Chapter 1

Estimate Types

Construction estimators use four basic types of estimates. These types may be referred to by different names and may not be recognized by all as definitive, but most estimators will agree that each type has its place in the construction estimating process. The type of estimate performed is related to the amount of design information available. As the project proceeds through the various stages of design (from schematic design to design development to contract documents), the type of estimate changes and the accuracy of the estimate increases. Figure 1. 1 graphically demonstrates the relationship of required time versus resulting accuracy for these four basic estimate types.

1. **Order of Magnitude Estimate**: The order of magnitude estimate could be loosely described as an educated guess. It is also known as a "napkin estimate," because it is often the result of a conversation between a contractor (or developer) and a client/owner over lunch or dinner, in which an estimate is created on the nearest piece of paper, usually a napkin. Order of Magnitude Estimates can be completed in a matter of minutes. Accuracy is plus or minus 20%.
2. **Square Foot and Cubic Foot Estimates**: This type of estimate is most often useful when only the proposed size and use of a planned building is known. Very little information is required. Performing a breakout for this type of estimate enables the designer and estimator to adjust components for the proposed use of the structure (hospital, factory, school, apartments), type of foundation (slab on grade, spread footing, piles), and superstructure (steel, concrete, or a combination) and to focus the cost more closely to the final price. Accuracy of the square foot estimate is plus or minus 15%.
3. **Assemblies (or Systems) Estimate**: A systems estimate is best used as a budgetary tool in the planning stages of a project. Accuracy is expected at plus or minus 10%.
4. **Unit Price Estimate**: Working drawings and full specifications are required to complete a unit price estimate. It is the most accurate of the four types but is also the most time-consuming. Used primarily for bidding purposes, accuracy is plus or minus 5%.

Order of Magnitude Estimates

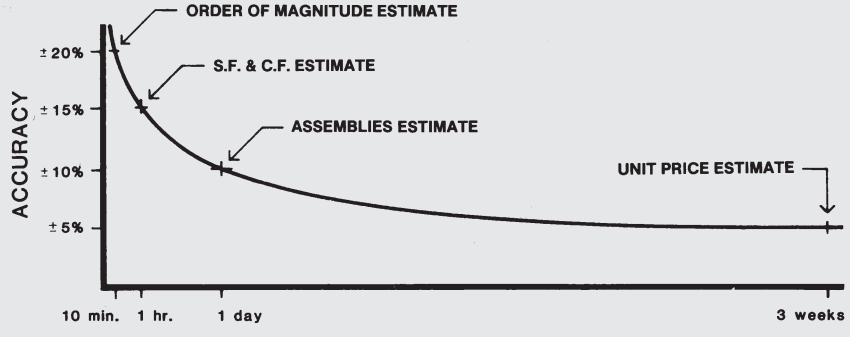
The Order of Magnitude Estimate can be completed with only a minimum of information. The proposed use and size of the planned structure should be known and may be the only requirement. The "units" to describe the structure can be very general, and need not be well-defined. For example: "An office building for a small service company in a suburban industrial park will cost about $650,000." This type of statement (or estimate) can be made after a few minutes of thought used to draw upon experience and to make comparisons with similar projects from the past. While this rough figure might be appropriate for a project in one region of the country, an adjustment may be required for a change of location and for cost changes over time (price changes, inflation, etc.).

Figure 1.2, from *Means Building Construction Cost Data*, shows examples of a different approach to the Order of Magnitude Estimate. This format is based on unit of use. Please note at the bottom of the categories "Hospitals" and "Housing" that costs are given "per bed or person," "per rental unit," and "per apartment." This data does not require that details of the proposed project be known in order to determine rough costs; the only required information is the intended use of the building and its approximate size. What is lacking in accuracy (plus or minus 20%) is more than compensated by the minimal time required to complete the Order of Magnitude Estimate—a matter of minutes.

