

Military Construction Cost Estimating

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Agenda

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- Construction Cost Adjustment Factors
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 - Facility Acquisition Management Plan
 - Planning and Programming
 - Design Process
 - Construction
 - Operations and Sustainment Costs Estimating
- Cost Estimating Tips





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MILCON Common Estimating Sources



- **PAX Newsletter No 3.2.1 (PAX/ACF)**: DoD Area Cost Factors PAX Newsletter No 3.2.1, dated 20 Mar 2014. The ACF values are based on a 2013 CONUS construction market survey of 96 Base Cities (two cities per State in Bold font) plus an additional 120+ CONUS locations' average construction costs.
- **PAX Newsletter 3.2.2 (PAX)**: Unit Costs for the Army Facilities – Military Construction Program (PAX Newsletter 3.2.2, dated 5 May 2013 : Revised 11 Sept 13) The Primary Facilities unit costs include installed (built-in) building equipment and furnishings normally funded by the MILCON funds, contractor's markup cost for overhead & profit, but do NOT include allowances for construction contingencies and supervision, inspection, and overhead (SIOH), constructions cost growth resulting from user changes, unforeseen site conditions, or contract document errors and omissions.
- **RSMeans CostWorks 2014, Version 15.18**: RSMeans is North America's leading supplier of construction cost information. RSMeans provides accurate and up-to-date cost information that helps owners, developers, architects, engineers, contractors, and others to carefully and precisely project and control the cost of both new building construction and renovation projects. In addition to its collection of annual construction cost data books, RSMeans offers construction estimating and facilities management seminars, electronic cost databases and software, reference books, and consulting services.
- **Unified Facilities Criteria (UFC)**: The UFC is the DoD Facilities Pricing Guide (UFC 3-701-01 March 2011 Change 5, August 2013) which is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD(AT&L) Memorandum dated 29 May 2002.

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Construction Cost Estimating Methodologies

- **Project Comparisons (Analogies)**: Early planning estimate. Primary Facilities are based on experience from similar projects, with known adjustments or assumptions. This method is considered "preliminary" and is accurate only from -25% to +40%
- **Square Foot/ Meter (Unit Cost and Units of Measure)**: Method of developing both preliminary and intermediate budgets based on historical data when design has matured to allow calculations of floor areas and volumes. Estimates made with this method can be expected to be accurate between -15% to +25%
- **Parametric Cost**: Is an intermediate-level estimate performed when design drawings are typically between 10% and 35% complete. Parametric costs are based on assemblies or systems grouping the work of several trades, disciplines and/or work items into a single unit for estimating purposes. Estimates made with this method can be expected to be accurate between -10% to +15%
- **Quantity Take Off (QTO)**: Work divided into smallest work increments and unit price. e.g. # bricks + delivery + ties + mortar + etc.; QTO can be based on a site adapt design cost estimate or using a 35% or more design. This method provides the most accurate estimate, typically between -7.5% to +10%

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UFC Unit Costs Breakdown

- Replacement unit cost provides a complete and useable facility capable of serving the purpose of the original facility. Replacement costs include:
 - Construction of standard foundations
 - All interior Walls
 - Exterior walls
 - Doors
 - Roof
 - Utilities out to the 5-foot line
 - All built-in plumbing
 - Lighting fixtures
 - Security and fire protection systems
 - Electrical distribution
 - Wall and floor coverings
 - Heating and air conditioning systems
 - Elevators
- Not included are project costs such as:
 - Design
 - Supporting facility costs
 - Special foundations
 - Equipment acquired with other funding sources (e.g. mission-funded range targets)
 - Contingency costs, and supervision, inspection, and overhead (SIOH)
 - Items not included are generally considered personal property such as computer systems, telephone instruments, and furniture

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Construction Cost Adjustment Factors

