

Cost Estimating for Hydropower Project Planning



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US Army Corps of Engineers
BUILDING STRONG





Overview

- Background
- USACE hydropower project cost estimating process
- Challenges in cost estimating & strategies for mitigation of cost risk





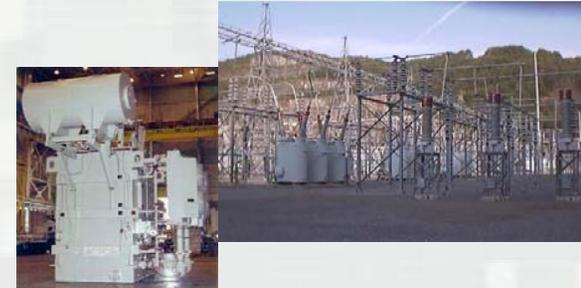
USACE regulations

- ER 1110-1-1300 Cost Engineering Policy and General Requirements
- ER 1110-2-1150 Engineering and Design for Civil Works Project
- ER 1110-2-1302 Civil Works Cost Engineering
- ETL 1110-2-573 Construction Cost Estimating Guide for Civil Works

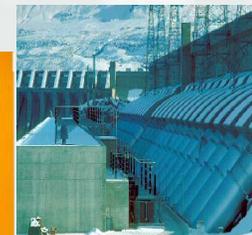




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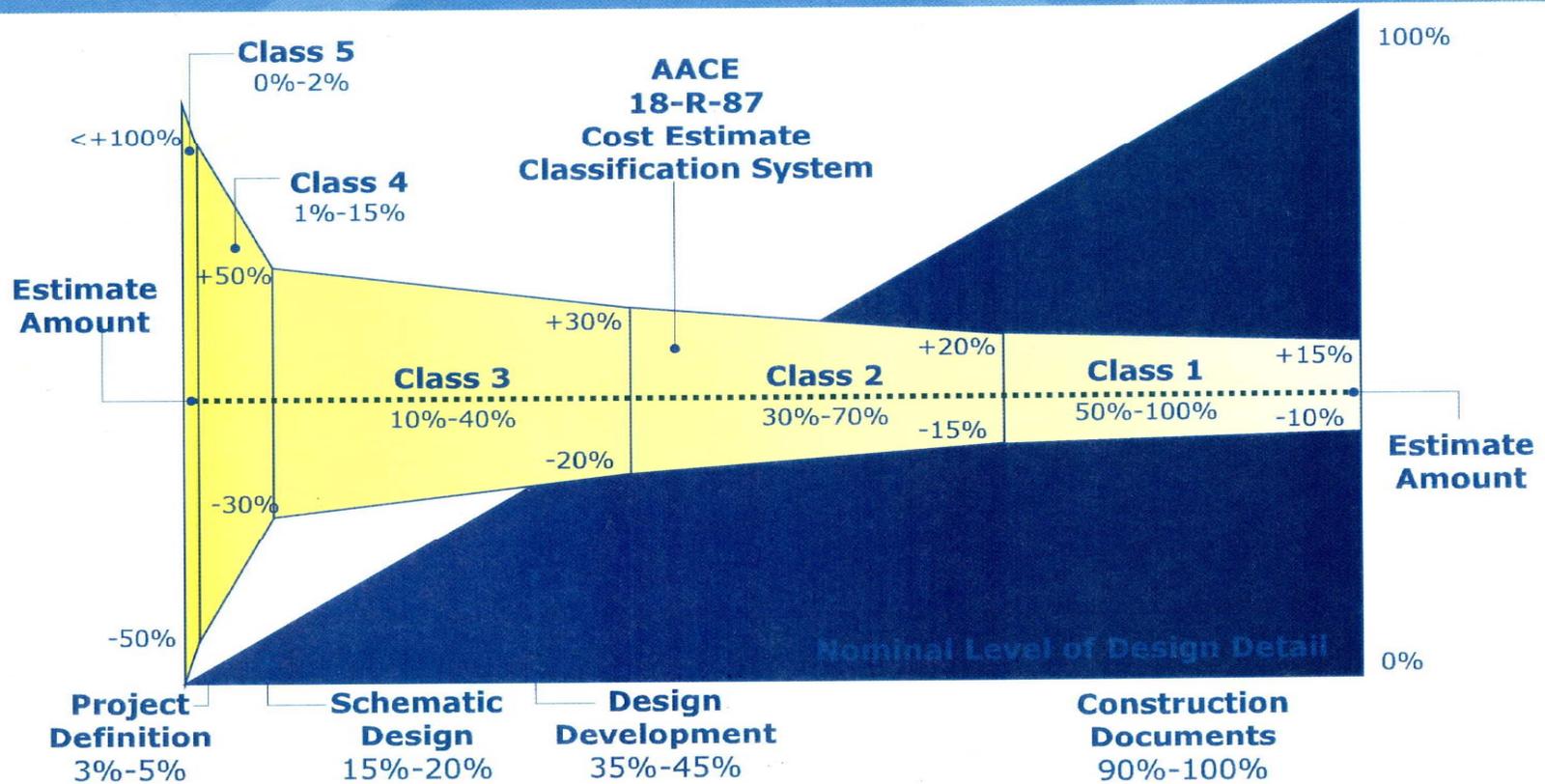
HDC performs planning, engineering and design, maintains expertise, and develops standards for the U.S. Army Corps of Engineers hydroelectric power facilities and large pumping plants.





