyond interpretation at the time of or after contract award. This is typically added as a markup along with S&A (or SIOH) to a project estimate to form the project cost. For MILCON projects, new construction contingency is typically 5% and for renovation is 10%, however the appropriate contingency is determined by the project manager.

Design Contingency: An amount or cost added to a project estimate that covers costs that will likely be incurred, but are not precisely known or designed at the time of estimation. Typically this is applied during the early stages of project and is reduced or eliminated as the project develops. This amount is determined by the estimator based on his prior experience and judgment.

11.1.6 *References and Guidance*

The following publications provide guidance and/or policy for military construction cost estimating. The following list is provided for reference, however the most current edition of each publication should be obtained from the USACE repository as identified in section 11.1.7.

 a. ER 1110-1-1300 Cost Engineering Policy and General Requirements

 b. ER 1110-3-1300 Military Programs Cost Engineering

 c. UFC 3-701-01 DoD Facilities Pricing Guide

 d. UFC 3-710-01A Code 3 Design with Parametric Estimating

 e. UFC 3-730-01 Programming Cost Estimates for Military Construction

 f. UFC 3-740-05 Handbook: Construction Cost Estimating

 g. UFC 3-700-02A Construction Cost Estimates

11.1.7 *Web Resources*

11.1.7.1 *Guidance and Policy*

USACE publications such as ER, EC, EM and other official public documents from HQ USACE can be found at:

http://www.publications.usace.army.mil/

UFC's can be found at the Whole Building Design Guide site at:

http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4

11.1.7.2 *Programming Information*

PAX Newsletter: Army Facilities Pricing Guide and DoD area Cost Factors

http://www.usace.army.mil/CostEngineering/ProgrammingAdministrationandExecutionSystemNe.aspx

11.1.7.3 *Wage Rates*

Dept. of Labor Wage Determinations:

http://www.wdol.gov/dba.aspx#0

11.1.7.4 *Travel Expense Cost Source*

GSA Per Diem Rates:

http://www.gsa.gov/portal/content/104877

11.1.7.5 *Online Pricing Sources*

GSA Advantage:

https://www.gsaadvantage.gov/advantage/main/start_page.do

11.2   ESTIMATE GENERATION

11.2.1 *General*

The project estimate and the estimator play an integral role to project development. The importance of an accurate and well developed estimate cannot be understated. The project estimate provides valuable feedback to the PDT as design choices are encountered and changes are made in response to funding and other project constraints.

In comparison to the typical disciplines such as structural, electrical, and mechanical, the successful cost engineer or estimator often applies a much wider degree of judgment and

proprietary software or algorithms be used in formulation of the estimate in part or whole. The prepared estimate must be fully usable by government estimators in formulation of the IGE. As such, the estimate file(s) must be compatible with approved software packages and allow full manipulation and reproduction by the government.

11.2.4.2 *Excel and Other Tools*

In general, Excel may not be used for estimate generation except for partial or basic estimating products or portions in which the native functions of the approved software packages are not sufficient or in the best interest of the government. Usage of Excel or other software tools, in full or part, for estimating a project shall be pre-approved by LRL ED-MC. All estimates and estimate portions prepared via other software means shall mirror the elemental construction and mathematics of the approved software packages. Each estimated task shall be composed of labor, labor output, material, and equipment cost basis along with a complete description of the task item. Additionally the source of such cost basis shall be identified for each task, i.e. "RSM 260533135000," "Judgmental," "Quote #21315 dated…" such that the cost basis is traceable and fully reproducible.

11.2.4.3 *Cost Sources and Pricing Data*

All cost sources and pricing information used by the estimator must be documented, traceable, and reproducible by the government estimator. The estimator will employ a wide range of cost and pricing data to produce an accurate estimate. This data may be obtained from vendor quotations, historical bid results, or widely recognized cost databases. Regardless of source, the data must be fully documented or annotated such that the source can be identified, traced, and/or reproduced if necessary.

Vendor quotations provide the most accurate pricing available, but must be documented. Annotation for vendor quotes should include company name or website, POC, phone number or email address, identifying information such as quote number, and the date the quotation was obtained such that a third party estimator can verify the quote or receive updates in the event of delayed project development.

Where vendor quotations are not available, the use of widely recognized construction cost databases, such as RS Means and others, is highly encouraged. While it is recognized that database costs are occasionally subject to error or inaccuracy, the estimator can correct (and note) as necessary.   Database cost information should be the default cost source in the absence of more accurate information such as a vendor quote. Additionally, cost database items shall be unaltered by default, unless the estimator has sufficient basis for modification and annotates accordingly.

Historical cost information may also be used but the supporting data used must accompany the estimate submittal. Historical costs must be supported with

documentation that denotes general scope, location, date, etc. such that the applicability of such information can be accurately assessed by a third party estimator. Historical cost must also be escalated and adjusted per location accordingly with documented information.

In the unlikely event no cost information is available for a construction task, the estimator's judgment should be employed. However, all judgmental costs should be noted and supported by a sound logical basis, such as comparison to a similar task or product, simple reasoning, proportional relations, weight basis, etc. such that the costs are fully explained for a third party reviewer.

11.2.4.4 *Quantity Takeoff*

All estimates shall be based on a detailed quantity takeoff of construction tasks unless the project is a Design-Build procurement. If quantity takeoff is documented outside the estimating software package, files shall be maintained in an organized and retrievable manner such that examination or recalculation can be performed if necessary. However, the final quantity shall be recorded in the quantity field of the appropriate software package and separate QTO sheets need not be submitted with the estimate. In the event the QTO for an item is materially different from that shown in the project documents, such as a adding a 10% waste factor, the difference of recorded and apparent quantity shall be noted appropriately within the estimate file.

11.2.4.5 *Basis of Estimate*

With each project estimate, documentation of the basis of estimate shall be provided with each submittal. If using MII, this documentation may be embedded in the Notes tab of the project properties. This practice is highly encouraged. If using other means, the basis of estimate may be documented externally and submitted with the estimate.

