



# How Much Will It **Really** Cost?



## Developing A Responsible Cost Estimate For Your Pumped Storage Project

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# A Great Reference (I wrote some of it)

- **U.S. Society on Dams White Paper “Guidelines for Construction Cost Estimating for Dam Engineers and Owners”, May 2012**
  - **Written by a committee with USACOE, USBR, Water District, Public Utility, Investor Owned Utility, Contractor, and Engineer Members**
  - **Vetted through the USSD approval process**
  - **Consistent with USACOE, USBR, AACE (Association for the Advancement of Cost Engineering) guidance**
  - **Available for free download at**  
<http://ussdams.com/reports/Guidelines%20for%20Construction%20Cost%20Estimating.pdf>



# Guidelines for Construction Cost Estimating for Dam Engineers and Owners

- **Topics Covered**
  - **Stages of Project Design and Associated Estimate**
  - **Development of Work Breakdown Structure**
  - **Direct Project Costs**
  - **Indirect Project Costs**
  - **Corporate Overhead**
  - **Contingency**
  - **Profit**
  - **Other Owner Costs**



# Stages of Project Design and Associated Estimate

- **By or For Owner**
  - **Conceptual (AACE Class 5)**
  - **Reconnaissance (AACE Class 4)**
  - **Feasibility (AACE Class 3)**
  - **Final Design (AACE Class 2)**
- **By Bidder**
  - **Bid Estimate (AACE Class 2 or AACE Class 1)**



# Direct Project Costs

- Labor
- Equipment
- Material
- Subcontracts
- Production Rates



# Indirect Project Costs

- **Bonds**
- **Safety Program**
- **Quality Control Program**
- **Contractor and Resident Engineer Job Staff**
- **Mobilization and Demobilization**
- **Job Offices and facilities**
- **Indirect Equipment cost**
  - Trucks and Forklifts
  - Generators, Pumps, and Compressors
  - Cranes and Hoists
  - Compressors
  - Scaffolding
- **General and Miscellaneous**
- **Environmental Program**
- **Construction Surveying and Staking**
- **Insurance and Warranty Costs**
- **Taxes**



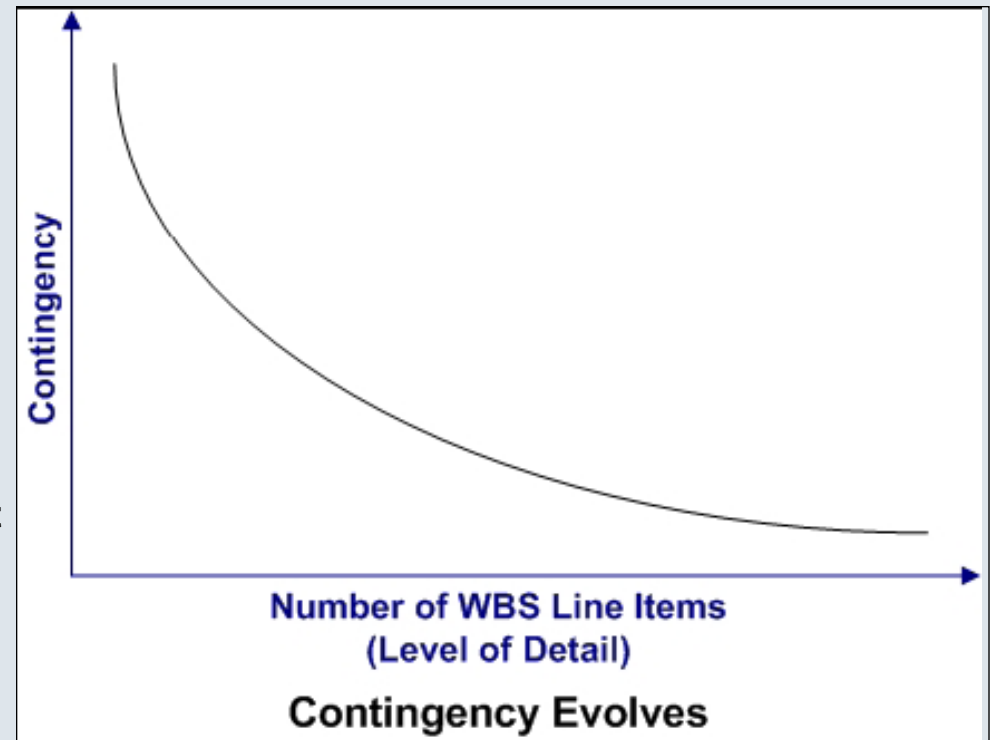
# Contingency 101: What is this contingency thing?