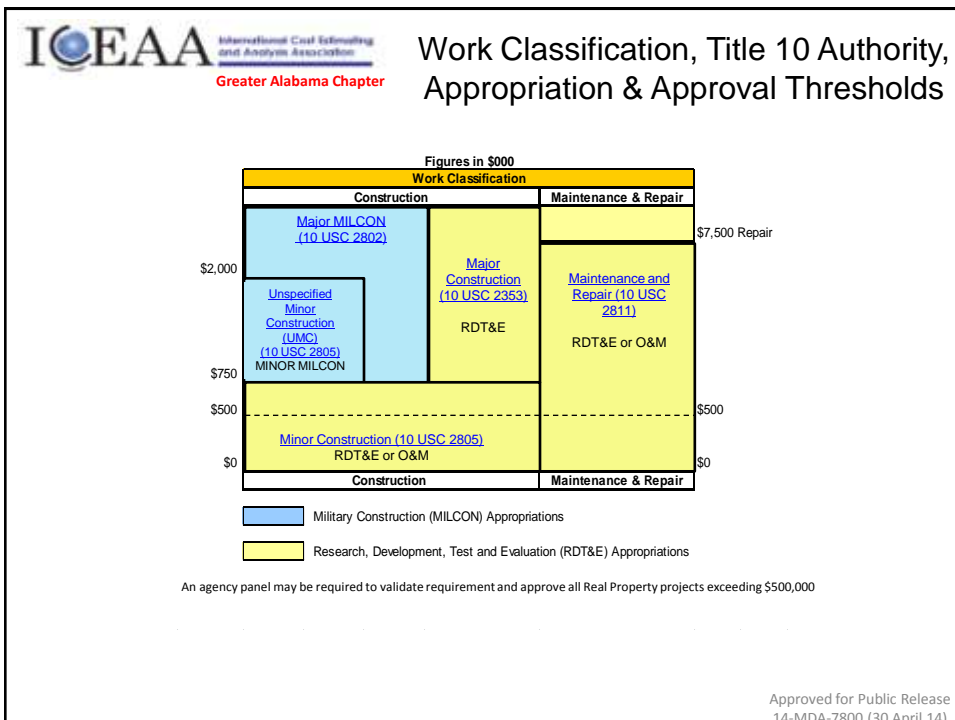
- **Size Adjustment Factor:**
Facility list typically includes size variations, based on historical awards. Size Adjustment is required for deviations from reference size.
- **Area Cost Factor (ACF):**
Using DoD Area Cost Factors PAX Newsletter No 3.2.1, which based on CONUS construction market survey of 96 Base Cities (two cities per State in Bold font) plus an additional 120+ CONUS locations' average construction costs.
- **Cost Escalation:**
DoD Inflation Rates released annually by OSD around February.
- **Labor Productivity Adjustment (LPA):**
Labor productivity is measured by units of work placed or produced per man-hour. Labor productivity is sometimes measured by proxy. One such proxy is installation rate, that is, units of work in place per unit time. Loss of productivity is defined as the reduction in productivity caused by unanticipated conditions. Such conditions may include adverse weather, scheduled overtime, and material delivery problems.
- **Contingency:**
Project cost estimate should include a separate item as a reserve for construction contingencies to cover construction requirements which cannot be foreseen before the contract is awarded. The contingency reserve is for some adverse or unexpected condition not susceptible to predetermination from the data at hand during engineering and design; it must be included in the project cost estimate.
- **Supervision, Inspection, and Overhead (SIOH):**
The SIOH for CONUS locations is 6 percent. For OCONUS locations, the SIOH is 6.5 percent. SIOH accounts for managerial functions related to Military Construction.