The basis of the estimate should include the following:
- a. Project title
- b. Location or Installation
- c. P2#
- d. Delivery method Design-Bid-Build or Design-Build
- e. Fiscal Year
- f. Solicitation # (if known)
- g. Program amount (PA)
- h. Construction Cost Limit (CCL)
- i. Description of project scope and assignment of base bid and option items
- j. Significant assumptions
- k. Direct Cost Markups (as applicable)
    - a. Productivity
    - b. Overtime

      c.   Sales tax (required)
      d.   Adjustments

l.   Prime Contractor Markups (as applicable)
      a.   Profit (required)
      b.   JOOH (required)
      c.   HOOH (required)
      d.   Bond (required)
      e.   Design fees
      f.   Design Contingency
      g.   Other

m.   Project Markups (as applicable)
      a.   Escalation (required)
      b.   Construction Contingency (required)
      c.   S&A or SIOH (required)
      d.   Other

n.   Other pertinent information

Basis of Estimate information above should be inserted in the large notes window of the Notes tab in project properties as shown below.
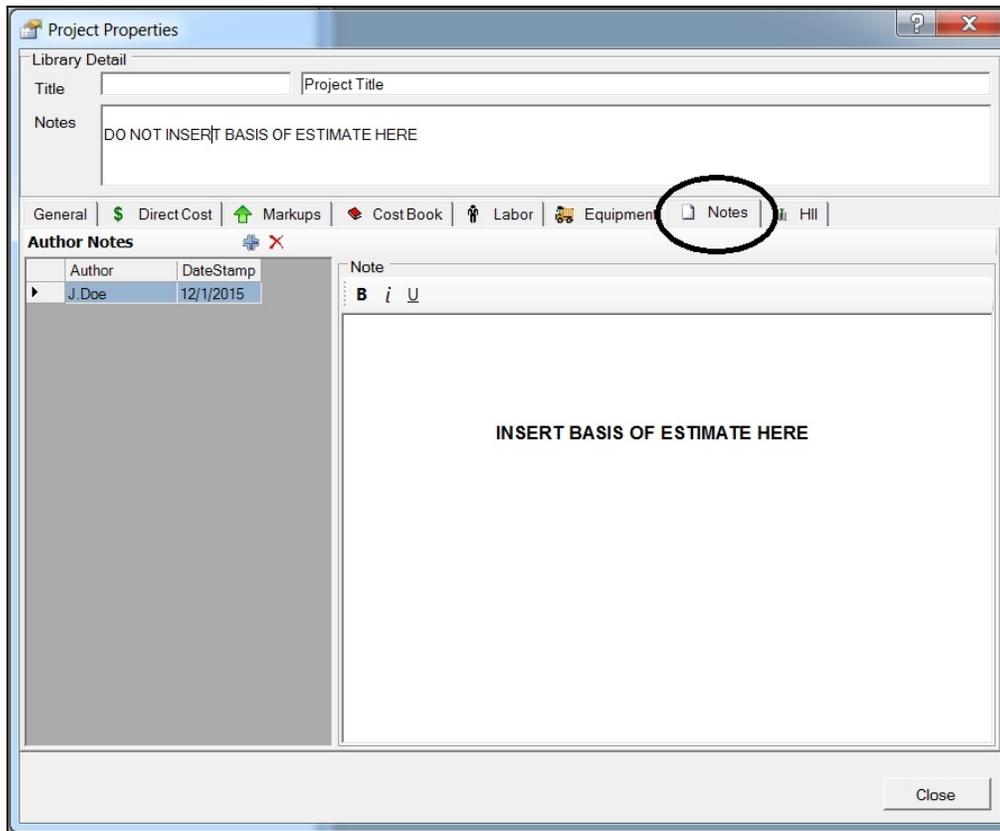
The author notes should be used as a log of information updates after initial information is inserted as the first entry. At subsequent submittals updated information can be added as a new note such that the history of estimate evolution is captured and integral to the estimate file.

11.2.4.6 *Wage Rates*

Federal projects are subject to prevailing wage rates in the locality of construction as a minimum, however appropriate wage rates may be higher in certain locales. The corresponding minimum wage rate can be found at the Dept. of Labor website noted in 11.1.7.3. The general decision number should be entered in the description field on the left with the decision date in the field to the right. The wage rate utilized in the estimate should be noted as follows:

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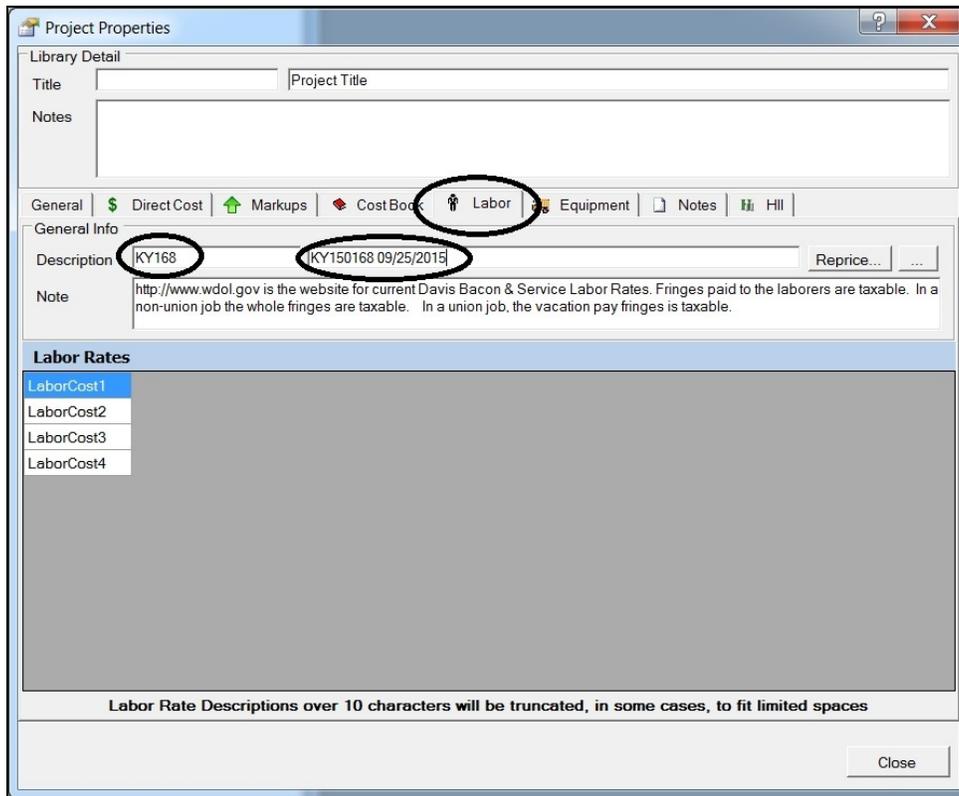
If an estimate or portion of estimate is performed outside of the approved estimating platforms (i.e. Excel), it is essential that each task have fundamental labor and output basis and attached craft labor rate to allow for wage rate changes. It is extremely common for wage rates to change after the project has advertised (and thus A-E or estimator involvement has materially concluded) but before award. Often the government estimator will make these modifications rather than re-engaging the A-E chain, however estimates must be structured to facilitate such a change.

