

Concrete Formwork Takeoff 101 – It’s All About SFCA

Executive Summary. There are some basics to concrete formwork takeoff whether you’re doing residential flatwork, a 40-story condominium tower, or a \$500 million wastewater treatment plant. Start here with learning just the basics of concrete takeoff.

First, a quickie on Estimating 101. Estimating is a two step process: takeoff and then pricing. Takeoff is the process by which the quantities are generated from a review of the plans and then a measurement (area, length, number, count, each, et cetera). Pricing occurs next, and is when those quantities have dollars assigned/associated to them (\$/SF of formwork, \$/LF of waterstop, \$/EA for dowels, et cetera).

But, today we’re talking about takeoff only. And only concrete formwork. We’re not even talking about generating quantities of concrete (the length * the width * the depth / 27 CF/CY to get the volume of concrete).

The quantities we need. The most basic unit of measure in concrete formwork takeoff is the area of the concrete that the formwork will touch; this is called *square feet of contact area*. And in your takeoff to your boss, the estimator, you’ll want to denote this area as SF (square feet) or SFCA (square feet of contact area). This sounds easy, but it can get confusing – you must know how to read plans and to visualize in three dimensions. The photo at the right is a wall which is, say, 50’ long x 24’ tall which is 1,220 SFCA (but don’t forget the other side of the wall too!).



Concrete being poured into wall formwork. This is a gangwall because the form is so big and it was formed on the ground and flown in with the crane (versus a smaller wall which may be built in place).

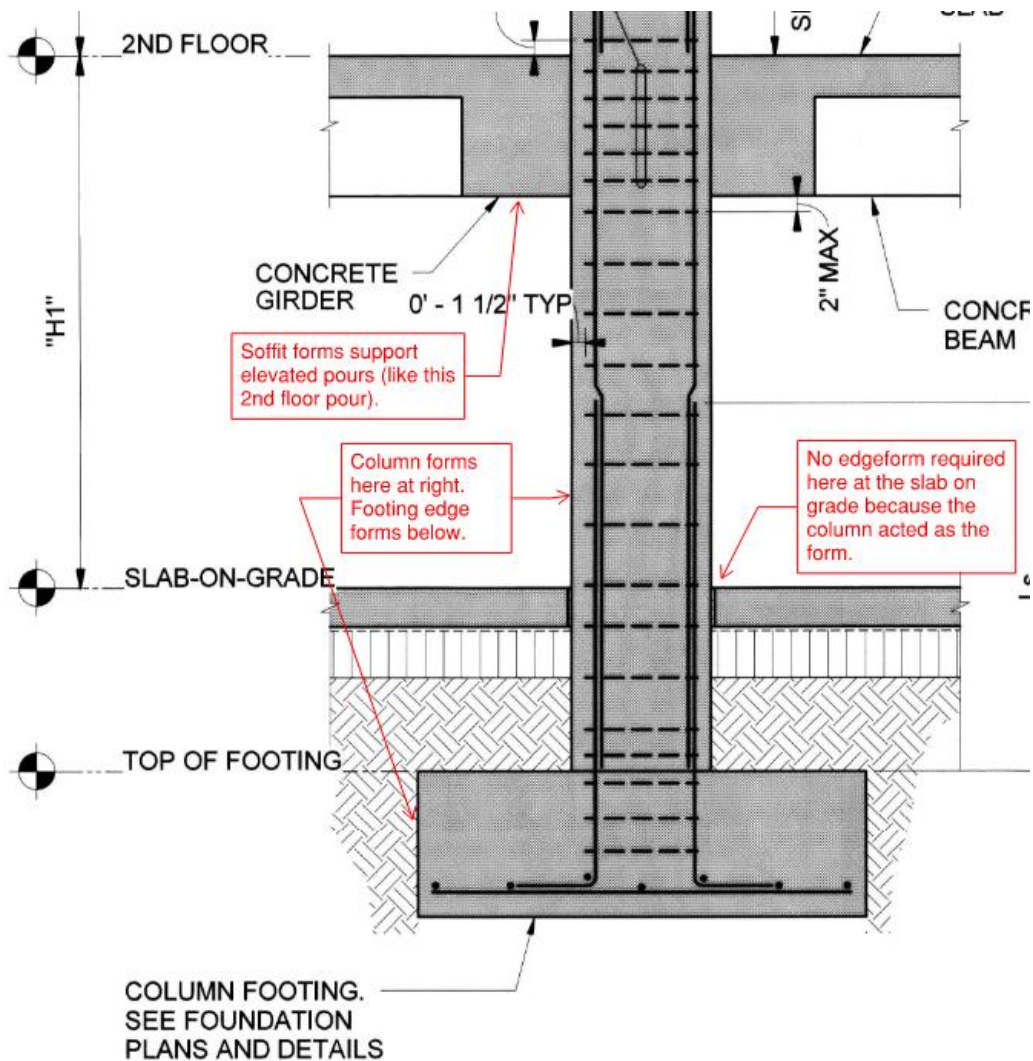
Although the size of this wall is daunting, the concept is simple. Just figure out where the form contacts the concrete and bust out your \$5 Casio calculator: height * length gives square feet, and you’re done!

