

50 17 | Square Foot Costs

50 17 00 S.F. Costs		UNIT	UNIT COSTS			% OF TOTAL				
			1/4	MEDIAN	3/4	1/4	MEDIAN	3/4		
52	3100	Total: Mechanical & Electrical	S.F.	47.50	89	105	27.50%	30%	34%	52
53	0010	LIBRARIES	S.F.	113	141	186				53
	0020	Total project costs	C.F.	7.70	9.65	12.30				
	0500	Masonry	S.F.	8.80	15.60	26	5.80%	7.80%	12.35%	
	1800	Equipment		1.54	4.14	6.25	.41%	1.50%	4.16%	
	2720	Plumbing		4.16	6.05	8.20	3.38%	4.60%	5.70%	
	2770	Heating, ventilating, air conditioning		9.20	15.60	20.50	7.80%	10.95%	12.80%	
	2900	Electrical		11.30	14.75	18.65	8.30%	10.25%	11.95%	
	3100	Total: Mechanical & Electrical		34	43	53.50	19.65%	22.50%	26.50%	
54	0010	LIVING, ASSISTED	S.F.	104	123	145				54
	0020	Total project costs	C.F.	8.75	10.25	11.65				
	0500	Masonry	S.F.	3.06	3.65	4.29	2.37%	3.16%	3.86%	
	1800	Equipment		2.37	2.75	3.53	2.12%	2.45%	2.66%	
	2720	Plumbing		8.75	11.70	12.10	6.05%	8.15%	10.60%	
	2770	Heating, ventilating, air conditioning		10.35	10.85	11.85	7.95%	9.35%	9.70%	
	2900	Electrical		10.20	11.25	13.05	9%	10%	10.70%	
	3100	Total: Mechanical & Electrical		28.50	33.50	38.50	26%	29%	31.50%	
55	0010	MEDICAL CLINICS	S.F.	106	131	166				55
	0020	Total project costs	C.F.	7.75	10.05	13.35				
	1800	Equipment	S.F.	2.87	6	9.35	1.05%	2.94%	6.35%	
	2720	Plumbing		7.05	9.90	13.25	6.15%	8.40%	10.10%	
	2770	Heating, ventilating, air conditioning		8.40	11	16.20	6.65%	8.85%	11.35%	
	2900	Electrical		9.10	12.95	16.90	8.10%	10%	12.25%	
	3100	Total: Mechanical & Electrical		29	39.50	54	22.50%	27%	33.50%	
	3500	See also division 11700 (MF2004 11 71 00)								
57	0010	MEDICAL OFFICES	S.F.	100	123	151				57
	0020	Total project costs	C.F.	7.45	10.10	13.65				
	1800	Equipment	S.F.	3.46	6.50	9.25	.98%	5.10%	7.05%	
	2720	Plumbing		5.50	8.50	11.45	5.60%	6.80%	8.50%	
	2770	Heating, ventilating, air conditioning		6.65	9.80	12.70	6.15%	8.05%	9.70%	
	2900	Electrical		8	11.60	16.20	7.60%	9.80%	11.70%	
	3100	Total: Mechanical & Electrical		21.50	31	47	19.35%	23%	30.50%	
59	0010	MOTELS	S.F.	63	91	119				59
	0020	Total project costs	C.F.	5.60	7.50	12.25				
	2720	Plumbing	S.F.	6.40	8.10	9.70	9.45%	10.60%	12.55%	
	2770	Heating, ventilating, air conditioning		3.89	5.80	10.40	5.60%	5.60%	10%	
	2900	Electrical		5.95	7.50	9.35	7.45%	9.05%	10.45%	
	3100	Total: Mechanical & Electrical		20	25.50	43.50	18.50%	24%	25.50%	
	5000									
	9000	Per rental unit, total cost	Unit	32,000	61,000	66,000				
	9500	Total: Mechanical & Electrical	"	6,250	9,450	11,000				
60	0010	NURSING HOMES	S.F.	98.50	127	156				60
	0020	Total project costs	C.F.	7.75	9.70	13.25				
	1800	Equipment	S.F.	3.11	4.12	6.85	2.02%	3.62%	4.99%	
	2720	Plumbing		8.45	12.80	15.45	8.75%	10.10%	12.70%	
	2770	Heating, ventilating, air conditioning		8.90	13.50	17.90	9.70%	11.45%	11.80%	
	2900	Electrical		9.75	12.20	16.60	9.40%	10.55%	12.45%	
	3100	Total: Mechanical & Electrical		23.50	32.50	54.50	26%	29.50%	30.50%	
	9000	Per bed or person, total cost	Bed	43,800	55,000	70,500				
61	0010	OFFICES Low Rise (1 to 4 story)	S.F.	83	107	139				61
	0020	Total project costs	C.F.	5.95	8.20	10.75				
	0100	Site work	S.F.	6.45	11.05	16.40	5.90%	9.70%	13.55%	
	0500	Masonry	"	2.86	6.35	11.75	2.62%	5.45%	8.20%	
	1800	Equipment	S.F.	.88	1.73	4.71	.73%	1.50%	3.66%	
	2720	Plumbing		2.95	4.59	6.70	3.66%	4.50%	6.10%	
	2770	Heating, ventilating, air conditioning		6.60	9.15	13.40	7.20%	10.30%	11.70%	
	2900	Electrical		6.75	9.65	13.60	7.45%	9.65%	11.40%	

Figure 2.2

A Note on Rounding

Rounding off, or decreasing the number of significant digits, should be done only when it will not statistically affect the resulting product. The estimator must use good judgment to determine instances when rounding is appropriate. An overall 2%–3% variation in a competitive market can often be the difference between getting or losing a job, or between profit or no profit. The estimator should establish rules for rounding to achieve a consistent level of precision. In general, it is best not to round numbers until the final summary of quantities. Pennies should be rounded off to the nearest dollar, and, when appropriate, dollars can be rounded off to the closest five or ten.