Hourly craft rates consist of a wage and fringe component. The fringe component may be further divided in taxable and non-taxable wages. Tax status of a fringe benefit is dependent on several factors such a fringe type, local practice, etc. It is a commonly accepted (but not required) practice to enter all but $1 of the fringe rate as non-taxable and the remainder as taxable. The estimator may consider all fringe wages as taxable as well, the latter having a more conservative effect and increasing overall cost. If the estimate is highly dependent on one or few craft labor rates the estimator shall determine tax status of fringes more accurately, however for military construction projects employing a wide range of craft labor rates, this is unnecessary.

11.2.4.7 *Cost Book and Equipment Book Identification*

The Cost Book library utilized in the estimate is noted in the Cost Book tab of project properties. This basis information is added automatically when the library is selected and

there should be no need to alter this information by the estimator. The appropriate Cost Book library is noted in 11.1.3.

The Equipment library utilized in the estimate is determined by the estimator and should correspond to the region containing the location of the project. This basis information is added automatically when the library is selected. The appropriate set of Equipment libraries is noted in 11.1.3.

11.2.4.8 *Estimate Structure*

The estimate structure shall match the bid schedule and shall require no manipulation of totals to populate the bid schedule fields (other than the addition of escalation if applied). There shall be at least one highest level folder representing the base bid, or two if options are identified. One highest level folder should contain all base bid CLIN items and a second highest level folder for all option CLINs. Each bid schedule CLIN should correspond to a single sub-folder containing all tasks and costs associated with that CLIN.

If the estimate contains cost items for project tracking purposes but are unrelated to the construction contract, such as FF&E or real estate, they shall be located in highest level folders (equal to base bid and option folders) such that the estimator can un-assign contractors or omit the folder entirely for completion of the bid schedule.

The following represents the typical folder structure for military construction projects:
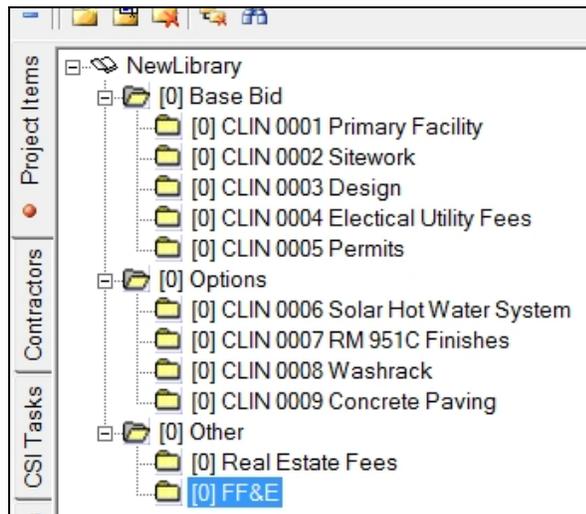
11.2.4.9 *Work Breakdown Structure*

All military construction estimates shall use the approved TRACES work breakdown structure template. This WBS shall be used for all CLINS comprising the construction

contract. The estimator may obtain the MII template of this format by contacting LRL ED-MC. Upon substantial completion of the estimate, the estimator shall remove unused folders.

11.2.4.10 *Direct Cost Markups*

11.2.4.10.1 *Productivity*

The estimator may choose to alter the default productivity of 100% for projects that include adverse conditions that hinder task performance. A common application of this factor occurs on military construction contracts in high security areas to account for site badging and close supervision. For regular losses of productive time, the native factor provided is the preferred method for adjustment, rather than additional estimator created markups. If a productivity is chosen, the reason for such shall be documented by the estimator, preferably via project property notation.

The productivity factor is DEFINED in the project properties Markups tab, however the estimator must APPLY the markup in the Project Items view either broadly through folder assignment on individual tasks as needed.

11.2.4.10.2 *Overtime*

Military construction projects may incur varying work schedules including weekend or after hours work. The native method for calculating overtime shall be used wherever possible and blanket percentage markups elsewhere are not recommended unless the schedule for the project cannot be represented accurately via the native method.

Note: The estimator should be aware that using the built-in OT calculation only accounts the cost aspect of abnormal working hours. From a scheduling perspective, the total man hours are not adjusted to account for recognized productivity losses due to working longer hours for lengthy periods of time.

11.2.4.10.3 *Sales Tax*

The estimator shall determine the applicability of sales tax in each locality. Sales tax exemptions exist for federal projects in many locations, however implementation of the exemption by the bidder is subject to estimator's interpretation. In many states, exemptions exist only for direct purchases by the government, which is not applicable for military construction projects. In some areas a simple, easily obtained exemption certificate may be issued to the contractor by the State DOR and may be transferrable to sub-contractors as well. On military installations, the sales tax exemption means and methods may be well known and commonly implemented. However, in other areas forms and documentation must be filed with each purchase or may not be transferrable to subcontractors making material purchases. Additionally, not all materials will be

purchased within the state boundary of the project location, especially near borders. Therefore, sales tax application must be assessed by the estimator for each project with final determination and application noted in the project properties notes tab. The appropriate state Dept. of Revenue may be contacted for tax rates and other information.

