ESTIMATING & COSTING

Webinar by Claude Lawrenson

Agenda

- Estimating & costing - are they the same thing
- What are the differences that exist
- Estimation in perspective
- Assessing bids
- Looking at the bigger picture

Overview

Many factors affect building cost -

Estimates are dependent on some main cost factors

- Materials
- Labour (work)
- Equipment
- Overhead/profit
- Financing ($$$$$$$$$$$$

To identify work we must be able to identify, describe and quantify it. Measurement is a fundamental part of estimating.

Estimating & Costing

Primary purpose of construction estimating

- Determine construction cost – direct & indirect
- Requires a detailed breakdown of main components – material, time, labour (workers), equipment, etc.
- Indirect refers to items such as utilities, administrative, fees and permits, temporary structures, etc.
- Used to determine expected expenditures for a project
- During construction used to order materials and work
- Determines whether a project can proceed or not

Estimates are about costs.

Cost Influences

Calculated based on

- Scope and definition
- Project size
- Complexity

Clear quality drawing & specs (contract documents) for a project details, along detailed information helps in reducing unknowns and risk.

UniFormat™, a publication of CSI and CSC, is a method of arranging construction information based on functional elements, or parts of a facility characterized by their functions, without regard to the materials and methods used to accomplish them.

Main Elements

Group

Individual Elements (Items)

Figure 1 - ASTM UNIFORMAT II
Classification of Building Elements (E1557-97)

Level 1 Major Group Elements	Level 2 Group Elements	Level 3 Individual Elements
A. SUBSTRUCTURE	A10 Foundations	A1010 Standard Foundations A1020 Special Foundations A1030 Slab on Grade
	A20 Basement Construction	A2010 Basement Excavation A2020 Basement Walls
B. SHELL	B10 Superstructure	B1010 Floor Construction B1020 Roof Construction
	B20 Exterior Closure	B2010 Exterior Walls B2020 Exterior Windows Exterior Doors
	B30 Roofing	B3010 Roof Coverings B3020 Roof Openings
C. INTERIORS	C10 Interior Construction	C1010 Partitions C1020 Interior Doors C1030 Specialties
	C20 Staircases	C2010 Stair Construction C2020 Stair Finishes
	C30 Interior Finishes	C3010 Wall Finishes C3020 Floor Finishes C3030 Ceiling Finishes
D. SERVICES	D10 Conveying Systems	D1010 Elevators D1020 Escalators & Moving Walks D1030 Material Handling Systems
	D20 Plumbing	D2010 Plumbing Fixtures D2020 Domestic Water Distribution D2030 Sanitary Waste D2040 Rain Water Drainage D2060 Special Plumbing Systems
	D30 HVAC	D3010 Energy Supply D3020 Heat Generating Systems D3030 Cooling Generating Systems D3040 Distribution Systems D3050 Terminal & Package Units D3060 Controls & Instrumentation D3070 Special HVAC Systems & Equipment D3080 Systems Testing & Balancing
	D40 Fire Protection	D4010 Fire Protection Sprinkler Systems D4020 Stand-Pipe & Hose Systems D4030 Fire Protection Specialties D4040 Special Electrical Systems
	D50 Electrical	D5010 Electrical Service & Distribution D5020 Lighting & Branch Wiring D5030 Communication & Security Systems D5040 Special Electrical Systems
E. EQUIPMENT & FURNISHINGS	E10 Equipment	E1010 Commercial Equipment E1020 Institutional Equipment E1030 Vehicular Equipment E1040 Other Equipment
	E20 Furnishings	E2010 Fixed Furnishings E2020 Movable Furnishings
F. SPECIAL CONSTRUCTION & DEMOLITION	F10 Special Construction	F1010 Special Structures F1020 Integrated Construction F1030 Special Construction Systems F1040 Special Facilities F1050 Special Controls & Instrumentation
	F20 Selective Building Demolition	F2010 Building Elements Demolition F2020 Hazardous Components Abatement

