CONSTRUCTION PROJECT MANAGEMENT

A Complete Introduction

Second Edition

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11

Conceptual and Design Estimates

The previous chapter introduced the fundamentals of estimating: what they are, why and when they're done, and what some of the issues are that impact the numbers. We learned that there are different types of preconstruction estimates, distinguished primarily by when in the process they are completed and, consequently, how much information is known about the project. Different types of estimates are useful in different ways: an estimate completed early in the process (a conceptual estimate) provides the owner with a planning and budgetary tool; a design estimate, completed after some details are known, enables both the owner and architect to make informed choices about materials and systems; and a detailed estimate is used by contractors to determine costs required to build the project.

This chapter focuses on the methodologies for developing conceptual and design estimates. As noted, these estimates (as well as detailed estimates, which we'll review in the next chapter) are prepared before construction begins. As the project design progresses and details become known, the estimates become increasingly accurate. Typically, the owner and the designer prepare these estimates, but, depending on the delivery system, a construction manager may also develop them.

Conceptual estimates

A conceptual estimate is an estimate completed early in the planning phase (typically during feasibility) by the owner to determine if the project is affordable and to help define the scope of work. Because this type of estimate is done before many details are known, it can be completed quickly. The fact that it is based only on broad design projections before many specific decisions have been made means that it is, by necessity, very rough. For this reason, conceptual estimates are often referred to as **rough-order-of-magnitude (ROM)** estimates and they are useful primarily as planning tools.

How might someone develop a ROM estimate? If the owner is familiar with the type of project being estimated, he will use his own in-house data to complete the estimate. Otherwise, he must rely on a consulting estimator or on purchased data such as that published by RSMeans (introduced in the previous chapter; see the examples of their published data that follow). The estimator determines the number of units for the project—a hotel (rooms), a hospital (beds), an apartment building (apartments)—and multiplies this anticipated quantity by a cost per unit.

Imagine that an owner is interested in developing a 42-room hotel and wants to get a rough idea of the financial feasibility of the project. He has experience with similar projects and thinks that the total cost per room (including all costs except those to purchase the site) will be in the range of $84,000. A ROM estimate can be as simple as the following:

Number of rooms × cost per room = total cost
42 rooms × $84,000/room = $3,528,000 total cost

In order to increase the estimate's accuracy, adjustments can be made for project location and an inflation factor can be added if the anticipated start date is well in the future. (We'll discuss estimate adjustments later in the chapter.)

Inevitably, there are design issues (and therefore expenses) left unaddressed: Does the project have any special architectural features? What is the anticipated quality of the materials? What kind of mechanical systems are being used? Is the project exceptionally energy efficient? Although some questions can be adjusted for in the estimate, many are left unanswered. What the owner does get, however, is the cost for an *average* similar project and he can use this information to adjust his program or budget.

Although a conceptual estimate is very rough, with limited accuracy, it can serve an important function. Data regarding project budgets and programs provided to the owner early in the planning process can be used to set broad development goals and cost projections. What does an owner do, for example, when the conceptual estimate is too high? Take our hotel: he is going to depend on bank financing for the project and doesn't think he can get loans for more than $3 million. What might he do? There are basically four options: 1) abandon the idea; 2) cut back the size of the proposed project to lower the overall cost; 3) reduce the quality of the work, thereby lowering the square-foot cost and meeting the lower budget; or 4) some combination of 2 and 3. Although the final actual costs for the hotel will be different, the conceptual estimate should be close enough to enable the owner to make a reasonable decision regarding how to proceed.

Design estimates

A rough-order-of-magnitude estimate is a tool for answering some basic questions about a project during its earliest stage of development. As the design progresses and more details become known, it is possible to develop increasingly accurate estimates that provide the tools for evaluating competing alternative systems, and materials. There are several methods of estimating that are typically employed to develop these estimates; lets look at two: square foot and assemblies estimating.