Square Foot and Cubic Foot Estimates

The use of Square Foot and Cubic Foot Estimates is most appropriate prior to the preparation of plans or preliminary drawings, when budgetary parameters are being analyzed and established. Please refer again to Figure 1.2 and note that costs for each type of project are presented first as "Total project costs" by square foot and by cubic foot. These costs are then broken down into different construction components, and then into the relationship of each component to the project as a whole, in terms of costs per square foot. This breakdown enables the designer, planner, or estimator to adjust certain components according to the unique requirements of the proposed project.

Historical data for square foot costs of new construction are plentiful (see *Means Building Construction Cost Data*, Division 17). However, the best source of



ESTIMATING TIME VS. ACCURACY
(Based on a $2,000,000 project)

Figure 1.1

square foot costs is the estimator's own cost records for similar projects, adjusted to the parameters of the project in question. While helpful for preparing preliminary budgets, Square Foot and Cubic Foot Estimates can also be useful as checks against other, more detailed estimates. While slightly more time is required than with Order of Magnitude Estimates, a greater accuracy (plus or minus 15%) is achieved due to more specific definition of the project. A Square Foot Estimate is consistent with the amount of design information available at the schematic design phase.

Assemblies (Systems) Estimates

Rising design and construction costs in recent years have made budgeting and cost efficiency increasingly important in the early stages of building projects. Never before has the estimating process had such a crucial role in the initial planning. Unit Price Estimating, because of the time and detailed information required, is not suited as a budgetary or planning tool. A faster and more cost-effective method is needed for the planning phase of a building project; this is the "Assemblies," or "Systems Estimate." An Assemblies Estimate is usually prepared when the architect completes the design development plans.
The Systems method is a logical, sequential approach which reflects how a building is constructed. Seven "UNIFORMAT II" major groups organize building construction into major components that can be used in Assemblies Estimates. These UNIFORMAT II divisions are listed below:

Assemblies Major Groups:

A - Substructure

B - Shell

C - Interiors

D - Services

E - Equipment & Furnishings

F - Special Construction & Demolition

G - Building Sitework

Each major group is further broken down into systems. Each of these systems incorporates several different items into an assemblage that is commonly used in building construction. Figure 1.3 is an example of a typical system, in this case "Drywall Partitions/Wood Stud Framing" (see *Means Assemblies Cost Data*).

In the Assemblies format, a construction component may appear in more than one division. For example, concrete is found in A – Substructure, as well as in B and G (see list above). Conversely, each division may incorporate many different areas of construction, and the labor of different trades.

A great advantage of the Assemblies Estimate is that the estimator/designer is able to substitute one system for another during design development and can quickly determine the cost differential. The owner can then anticipate accurate budgetary requirements before final details and dimensions are established.

Final design details of the building project are required for a Unit Price Estimate. The Assemblies method does not require such details, but the estimators who use it must have a solid background knowledge of construction materials and methods, building code requirements, design options, and budgetary restrictions.