Recommended for larger projects

Sample House - Estimate

Work Item	Vendor	Labor	Equipment	Materials	Subcontr.	Subtotal	Markup %	Markup	Total
Permits/Fees	City of Los Angeles				$1,500.00	$1,500.00		$0.00	$1,500.00
Excavation		$6,000.00	$8,000.00	$500.00		$14,500.00	15.00%	$2,175.00	$16,675.00
Utilities		$3,500.00	$2,500.00	$2,750.00	$1,000.00	$9,750.00	15.00%	$1,462.50	$11,212.50
Water Well						$0.00		$0.00	$0.00
Septic Tank						$0.00		$0.00	$0.00
Foundation	Connie's Concrete				$3,500.00	$3,500.00	5.00%	$175.00	$3,675.00
Concrete Flatwork	Connie's Concrete				$1,900.00	$1,900.00	5.00%	$95.00	$1,995.00
Framing		$3,500.00	$1,500.00	$9,000.00		$14,000.00	15.00%	$2,100.00	$16,100.00
Roofing	Robert's Roofing				$3,500.00	$3,500.00	5.00%	$175.00	$3,675.00
Windows/Ext.Doors	Wally's Windows				$8,000.00	$8,000.00	5.00%	$400.00	$8,400.00
Garage Door	Gary's Garage Doors				$2,250.00	$2,250.00	5.00%	$112.50	$2,362.50
Siding						$0.00		$0.00	$0.00
Electrical	Ernie's Electric				$18,500.00	$18,500.00	5.00%	$925.00	$19,425.00
Plumbing	Mac's Mechanical				$16,500.00	$16,500.00	5.00%	$825.00	$17,325.00
HVAC	Mac's Mechanical				$23,000.00	$23,000.00	5.00%	$1,150.00	$24,150.00
Insulation		$3,500.00		$1,000.00		$4,500.00		$0.00	$4,500.00
Masonry	Mason's Masonry				$14,500.00	$14,500.00	5.00%	$725.00	$15,225.00
Drywall	Doug's Drywall				$12,500.00	$12,500.00	5.00%	$625.00	$13,125.00
Interior Trim	Doug's Drywall				$9,000.00	$9,000.00	5.00%	$450.00	$9,450.00
Painting	Paul's Painting				$13,500.00	$13,500.00	5.00%	$675.00	$14,175.00
Floor Coverings	Carl's Carpets				$16,500.00	$16,500.00	5.00%	$825.00	$17,325.00
Cabinets	Ken's Kabinets				$22,500.00	$22,500.00	5.00%	$1,125.00	$23,625.00
Appliances	Abby's Appliances	$2,500.00		$11,500.00		$14,000.00	15.00%	$2,100.00	$16,100.00
Landscaping	Sonny's Sodding				$2,750.00	$2,750.00	5.00%	$137.50	$2,887.50
Overhead Costs		$10,000.00				$10,000.00	20.00%	$2,000.00	$12,000.00
Other						$0.00		$0.00	$0.00
						$0.00		$0.00	$0.00
						$0.00		$0.00	$0.00
						$0.00		$0.00	$0.00
						$0.00		$0.00	$0.00
						$0.00		$0.00	$0.00
TOTALS						**$236,650.00**	**7.71%**	**$18,257.50**	**$254,907.50**

Costing

Actual costs versus estimated cost

- Estimated cost is determined before the commencement of a project
- Actual costs is known after completion of the work
- May include operation, maintenance and upkeep costs
- May include cost of land, servicing, (significant other costs)

What is the "real" total cost of the project?

Consider all the costs that should be included.

Estimating & Costing

Minimizing costs -

- Square or rectangular homes are less expensive to build than irregular shaped, similarly certain roof shapes, etc.
- Using standard stock materials
- Prefabricated materials often provides cost savings
- Using materials such as pre-hung doors
- Designing to minimum codes/building standards
- Minimizing custom built-ins
- Providing short plumbing lines and duct runs
- Use of appropriate insulation to reduce energy costs
- Avoiding construction design changes

Estimating & Costing

Dealing with contractors/subcontractors estimates -

- Necessary to determine if the estimate is realistic to your own takeoff (comparable)
- Where possible comparing the pricing received from 2 or 3 trades such as plumbing, electrical, etc.
- Are there exceptions or differences (alternates substituted)?
- Have they included everything?

Estimated Cost vs Actual Cost

What is most important?