It can’t be that easy, what other areas are there? You’re correct, it’s not as “easy” as shown above in the big wall pour above. The next page shows different types of formwork you’ll have to decipher in the plans.

<u>Formwork type</u>	<u>Where will I find it?</u>	<u>Notes about takeoff</u>
Edge form	Edge form can be at a footing on grade, on a bridge deck pour, or on the 10 th story of a condo tower.	Again, SFCA is where it's at, but you probably ought to take this off in LF (lineal feet) too. Depending on the height of the edge form, the estimator may prefer to estimate it in LF, not SF or SFCA.
Soffit form	Soffit form is where you're forming the underside of something. This can be the underside of a beam, the underside of a walkway around a clarifier, the underside of that bridge pier support which sits in the median on your way to work (this is also known as a bridge bent), or the underside of a floor slab.	Often times there will be adjacent decking to the concrete soffit (this decking is a place where the crew can stand to facilitate getting the concrete placed on pour day). Talk to your estimator about how he wants these quantities tabulated.
Wall form	There are short walls (in height), tall walls, long walls, and short walls (in length). They can be complicated by special finishes like architectural features (see photo below) - if so, this will have to be noted for the estimator.	The estimator may want you to separate gang forms, handset forms, short walls, and tall walls. This is because they will require different production rates or even special materials.
Bulkheads, construction joints, and expansion joints	These can be at walls, beams, and at slabs. They usually require more work because they have rebar passing through them, or rubber waterstop embedded halfway in them, or require special roughening. The three terms are not synonymous, but they are similar enough to be grouped here together.	Make sure to separate the types of joints these are because likely they will each require different effort (laborwise) and/or material (i.e. purchase of waterstop or maybe a two-part epoxy for concrete-to-concrete bonding).
Hanging form	Hanging forms are forms that are suspended from a separate piece of formwork. An example is the front face of a curb and gutter; the curb and the gutter are poured simultaneously, so something must create the curb face. This is where the hanging form comes into play.	In the curb and gutter formwork example, notice the Support for Hanging Form portion – this method will be figured by the estimator, and then in the field by the carpenter crew.

On this page, and those that follow, are some examples of where different formwork would be required.

The example immediately below shows edge form, soffit form, and column form in a multi-story building. Earthen forms have not been mentioned, but that may be an option for the column footing below. "Earthen forms" is a term for when excavations are cut to the dimension of the concrete element and then the concrete is poured up against the soil (so the earth acts as the form).



This wall at right shows an architectural feature. The wall has been stripped of its form and now the reveal in the concrete face shows what the architect envisioned, and mandated in the drawings.



