

Cost Estimating Format (CEF) for Large Projects

J. David Duffer

Federal Emergency Management Agency

and

J. Brian Leap

Fluor Federal Services





Introduction - Peer Review

- The CEF is a standardized format for estimating the cost of large projects
- Developed as a result of the Northridge Earthquake recovery effort
- The CEF received a peer review by the American Society of Civil Engineers (ASCE) in the spring of 1998



Peer Review Focus

- During the redesign of the Public Assistance Program, FEMA developed a scope of work for the conduct of an independent peer review, to determine if:
 - the CEF is adequate for use nationally;
 - the risk for the estimating methodology is low enough to pass on to the applicant in a disaster environment;
 - if the two items above are not true, what revisions to the CEF are required to make the CEF usable nationally;





Peer Review Focus (additional items)

- What technical expertise is required to correctly apply the the CEF system?
- What level of system maintenance is required to maximize the accuracy of the CEF?
- What level of training and written guidance is required to maximize the accuracy of the CEF?
- What level of public education is necessary to have the CEF system accepted by applicants?



ASCE Peer Review

- Three professional organizations were solicited to respond to the scope of work.
- ASCE was selected to conduct the peer review because of its responsive proposal within the specified time limits.
- ASCE provided a three-person review Committee.





Peer Review Committee

- Thomas D. Wosser, P.E., Chairman
 - Structural Engineer and Senior Principal
Degenkolb Engineers,
San Francisco, CA

- Thomas E. Cooper, P.E., Ph.D.
 - Associate Professor, Auburn University

- G. E. “Jim” Mulford, P.E., Cost Engineer
 - HQ, US Army Corps of Engineers,
Washington, D.C.



*P*eer Review Process

- Began February 3, 1998 with a series of joint FEMA/TAC/Committee meetings.
- Continued with independent work by the Peer Review Committee.
- Ended with submission of the final peer review report dated April 24, 1998.





Peer Review Conclusions

- ASCE concluded that the CEF will:
 - Be adequate for use nationally;
 - Provide a methodology with a risk low enough to be assumed by the applicants;
 - Meet the requirements of items 1 & 2 upon incorporating comments presented by the Committee;
 - Require a high level of expertise with a well-qualified Project officer and supporting staff.





Peer Review Recommendations

- Consolidate the two separate, but parallel systems into a single CEF program –
 - completed for all categories of permanent work;
- Clarify the scope of the CEF –
 - new training and guidelines have been adopted in-line with the ASCE recommendations;
- Designate the Project Officer (PO) as being responsible for the determination of the total project cost –
 - under the redesigned PA program this responsibility resides with the PO.



The CEF in Detail

- The purpose of CEF
- The components of CEF
- CEF application during project formulation
- When is the CEF appropriate for a project?



Background

- Inadequacies of the PA Program Large Project estimating process
 - Damage Survey Reports
 - Northridge
- Improvements
 - Grants Acceleration Program
 - Project Formulation Process



CEF is . . .

- An Excel™ spreadsheet for:
 - Organizing items of work
 - Applying factors
 - Deriving a cost estimate
 - Summarizing a cost estimate

- An uniform method for preparing estimates

- A forward-pricing tool



CEF is not . . .

- An “expert” system
- A shortcut to developing good estimates
- A replacement for professional cost estimating expertise



A Advantages of CEF

- Provides a uniform means of estimating
- Greater degree of applicant confidence
- Conducive to more effective project management
- Reduced FEMA administrative costs



*F*uture Goal

Use as a final cost
settlement instrument





***I*ntroduction -**

Cost Estimating Format (CEF) for Large Projects

J. David Duffer

**Readiness, Response and Recovery Division
Federal Emergency Management Agency**



*P*roject Formulation

- Qualify project for CEF
- Develop damage description
- Develop scope of work
- Identify unit cost data
- Complete CEF Spreadsheet
- Complete Project Worksheet
- Project approval and obligate funds



Application Criteria

- Large projects
- Permanent work (Categories C-F)
- Eligible work
- Project less than 50 percent complete
- 4+ months to reach 90 percent project completion



CEF Spreadsheet Components

- CEF Fact Sheet
- Part A (base costs only)
- Summary of Completed Work
- Summary of Uncompleted Work
- Total Project Summary
- CEF Notes





CEF Spreadsheet Capabilities

- Categorizing work
- Manipulating Part A
- Assigning factors
- Adding subtotals
- Links between spreadsheets





Project Worksheet Documentation

- Damage description and scope of work
- Photographs, maps, plans, specifications
- Permits and clearances
- Special Considerations
- CEF spreadsheet
- Cost summary sheets



The Project Worksheet

- Completed by Project Officer
- Components
 - damage description and scope of work
 - work activities
 - itemized unit costs
 - project related b/u information
- Submitted to PAC with supporting documentation