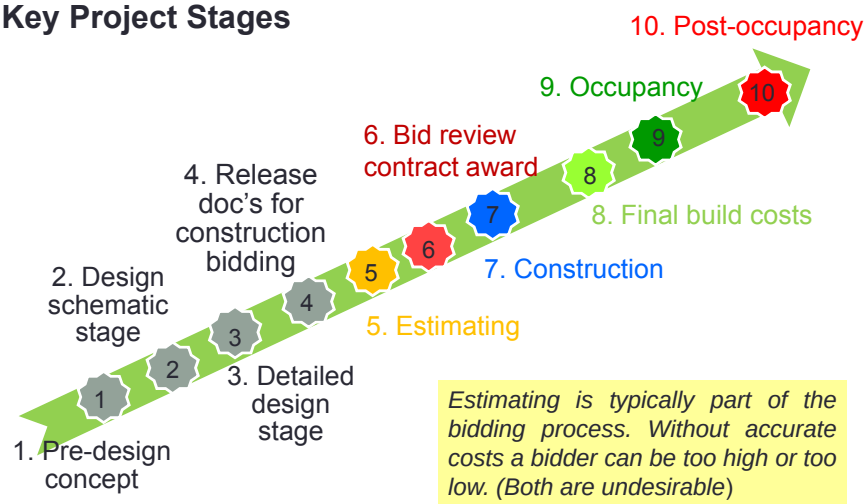
- Estimated cost provides "probable costs" of the work usually ***before*** the work take place
- The bid price is the price "tendered" to the owner or rep
- Actual costs is only known ***after*** the completion of the work

In reality they are both equally important for different reasons.

Likewise good estimating practices involves ***comparing*** actual cost against the estimated cost.

Project Phase Arrow

Key Project Stages



Estimating is typically part of the bidding process. Without accurate costs a bidder can be too high or too low. (Both are undesirable)

Estimating Phase

What's required?

- Plans (drawings) provide location and construction details
- Specifications provide materials, installation and workmanship as well as general contract conditions
- Estimating – requires understanding of methods of measurement as well a ability to read/interpret drawings

Location and understanding of pricing is important information based on regional costs variations. *Costing guide books can be helpful, but, a gamble if local pricing is not considered.*

Estimating

What's required?

Generally takes place during bidding period.

Estimating costs data can be derived from:

- Well-trained estimators
- Field experience
- Company cost records
- Observation of crew work (work performance studies)

Last resort:

Costing database guides/software such as RSMeans

Bidding Phase

Stage where contractors/subcontractors provide an offer (bid price) for "work" -

- It requires an estimate of cost for work completion
- Generally completion to required bid proposal documents
- Typically bids accepted by a specific time & date
- May require specific bonds for performance, etc.
- May require negotiations before signing of "contract" or "agreement" for the project "work"

Competitive bidding is popular *with many owners because it usually results in the lower construction costs. Bidding is mandatory for most public agencies.*

Bidding Variables

What variables affect bids the most?

1. Contractors overhead and profit margin
2. Conditions of the construction marketplace
3. Cost of labour & materials
4. Bids from subcontractors
5. Project location - close by, or at a great distance

Bid Conditions

What are key points regarding bid conditions?

- Clearly stated terms and conditions for the bid
- Type of bid – most common “specified price”, or unit pricing
- Recommend use of industry standard bid forms such as CCDC bid and contract forms (or modified derivative)
- Requires an understanding of build site and conditions
- Determining by owner/rep – what are the key evaluation points for selecting the winning bid

Late Bids

Scenario – *A contractor comes rushing through the door 3 minutes late with their bid. The bids have not been opened yet. What standard should the bid panel do?*

1. Refuse the bid, stating the deadline has passed.
2. Ask if there are any objections from the other bidders present to accept the bid since none have been opened yet.
3. Accept the bid with prejudice.
4. Accept the bid since none have been opened yet, but make note to look on it with disfavour when the bids are evaluated.

Feel free to post on the “chat” for later review.

Evaluation & Award of Bid

Evaluation panel – *typically an owner/owners rep, architect or engineer assists in the evaluation of construction bids.*

Often bids are evaluated based on:

1. The lowest bid
2. Review of any alternates or substitution pricing
3. Review of bidders subcontractors
4. Review of qualifications/experience statements
5. Other documentation required by “instruction to bidders”

Evaluation & Award of Bid

What conditions should be considered on “private” projects?

A few things to consider include:

1. Relationship with owner (conflict of interest)
2. Value of the work
3. Quality expectations
4. Past experience regarding previous work

Remember, the lowest price isn’t always the best value.

Evaluation of High Bids

What if the lowest bid comes in 20% higher than the budget, what would you advise?

1. Revise the design to reduce construction costs.
2. Rebid using another list of different contractors.
3. Have the owner reduce the scope of work to reduce costs.
4. Have all deduct alternates (lesser quality) be accepted in order to reduce costs, as well as have the owner slightly increase the budget to bring the pricing costs closer together.

Feel free to post on the "chat" for later review.