Construction cost estimate accuracy ranges

AACE – Classification System



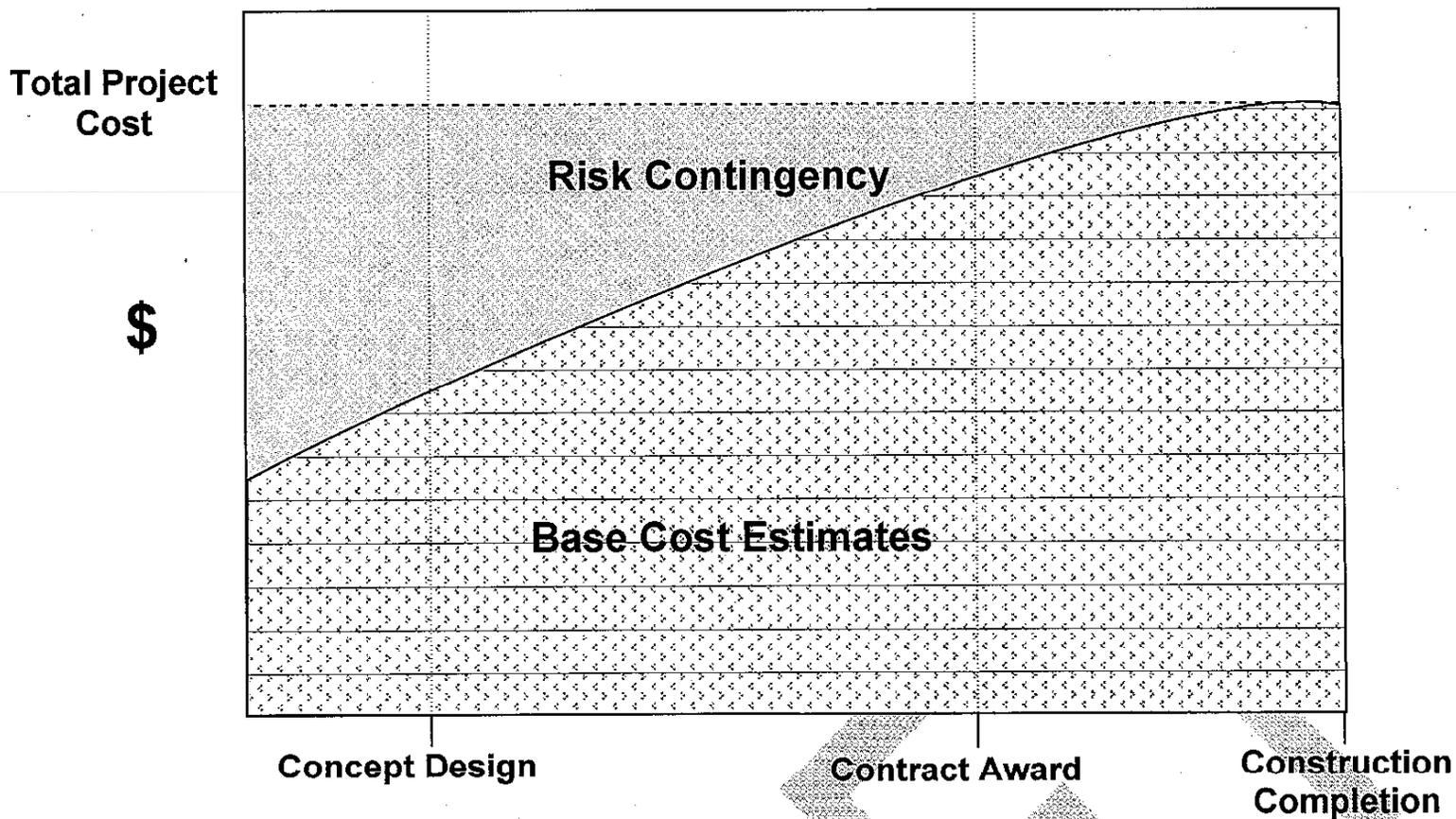
Total project cost components

- Planning & project management
- Design
- Contract
- Engineering during construction
- Supervision and administration
- Rarely - real estate & environmental
- Contingency





Cost estimate evolution over time





Contingencies

- Cost allowances to cover unknowns, uncertainties or unanticipated conditions
- Not possible to predict costs from data at hand
- Used for budgetary estimates, not independent government estimates





Typical cost estimating cycle

Project stage	Type of estimate
Budget/program approval	Rough order of magnitude
Scoping/development of PMP	Hydroelectric Design Center SSB
During design	Engineer's estimate
Prior to award of contract	Independent Government Estimate





Rough order of magnitude estimates

- Needed prior to project initiation
- No project funds available for scoping
- Judgment-based
- Very limited time or effort expended in preparing
- Limited or no background documentation
- Very high uncertainty about scope
- Accuracy can range from -50% to +100%





Hydroelectric Design Center SSBs

- Include HDC costs only
 - ▶ Labor
 - ▶ Travel
 - ▶ A/E contracts
- Mostly judgment-based
- Scoping funds generally available
- Some effort expended in preparing
- Limited project definition documents
- Relatively high uncertainty about scope at project initiation





Engineer's estimate

- Prepared during design
- When done by HDC, only includes materials and labor costs of contract for portion of design done by HDC
- Based less on judgment, more comparative with some parametric analysis
- Input into district's estimated total project cost





