FEMA’s Comparative Analysis

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Washington, D.C.
September 26, 2001
Panel Tasking

- Q1 – Does FEMA’s CEF parallel the ASPE Level 3 (L3) estimating approach?
- Q2 – Would CEF (at L3) provide a level of confidence that meets the ASPE L5 (± 10%) floor and ceiling thresholds selected by the panel?
Introduction

Accuracy of an estimate is governed by:

- Clear definition of the scope-of-work
- Level of completion of A&E effort
- Estimating technique employed
- Skill of estimator / team
Part A – Construction Costs
Part B – General Requirements

Part C – Design and Construction Cost Contingencies

Part D – Overhead & Profit

Part E – Escalation
CEF Parts F - H

- Part F – Plan Review and Permits
- Part G – Owners Reserve
- Part H – Management & Design Costs
## When are the factors used?

<table>
<thead>
<tr>
<th>CEF Part</th>
<th>Nature of costs used in Part A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Complete</td>
</tr>
<tr>
<td>B</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td>-</td>
</tr>
<tr>
<td>D</td>
<td>-</td>
</tr>
<tr>
<td>E</td>
<td>-</td>
</tr>
<tr>
<td>F</td>
<td>-</td>
</tr>
<tr>
<td>G</td>
<td>-</td>
</tr>
<tr>
<td>H</td>
<td>Y</td>
</tr>
</tbody>
</table>
ASPE Estimating Procedures

- Level 1 – Order of Magnitude Estimate
- Level 2 – Schematic Design Concept
- Level 3 – Design Development (25%)
- Level 4 – Project Control (75%)
- Level 5 – Construction Documents (90%)
- Level 6 – Bid Documents
Findings - Q1

Does FEMA’s CEF parallel the ASPE Level 3 (L3) estimating approach?

Yes, the CEF process does parallel the ASPE L3 process, both in:

- level of contingency, e.g., design phase scope contingency, and
- type and level of design documentation
Comparison of four estimating methods and their contingencies at different design stages:

<table>
<thead>
<tr>
<th>Stage</th>
<th>CEF</th>
<th>BCH</th>
<th>DOE</th>
<th>AACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary Engineering Analysis</td>
<td>15 to 20%</td>
<td>10 to 15%</td>
<td>15 to 25%</td>
<td>+25 / - 15%</td>
</tr>
<tr>
<td>Working Drawing Stage</td>
<td>2 to 10%</td>
<td>2 to 7%</td>
<td>5 to 15%</td>
<td>+10 / - 5%</td>
</tr>
</tbody>
</table>
### ASPE L3 Requirements
- General site description
- Preliminary structural design
- Site dimensions
- Elevations
- Roads
- Impounds & fences
- General arrangements
- Architectural construction

### CEF Guidelines
- Site map or location plan
- Photographs and sketches
- Measurements & calculations
- Applicable codes & standards
- Schematic drawings, plans

**Type of Design Documentation**

**Similarities…**
### Type of Design Documentation

#### Differences...

<table>
<thead>
<tr>
<th>ASPE L3 Requirements</th>
<th>CEF Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable for all size projects</td>
<td>Applicable for large projects (&gt; $50,600 FY 2001)</td>
</tr>
<tr>
<td>Named plans or drawings:</td>
<td></td>
</tr>
<tr>
<td>➢ Preliminary building equipment</td>
<td>➢ “As-built” plans</td>
</tr>
<tr>
<td>➢ Soil bearing condition</td>
<td>➢ 406 hazard mitigation proposals</td>
</tr>
<tr>
<td>➢ Preliminary plumbing</td>
<td>➢ Force account summary sheets</td>
</tr>
<tr>
<td>➢ Preliminary mechanical</td>
<td></td>
</tr>
<tr>
<td>➢ Preliminary electrical</td>
<td></td>
</tr>
</tbody>
</table>

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Work Type versus Accuracy

- Repair Work
- Other Discrete Work Elements
- Retrofit / Upgrade
- Hazard Mitigation
- New Construction
## Category of Projects and % Permanent Work

<table>
<thead>
<tr>
<th>Category</th>
<th>% Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat. C - Roads &amp; Bridges</td>
<td>57%</td>
</tr>
<tr>
<td>Cat. D - Water Control Facilities</td>
<td>6%</td>
</tr>
<tr>
<td>Cat. E - Buildings &amp; Equipment</td>
<td>16%</td>
</tr>
<tr>
<td>Cat. F - Utilities</td>
<td>12%</td>
</tr>
<tr>
<td>Cat. G - Parks, Recreation &amp; Other</td>
<td>9%</td>
</tr>
</tbody>
</table>
Findings Summary - Q1

Does FEMA’s CEF parallel the ASPE Level 3 (L3) estimating approach?

Yes, similar requirements and only minor differences. Key points:

- Itemized base costs (CEF Part A)
- Confidence in Part A - use of factors
- Risk to applicant depends on type of work and availability of applicant supplied information
Findings - Q2

- Would CEF (at L3) provide a level of confidence that meets the ASPE L5 (± 10%) floor and ceiling thresholds selected by the panel?

- Under post disaster conditions, a CEF estimate will compare favorably with the other cost estimating methodologies (depicted at slide 10), and produce an estimate of approximately the same magnitude and confidence level.
The following actions could provide a higher level of confidence that actual project costs will fall closer to the target thresholds:

- Clear definition of the scope-of-work
- Increased applicant participation (team approach to estimating)
- Refine the project qualification criteria to include all large permanent work projects
Ensuring Level of Confidence

Actions (continued)

- Update the CEF Instructional Guide to include lessons learned in the field
- Expand DFTO CEF Training for Cost Estimators to include PAO, PAC’s, and PO’s
- Measure the performance of CEF to the 10% floor and ceiling thresholds by all of an applicant’s large permanent work projects, rather than by a single project
Questions and Comments
Engineering and Design Services
(Curves A & B) Status

- **1982** - Nationwide survey of A&E firms performed to update the curves
- **1996** - 3rd edition of Manual 45 published
- **2001** - ASCE Committee on Professional Practice meeting in San Antonio, TX
Questions and Comments
Recommendation Report

Development

- Foreword
- Introduction
  - curriculum vitae of each Panel member
- Charter and Duties
Development

- Executive Summary (establish tone)
  - estimating business practices and discuss design contingencies, etc.
  - level of effort put into CEF and its germaneness to the PA Program
  - GAP background and early-CEF development during the Northridge Earthquake
Development

- Executive Summary (continued)
  - ASCE Independent Peer Review of CEF developed during the redesign of the PA Program
Development

Recommendations

- recommended cost estimating methodology
- the level of technical expertise required to uniformly apply it
- the type of training guidance to make available to users to maximize its’ accuracy and national applicability
- ± 10% floor and ceiling thresholds
Development

- Appendices
  - activities and accomplishments
  - charter of the Expert Panel
  - others (meeting notes and appendices, etc.)?