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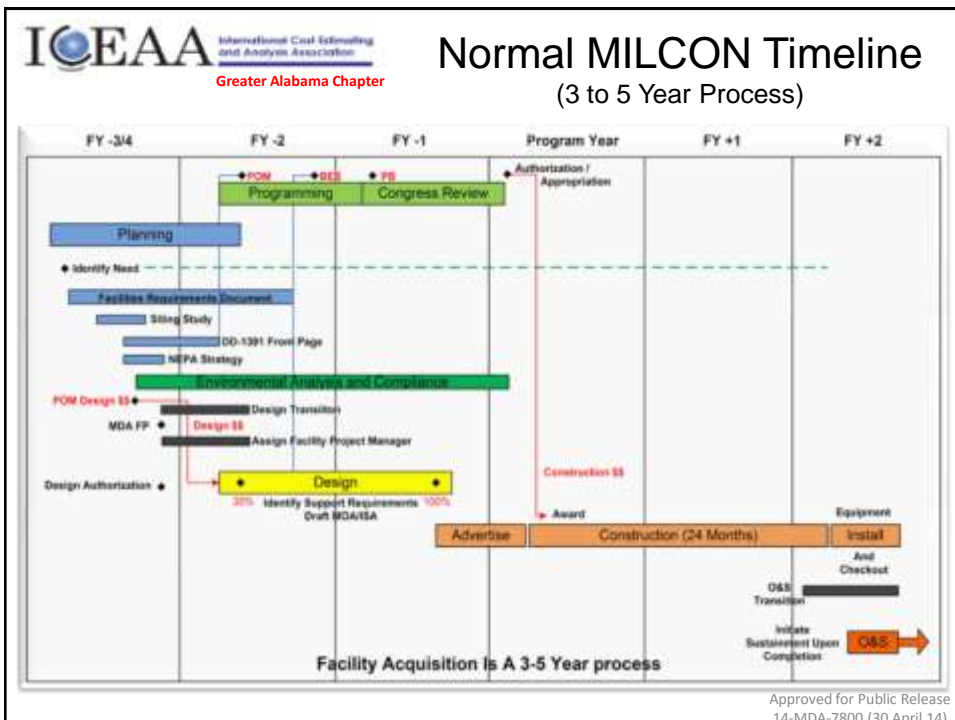
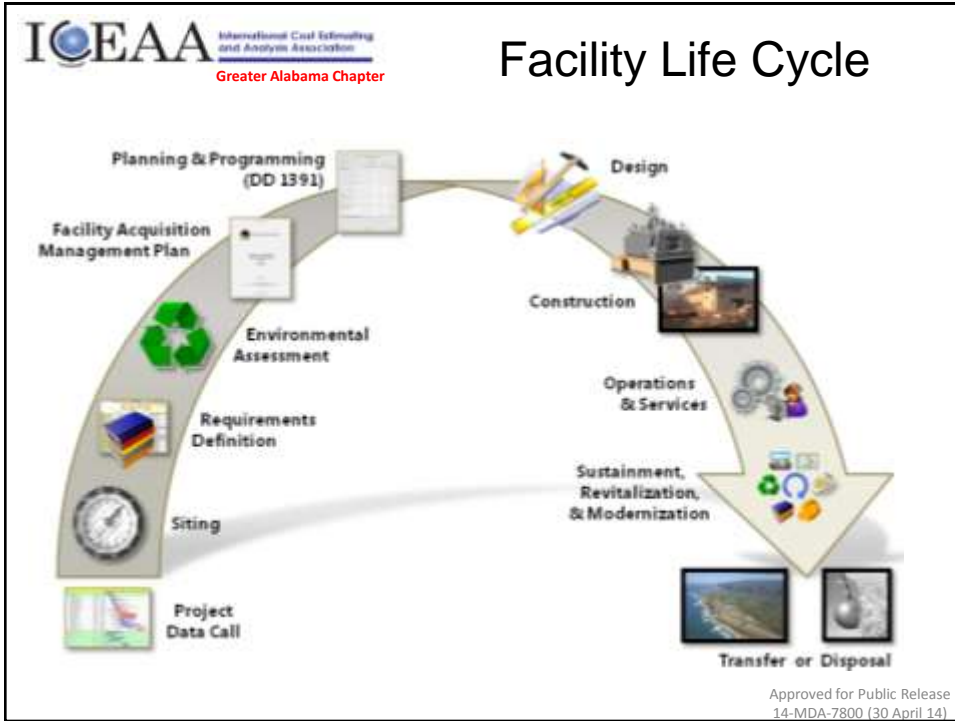
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Appropriation Category	Scope / Type of Work Effort	Period Available for Obligation
MILCON	<p><u>Major MILCON (10 USC 2802)</u></p> <ul style="list-style-type: none"> Project > \$750K (generally > \$2M) Line Item Authorization & Appropriations <p><u>Unspecified Minor Construction (UMC) MILCON (10 USC 2805)</u></p> <ul style="list-style-type: none"> Project > \$750K < or = \$2M, (Unforeseen, Urgent Requirement) Life, Health, Safety < or = \$3M Annual Lump Sum Appropriation <p><u>MILCON Planning and Design (MILCON P&D)(10 USC 2807)</u></p> <ul style="list-style-type: none"> Used for design of MILCON Project Annual Lump Sum Appropriations 	5 Years
RDT&E	<p><u>RDT&E (10 USC 2353)</u></p> <ul style="list-style-type: none"> Allowed for Construction Under Very Strict Requirements Must be in support of RDT&E Contract Cannot have General Utility/Administration Must be Operated & Maintained by RDT&E Contractor Must be on RDT&E Contractor Property 	2 Years
O&M	<p><u>O&M (10 USC 2805)</u></p> <ul style="list-style-type: none"> Minor MILCON Project < or = \$750K Used for MILCON project development, master planning for site approval, budget development (DD Form 1391), Environmental Analysis, Replenishment of Spares, Fuel etc. 	1 Year