Square foot estimating

S**quare foot estimating** is a method for developing data after some design detail is available but before the entire design is complete. The method uses a cost per square foot to calculate totals (size in square feet × cost per SF = total cost) and includes labor, equipment, material, overhead, and profit but does not calculate these numbers separately. This type of estimate is more detailed and hence more accurate than the rough-order-of-magnitude estimate and is used to refine the project further.

Square foot estimates use cost per square foot to calculate costs and are typically completed by contractors or architects using the estimator's own experience. They are also done using published data such as the cost data guides printed by the RSMeans Company. Let's look at how a contractor might use an RSMeans guide to price a private residence that has not yet been completely designed but about which major decisions regarding layout, materials, and amenities have been determined. (In addition to residential projects, the RSMeans guide also has data for industrial, commercial, and institutional structures. Here we'll focus on residential work, however.)

Problem to solve

> *What is the estimated cost of a 1,400 SF one-story house in Tampa, Florida, with one and a half baths, a one-car detached garage, and textured ceilings? Assume the exterior wall system is stucco over wood frame and that the quality of the structure is average.*

Price is linked to quality: the higher the quality the higher the price. So, in order to maximize pricing accuracy, the estimator needs to understand what quality is anticipated. RSMeans addresses this through their *classes* of residential construction: economy, average, custom, and, luxury. Each classification is marked by specific characteristics. The roof specifications, for example, for the various classes are as follows:

- *Economy* class: 20 year asphalt shingles, #15 felt building paper, aluminum gutters, downspouts, drip edges and flashings.
- *Average* class: 25 year asphalt shingles, #15 felt building paper, aluminum gutters, downspouts, drip edges and flashings.
- *Custom* class: 30 year asphalt shingles, #15 felt building paper, aluminum gutters, downspouts and drip edges, copper flashings.
- *Luxury* class: Red cedar shingles, #15 felt building paper, aluminum gutters, downspouts and drip edges, copper flashings.

Brief specification assumptions for each class also include Site Work, Foundations, Framing, Exterior Walls, Interiors, Specialties, Mechanical, Electrical, and Overhead and Profit.

In our problem, we are pricing a house of "average" quality, which, according to Means, is a house with a simple design built from standard plans. Beyond the basic specifications, features of this class of home include one bathroom, asphalt roofing, and no garage; there are some distinctive features to the house and the workmanship typically exceeds minimum code requirements. (Our house is slightly different from the "average" identified by Means because of the extra half-bath and the garage. There will be an opportunity later to take these facts into account.)

Pricing is also affected by the number of stories a house has. Means provides cost breakdowns for seven different *types* of housing defined by the number of stories (1, 1½, 2, 2½, Bi-level, and Tri-level). The estimator needs to select the cost data sheet that matches the *quality* of the project (identified by class: economy, average, custom, or luxury) plus the residential *type.* For our problem we have been asked to price an average one-story house. Figure 11.1 is therefore the appropriate RSMeans Cost Data Sheet.

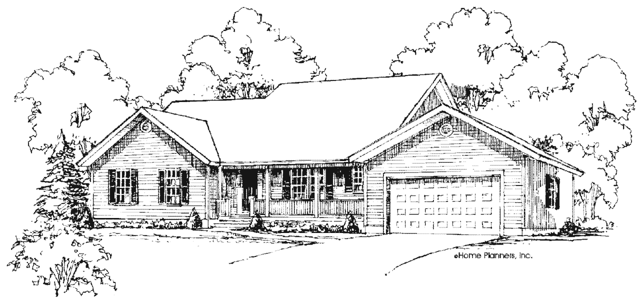
The RSMeans data sheet uses the exterior wall system and the size of the house to show *national average costs* per square foot. For residential projects, there are four possible exterior wall systems (wood, brick, stucco, and masonry; see the vertical column in the box data in Figure 11.1) and a range of living areas in square feet. In our example, the range is from 600 to 3,200 square feet. (These numbers vary depending on the class and type of house.) Basements may also be added and the estimator can adjust costs for various modifications such as extra bathrooms, garages, and upgraded materials and systems such as tile roofing and air conditioning.

