

CHAPTER 5

METALS

CSI DIVISION 5
STRUCTURAL METAL FRAMING
05200 METAL JOISTS
05300 METAL DECKING
05400 LIGHTGAGE FRAMING
05500 METAL FABRICATIONS

05100 STRUCTURAL METAL FRAMING

The preparation of a structural steel estimate involves a great deal of work because of the large amount of detail required in listing the quantities from the plans, computing the weights of the various sections, making the shop drawings and detailing the steel, and estimating the cost of shop fabrication, freight, trucking, and erecting the steel on the job.

The structural steel framework of a building usually consists of anchor bolts, setting plates, base plates, columns, girders, beams, lintels, roof trusses, etc., which are fabricated from standard shapes, such as angles, "S" beams, channels, "W" beams and columns, plates, rods, etc., in combinations designed to give the required strength.

Estimating Quantities of Structural Steel

When estimating the quantity of structural steel required for any job, each class of work (column bases, columns, girders, beams, lintels, trusses) should be estimated separately, because each involves different labor operations in fabrication and erection.

All standard connections can be taken from the *AISC Manual of Steel Construction*. Be sure to include rivets and bolts for connecting steel to steel. In addition to the structural framing of the building, it is often necessary for the structural steel contractor to furnish numerous miscellaneous items, such as bearing plates, loose lintels, and anchor bolts, even though they are set in place by other contractors.

Items to be Included in a Structural Steel Estimate. When preparing an estimate on structural steel, the following items should be included to obtain the erected price:

1. Cost of structural steel shapes at the mill or warehouse.
2. Freight or trucking of structural steel shapes from rolling mill or warehouse to fabricating shop.

advantage, that is the most economical method to use, because the crane can be moved about at slight expense.

Steel Erection Contractors. Most structural steel is erected by specialty contractors, who have an organization and personnel with background and experience. These contractors can erect structural steel much cheaper than the average general contractor, because they have well-organized crews specializing in this type of work. They also have on hand the most modern equipment, such as crawler cranes, truck cranes, lightweight and modern air tools, such as grinders, drills, rivet busters, impact wrenches, welding machines, and other special tools which are furnished to the job as needed and seldom figured in the job cost.

Erecting Structural Steel in Skeleton Frame Buildings. When figuring erection on a job of this type, consider carefully the amount of equipment, size of cranes, etc. required, as described previously.

On a one-crane job, an erection crew should unload, handle, erect, and connect 9 to 10 tons (8.1-9.0 metric tons) of steel per 8-hr. day, at the following labor cost per ton (metric ton):

Erection crew	Hours	Rate	Total	Rate	Total
1 foreman	0.85	\$....	\$....	\$31.20	\$ 26.52
2 ir. wkrs."hooking on"	1.70	....	....	30.28	51.48
1 ir. wkr. giving signals	0.85	....	....	30.28	25.74
4 ir. wkrs."connecting"	3.40	....	....	30.28	<u>102.95</u>
Cost per ton.....			\$....		\$ 206.69
per metric ton .....			....		227.36

Add for workmen's compensation and liability insurance. If the structural connections are welded instead of bolted, add \$26.00 to \$31.00 per ton (metric ton).

Erecting Structural Steel in Wall Bearing Buildings. On wall bearing buildings, the ends of all beams and channels usually rest on the exterior masonry walls while the interior framing is carried on masonry walls or structural steel columns. Field connections are usually bolted.

Eight workers together should handle and erect (including bolted connections) about 8 tons (7.2 metric tons) of steel per 8-hr. day, at the following labor cost per ton (metric ton):

	Hours	Rate	Total	Rate	Total
1 Foreman	1	\$....	\$....	\$31.20	\$31.20
7 Iron Workers.....	7	....	....	30.28	<u>211.96</u>
Cost per ton.....			\$....		\$ 243.16
per metric ton .....			....		267.48

Add for worker's compensation and liability insurance.