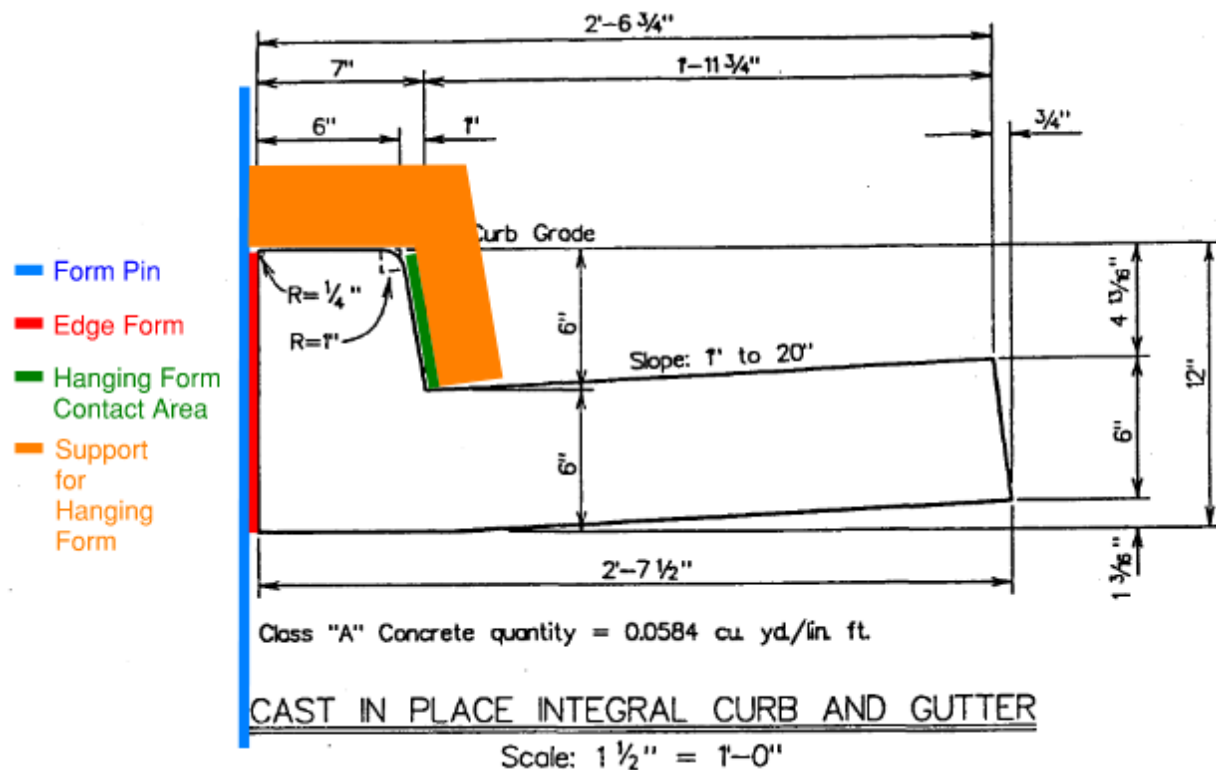
Notice the architectural feature in this wall. This is usually formed with chamfer or a form liner.

This photo at right shows typical soffit forming. The shoring towers/frames at right support metal beams and plywood used to form the underside of a concrete beam or slab.



Shoring towers/frames with metal beams and plywood above forming the underside of a beam or floor.

And lastly, here is an example of hanging form. Two concrete contact areas are shown. The contact area in red is treated like an edge form on grade, and the orange and green combination "hangs" from above and forms the front face of curb. For simplicity sake, the far right side of this drawing does not show the required formwork at the gutter's 6" face.



My story. Concrete takeoff and pricing is a lot of fun. I've done tens of thousands of cubic yards and millions of square feet. As the engineer in charge of takeoff, you must accurately calculate the SFCA (square feet of contact area) for the project. The estimator will make the decision on the material and methods of formwork usually on a structure-by-structure basis. Sometimes there are unique features which require a special purchase (like, say, a column capital with the shape of the state of Texas in it). Absent any direction from your estimator, try to group things which are similar so that a crew and production can be set for similar items. If there are special materials required like dowels, form savers, or waterstop, make a note. If you have questions, ask your supervisor!

Work safe!