



**Tri-Service Cost Engineers**

# **Total Ownership Cost as an Evaluation Factor**

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# Premise



## Tri-Service Cost Engineers

**Total ownership cost (TOC) analysis during design-build (DB) source selection process results in more informed decision making:**

- **To reduce total ownership cost of facility**
- **To achieve energy and sustainability goals**

Note: “Life Cycle Cost” and “Total Ownership Cost” are used synonymously

# Approach



## Tri-Service Cost Engineers

- **Develop tool to evaluate the TOC of a DB proposal**
  - “TOC Template” completed & submitted by DB proposer
  - Government (GOV) team develops baseline TOC to set level playing field for proposal evaluation
  - Technical Evaluation Board (TEB) evaluates whether proposal includes reasonable estimates for all costs in TOC analysis
- **Template initially developed for 7 common facility types:**

Admin Bldg	Child Development Center
Bachelor Quarters	Instructional Training Fac (general purpose)
High Bay Hangar	Operational Training Fac (specialized)
Fitness Center	
- **Other facility types continue to be evaluated on standard energy & sustainability factors similar to current practice**

# Approach (Cont.)



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### Keep it simple:

- Recognize <15% design definition achieved at proposal stage
- Focus on major TOC cost drivers (80% / 20% rule of thumb)
- Recognize certain building components are prescribed in RFP
  - Makes no sense to include prescribed components in TOC analysis
- Minimum documentation needed to verify contractor's TOC
- Net Present Values are calculated using OMB Circular A-94 Real Discount Rate (rate without inflation)
  - Constant dollars that have the purchasing power of the base year (i.e. no general inflation in calculations)

# Period of Analysis



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## US Code Title 42, 8254 “Establishment and use of life cycle cost methods and procedures” specifies use of LCC methods for design of new Federal buildings

- Applies to the building’s energy system
- Period of analysis is specified as the life of the energy system or 40 yrs, whichever is shorter
- DB TOC Template assumes 40 years for all energy consuming systems
- For simplicity the Template also uses 40 year period for sustainment analysis

# GOV Use of TOC Template



**Tri-Service Cost Engineers**

- **TOC is considered a technical factor, sub-factor or element**
- **Specific use of the template in the technical evaluation TBD by each Service, including:**
  - Whether it's a separate factor or within an existing factor
  - Relative weight of TOC in overall technical evaluation
- **NAVFAC will pilot TOC Template before wide implementation**
  - Need to develop basis of evaluation for technical factor
  - Still refining technical submission requirements

# Template Structure



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- **Excel spreadsheets**
- **Uses ASTM Uniformat II classification standard for organizing building parts**
  - Level 3 elements are prescribed by Uniformat
  - Level 4 sub-elements are proposed by NAVFAC  
(i.e. they're flexible - items can be modified by GOV Team and additional items added by Proposer)
- **Color scheme for cells:**
  - White = predetermined data & text
  - Tan = GOV Team to fill in
  - Light Green = Proposer to fill in
  - Purple = GOV baseline info automatically generated by template

# Template Parts



## Tri-Service Cost Engineers

### 1. Net Investment

- Contractor's proposal cost (or Final GOV Estimate for baseline) for primary facility design, construction, and any other related costs

### 2. Energy Analysis

- Up to 6 energy sources can be evaluated:

electricity

steam (gas generated)

distillate oil

natural gas

steam (oil generated)

residual oil

### 3. Sustainment Analysis

- Major building component / system Preventive Maintenance (PM) and whole component replacement at end of service life
- Does not include operating costs and unscheduled / corrective maintenance (assumed equal for all proposals)

### 4. Government Baseline TOC

- Based on minimum ASHRAE 90.1 2007 and IBC code requirements

# 1. Net Investment



## Tri-Service Cost Engineers

- **Design & construction cost is in base year dollars**
  - Equals DB proposal cost (or Final GOV Estimate for baseline)
- **Building's Terminal Value is not considered in TOC Template**
  - Not a significant TOC “cost driver” after 40 years in comparison to Initial Investment, Energy and Sustainment costs
  - Simplifies template and eliminates subjectivity associated with hard to define factors affecting terminal value (e.g. determining relationship between durability and initial cost)
  - Component Terminal Value is considered in TOC sustainment analysis
- **Building Service Life also not utilized in TOC Template**
  - Assumed to be at least 40 years and to be equal for baseline and all proposals
  - Component Service Life is considered in TOC sustainment analysis

## 2. Energy Analysis



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- **RFP provides:**
  - Facility occupancy / use parameters
  - Local utility rates
- **Energy consumption estimated by proposer using any whole building energy simulation software meeting ASHRAE Standard 140-2007**
  - Carrier's Hourly Analysis Program (HAP)
  - Trane Air Conditioning Economics (TRACE)
  - DOE's eQuest
  - Other software meeting standard
- **Proposer submits software's summary reports of inputs / outputs**
  - Enables GOV team to assess reasonableness of energy analysis