To determine the cost for our house, the estimator locates the house's exterior wall system; in our case, this is stucco over wood frame. Next, we read across to the square footage that matches the proposed building size; in our problem, it is 1,400 square feet. Reading down at the intersection of exterior wall and building square footage shows a cost of $119.00 per square foot. (Interpolation is necessary if the square footage is different from what is presented in the cost sheet. For example, if the building is 1,500 square feet, the

RESIDENTIAL | Average | 1 Story

- **Simple design from standard plans**
- **Single family — 1 full bath, 1 kitchen**
- **No basement**
- **Asphalt shingles on roof**
- **Hot air heat**
- **Gypsum wallboard interior finishes**
- **Materials and workmanship are average**
- **Detail specifications on p. 27**

Note: The illustration shown may contain some optional components (for example: garages and/or fireplaces) whose costs are shown in the modifications, adjustments, & alternatives below or at the end of the square foot section.



Base cost per square foot of living area

	Living Area										
Exterior Wall	**600**	**800**	**1000**	**1200**	**1400**	**1600**	**1800**	**2000**	**2400**	**2800**	**3200**
Wood Siding - Wood Frame	172.50	154.65	141.65	131.25	122.50	116.75	113.60	109.85	102.45	97.05	93.30
Brick Veneer - Wood Frame	178.70	160.15	146.60	135.70	126.60	120.60	117.35	113.30	105.65	100.00	96.00
Stucco on Wood Frame	167.35	150.00	137.45	127.45	119.00	113.50	110.50	106.85	99.80	94.60	91.05
Solid Masonry	191.80	171.85	157.20	145.30	135.30	128.75	125.20	120.70	112.40	106.25	101.80
Finished Basement, Add	40.50	39.05	37.25	35.55	34.15	33.30	32.80	32.05	31.05	30.25	29.55
Unfinished Basement, Add	16.80	15.15	14.00	13.00	12.15	11.65	11.25	10.85	10.25	9.75	9.35

Modifications

Add to the total cost

Upgrade Kitchen Cabinets	$ + 5950
Solid Surface Countertops (Included)	
Full Bath - including plumbing, wall and floor finishes	+ 8050
Half Bath - including plumbing, wall and floor finishes	+ 4767
One Car Attached Garage	+ 15,086
One Car Detached Garage	+ 19,847
Fireplace & Chimney	+ 6942

Adjustments

For multi family - add to total cost

Additional Kitchen	$ + 9963
Additional Bath	+ 8050
Additional Entry & Exit	+ 1804
Separate Heating	+ 1650
Separate Electric	+ 1817

For Townhouse/Rowhouse - Multiply cost per square foot by

Inner Unit	.92
End Unit	.96

Alternatives

Add to or deduct from the cost per square foot of living area

Cedar Shake Roof	+ 3.50
Clay Tile Roof	+ 6.90
Slate Roof	+ 7.70
Upgrade Walls to Skim Coat Plaster	+ .49
Upgrade Ceilings to Textured Finish	+ .60
Air Conditioning, in Heating Ductwork	+ 4.95
In Separate Ductwork	+ 7.32
Heating Systems, Hot Water	+ 1.63
Heat Pump	+ 1.37
Electric Heat	– .79
Not Heated	– 3.61

Additional upgrades or components

Kitchen Cabinets & Countertops	Page 58
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28 **Important: See the Reference Section for Location Factors (to adjust for your city) and Estimating Forms.**

Figure 11.1. Square foot cost data.

cost per square foot is the cost per SF for 1,400 SF house [$119.00] + the cost per SF for a 1,600 SF house [$113.50] ÷ 2 = $116.25.)

To find the total base cost for our house, we multiply the square footage of the building by the cost per square foot as shown in the data sheet.