Evaluation of High Bids – Part 2

Where all bids exceed the budget and where the owner(s) agreement fixes a limit on costs, there are 4 possible options.

1. Rebid (or negotiate)
2. Authorize an increase in cost and proceed
3. Work with the architect/engineer/designer in revising the scope of work to reduce costs
4. Abandon the project

Rebidding seldom results in significant cost saving reductions unless large major modifications and changes in the project is initiated.

Project Risk

What are some of the risk factors?

- Unaccepted work (workmanship)
- Unaccepted installation (quality control)
- Lack of payment (holdbacks, etc.)
- Higher than estimated cost (i.e. current lumber prices)
- Poor estimating practices (bid too low to complete work)
- Poor labour (work) management (lack of supervision)
- Delays – longer construction time, delays in delivery, etc.
- Damage, fire, flood etc……

Factors affecting cost

What factors impact cost estimates?

- Legal and administrative requirements
- Complexity of the project
- Documentation quality
- Materials and construction methods
- Location (ease of access and servicing)
- Scheduling (time)
- Contingency for unforeseen (unknowns)
- The build environment

Costing – What else is required?

Consider the following:

- Rising energy costs – does it meet current building energy code requirements?
- Material replacement costs – are the materials suitable to the climate region, or the living environment?
- Anticipated annual maintenance costs – often anticipating a cost range between 2-5% of actual construction costs

Lets take a look at the "costing" side regarding "post occupancy".

Life Cycle Costs

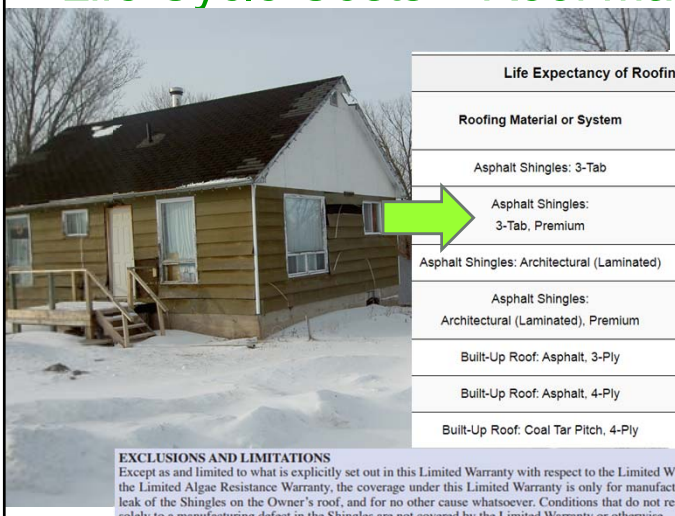
Consider the total cost of a piece of equipment such as a furnace. What do we need to consider regarding cost?

- Initial cost (purchase & installation)
- Operating costs (energy use, repairs, maintenance)
- Decommissioning costs (removal & disposal)

Furnace A: $3000 w/annual cost $1200
Furnace B: $3500 w/annual cost of $1100

Although there's a heating cost difference of $100/year over 15 years the cost difference of ($100x15) = $1500 - $500 = $1000 actual cost difference.

Life Cycle Costs – Roof Materials



Life Expectancy of Roofing Materials and Roof Systems		
Roofing Material or System	Typical Useful Service Life	Common Length Manufacturer's Warr
Asphalt Shingles: 3-Tab	12 - 25 Years	10 Years
Asphalt Shingles: 3-Tab, Premium	20 - 35 Years	20 Years
Asphalt Shingles: Architectural (Laminated)	25 - 40 Years	25 Years
Asphalt Shingles: Architectural (Laminated), Premium	35 - 50 Years	40 Years
Built-Up Roof: Asphalt, 3-Ply	15 - 20 Years	10 Years
Built-Up Roof: Asphalt, 4-Ply	20 - 25 Years	15 Years
Built-Up Roof: Coal Tar Pitch, 4-Ply	25 - 30 Years	20 Years