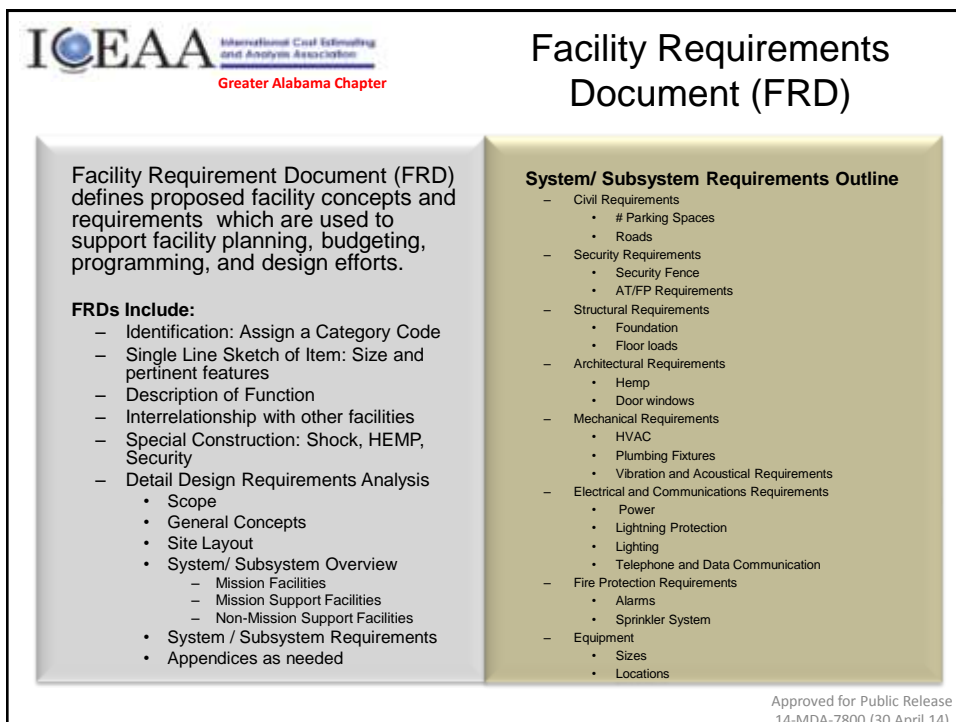
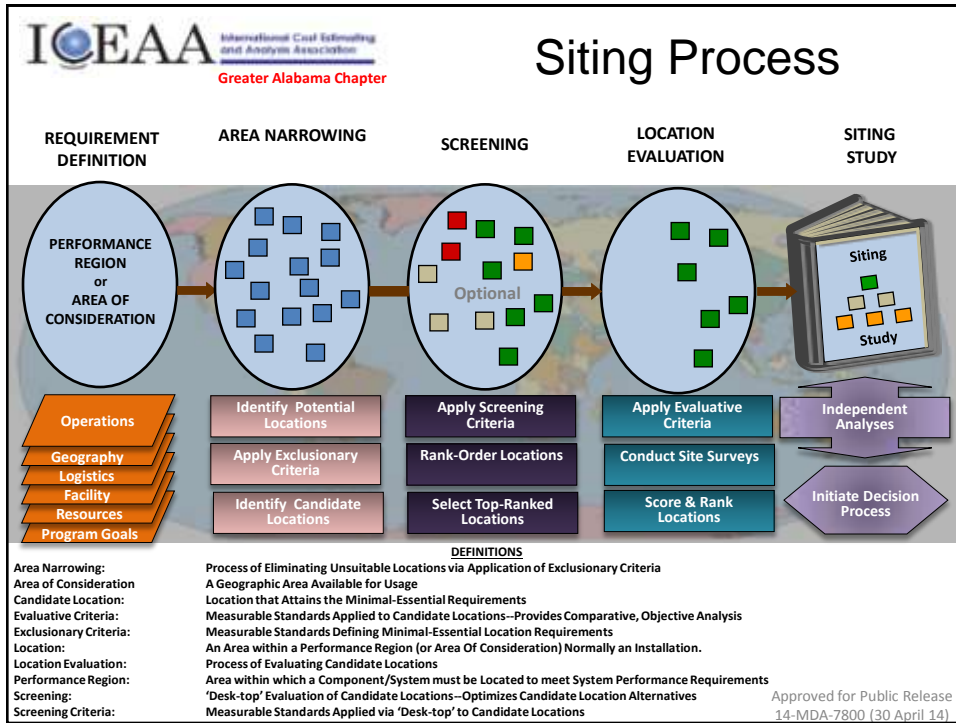
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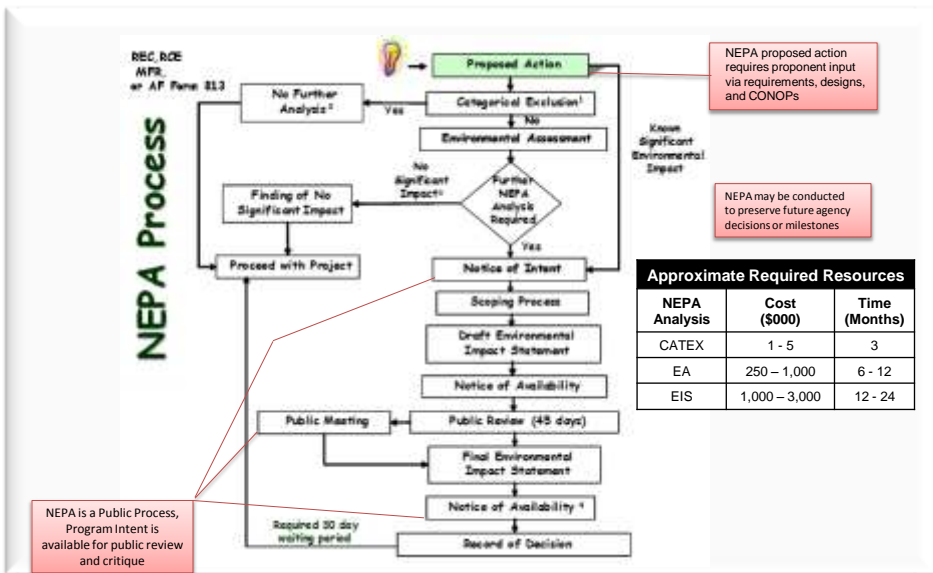