17100 | S.F., C.F. and % of Total Costs

17100 | S.F. & C.F. Costs

				UNIT	UNIT COSTS 1/4	UNIT COSTS MEDIAN	UNIT COSTS 3/4	% OF TOTAL 1/4	% OF TOTAL MEDIAN	% OF TOTAL 3/4	
400	0500	Masonry	R17100 -100	S.F.	5.65	11.10	17.20	6%	10%	15.50%	400
	2720	Plumbing			2.71	5.20	9.80	3.60%	6.70%	8%	
	2730	Heating & ventilating			4.64	6.70	12.95	6.20%	7.40%	13.50%	
	2900	Electrical			4.46	6.60	10.10	6.30%	8%	11.70%	
	3100	Total: Mechanical & Electrical		▼	11.30	20.50	33.50	15.20%	25.50%	32.70%	
410	0010	**GARAGES, PARKING**	R17100 -100	S.F.	23	33	59				410
	0020	Total project costs		C.F.	2.21	3	4.37				
	2720	Plumbing		S.F.	.61	1.03	1.59	2.60%	3.40%	3.90%	
	2900	Electrical			.96	1.46	2.14	4.30%	5.20%	6.30%	
	3100	Total: Mechanical & Electrical		▼	1.28	3.77	4.83	6.50%	9.40%	12.80%	
	3200										
	9000	Per car, total cost		Car	9,900	12,500	16,100				
430	0010	**GYMNASIUMS**	R17100 -100	S.F.	65.50	83.50	106				430
	0020	Total project costs		C.F.	3.26	4.17	5.40				
	1800	Equipment		S.F.	1.38	2.81	5.60	2.10%	3.40%	6.70%	
	2720	Plumbing			4.14	5.10	6.10	5.40%	7.30%	7.90%	
	2770	Heating, ventilating, air conditioning			4.45	6.80	13.60	9%	11.10%	22.60%	
	2900	Electrical			4.95	6.15	8.15	6.60%	8.30%	10.70%	
	3100	Total: Mechanical & Electrical		▼	15.35	21	28.50	20.60%	26.20%	29.40%	
	3500	See also division 11480									
460	0010	**HOSPITALS**	R17100 -100	S.F.	135	157	233				460
	0020	Total project costs		C.F.	9.50	11.75	16.95				
	1800	Equipment		S.F.	3.19	6.15	10.55	2.50%	3.80%	6%	
	2720	Plumbing			11.25	15.10	19.45	7.80%	9.40%	11.80%	
	2770	Heating, ventilating, air conditioning			15.85	21	28.50	8.40%	14.60%	17%	
	2900	Electrical			13.50	17.55	27.50	9.90%	12%	14.50%	
	3100	Total: Mechanical & Electrical		▼	38.50	51	83.50	26.60%	33.10%	39%	
	9000	Per bed or person, total cost		Bed	48,400	103,000	162,000				
	9900	See also division 11700 & 11780									
480	0010	**HOUSING** For the Elderly	R17100 -100	S.F.	62	78	95.50				480
	0020	Total project costs		C.F.	4.38	6.10	7.80				
	0100	Site work		S.F.	4.30	6.80	9.80	5.10%	8.20%	12.10%	
	0500	Masonry			1.88	7.05	10.25	2.10%	7.10%	12.20%	
	1800	Equipment			1.48	2.02	3.27	1.90%	3.20%	4.40%	
	2510	Conveying systems			1.50	2.02	2.74	1.80%	2.30%	2.90%	
	2720	Plumbing			4.58	5.90	7.85	8.10%	9.70%	10.90%	
	2730	Heating, ventilating, air conditioning			2.35	3.33	4.98	3.30%	5.60%	7.20%	
	2900	Electrical			4.60	6.20	7.95	7.30%	8.50%	10.50%	
	3100	Total: Mechanical & Electrical		▼	15.85	18.60	24.50	18.10%	22%	29.10%	
	9000	Per rental unit, total cost		Unit	57,500	67,000	74,500				
	9500	Total: Mechanical & Electrical		"	12,300	14,700	17,200				
500	0010	**HOUSING** Public (Low Rise)	R17100 -100	S.F.	52	72	94				500
	0020	Total project costs		C.F.	4.12	5.75	7.15				
	0100	Site work		S.F.	6.60	9.50	15.40	8.40%	11.70%	16.50%	
	1800	Equipment			1.41	2.30	3.67	2.30%	3%	5.10%	
	2720	Plumbing			3.53	4.95	6.25	6.80%	9%	11.60%	
	2730	Heating, ventilating, air conditioning			1.88	3.65	4	4.20%	6%	6.40%	
	2900	Electrical			3.14	4.68	6.50	5.10%	6.60%	8.30%	
	3100	Total: Mechanical & Electrical		▼	14.90	19.20	21.50	14.50%	17.60%	26.50%	
	9000	Per apartment, total cost		Apt.	57,000	65,000	81,500				
	9500	Total: Mechanical & Electrical		"	12,200	15,000	16,600				
510	0010	**ICE SKATING RINKS**	R17100 -100	S.F.	46	80	114				510
	0020	Total project costs		C.F.	3.26	3.34	3.85				
	2720	Plumbing		S.F.	1.66	3.11	3.18	3.10%	5.60%	6.70%	
	2900	Electrical		▼	4.75	7.30	7.70	6.70%	15%	15.80%	

(Reprinted from Means Building Construction Cost Data 2002.)

Figure 1.2