The sales tax rate is DEFINED in the project properties Markups tab, however the estimator must APPLY the markup in the Project Items view either broadly through folder assignment or on individual tasks as needed.

11.2.4.10.4 *User Markups*

The estimator may create any markups needed for direct cost adjustments, but is reminded to categorize and choose calculation method accordingly. Documentation or explanation for created markups is required.

11.2.4.11 *Contractor Markups*

11.2.4.11.1 *General*

The estimator shall order all default or created markups in the fashion they are typically calculated as follows:

1. JOOH (Job Office or Field Overhead)
2. HOOH (Home Office Overhead)
3. Profit
4. Bond
5. Design and others

In the case of created markups for subs or other contractors, the relative order shall follow that above and the markup may appear before or after the corresponding Prime markup. *Failure to follow this markup order can cause inaccurate calculation of the estimate total.*

All default and created markups shall have an appropriate category assigned, i.e. HOOH = HOOH, Profit = profit, etc. created markups may be categorized as "Allowance" or "Misc" if appropriate. *Although mis-categorization does not affect estimate total calculation, column addition in reports may be affected.*

11.2.4.11.2 *JOOH or Field Overhead*

By default, prime contractor field overhead (JOOH) should be calculated and itemized per contract and project requirements, rather than applied as general percentage. JOOH typically includes, but is not limited to, job supervision personnel, temporary project office, temporary storage, temporary utilities, quality control, schedules, etc. Military

construction projects' JOOH range in cost from a few hundred thousand to many millions of dollars. For small projects, such as MATOC procurements, required field personnel can comprise a large cost component of the estimate and as a percentage may be 40-50% or even higher. For larger projects, the fraction of field overhead is smaller, typically less than 10%. The highly preferred method is to itemize JOOH requirements per contract and project requirements.

For sub-contractor JOOH markups, a percentage may be used instead of calculated.

The default method of calculation is "running" and is encouraged. The estimator is free to deviate from this if necessary, but shall provide basis explaining the need for modification.

11.2.4.11.3 *HOOH or Home Office Overhead*

This markup may or may not be used for military construction cost estimates. Typically for construction firms, this markup accounts for corporate office overhead, executive salaries, etc. If this markup is not used, the estimator should consider increasing JOOH to account for these incurred costs. For smaller MILCON project the estimator may choose to omit this markup. If implemented, the default method of calculation is "running" and is encouraged. The estimator is free to deviate from this if necessary, but shall provide basis explaining the need for modification.

11.2.4.11.4 *Profit*

The estimator is required to use the *Profit Weighted Guideline Method* of prime profit calculation for negotiated MILCON projects and highly encouraged for all other projects. This is a widely accepted, methodical approach for determining fair and reasonable profit amounts. Details of the method can be found in reference F and G of section 11.1.6.

It is the locally accepted practice to assign the government assistance factor to 0.12 (below average) by default since it is highly unlikely the government will assist the contractor with construction. All other factors shall be assigned using data given in reference F of section 11.1.6 and the estimator's judgment.

This method may also be employed for sub-contractor profit calculation, however a basic percentage may be applied. Calculation method should be "Running" by default but may be altered if appropriate notation of basis is given.

11.2.4.11.5 *Bond*

Use of the bond tables for the prime contractor is encouraged, but a general percentage may also be applied. Generally, the prime contractor's bond covers that of sub contracted work, thus bond markups for subs are unnecessary.

11.2.4.11.6 *User markups*

An accurate estimate may employ a variety of user created markups, such as design or contractor premiums. The estimator may create markups as needed, but is reminded to categorize them appropriately so as not to affect reports and to document why the markup was applied.

11.2.4.12 *Owner Markups*

11.2.4.12.1 *Escalation*

Escalation is an owner cost and shall be included in estimates as appropriate, especially for large projects with a long construction period. Escalation is incurred as general cost increases occur affecting all three of the fundamental bases: labor, material, and equipment. Escalation shall be computed from the expected award date through the mid-point of construction. One possible such source for escalation rates is the PAX Newsletter cited in section 11.1.7.2. Other sources for escalation rates may be utilized, but underlying data and/or basis must be provided such that applicability can be determined.

11.2.4.12.2 *Contingency*

This owner markup represents the construction contingency cited in cost engineering guidance. It is an allowance for unexpected conditions or circumstances encountered post award of the project during construction. For military construction projects the appropriate contingency amount is determined by the project manager, however 5% and 10% are default values for new construction and renovation work, respectively.

11.2.4.12.3 *S&A or SIOH*

This markup is the allowance for construction administration of USACE projects. It represents a sum to allow for quality assurance activities of USACE construction personnel such as field inspection, submittal review, etc. Applicable rates are set annually by HQ USACE in the internal Consolidated Command Guidance. The current applicable rates may be obtained through A-E Manager of the project.

As of FY15 applicable rates are as follows:

> MILCON = 5.7%
> O&M = 5.6%

11.2.4.13 *User Defined Markups*

11.2.4.13.1 *Material Inflation*

The estimator shall employ a material cost adjustment to account for material inflation occurring between the publish date of the cost database and the time of estimate generation or local material market effects. Such a markup should be created as a direct cost markup applicable to material costs only and categorized other than "Productivity" or "Overtime."

It is a locally accepted practice to adjust database material costs utilizing the Engineering News Record Material Price Index for the period between database publication (typically January) and the current month.

The estimator is reminded that once the markup is defined, it must be applied in the project items view broadly via folder assignment or by individual tasks to become effective.   The estimator shall consider the effect of such markups in estimates with significant numbers of task level material overrides or other user created costs.