Environmental Compliance

- The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions.
- NEPA environmental compliance considerations may include, but are not limited to:
 - Environmental Impact Analysis
 - Wetlands and Floodplains
 - Coastal Zone Management
 - Coastal Barrier Resources
 - Hazardous Material Storage or Contaminated areas
 - Threatened and Endangered Species
 - Cultural Resources Management
 - Unexpected Discovery of Archaeological Sites
 - Interagency and Intergovernmental
 - Coordination for Environmental Planning
- NEPA Process :
 - **Categorical Exclusion (CATEX):** Categories of actions that normally do not require an EA or an EIS if it has been determined that they do not individually or cumulatively have a substantial effect on the human environment. A CATEX decision is documented with a Record of Environmental Consideration (REC).
 - **Environmental Assessment (EA):** When a proposed action does not clearly require an EIS but is not categorically excluded, an EA is prepared providing sufficient evidence and analysis for determining whether to prepare an EIS. The EA process concludes with either a Finding of No Significant Impact or a determination to prepare an Environmental Impact Statement.
 - **Environmental Impact Statement (EIS):** Used when an action clearly has significant impacts or when an EA cannot be concluded with a FONSI. The EIS process ends with the completion of a Record of Decision (ROD). The ROD explains the agency's decision, describes the alternatives the agency considered (including the environmentally preferred alternative), and discusses plans for mitigating potential environmental effects and monitoring those commitments.

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NEPA Process Flow



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Facility Acquisition Management Plan

- Facility Acquisition Management Plan (FAMP): A document that establishes the roles and responsibilities, cost considerations and timeline to acquire a facility. It includes the design and construction acquisition strategies and configuration control procedures.
 - It details what type of acquisition strategy
 - Design-Bid-Build (D-B-B): One contract is issued for the project design. Another contract is issued for construction of the project.
 - Design-Build (D-B) : The design and construction services are contracted by a single entity to minimize risk and reduce the delivery schedule by overlapping the design phase and construction phase of the project.
 - It includes:
 - List of key personnel with contact information.
 - Project schedule, with activities, dates, and durations, of all the actions required to take a project from design authorization to construction completion.
 - Change management processes are critically important to know who can direct changes to the requirements and who can direct changes to the contractor—and these are not the same people.
 - A FAMP also includes any reporting or notification requirements.

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Common MILCON Contract Options

Design-Build (D-B):


- Is a single contract issued for both the design and build of a project.
- Elements of the D-B process:
 - D-B is a single contract with one entity that is responsible for design and construction.
 - DD 1391 Block 12 typically includes a 5% for P&D used usually by USACE to prepare design up to 35%.
 - The design/construction agent then prepares a bid package and solicits proposals to build the facility.
 - The designer/builder, on award of contract, is responsible for the preparation and quality of the design as well as construction.
 - DD 1391 Block 9 includes a 4% D-B Contract Cost for 36%- 100% Design
 - The builder may start construction before the design is 100 percent complete. The designer continues design while construction is under way.

Design-Bid-Build (D-B-B):

- One contract is issued for the project design. Another contract is issued for construction of the project.
- Elements of the D-B-B process:
 - A design agent who is responsible for a design package that meets the requirements of the FRD.
 - DD 1391 Block 12 captures P&D for 100% design. This is typically 10% of construction cost estimate.
 - A construction agent who prepares a construction Request for Proposal (RFP) for solicitation.
 - Contract award by the construction agent.
 - Management by the construction agent through project completion and closeout.