Sources of Eligibility Criteria

- Stafford Act
- 44 CFR:
 - Part 206: PA Program eligibility
 - Part 13: Allowable costs
- FEMA policies





Eligibility Criteria for Scope of Work

- Basic eligibility criteria
 - Damage must be disaster-related
 - Restoration to pre-disaster condition
- Improvements may be eligible as:
 - codes and standards upgrades
 - hazard mitigation
- Scope does not include ineligible items of work





Scope of Work (continued)

- An eligible facility must:
 - be the responsibility of an eligible applicant
 - be located in a designated disaster area
 - not be under the specific authority of another Federal agency
 - be in active use at the time of the disaster

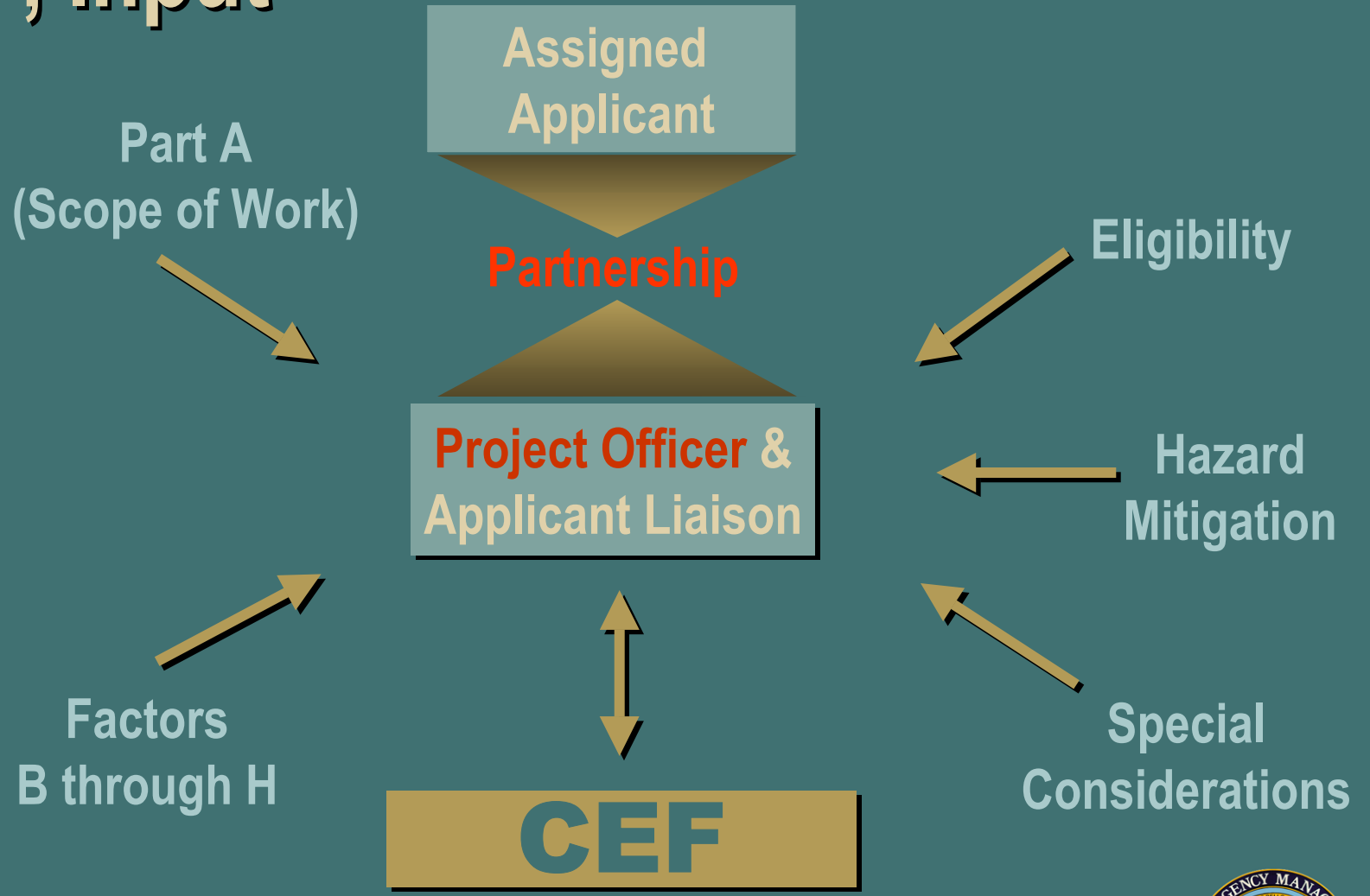


*D*amage Description and Scope of Work Components

- Location
- Damage cause and description
- Damage dimensions
- Scope of work to repair damage:
 - Work items
 - Dimensions and quantities