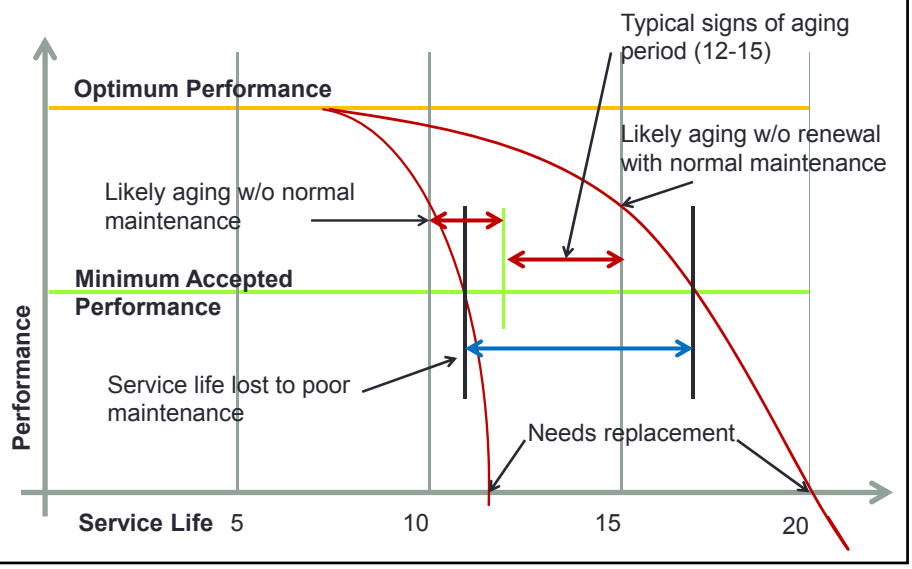
EXCLUSIONS AND LIMITATIONS

Except as and limited to what is explicitly set out in this Limited Warranty with respect to the Limited Wind Resistance Warranty and the Limited Algae Resistance Warranty, the coverage under this Limited Warranty is only for manufacturing defects that result in a leak of the Shingles on the Owner's roof, and for no other cause whatsoever. Conditions that do not result in a leak, or are not due solely to a manufacturing defect in the Shingles are not covered by the Limited Warranty or otherwise.

As a result, and without limiting the generality of the foregoing, IKO will not have any liability or obligation under the Limited Warranty or otherwise for the following:

1. Any damage that occurs during or after any improper application process, including one that fails to follow IKO's printed application instructions;
2. Any variation in the color or shading between installed Shingles on the building, including the fading or weathering of colored

Life Cycle – Performance / Service Life



Life Cycle Costs – Other Materials

So consider just about any building material – siding, windows doors, etc. What about major appliances – heating equipment, etc.?

Performance & Service Life

Consider – "does the product meet a recognized test standard"?

Here's an example to replace the old wood siding on that house:

https://www.mittensiding.com/upload/editor/Mitten-CCMC.pdf

Based on the listing we can determine it was evaluated (tested) and conforms to a Canadian material standard – CAN/CGSB-41.24-95

It was re-evaluated – 2016-06-15

A Word about Building Standards

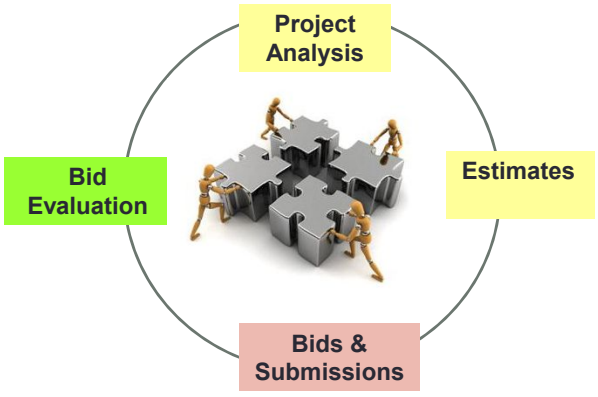
Regarding quality and reliability – material standards are used to define materials, quality, grades & characteristics such as workmanship.

Closely related are installation standards for materials – similar to “best practices”.

Building standards are referenced in and throughout building codes and most often in the specifications for construction projects. Therefore both drawings and specifications play a key part of quality builds.

Review: Key Phases

Estimating helps in determining these key phases.



But costing takes into account the bigger long term picture such as life cycle consideration.

Summary

If all bidders are equally qualified, have good past build record, and their bids are based on the same set of construction build documents, than the bid price should be the only variable.

An open and transparent bid process and open bid evaluation meeting process provides a "fair and truly transparent" reasonable way to select the project contractor for any construction project.

Project build quality control starts with the owner recognizing the ability to get a longer service life paying attention and considering performance factors.

Web Reference Links

Renovation & Building Costs

Analyzing Construction Costs

A Guide to Cost Resources

Guide to Cost Estimating

RSMeans Construction Cost

Ontario Tenders Portal

Merx (Canadian Tenders)