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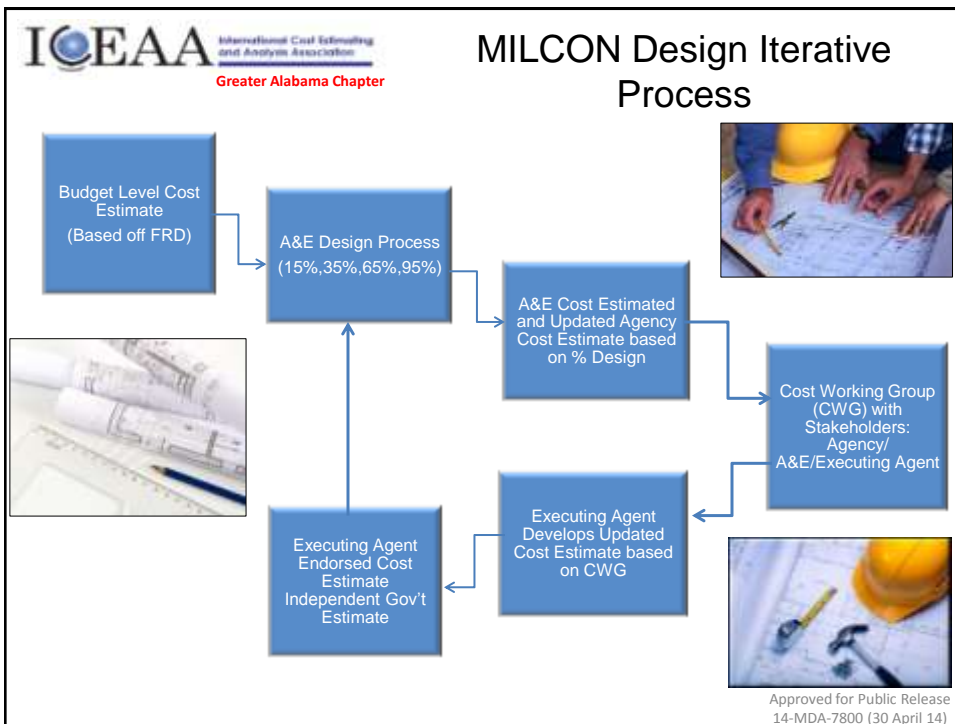
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DD FORM 1391

1. COMPONENT		FY 2014 MILITARY CONSTRUCTION PROJECT DATA		2. DATE	
3. INSTALLATION AND LOCATION		4. PROJECT TITLE		5. MONTH/ YEAR	
6. PROGRAM ELEMENT	7. CATEGORY CODE	8. PROJECT NUMBER	9. PROJECT COST (MIL)		
3. COST ESTIMATES					
ITEM	QTY	UNIT PRICE	UNIT COST	TOTAL COST	
PRIMARY FACILITY					
The portion of the DD Form 1391 is a portion of a contract... (text continues)					
SUPPORTING FACILITIES					
This portion of the DD Form 1391 is a portion of a contract... (text continues)					
INSTALLATION					
This portion of the DD Form 1391 is a portion of a contract... (text continues)					

1. COMPONENT		FY 2014 MILITARY CONSTRUCTION PROJECT DATA		2. DATE	
3. INSTALLATION AND LOCATION		4. PROJECT TITLE		5. MONTH/ YEAR	
6. PROGRAM ELEMENT	7. CATEGORY CODE	8. PROJECT NUMBER	9. PROJECT COST (MIL)		
4. OTHER DATA					
A. Technical Description					
1. Name					
2. Location					
3. Description					
4. Construction Method					
5. Construction Details					
6. Construction Equipment					
7. Construction Materials					
8. Construction Labor					
9. Construction Other					
10. Construction Other					
11. Construction Other					
12. Construction Other					
13. Construction Other					
14. Construction Other					
15. Construction Other					
16. Construction Other					
17. Construction Other					
18. Construction Other					
19. Construction Other					
20. Construction Other					

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Operation and Sustainment Unit Costs