11.2.4.13.2 *Labor Inflation*

In general, labor inflation markups shall be avoided as appropriate labor costs should be computed via accurate wage rates. However, in certain circumstances, such as localities hosting large municipal projects, labor shortages or other local labor market effects, a labor premiums may be appropriate. If needed, labor inflation shall be defined as a direct cost markup applicable to labor costs, and applied to necessary task items.

11.2.4.13.2 *Equipment Inflation*

In general equipment inflation markups should also be avoided as equipment rates should be appropriately calculated using the correct equipment library. For military construction projects, equipment typically comprises a small portion of project cost, however local market effects may be captured via this method. This markup should also be defined as a direct cost markup applicable to equipment cost only.

11.2.4.13.2 *Other User Defined Markups*

The estimator may define other markups to adjust task items or overall cost as necessary to account for various market conditions.   These may be employed as direct cost or contractor markups as appropriate, however, all user defined markups require explanation of basis in the way of project notes such that applicability can be determined and verified.

11.2.4.14 *Project Task Overrides*

11.2.4.14.1 *General*

In general, manual overrides of output, labor, material, or equipment should be avoided, unless more accurate and substantial information is known, in which case override is expected. All overrides must be accompanied by an explanation of basis and specific supporting information. If an override's basis is historical information, that information or data must be included with the estimate such that it is verifiable and its applicability can be assessed.

Manual overrides should only be made for spot or minor adjustments. Where a task is of high value due to attached L, M or E costs or through its applied quantity, more robust changes of the underlying CSI task or crew makeup should made. If significant modifications are needed, the estimator should consider creating a unique USR cost with the appropriate labor, crew and material component makeups.

General, non-specific override notation of "based on prior bids" or "estimator's experience" are not acceptable. Additionally, estimates comprised of significant manual overrides without adequate explanation or substantiation are not acceptable. Significant manual overrides make estimates cumbersome or impossible to update, verify or corroborate. Un-explained overrides do not provide the self-evident basis required in cases of dispute, modification, or negotiation.

The estimator should choose the method and location (project task level or CSI task level) wisely considering the effect of the override given the task item makeup hierarchy. If the override is to be made on a single or few tasks, project level override may be most appropriate and is generally preferred because the accompanying notation is immediately apparent to the reviewer. However if the same task is used in multiple places throughout the estimate, changes at the underlying CSI task level with accompanying notation there may be more appropriate.

Project task level overrides of output, labor, material, equipment, or sub bids should be accompanied by explanation in the notes field directly below the task description as follows:

11.2.4.14.2 *Output Overrides*

If labor costs must be adjusted on individual or low value tasks, the preferred method is via adjusting task output. This provides capability to update wage rates appropriately. If the task is of high value due to labor component or quantity, more proper adjustments of the crew and labor makeup should be made.

11.2.4.14.3 *Labor Overrides*

Labor cost adjustments may be made through manual overrides, however the estimator is cautioned that the labor cost will not reflect subsequent wage rate changes.

11.2.4.14.4 *Material overrides*

Material overrides are frequently needed to address material price fluctuations. However as with other overrides, explanation (cost source, date, POC, etc.) is needed.

11.2.4.14.5 *Equipment and Sub-bid Overrides*

Overrides of these parameters have the same requirement for explanation as Labor, Material, and Output equivalents.

11.2.4.15 *CSI Task Level Adjustments*

11.2.4.15.1 *Material and Sub Bid Adjustments*

The estimator may choose to modify the default attached material or sub-bid cost at the CSI task level. This method is more appropriate and expedient if the CSI task is used in many places throughout the estimate and allows the modification to be made in one place instead of many. As always, notation explaining the nature of the change is required. An example is shown below:

11.2.4.15.2 *Output Adjustment*

Under no circumstances shall output be modified at the CSI task level. For spot adjustments and minor corrections, this change shall be made at the project level. However, if the value of the task or frequency of use requires modification of the CSI task, the estimator shall make a copy of the CSI task, modify the output as required and provide notes detailing the change as required.

11.2.4.16 *User Created Items*

The estimator is often tasked with generating cost data for unique or summarized construction tasks. User created tasks shall be created from elemental basis in a similar fashion to standard task items. Task items begin by defining required labor and equipment and associating them via crew makeup. The created crew is attached to a CSI task where appropriate materials cost and output rate are assigned before use as a project task.
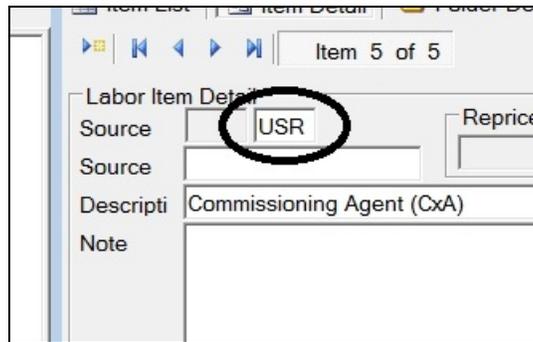
11.2.4.16.1 *General*

11.2.4.16.1.1 *Labor Items*

Labor items may be created as needed. Sufficient notation and description of the labor item shall be included. If only a few labor items are created they can be arranged in the appropriate folder of similar labor crafts as shown on the left below. If many labor crafts are created, they should be grouped into a user created folder to facilitate review as shown on the right below.

Generally it is preferred that items are created rather than copied and edited. If a labor item is copied and then edited, the estimator shall ensure the source code is edited to USR as shown.

The estimator shall provide explanation of the attached wage rate and fringe if they do not follow the appropriate wage decision noted in the estimate, see 11.2.4.6.

11.2.4.16.1.2 *Equipment*

Creation of equipment items shall follow the general tenets of equivalent labor, crew, and CSI task items. Makeup shall be self-evident, complete and noted as necessary. USR created equipment items shall be similarly located in a USR folder in order to facilitate review.

11.2.4.16.1.3 *Crew Makeup*

Crews may be copied and edited or created by the estimator. The estimator shall take care in assigning crew labor, labor type, and equipment assignment. Similar to assemblies, crew makeup errors can result in significant estimating error. All user created or edited crews shall be located in a USR folder as shown in section 11.2.4.16.1.1, regardless of the number of created or copied crews.