## 2. Energy Analysis (Cont.)



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- **Proposer submits LEED for new construction Energy Analysis (EA) Credit 1 Summary Report**
  - Shows how proposal is optimizing energy performance
  - Generated by all energy simulation software
- **Proposer enters first year's energy consumption by each Uniformat II Level 4 building component in template**
  - Energy Analysis spreadsheet automatically calculates 40-yr NPV energy cost
  - Uses current annual supplement to NIST Handbook 135 energy differential escalation rates

# 3. Sustainment Analysis



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- **Major “cost driver” building components are displayed at Uniformat II Level 3**
  - “Major” defined by GOV Team
    - Guided by TOC Template historical percentages displayed in spreadsheet
    - Limited to those components not prescribed in RFP and with sufficient Level 3 differentiation to produce distinguishable differences in TOC results
- **Sustainment spreadsheet calculates 40-yr NPV sustainment cost**
  - Proposers directed to use RS Means cost data as source of PM and M&R sustainment requirements/ cost estimates
  - Analysis is at Uniformat II Level 4 component
  - If proposal includes any Level 4 component for which no industry maintenance data is available (i.e. green roofs, solar hot water, photovoltaic, etc.) Proposer must submit manufacturer info to verify PM and M&R costs

# Sustainment Analysis (Cont.)



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## Building Component Top Contributors to Total Sustainment Cost

ADMINISTRATIVE BUILDING	
% of Total Sustain Cost	Uniformat Level III Component
33.5%	Cooling Systems
11.5%	Floor Finishes
8.6%	Exterior Windows
5.8%	Wall Finishes
5.7%	Communication/Security
5.3%	Lighting
5.2%	Plumbing Fixtures
4.3%	Roof Coverings (Green Roof)
<u>0.0%</u>	Energy Supply (Renewables)
79.9%	Total

# 4. GOV Baseline TOC



## Tri-Service Cost Engineers

- **NET INVESTMENT** : Uses sum of “Total Contract Cost” + “DB Design Cost” from DD 1391 Block 9
- **ENERGY**: Uses predetermined calculations for 7 facility types
  - Energy consumption was modeled for 7 building types, large and small size, 15 CONUS climate zones
  - Assumes rectangular building, minimum code criteria, & ASHRAE 90.1 2007 standards
  - Choice of facility type, size & location automatically fills in consumption by Level 4 component, spreadsheet calculates 40-yr cost
- **SUSTAINMENT**: Uses sustainment cost factor from current **DOD Facilities Pricing Guide**
  - Cost factor includes operation cost so should be higher than proposer’s sustainment estimate - but is still “roughly” comparable
  - Allocates total building sustainment cost to Level 3 components by their % contribution to sustainment cost
- **RFP**: includes **Baseline info**

# TOC Results



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- **Sums for baseline and each proposal:**
  - + Base Year NPV Investment Cost
  - + 40-yr NPV Energy Cost
  - + 40-yr NPV Sustainment Cost
  - = “Relative” Total Ownership Cost
- **Relative total ownership cost will be evaluated technically against GOV baseline**
  - Technical strengths & weaknesses
  - Adjectival rating

# TOC Caveats



## Tri-Service Cost Engineers

- **Proposer is not held to all design detail assumptions required to do TOC analysis**
  - Order of Precedence clause is used to ensure final design meets or exceeds RFP requirements and contractor's proposal
  - Examples of items not "locked": type & amount of glazing, light fixture type & quantity, etc.
  - Allows design innovation and further TOC-based decisions during design development
- **Final Design TOC must be  $\leq$  Proposal TOC**
  - RFP states this as a performance requirement
  - Contractor provides final design TOC using same template approach used in his proposal
  - Contractor's motivation is to achieve a high contract performance rating

# POA&M



## Tri-Service Cost Engineers

### ACTION

### DATE

Tri-Service TOC Template Team Chartered/Work Started

Mar 2010 (Done)

Brief Tri-Service Cost Engineers Steering Committee

Jan 2011 (Done)

Office Calls to AGC, AIA, ACEC & DBIA

Apr 2011 (Done)

AGC Template Focus Group

May 18, 2011 (Done)

Industry Forum (Dulles Hyatt, Herndon VA)

Jun 2, 2011 (Done)

**AGC Draft RFP Focus Group**

**Sep 2011**

Post Template/Example RFP in FedBizOps For Comments

Oct 2011

Pilot Program (1 or 2 Navy projects)

Nov 2011

Start Full Implementation (7 common building types)

TBD