- Operation unit costs represent the annual average “bare” operational cost for each FAC, and serve as the basis for calculating annual facilities operations requirements for DoD using the following formula:

$$\text{Operation requirement} = (\text{Facility Quantity}) \times (\text{Operation Unit Cost}) \times (\text{Locality Index}) \times (\text{Inflation})$$
- Sustainment provides for maintenance and repair activities necessary to keep a typical inventory of facilities in good working order over their expected service life.
 - It includes:
 - Regularly scheduled adjustments and inspections, including maintenance inspections (fire sprinkler heads, HVAC systems) and regulatory inspections (elevators, bridges)
 - Preventive maintenance tasks
 - Emergency response and service calls for minor repairs
 - Major repair or replacement of facility components (usually accomplished by contract) that are expected to occur periodically throughout the facility service life
 - It does not include:
 - Repairing or replacing non-attached equipment or furniture, or bldg. components that typically last more than 50 years (such as foundations and structural members)
 - Restoration, modernization, environmental compliance, specialized historical preservation, 7 general facility condition inspections and assessments, planning and design (other than shop drawings), or costs related to acts of God

$$\text{Sustainment Requirement} = (\text{Facility Quantity}) \times (\text{Sustainment Unit Cost}) \times (\text{Sustainment Area Cost Factor}) \times (\text{Inflation})$$

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Cost Estimating Tips

- Requirements drive our estimates
- Don't give out numbers unless you can defend them
- Estimates should always be thoroughly documented
- Good leadership will stand behind estimators' cost estimates because they have trained and/or hired qualified cost analysts

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Questions?

Backup Slides

MILCON Appropriation Codes

[Major MILCON \(10 U.S.C. 2802\)](#). Congress specifically approves and provides line-item authorization and appropriation for each foreseen project over \$750,000 in cost.

[Major Construction \(10 U.S.C. 2353\)](#). Construction for the acquisition of facilities or of research, developmental, or test facilities necessary for the performance of an RDT&E contract. 10 U.S.C. 2353 does not authorize new construction or improvements of facilities having general utility. Projects over \$750,000 must conform to the provisions of 10 U.S.C. Section 2353, "Contracts: acquisition, construction, or furnishings of test facilities and equipment" and requires Congressional notification per Reference (b), DoD 7000.14-R, FMR. Projects over \$10,000,000 require OUSD (Acquisition, Technology and Logistics) approval per Reference (l), DoD Directive 4275.5.

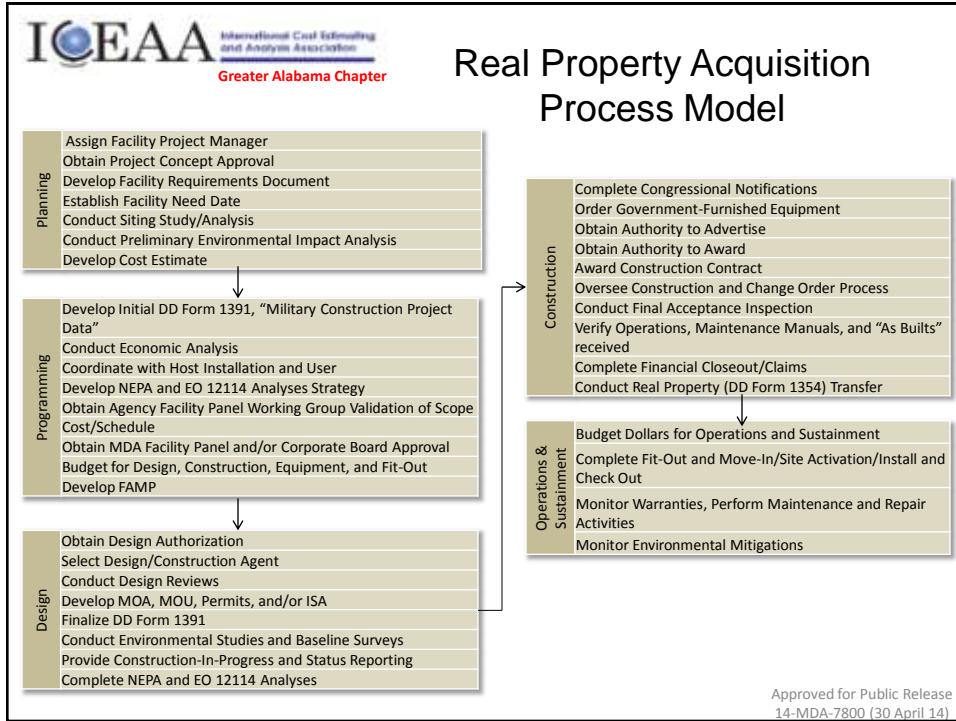
[Minor Construction \(10 U.S.C. 2805\)](#). Construction to carry out minor construction projects costing not more than \$750,000 (\$1,500,000 for life safety projects) using funds available for Operation and Maintenance (O&M). Projects over \$750,000 up to \$2,000,000 may use available UMC funds. Projects over \$750,000 require Congressional notification. All minor construction must result in a complete and usable facility. In no event are two or more construction projects or minor and major construction projects to be contrived to be a usable facility.