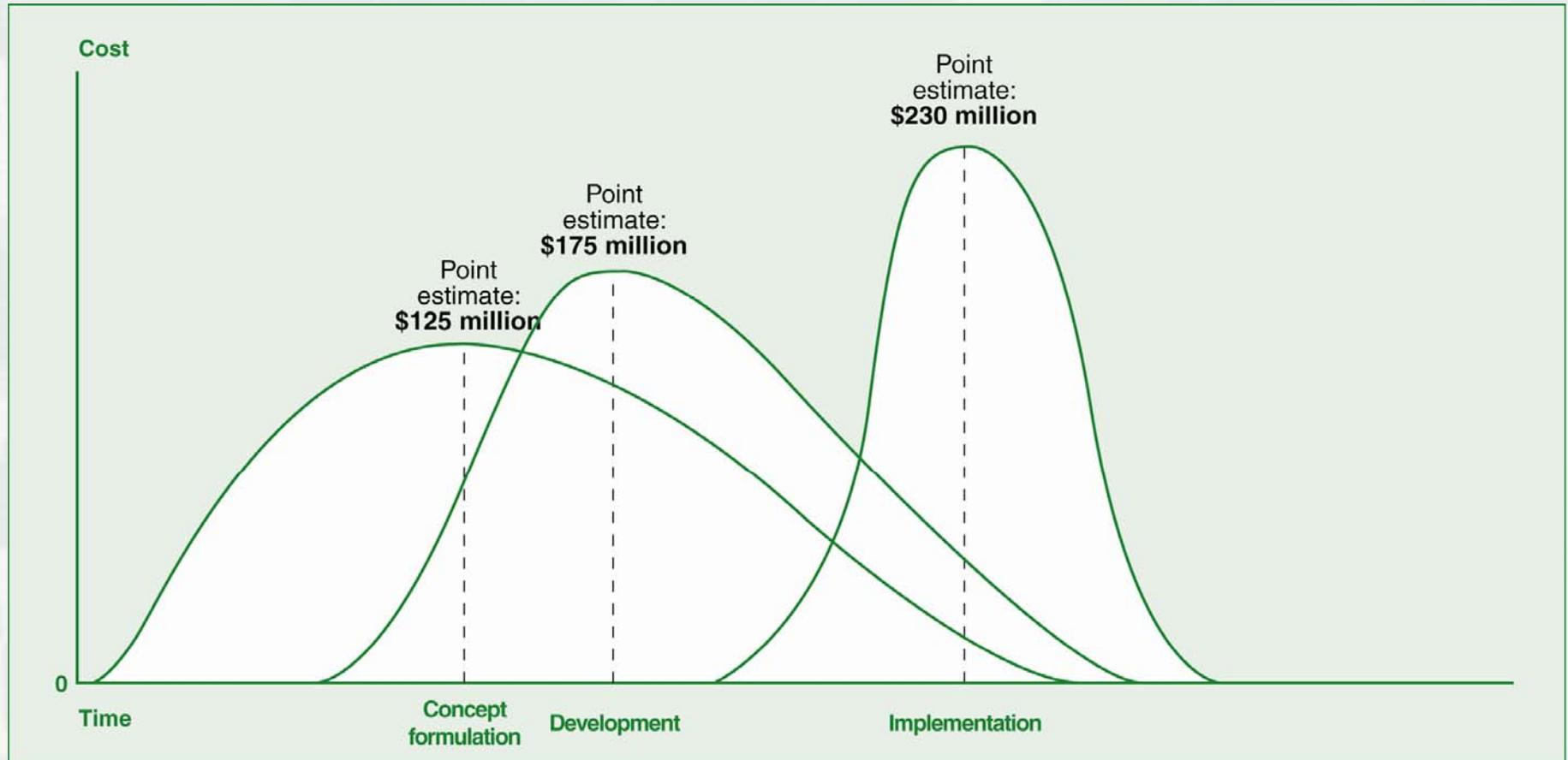
Independent Government Estimate (IGE)

- Formal, approved cost estimate prepared by cost engineering to support a contract award
- One estimate per contract
- Total contract cost
- Prepared in MII (aka MCACES)
- Ensure fair and reasonable contract costs
- Deterministic – based on unit costs & calculated quantities





The basic cost estimating challenge



Example of civil works project cost increase over time



Top 6 reasons for major cost differences

- Scope change
- Incorrect contingencies
- Acquisition strategy, timeline, restrictions
- Economy shifts (material pricing)
- Team work - lack of development funds/schedule/communication
- Estimator's ability to develop quality estimate





Ways to mitigate for cost risk

- Increase scope definition/documentation
- Include appropriate contingency factors
 - ▶ Use cost risk analysis
- Conduct early acquisition planning
- Revisit costs over time
- Follow best practices for business processes
- Include a cost engineer on the team