Convert Units of Measure

The final summary is also the time to convert units of measure into standards for practical use (linear feet of copper tube to twenty-foot divisions, for example). This is done to keep the numerical value of the unit equitable to what will be purchased and handled.

Be sure to quantify (count) and include “labor only” items that are not shown on the plans. Such items may or may not be indicated in the specifications and might include cleanup, special labor for handling materials, testing, code inspectors, etc.

Summary

The following list summarizes the suggestions outlined in this chapter plus a few more guidelines that will be helpful during the quantity takeoff:

- Use preprinted forms.
- Use only the front side of each piece of paper.
- Transfer carefully when copying numbers from one sheet to the next.
- List dimensions (width, length) in a consistent order.
- Verify the scale of drawings before using them as a basis for measurement. A good check is to scale off a bathtub (usually 5'), a light fixture (2' × 4'), or a doorway (3').
- Mark drawings neatly and consistently as quantities are counted.
- Be alert for changes in scale, or notes such as “NTS” (not to scale). Sometimes these drawings have been photographically reduced.
- Include required items that may not appear in the plans and specs.
- Be alert for discrepancies between the plans and the specs.

And perhaps the four most important points:

- Print legibly.
- Be organized.
- Use common sense.
- Be consistent.

Grip Type Mechanical Joint Fittings

Takeoff Procedure: The fittings, flanges, nozzles, branch welds, and butt welds needed for intermediate joints should be recorded by size on the takeoff sheet for steel piping (shown in Figure 13.9). From this fitting list, the diameter inches are determined for the total welding labor and material cost.

The grip type of fitting is used in the fire protection field, building service systems (i.e., storm and sanitary drains), potable, heating, cooling, and condenser water systems. (Not available for steam or gas piping.)

150 Lb. Steel Flanges				
Pipe Size	Diam. of Bolt Circle	Diam. of Bolts	No. of Bolts	Bolt Length
1/2	2 ³ / ₈	1/2	4	1 ³ / ₄
3/4	2 ³ / ₄	1/2	4	2
1	3 ¹ / ₈	1/2	4	2
1 ¹ / ₄	3 ¹ / ₂	1/2	4	2 ¹ / ₄
1 ¹ / ₂	3 ⁷ / ₈	1/2	4	2 ¹ / ₄
2	4 ³ / ₄	5/8	4	2 ³ / ₄
2 ¹ / ₂	5 ¹ / ₂	5/8	4	3
3	6	5/8	4	3
3 ¹ / ₂	7	5/8	8	3
4	7 ¹ / ₂	5/8	8	3
5	8 ¹ / ₂	3/4	8	3 ¹ / ₄
6	9 ¹ / ₂	3/4	8	3 ¹ / ₄
8	11 ³ / ₄	3/4	8	3 ¹ / ₂
10	14 ¹ / ₄	7/8	12	3 ³ / ₄
12	17	7/8	12	4
14	18 ³ / ₄	1	12	4 ¹ / ₄
16	21 ¹ / ₄	1	16	4 ¹ / ₂
18	22 ³ / ₄	1 ¹ / ₈	16	4 ³ / ₄
20	25	1 ¹ / ₈	20	5 ¹ / ₄
22	27 ¹ / ₄	1 ¹ / ₄	20	5 ¹ / ₂
24	29 ¹ / ₂	1 ¹ / ₄	20	5 ³ / ₄
26	31 ³ / ₄	1 ¹ / ₄	24	6
30	36	1 ¹ / ₄	28	6 ¹ / ₄
34	40 ¹ / ₂	1 ¹ / ₂	32	7
36	42 ³ / ₄	1 ¹ / ₂	32	7
42	49 ¹ / ₂	1 ¹ / ₂	36	7 ¹ / ₂

Steel, cast iron, bronze, stainless, etc. Flanges have identical bolting requirements per pipe size and pressure rating.

Figure 13.8

Square Foot & Systems Estimating Examples

Often the contractor is faced with the need to develop a preliminary estimate for a project. The estimate may be for the entire project or for only a portion of the work, which is often the case for the mechanical contractor. This chapter contains two complete sample estimates for the mechanical portion of an office building: a square foot estimate and a systems estimate. In these step-by-step examples, forms are filled out and calculations are made according to the techniques described in Part One, “The Estimating Process.” All cost and reference tables are from the annual *Means Mechanical Cost Data* or *Means Plumbing Cost Data*.

Project Description

A mechanical contractor has been invited by a familiar general contractor to submit a budget estimate on an office building. The project is a three-story office building with a penthouse and garage. Area calculations for this building are shown in Figure 23.1. For purposes of illustration, a budget estimate will first be developed as a square foot estimate based on the bare minimum of information supplied. A sketch of the building concept with overall dimensions is shown in Figure 23.1.

Square Foot Estimating Example

There are two occasions when square foot cost estimates are useful. The first is during the conceptual stage when few, if any, details are available. At this time, square foot costs make a useful starting point for ballpark budget purposes. The second instance when square foot costs are used is after bids are received. Square foot costs may be used at this time to check on the accuracy or competitiveness of the bids. As soon as details become available in the project design, the square foot approach should be discontinued and the project priced by its particular assemblies or unit costs.