1,400 SF × $119/SF = $166,600

As noted, the base square foot cost can be increased, or reduced, depending on the complexity of the building, whether it has a basement, and if there are any features that deviate from the average house. So, to get our estimate as close as possible to what the building will cost, we need to add in the upgrades. The upper left of the cost sheet indicates what is included in the average house. Our house has upgrades of an extra half-bath, a garage, and textured ceilings. If we refer to Figure 11.1, we can see that the following costs need to be added to the base cost:

½ bath	Add	$4,767
One-car detached garage	Add	$19,847
Upgrade ceilings to textured finish ($.60/SF × 1,400 SF)	Add	$840
Total modifications =		$25,454

To get the total estimated project cost, we add the upgrades to the base price:

$166,600 + $25,454 = $192,054

But we're not quite done.

Because the Means cost sheets are all based on *average national costs*, an additional adjustment must be made to take into account that the house will be built in Tampa, Florida. Location adjustments are done by multiplying the project cost by a *city location factor* (Figure 11.2). The location factor assumes that the *average* city cost is 100, and costs in Tampa (and elsewhere) are expressed as a percentage of this average.

On the location factor sheet, find Tampa and go across to the residential column. We can see that Tampa is valued at .82 of the national average. This means it's cheaper to build in Tampa than it is in the average American city.

RSMeans is a leading provider of construction cost data, software, and services for all phases of the construction life cycle.

Location Factors - Residential/Commercial

Costs shown in *Square Foot Costs with RSMeans data* are based on national averages for materials and installation. To adjust these costs to a specific location, simply multiply the base cost by the factor for that city. The data is arranged alphabetically by state and postal zip code numbers. For a city not listed, use the factor for a nearby city with similar economic characteristics.

STATE/ZIP	CITY	Residential	Commercial
ALABAMA			
350-352	Birmingham	.83	.85
354	Tuscaloosa	.84	.86
355	Jasper	.83	.86
356	Decatur	.83	.85
357-358	Huntsville	.83	.85
359	Gadsden	.82	.85
360-361	Montgomery	.82	.85
362	Anniston	.81	.83
363	Dothan	.84	.85
364	Evergreen	.81	.85
365-366	Mobile	.83	.84
367	Selma	.82	.85
368	Phenix City	.83	.85
369	Butler	.81	.85
ALASKA			
995-996	Anchorage	1.22	1.17
997	Fairbanks	1.25	1.18
998	Juneau	1.23	1.17
999	Ketchikan	1.26	1.24
ARIZONA			
850,853	Phoenix	.87	.88
851,852	Mesa/Tempe	.86	.87
855	Globe	.85	.87
856-857	Tucson	.85	.86
859	Show Low	.86	.88
860	Flagstaff	.87	.89
863	Prescott	.86	.88
864	Kingman	.85	.87
865	Chambers	.87	.88
ARKANSAS			
716	Pine Bluff	.78	.83
717	Camden	.76	.80
718	Texarkana	.78	.80
719	Hot Springs	.75	.80
720-722	Little Rock	.80	.83
723	West Memphis	.78	.82
724	Jonesboro	.77	.81
725	Batesville	.75	.79
726	Harrison	.76	.79
727	Fayetteville	.74	.79
728	Russellville	.75	.78
729	Fort Smith	.81	.81
CALIFORNIA			
900-902	Los Angeles	1.15	1.13
903-905	Inglewood	1.12	1.09
906-908	Long Beach	1.12	1.10
910-912	Pasadena	1.11	1.09
913-916	Van Nuys	1.14	1.11
917-918	Alhambra	1.15	1.10
919-921	San Diego	1.10	1.09
922	Palm Springs	1.11	1.09
923-924	San Bernardino	1.14	1.08
925	Riverside	1.14	1.11
926-927	Santa Ana	1.13	1.08
928	Anaheim	1.14	1.11
930	Oxnard	1.14	1.10
931	Santa Barbara	1.14	1.10
932-933	Bakersfield	1.11	1.08
934	San Luis Obispo	1.15	1.10
935	Mojave	1.12	1.07
936-938	Fresno	1.18	1.11
939	Salinas	1.21	1.15
940-941	San Francisco	1.33	1.29
942,956-958	Sacramento	1.19	1.14
943	Palo Alto	1.27	1.20
944	San Mateo	1.30	1.21
945	Vallejo	1.23	1.17
946	Oakland	1.29	1.23
947	Berkeley	1.32	1.23
948	Richmond	1.31	1.20
949	San Rafael	1.30	1.23
950	Santa Cruz	1.25	1.18
951	San Jose	1.30	1.23
952	Stockton	1.19	1.12
953	Modesto	1.18	1.12