[Unspecified Minor Military Construction \(UMC\) \(10 U.S.C. 2805\)](#). Military construction projects between \$750,000 and \$2,000,000 in cost (\$3,000,000 for life, health, or safety-threatening projects) funded by a lump-sum MILCON appropriation. UMC is the means to accomplish critical unforeseen project needs that cannot be met using the normal budgeting process. The D has project approval authority, but a 21-day Congressional notification is required.

[Repair \(10 U.S.C. 2811\)](#). Repair projects funded with O&M or RDT&E for an entire single purpose facility or one or more functional areas of a multi-purpose facility and are over \$7,500,000 require Congressional notification. Repair means to restore real property to such conditions that it may be effectively used to its designated functional purpose.

[Architectural and engineering services and construction design\(10USC 2807\)](#). Planning and design of MILCON programs and projects. It includes design and engineering services such as plan drawings and specifications required before awarding a construction contract, after a project has been authorized for design. MILCON P&D is a lump sum account that requires Congressional notification for contract awards over \$1M.

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Acronyms

AT/FP	Anti-Terrorism/Force Protection
ACF	Area Cost Factor
BES	Budget Estimate Submission
CATEX	Categorical Exclusion
DoD	Department of Defense
DBB	Design- Bid-Build
DB	Design- Build
EA	Environmental Assessment
EIS	Environmental Impact Statement
FAMP	Facilities Acquisition Management Plan
FRD	Facilities Requirement Document
FAC	Facility Code
HVAC	Heating, Ventilation, and Air Conditioning
HEMP	High Altitude Electromagnetic Pulse
ISA	Industry Standard Architecture
LPA	Labor Productivity Adjustment
MOA	Memorandum of Agreement
MILCON	Military Construction
NEPA	National Environmental Policy Act of 1969
O&M	Operations & Maintenance
O&S	Operations & Sustainment
PB	President's Budget
POM	Program Objective Memorandum
PAX	Programming Administration and Execution System
QTO	Quantity Take Off
REC	Record of Completion
RFP	Request for Proposal
RDT&E	Research, Development, Test & Evaluation
SIOH	Supervision, Inspection, & Overhead
UFC	Unified Facilities Criteria
USACE	United States Army Corps of Engineers
USC	United States Code

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SOURCES

- PAX Newsletters 3.2.2 and 3.2.1:
<http://www.usace.army.mil/CostEngineering/ProgrammingAdministrationandExecutionSystemNe.aspx>
- Cost Works software: www.rsmeans.com
- Unified Facilities Criteria (UFC): <http://dod.wbdg.org/>
- US Codes: <http://uscode.house.gov/>
- MDA Documents Referenced
 - MDA Instruction 4165.01-INS, "Real Property Acquisition and Sustainment" (26 August 2011)
 - MDA Facility Acquisition Guide; A Desk Reference for Element Program and Facility Project Managers (undated)
 - NEPA Environmental Impact Statement Brief; Eric Sorrells (undated)
 - Military Construction and Sustainment, Restoration, & Modernization; Martin Duke (September 13, 2013)
 - MILCON Cost Estimating; David Wickwire (November 8, 2011)
- Dilbert: www.dilbert.com

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MILCON Planning and Programming

Military Construction Planning Process

Planning is the process of collecting and validating information answering the basic questions of what, when, where, and how much.

- "What" identifies the requirement.
- "When" is a milestone schedule that supports the facility need date.
- "Where" determines a preferred location for the facility.
- "How Much" is the estimated facility cost.

Military Construction Programming Process

- MILCON Program involves a sequence of reviews by the OSD, OMB, and Congress.
- The DOD Financial Management Regulation 7000.14-R urges the design of all construction projects be at least 35% complete when submitted to Congress. This allows for submission of an accurate budget estimate based on the project design.

Military Construction Programming Process consists of four phases:

- 1) GY - Guidance Year: The Agency publishes Program Guidance and the Elements respond by submitting their POMs containing updated construction programs for the POM period. POM - Even Years, A-POM - odd years. Program MILCON P&D.
- 2) DY - Design Year: During the design year, the Agency will build its POM for submission to OSD as the project design proceeds toward 35% completion. Receive MILCON P&D.
- 3) BY - Budget Year: During the budget year, the Agency presents each project in the MILCON program before OSD, OMB, and Congress. OSD directed changes are made before submission of the President's Budget (PB) to the Congress in January. Complete 35% design, Obtain 35% cost estimate, Program MILCON funds.
- 4) PY - Program Year: The program year, or execution year, is the year funds are made available for construction. MILCON funds received for execution.

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