CEF, Input



CEF Parts

A

SCOPE OF WORK

B

GENERAL REQUIREMENTS

C

COST CONTINGENCIES

D

GC'S OVERHEAD /PROFIT

E

COST ESCALATION

F

PLAN REVIEW , PERMITS AND FEES

G

RESERVE FOR CHANGE ORDERS

H

PROJECT MANAGEMENT /DESIGN





CEF, Organizing Part A

- Completed versus Uncompleted Work
- Permanent versus Non-permanent Work



Stages of Completion

- No work completed
- A&E report available
- Bid/contract available
- Partially completed work





CEF, Organizing Part A (continued)

- Type of work
 - Repair
 - Retrofit
 - New Construction
 - Hazard Mitigation
 - Other





Construction Cost Estimating

CSI Division 1 -- General Requirements

**OWNERS'
RESERVE
FOR
CHANGE
ORDERS**

WORK-IN-TRADES

- | | |
|-----------------------------------|--------------------------------|
| Div. 2 - Site Work | Div. 9 - Finishes |
| Div. 3 - Concrete | Div. 10 - Specialties |
| Div. 4 - Masonry | Div. 11 - Equipment |
| Div. 5 - Metals | Div. 12 - Furnishings |
| Div. 6 - Carpentry | Div. 13 - Special Construction |
| Div. 7 - Moisture Control | Div. 14 - Conveying Systems |
| Div. 8 - Doors, Windows,
Glass | Div. 15 - Mechanical |
| | Div. 16 - Electrical |

OWNER'S SOFT COSTS

A&E, Permits, Plan Review, Project Management





CEF, Organizing Part A (continued)

- Organize by CSI Division
- Components include:
 - Description and code
 - Quantity and units
 - Unit price
 - City adjustment factor





CEF, Organizing Part A (continued)

- Low bids or construction contracts
- Force account costs
- Local unit cost information
- R.S. Means Company, Inc. cost data
- FEMA Cost Codes
- USCOE Cost Information
- Other commercial cost estimating sources as approved by the PAO





CEF, Organizing Part A (continued)

- Analyzing Unit Cost Data
 - In-place costs
 - Overhead and profit
 - Union and non-union rates
 - Disaster-related changes
 - Lump sum items
 - City adjustment factor





CFR, Part B - General Requirements

- Safety and security measures
- Temporary services and utilities
- Quality control
- Submittals
- On-site project management





CEF, Part C - Cost Contingencies

- Level of design work completed
 - preliminary engineering analysis
 - working stage drawing
- Facility or project “constructability”
- Site access, staging, and storage
- Economy of scale





CEF, Part D - GC's Overhead & Profit

- Home office overhead
- Insurance and bonds
- Profit





CEF, Part E - Cost Escalation

- Duration of:
 - Design
 - Bid/award
 - Construction

- Midpoint of uncompleted construction





CEF, Part F - Plan Review, Permits & Fees

- Plan review fees
- Construction permit fees
- Fee waivers





CEF, Part G - Reserve for Change Orders

- The applicant controls the reserve
- It is for approved changes to eligible scope of work
- Incidental costs incurred after construction contract award
- Not used for:
 - Upgrades
 - Ineligible work





CEM, Part H - Project Management & Design

- Applicant's project development and management costs throughout the design and construction phases for:
 - Managing the design process
 - Basic design and inspection services normally performed by an A&E firm
 - Managing the construction phase (third party or in-house)



*F*orce Account

- If work is force account: adjust factors
- If combination of contract and force account: prepare separate Part A's
- Lack of information: assume contract work



406 Hazard Mitigation

- Must be eligible, cost effective, feasible
- For cost-benefit analysis:
 - Use construction costs (Part A) only
- After approval:
 - Add mitigation items to Part A
 - Run CEF to determine final estimate





Improved Project

- Restoration to pre-disaster design is eligible
- Cost of improvements borne by applicant
- Prepare Part A without improvements
- Run CEF to determine final estimate
- Grant capped at final estimate amount



Alternate Project

- Restoration to pre-disaster design is eligible
- Applicant may request alternate project
- Prepare Part A for eligible work only
- Run CEF to determine final estimate
- Grant capped at 75% of Federal share of the estimate (a 25% reduction of FEMA funding from original project estimate - excepting for publicly-owned facilities with unstable soils at the original site, then FEMA funding reduced by 10%).
- Excess costs borne by applicant



*R*epair Versus Replacement

- If repair >50% of replacement cost, replacement is eligible
- Repair: does not include current codes/standards
- Replacement: pre-disaster design using current codes/standards
- Comparison: use construction costs (Part A) only



Questions

Email address:
james.duffer@fema.gov