STATE/ZIP	CITY	Residential	Commercial
CALIFORNIA (CONT'D)			
954	Santa Rosa	1.27	1.21
955	Eureka	1.23	1.14
959	Marysville	1.20	1.14
960	Redding	1.24	1.18
961	Susanville	1.21	1.17
COLORADO			
800-802	Denver	.88	.91
803	Boulder	.90	.89
804	Golden	.85	.89
805	Fort Collins	.88	.90
806	Greeley	.88	.89
807	Fort Morgan	.85	.87
808-809	Colorado Springs	.84	.89
810	Pueblo	.84	.87
811	Alamosa	.84	.88
812	Salida	.82	.87
813	Durango	.86	.87
814	Montrose	.81	.87
815	Grand Junction	.92	.91
816	Glenwood Springs	.81	.87
CONNECTICUT			
060	New Britain	1.11	1.06
061	Hartford	1.09	1.07
062	Willimantic	1.11	1.07
063	New London	1.10	1.05
064	Meriden	1.10	1.06
065	New Haven	1.11	1.08
066	Bridgeport	1.12	1.07
067	Waterbury	1.11	1.07
068	Norwalk	1.11	1.07
069	Stamford	1.12	1.10
D.C.			
200-205	Washington	.92	.95
DELAWARE			
197	Newark	1.02	1.04
198	Wilmington	1.01	1.04
199	Dover	1.02	1.04
FLORIDA			
320,322	Jacksonville	.80	.82
321	Daytona Beach	.83	.84
323	Tallahassee	.80	.83
324	Panama City	.81	.83
325	Pensacola	.84	.85
326,344	Gainesville	.80	.83
327-328,347	Orlando	.81	.84
329	Melbourne	.83	.86
330-332,340	Miami	.79	.82
333	Fort Lauderdale	.80	.82
334,349	West Palm Beach	.80	.81
335-336,346	Tampa	.82	.84
337	St. Petersburg	.81	.85
338	Lakeland	.79	.84
339,341	Fort Myers	.79	.82
342	Sarasota	.83	.85
GEORGIA			
300-303,399	Atlanta	.88	.88
304	Statesboro	.79	.85
305	Gainesville	.82	.84
306	Athens	.81	.85
307	Dalton	.84	.87
308-309	Augusta	.87	.87
310-312	Macon	.84	.86
313-314	Savannah	.85	.86
315	Waycross	.81	.84
316	Valdosta	.75	.83
317,398	Albany	.84	.86
318-319	Columbus	.84	.86
HAWAII			
967	Hilo	1.19	1.17
968	Honolulu	1.21	1.19

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For customer support on your Square Foot Costs with RSMeans data, call 800.448.8182.

Figure 11.2. City location factors.

Multiplication of the adjusted project cost by the location factor for Tampa gives us the total estimate for building our house:

$192,054 × .82 = $157,484.28

If we compare the cost of building the house in Tampa ($157,484) with the national average for the same building ($192,054), we can see that Tampa is less costly.