11.2.4.16.1.4 *CSI Tasks*

CSI tasks may be created or copied and edited as needed, similar to crews. The estimator should take care in assigning material, sub bid, and crew output fields. If the CSI task is user created it shall include a complete description with explanatory notes in the notes field as necessary. If a CSI task is copied and subsequently edited, the estimator shall provide notation explaning edits and must change the description of the item to suit. This is necessary to easily distinguish the edited CSI task from the original and understand intent.

11.2.4.16.2 *Assemblies*

Assemblies can expedite estimate development by arranging common or frequently used tasks in a summarized manner. User created assemblies must be noted sufficiently to explain their basis and makeup such that a third party reviewer can understand and verify

the assembly's contents and content relations. For assemblies comprised of five items or less, a titular description will usually suffice. Where the assembly contents are more complex or not obvious, the estimator shall provide a more complete description in the notes sections as shown.
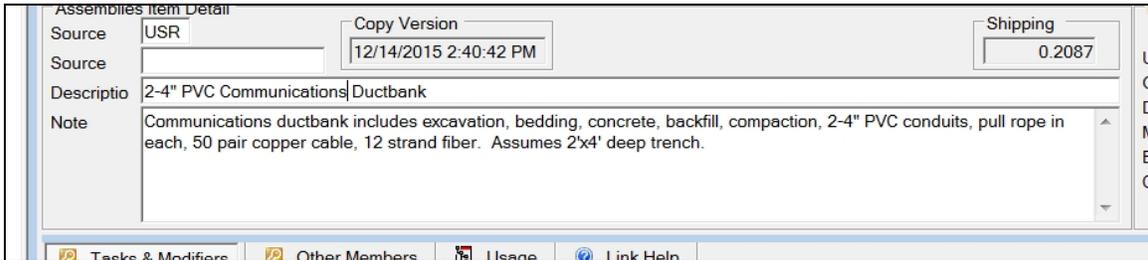
The estimator shall take extreme care in creating assembly and defining quantity relationships. Simple math or typographical errors can be heavily multiplied and result in significant estimate error.

It is preferred local practice to leave common factors and math operations visible in quantity definitions, rather than summarize the math string as an irrational number. This facilitates the reviewer in assessing applicability of the assembly and provides further explanation of makeup. In the example shown below, the factors correspond with details of the description, showing the reviewer that intended excavation dimensions are assembly length by 2' wide by 4" deep and is then converted to native unit of LCY. This allows the program to perform calculations, facilitates review, and avoids potential transcription error from the calculator.

11.2.5 *Filename Convention*

The estimate files shall be named as appropriate using identifying characteristics of the project. All estimate files shall include the P2#, project title, submittal description (35%, interim, final, RTA, etc), and date in that order. An example filename is as follows:

> 457861 Bldg F20607 HVAC Repair FINAL 1-25-16.mlp

11.2.6 *File Transmittal*

11.2.6.1 *Email*

Distribution of estimates via email should be done with caution due to attachment limitations and document control issues. However, files distributed via email can be accepted if they are compressed or file extensions are altered. Estimate files may be compressed (ZIP) to reduce file size. The attachment file size limit is approximately 10Mb. If the file is small enough, it may be sent uncompressed, but the file extension (native files only) must be changed to ".txt" to circumvent email filters for database files. When sending a native file, the email must include information regarding the original native file extension type (.mlp, .mla, .mrp, .mdb, etc.) so it can be reverted correctly when received.

11.2.6.2 *FTP*

FTP utilizing SAFE (commonly referred as AMRDEC) is the preferred method of file transfer. A user guide for accessing and using SAFE may be obtained from the Design Manager or LRL ED-MC.

Alternate FTP methods including A-E firm sites, can be used for transmittal of For Official Use Only (FOUO) files, however FTP sites must be project specific, password protected, and require specific login. Peripheral communication (email, phone call, etc.) between the transmitter and receiver should be made to ensure complete transmittal and receipt of files, particularly if compressed into a single file.

11.2.6.3 *Sensitive or Secure UNCLASSIFIED Projects*

File transmittal for sensitive or secure projects shall be in strict accordance with contract requirements and applicable security procedures. Consult with the Design Manager for proper file transmission procedures.

11.2.7 *Estimate Distribution*

In general, the estimate report shall be distributed in PDF format for project personnel in roles other than estimating in accordance with submittal requirements defined in the A-E contract. Record copies of the estimate shall be in accordance with contract documents.

The native estimate file(s) shall be distributed to only the Design Manager for forwarding to government estimators.

11.2.8 *Quality Control*

The estimator is responsible for adhering to quality control processes denoted in the applicable QCP. Estimate checkers shall be named in the note tab of the estimate project properties. If estimate review is not covered by the applicable QCP, estimates or

estimate products must be reviewed by another independent estimator. This can be a peer review or other consultant, as long as the reviewer possesses applicable estimating experience and familiarity with the software package used. Under no circumstances will the un-reviewed product of a single estimator be accepted by LRL ED-MC.

11.3 SUBMITTAL REQUIREMENTS

11.3.1 *General*

Project specific submittal requirements of the estimate shall be in accordance with the A-E contract scope. The Design Manager can provide specific addresses, number of copies, formats, and distribution lists as needed.

The following sections define general expectations of LRL ED-MC for submittal contents. Which submittals are required or appropriate is as defined by contract documents or directed by the Design Manager.

11.3.2 *Pre-concept and Other Estimate Derivatives*

There are generally no requirements for estimates prior to concept definition, however basic estimate products such as SF comparisons, charts, etc. may be needed.   If the estimate product will be reviewed by the government or must be manipulated in anyway, the native file used to create such is required.