- To a funding agency or owner, contingency is the amount of cost overrun you can stand before having to do something you do not want to do, which is going back to your funding authority (directors, PUC, executive committee, legislature, etc.) to ask for more money. In other words, to an owner, contingency is often the measure of cost estimate accuracy
- To an contractor or engineer, contingency is something very, very different. **Contingency is the very real cost assigned to uncertainties in the definition of a project.**
- As project development moves from the conceptual to reconnaissance, to feasibility, to the final design stage, uncertainties become known line items, so uncertainty, and therefore the total amount of contingency dollars in the estimate, becomes lower.



# Contingency 102: Major Sources of Uncertainty

- Insufficient geology and geotechnical information
- Design Changes, including changes in the level of design definition as project development occurs
- Quantity variations
- Differing site conditions
- Price variations
  - Escalation
  - Commodity shortages
  - Labor rate variations
- Schedule Risks
  - Strikes
  - Prolonged time between bid receipt and contract award
  - Excess weather delays
  - Late delivery of major equipment
- Market Conditions
  - Number of bidders
  - Availability of performance bonds
  - Reputation of Owner





# San Roque Multipurpose Project, The Philippines



# Profit

- **Contractor will put a certain level of profit in an estimate depending on:**
- **Number of (qualified) bidders**
- **Bidding climate**
- **Industry capacity**
- **Highly specialized designs or technology**
- **Working conditions**
  - I want more money for a project in the middle of nowhere at 8200 ft.
- **Contract type**
  - Firm Fixed Price, Time & Materials, Cost plus, Target Price, etc.
- **Contract terms and conditions**
  - I want more money to risk large liquidated damages
- **Owner Reputation**
  - Those guys are a pain, so I want more money to work for them



# Other Owner Costs

- **Project Financing**
- **Revenue loss due to service interruption**
- **Owner's project management**
- **Legal**
- **Environmental Permitting**
- **Right-of-Way and land acquisition**
- **Water Rights**
- **Engineering**
- **Public Outreach**
- **Construction management**
- **O&M**
- **Operator training**



# 900,000 Acre Ft Eastside Reservoir, Riverside County, CA Includes 40 MW Pumped Storage Plant



# Make Sure You Consider These Items

- **Beware of Fliebye Knight Development Corporation, a wholly owned subsidiary of Dewey, Cheatum, and Howe, LLC**
- **Check Developer Qualifications!**
- **Is the developer licensed to do business in the state or states where the project is located?**
- **Has the developer actually developed anything at all. Has even one of their long list of projects actually been built and is operating and can you go see it? Or is the developer just filing preliminary permits in the hopes someone else with money will be interested**
- **Is the developer's engineer licensed in the state or states where the project is located?**
- **Does the developer have actual funds to invest or is it trying to leverage someone else's money?**
- **Will the developer spend money on real studies, not just on pulling information off the web (USGS quads, water gauge info, etc) and repackaging it at the desk?**



# Project Killers – and what to do about them

- **T&E Species – Make sure you do an initial environmental due diligence early. Your project must meet NEPA requirements, so if there will be problems in this area, identify the obvious ones early and make a go/no go based on the cost and nature of mitigation as early as possible. This is not a substitute for a full EA or EIS as appropriate, but might stop you from throwing money down a black hole**
- **Water Rights – Make sure you can get them and pay for them as necessary early. No water, no project**
- **You will be sued. Have a legal strategy in place**
- **Evaluate all potential cost items. The biggest ignored cost/project killer is power transmission costs. Many, many otherwise feasible projects have died when a reviewer noticed that transmission costs were not in the proffered project financial proforma**



# The End – Any Questions?