What if we were to build the same building in San Francisco? How would *that* cost compare to the national average and to the cost in Tampa? To determine this, we do exactly what we did for Tampa: calculate an adjusted base cost and multiply by the location factor for San Francisco (1.33):

$192,054 × 1.33 = $255,431.82

So it appears that the cost to build our house in San Francisco is a lot higher than both the national average—$192,054—and the cost in Tampa—$157,484.28.

The final adjustment that might have to be made is for time. We computed our examples based on the 2018 Means data indices. A project set to begin sometime in the future needs to be adjusted for expected increases in labor and material. This can be accomplished by using an anticipated inflation figure or by referring to *Means Historical Data,* which suggests an escalation rate for future years.

Assemblies estimating

In a rough-order-of-magnitude estimate, the estimator is using gross unit costs (such as the number of hotel rooms) to get a rough idea of project costs. Square foot estimating looks at overall project area. In assemblies estimating, the team determines the individual cost of the many systems—foundation, flooring, mechanical, roofing, and so on—that make up any project. Assemblies estimates do not require complete design details; instead, they are based on the general size of the structure and other known parameters. The degree of accuracy is generally within +/-15%.

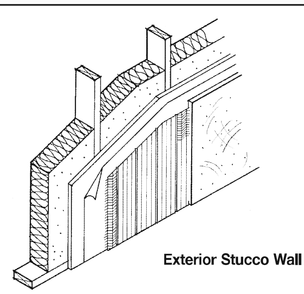
An assembly is the grouping of individual work items that together form a system. For example, an exterior stucco wall system might include 24 studs (8' high, 16" on center) with ⅝" plywood sheathing, fiberglass insulation, sheathing paper, and 3 coats of stucco, painted. The estimator will price the entire partition as a system by calculating the total units (in this example, square feet) and multiply by the cost per SF. (In this case $13.50 for both materials and labor.) Figure 11.3 is the appropriate Means *Assemblies Cost Data* sheet.

Most assemblies on a cost data sheet such as Figure 11.3 consist of three major elements: a visual representation of the assembly, the individual components that make up the assembly with a unit cost for materials and installation of the assembly, and costs for systems that are similar but have design or size changes. Assemblies are identified by a unique 12-character identifier (in our example: B2010 151 2100). The first 4 characters (B2010) takes the data to level 4 and the final 6 characters allows the estimator to break down costs into increased detail. For example, if our assembly had metal lath instead of ⅝" plywood sheathing, we would refer to B2010 151 2500. (Note that numbers are consistent across all RSMeans publications.) All RSMeans assemblies data include a unit of measure, in our case, square feet.

B20 Exterior Enclosure

B2010 Exterior Walls

Visual representation



The table below lists costs for some typical stucco walls including all the components as demonstrated in the component block below. Prices are presented for backup walls using wood studs, metal studs and CMU.

Individual components

System Components	QUANTITY	UNIT	COST PER S.F. MAT.	COST PER S.F. INST.	COST PER S.F. TOTAL
SYSTEM B2010 151 2100					
7/8" CEMENT STUCCO, PLYWOOD SHEATHING, STUD WALL, 2" X 4", 16" O.C.					
Framing 2x4 studs 8' high 16" O.C.	1.000	S.F.	.52	1.54	2.06
Plywood sheathing on ext. stud wall, 5/8" thick	1.000	S.F.	.84	1.18	2.02
Building paper, asphalt felt sheathing paper 15 lb	1.000	S.F.	.06	.17	.23
Stucco, 3 coats 7/8" thk, float finish, on frame construction	1.000	S.F.	1.02	5.92	6.94
Fiberglass insulation batts, paper or foil back, 3-1/2", R-11	1.000	S.F.	.52	.46	.98
Paint exterior stucco, brushwork, primer & 2 coats	1.000	S.F.	.25	1.02	1.27
TOTAL			3.21	10.29	13.50