11.3.3 *Concept Submittal (Code B)*

At the concept submittal either software package may be used. If the project is a standard facility, PACES is probably is more expedient, however MII may be used as well. Concept level estimates in MII must have summarized costs noted and explained. Assemblies, SF costs, and general allowances must be explained and noted in detail sufficient to verify applicability. The estimator may employ the use of design contingencies at this submittal commensurate with project detail.

For design-build (DB) projects PACES is likely the preferred package as it may be used throughout project development.

No bid schedule is required at the concept submittal.

11.3.4 *Interim Submittal*

For design-bid-build (DBB) projects, MII is the preferred software package for this submittal. At this stage sufficient detail should be available to create a detailed, task oriented estimate utilizing fewer summarized costs than at the concept submittal. The MII estimate may be an import from PACES or original creation. At this stage, the

estimator should be migrating from primarily aggregate, summarized costs to detailed task analysis with more significant quantity takeoff. Additionally, design contingencies should be of diminished value from the concept submittal.

For DB projects, PACES is likely the preferred software package, however, MII may also be used. PACES projects should be edited and revised commensurate with project development. MII estimates may incorporate aggregated or summarized cost elements as necessary to reflect project costs.

Inclusion of editable draft bid schedule is encouraged with this submittal. The estimate structure shall reflect that of the bid schedule.

11.3.5 *Final Submittal (Code C)*

For final DBB project submittals, all estimates should be complete using MII and based on detailed quantity takeoff and task analysis. At this stage, remnants of PACES import or summarized costs should be eliminated, as well as the use of design contingencies.

For DB projects, either software may be used. If PACES was used from project beginning, it is expected that basic model assumptions have been verified and edited as necessary to reflect project development. If utilizing MII, some aggregate or summarized costs may be appropriate, but should not comprise the primary basis of the estimate.

An editable and completed bid schedule is required for this submittal. The estimate structure shall reflect that of the bid schedule.

The estimates shall incorporate comments and changes from the interim review.

11.3.6 *Subsequent Submittals*

For post-final submittals, such as corrected, certified, RTA, etc, the submittal expectations are the same as for final.

The bid schedule shall be finalized, filled, and editable. The estimate structure shall match the bid schedule such that the estimator has pulled bid schedule values from the corresponding estimate report with no manipulation other than the addition of escalation if applied.

The estimate should require no manipulation by the government other than wage rate updates during the advertisement period and incorporate all comments and changes made to date.

CHAPTER 11 – COST ENGINEERING

In accordance with the A-E contract documents, the estimator shall provide estimating services for cost impacting amendments. All cost estimating principles stated within this document shall apply to the development of the cost estimate changes due to amendment.

11.4 ESTIMATE REVIEW PROCESS

11.4.1 *General*

All estimates received by LRL ED-MC will be reviewed for quality assurance in accordance with standard estimating process and procedures outlined in this document. The reviewer will provide written comments usually in the designated review in ProjNet, but may be in the form of a word document or email sent to the estimator or A-E firm representative.

The estimator is strongly encouraged to begin dialogue with the reviewer to address and alleviate concerns. As mentioned throughout this document the reviewer will seek to fully understand the estimator's intent and application of items in the estimate. The overwhelming majority of review concerns or comments are typically related to lack of understanding of the estimator's method or basis information by the reviewer.

11.4.2 *Review Processes*

11.4.2.1 *General*

MILCON projects estimates will be reviewed according to estimator's judgment as necessary, but will basically follow the general direction of the MILCON Checklist. A version (current as of 4th Qtr FY15) of this checklist is included as Appendix A for reference. This is a living document subject to change and improvement and the most current edition can be obtained via request to the LRL ED-MC POC. Estimators are encouraged to develop estimates with this checklist in mind for all MILCON projects, however for Reserve projects, its use by the government reviewer is mandatory.

In addition to the items and limits set forth in the checklist, the reviewer may use additional means or methods of review as applicable. Some of these general methods are described below.

11.4.2.2 *80/20 Rule*

Estimates may be reviewed in accordance with the general 80/20 rule observation that 80% of project costs are associated with 20% of tasks. Tasks comprising a high dollar value due to unit costs or large quantity will be scrutinized for accuracy. The complete task list in the estimate may be exported to excel for calculation and analysis of general rules of thumb.

Single line items comprising more than 0.5% of contract cost, will be reviewed and or verified.

11.4.2.2 *Contractor Markups*

Contractor markups will be assessed for structure and reasonableness base on prior experience and project particulars. Profit will be assessed in accordance with methods suggested in this document and the reviewer's judgment as necessary. Field office overhead will be reviewed in light of project requirements and methods previously suggested.

11.4.2.3 *Quantity Takeoff*

Quantity takeoff for high value components will be thoroughly reviewed as reflected in project documents and drawings. Depending on complexity of the estimate, varying degrees of spot checking may be employed by the reviewer.

11.4.2.4 *USR Items and Overrides*

All significant USR items and overrides will be reviewed thoroughly. The estimator shall thoroughly explain basis of creation or edit of user created items and overrides for the reviewer. User created assemblies, crews, and CSI tasks will be reviewed for proper makeup and math relations. Application of the procedures recommended in this document will facilitate review.

11.4.2.5 *Wage Rates*

Wage rates will be compared with the most current wage decision or other criteria if applicable.

11.4.2.6 *General Proportional Analysis*

Labor, material, and equipment proportions will be examined by comparison to prior experience for similar projects. Additionally systems proportions may be examined for typical military construction project estimates.

11.4.3 *Army Reserve Projects*

Army Reserve projects comprise a portion of LRL's overall mission and usually consist of a standard group of facilities. These Reserve projects are often located in areas other than established military installations. It is imperative that the estimator fully understand, consider and apply local market conditions specific to each project to produce accurate estimates.

CHAPTER 11 – COST ENGINEERING

In order to accurately capture local market conditions, section R of the checklist will be applied. While this is perfectly applicable to other MILCON project estimates, it was created specifically for use on Army Reserve projects.

11.5 FEEDBACK

11.5.1 *Reserved*

11.5.2 *Reserved*

11.6 APPENDICES

All appendices contained in this document are for reference only and subject to change, update, etc. The most current version shall be obtained through request to LRL ED-MC.