Costs for similar systems

B2010 151	Stucco Wall	COST PER S.F. MAT.	COST PER S.F. INST.	COST PER S.F. TOTAL
2100	Cement stucco, 7/8" th., plywood sheathing, stud wall, 2" x 4", 16" O.C.	3.21	10.30	13.51
2200	24" O.C.	3.09	10	13.09
2300	2" x 6", 16" O.C.	3.64	10.45	14.09
2400	24" O.C.	3.47	10.10	13.57
2500	No sheathing, metal lath on stud wall, 2" x 4", 16" O.C.	2.31	8.95	11.26
2600	24" O.C.	2.19	8.65	10.84
2700	2" x 6", 16" O.C.	2.74	9.10	11.84
2800	24" O.C.	2.57	8.75	11.32
2900	1/2" gypsum sheathing, 3-5/8" metal studs, 16" O.C.	3.40	9.35	12.75
2950	24" O.C.	3.03	8.80	11.83

Figure 11.3. Assemblies cost data sheet.

The Means cost guides use a standardized format so the estimator can readily locate systems and adapt to the specific project. For example, exterior walls are always identified as B2010, roof construction is always B1020, and interior partitions are always C1010. Each specific system also has a distinct identification, which adds additional organizational clarity.

Assemblies costing blends several different trades into different broad building components (such as exterior walls) and can be created for all the systems in a building. These estimates provide flexibility by allowing the estimator or designer to make comparisons of systems in various combinations. When the systems are combined, they provide a total building cost that includes worker base pay, fringe benefits, and contractor overhead, profit, and markups, as well as overhead and profit for the installing contractors.

How RSMeans gets its numbers RSMeans publishes annual updates to their many cost guides by carefully tracking costs around the U.S. and Canada. They contact manufacturers, dealers, distributors, and contractors to determine national average material costs (excluding sales taxes). Labor costs are based on a mathematical average of trade-specific wages in 30 major U.S. cities, and include overhead and profit figures as well as time normally spent on tasks such as mobilization, material handling, and cleanup. RSMeans researches rental and operating costs for equipment under normal use. General Requirements (such as Administration, Documentation, Submittals, and more) are also identified and are presented in two ways: Bare Costs and Total Cost including Overhead & Profit. As noted, the estimator will take into account special features of the project in order to improve accuracy.[1]

Assemblies estimating is typically done when drawings are between 10% and 75% complete[2] and accuracy is typically higher than with square foot estimating. As already discussed, conceptual and square foot estimating are approximate estimates completed before the design is complete. For the most accurate and detailed estimating, the owner looks to the detailed estimate developed by the contractor when the design and drawings are 100% complete (or very close) and before the bid submission. Not surprisingly, the detailed estimates are far more difficult and time-consuming to complete and their accuracy is more critical. These estimates are the subject of the next chapter.

Chapter vocabulary

Assemblies (systems) estimating—a method of estimating that prices the individual work units that form a system.

City location factor—used to adjust the national average costs of materials and installation shown in RSMeans cost data publications to those at specific locations.

Conceptual estimate—a cost estimate based on very little design information and using gross unit pricing to determine the project cost.

Design estimate—a cost estimate completed when some details are known.

Preliminary estimate—a cost estimate developed after some design is known and decisions are still being made.

Rough-order-of-magnitude (ROM) estimate—a conceptual cost estimate that is completed early in the planning phase by the owner to determine if the project is affordable and to help define the scope of work.

RSMeans—a leading provider of construction cost data, software, and services for all phases of the construction lifecycle.

Square foot estimating—a method of estimating that uses floor area to calculate costs after some design detail is available.

Topics for discussion

1. Discuss the value to an owner of a rough estimate.
2. Refer to Figure 11.1. What are the square foot costs for a 1,200-SF townhouse with wood siding over wood frame? Why is a location factor used?
3. Refer to Figure 11.2. Is it more costly to build in Los Angeles or in Washington, DC? What is the cost difference?
4. Why might a design estimate that has been developed using assemblies estimating be of value to the architect?