Appendix A

MILCON Checklist

MILCON Estimate QC Checklist

Project Title: [_____] P2#: [_____]

Estimate Preparer: [_____] Design Level: [_____]

Estimate Reviewer: [_____] Submittal Date: [_____]

General	Y	N	N/A	Comments	Revise?
G1. Is estimate detail commensurate with design detail level?	☐	☐	☐		☐
G2. Do the estimate notes identify scope, significant assumptions, wage decision, file path name, special conditions, P2#, PA, and other important information?	☐	☐	☐		☐
G3. Has the most current Unit Price Book been used?	☐	☐	☐		☐
G4. Has the most current Equipment book and appropriate region been utilized?	☐	☐	☐		☐
G5. Is the contractor structure explained or defined in notes, if not typical?	☐	☐	☐		☐
G6. Have subcontractors been appropriately assigned task items?	☐	☐	☐		☐
G7. Has the project delivery type (DB or DBB) and procurement method been identified in estimate notes?	☐	☐	☐		☐
G8. Does the estimate structure reflect the existing or expected bid schedule structure?	☐	☐	☐		☐
G9. Has a unit cost analysis or comparison been performed?	☐	☐	☐		☐

MARKUPS	Y	N	N/A	Comments	Revise?
MU1. Have productivity, overtime, and other adjustments to labor been considered? Do they reflect time and space constraints of the project? Are they noted?	☐	☐	☐		☐
MU2. Has Prime contractor Field office been itemized and include all costs such as personnel, liability insurance, field office rentals, small equipment mob/ demob, and consumables?	☐	☐	☐		☐
MU3. Are design contingencies included? If so are they noted and explained?	☐	☐	☐		☐
MU4. Has profit been calculated using Profit Weighted Guidelines?	☐	☐	☐		☐
MU5. Has historical material inflation been accounted for?	☐	☐	☐		☐
MU6. Does the estimate include general escalation beyond the estimate preparation date to the midpoint of construction?	☐	☐	☐		☐
MU7. Has design cost been included?	☐	☐	☐		☐
MU8. Are contractor markups applied and reasonable, including JOOH?	☐	☐	☐		☐

MATERIALS	Y	N	N/A	Comments	Revise?
ML1. Has the quantity take off been checked for high value and high qty items and spot checked for others?	☐	☐	☐		☐
ML2. Are material overrides, quotes, and quote contact information noted conspicuously?	☐	☐	☐		☐
ML3. Has cost driving material pricing been studied, altered, and updated per local market conditions as appropriate?	☐	☐	☐		☐
ML4. Are lumps sums and other user costs noted conspicuously?	☐	☐	☐		☐
ML5. Is sales tax included?	☐	☐	☐		☐
ML6. Have applied general factors been noted such as loss, waste, shrink, swell, etc?	☐	☐	☐		☐

LABOR	Y	N	N/A	Comments	Revise?
ML7. Do labor rates correspond with the noted wage decision for the project location?	☐	☐	☐		☐
ML8. Have appropriate Payroll Tax & Insurance been assigned to contractors?	☐	☐	☐		☐

FILTERS	Y	N	N/A	Comments	Revise?
F1. Have the project items that comprise 80% of contract cost been identified and examined?	☐	☐	☐		☐
F2. Have all cost items been assigned to a contractor?	☐	☐	☐		☐
F3. Have zero quantity items been removed or made non-zero quantity?	☐	☐	☐		☐
F4. Have all items with Output, Material, Labor, and Equipment overrides been examined that comprise more than 0.5% of the contract cost? Is the basis for overrides noted conspicuously?	☐	☐	☐		☐
F5. Have all USR project items comprising more than 0.5% of contract cost been examined and appropriately noted?	☐	☐	☐		☐

MCAR/RESERVE SPECIFIC	Comments
R1. What is the current PA?	
R2. What is the current CCL?	
R3. What are the programmed unit costs of primary facilities?	
R4. What is the current expected construction estimate of the ARC, OMS, UHS, and their associated supporting facilities costs?	
R5. What is the current programming unit cost for each facility?	
R6. What are the normalized, adjusted and filtered HAG unit costs for the three main facilities for the prior 3 years? Attach report for review.	

MCAR/RESERVE SPECIFIC	Y	N	N/A	Comments
R7. Have recent or prior year bid results been considered?	☐	☐	☐	
R8. Has the geographic USACE district been contacted?	☐	☐	☐	District: POC:
R9. Have any special market conditions been identified through contact with the geographic district?	☐	☐	☐	
R10. Have vendor and/or supplier quotes been obtained and noted as appropriate for major cost driving items?	☐	☐	☐	
R11. Does R4 exceed 79% of R2? Has the PE/A and/or PM been notified? List date and method.	☐	☐	☐	
R12. If R4 exceeds R2, has the ED-MC and ED-MR section chiefs been notified?	☐	☐	☐	

Appendix B

Equipment Region Map

Regions for the Construction Equipment
Ownership and Operating Expense Schedule

IX — ALASKA

XII — KWAJALEIN ISLAND

X — HAWAII

XI — PUERTO RICO

I, II, III, IV, V, VI, VII, VIII

Cities: SAN FRANCISCO, SACRAMENTO, LOS ANGELES, PORTLAND, WALLA WALLA, SEATTLE, ALBUQUERQUE, DALLAS, FORT WORTH, GALVESTON, TULSA, KANSAS CITY, OMAHA, ST. PAUL, ROCK ISLAND, ST. LOUIS, LITTLE ROCK, MEMPHIS, VICKSBURG, NEW ORLEANS, MOBILE, HUNTSVILLE, NASHVILLE, ATLANTA, LOUISVILLE, CINCINNATI, CHICAGO, DETROIT, HUNTINGTON, BALTIMORE, PITTSBURGH, BUFFALO, JACKSONVILLE, SAVANNAH, CHARLESTON, WILMINGTON, NORFOLK, PHILADELPHIA, NEW YORK, BOSTON