

Ask three excavating contractors in Sacramento how much it will cost to dig your footing or trench, and every one of them will start doing the same thing in their notebook or on their phone. They will measure in feet, calculate a volume in cubic feet, then quietly divide by 27 before giving you a price in cubic yards.

That divide by 27 step is not a trick. It is how you translate a three dimensional space measured in feet into the yard based language that dirt contractors, concrete suppliers, and trucking companies actually use.

If you understand that one idea, a lot of other things become clearer. You start to see whether an excavation quote is realistic, how much a vac ex crew can really get through in a day, and whether a “simple” 100 foot trench is going to take half a day or chew up your whole week.

This is especially important in the Sacramento region, where you are often mixing traditional excavation with vacuum excavation around gas, fiber, and aging utilities, and where soil swings from light granular to heavy, wet clay in a matter of blocks.

Let us walk through the math, then connect it to how real jobs get estimated and built.

Why 27 appears in every cubic yard calculation

The short version is that there are 3 feet in a yard, and volume uses three dimensions. You are not just converting length, you are converting length, width, and depth.

One yard equals 3 feet. A cubic yard is a cube that measures 1 yard on each side. Translate that to feet and you get a cube that is 3 feet by 3 feet by 3 feet.

Multiply those three dimensions:

$$3 \text{ feet} \times 3 \text{ feet} \times 3 \text{ feet} = 27 \text{ cubic feet.}$$

So 1 cubic yard equals 27 cubic feet. That never changes, whether you are in Sacramento, Seattle, or Miami.

When a contractor divides by 27, they are doing nothing more mysterious than converting from cubic feet (what your tape and plans give you) into cubic yards (what their equipment, trucking, and disposal pricing is built around).

Mathematically:

- $\text{volume in cubic yards} = \text{volume in cubic feet} \div 27$

Everything else in this article rests on that simple relationship.

How the math plays out on a real job

Take a classic residential example. You are pouring a perimeter footing that is 150 feet long, 2 feet wide, and 2 feet deep.

1. First step is always to keep all three dimensions in the same unit. Most plans show dimensions in feet, so stay with feet.
2. Multiply length by width by depth:

$$150 \text{ feet} \times 2 \text{ feet} \times 2 \text{ feet} = 600 \text{ cubic feet.}$$

3. Convert cubic feet to cubic yards by dividing by 27:

$600 \div 27 \approx 22.2$ cubic yards.

A contractor might round that up to 23 cubic yards to allow for irregularities, or to 25 cubic yards if they know the existing grade is not perfectly consistent and the inspector likes full depth.

Now bring money into it. If your excavator charges, for example, 18 to 25 dollars per cubic yard for straightforward machine excavation with easy access in Sacramento, they will multiply that unit price by 23 to 25 yards. On that job you might see an excavation line item between roughly 400 and 650 dollars, plus mobilization and disposal.

From a homeowner's point of view, this is why it matters. If you mistakenly treat your 600 cubic feet as 600 cubic yards, you are three orders of magnitude off. I have seen owners panic at a **Sacramento Vacuum Excavation** preliminary number because they misread their own math and thought they had hundreds of yards to **Sacramento Vacuum Excavation** move when it was really just a couple dozen.

The three core volume formulas you actually use

On plans, almost every excavation quantity in building and small civil work can be reduced to three shapes: rectangular prisms, trenches, and flat cuts or fills.

Here are the formulas contractors use over and over:

1. Rectangular footing or pit: $\text{length} \times \text{width} \times \text{depth (all in feet)} \div 27$.
2. Trench with constant width: $\text{length} \times \text{width} \times \text{depth (all in feet)} \div 27$.
3. Simple cut or fill over an area: $\text{area in square feet} \times \text{average depth in feet} \div 27$.

Everything starts with measuring or taking dimensions off the plan, multiplying to get cubic feet, then dividing by 27. The sophistication is not in the math, it is in the judgment about what "average depth" really means on a sloped, uneven site.

How much to excavate 200 cubic yards in Sacramento

"Two hundred yards" is a number that comes up a lot in conversations with owners and small developers. It is big enough that you care about truck cycles and disposal, but not so big that you bring in a full production fleet.

To get a feel for scale, think of 200 cubic yards as:

$200 \times 27 = 5,400$ cubic feet.

If that volume was a block of soil 6 feet deep, it would cover 900 square feet, about the footprint of a modest accessory dwelling unit. In practical terms, here is how that 200 yard job typically behaves:

- A 20 ton class excavator like a Cat 320 can excavate anywhere from 60 to 150 cubic yards per hour in loose, easy digging with a good operator and clean site lines. In Sacramento's mixed soils on a smaller site, the realistic range is much lower, often 25 to 75 cubic yards per hour once you factor in maneuvering, checking grades, and trucks.
- If a crew averages 40 yards per hour in real world conditions, 200 yards of excavation could be roughly a 5 hour dig, plus time for layout, traffic control if near the street, and cleanup.
- The actual cost to excavate 200 cubic yards in Sacramento might land, very broadly, between 3,000 and 7,000 dollars for conventional machine excavation, depending on access, haul distance, and whether there is rock, cobble, or groundwater.

Every one of those estimates starts from the same place: someone took dimensions in feet, multiplied them, then divided by 27 to get cubic yards before assigning productivity and dollars per yard.

How contractors price excavation jobs without magic

There is a myth that excavating is a “black art” and contractors just guess. On a good crew, that is not true. They do three things in sequence:

First, they calculate volumes. That is where divide by 27 enters. They might be pricing how long it takes an excavator to dig 100 cubic yards in one hour on clean trench work, versus 50 yards per hour in tight urban access.

Second, they match those cubic yards to real production numbers for specific equipment. A 35,000 pound excavator with a 1 cubic yard bucket will produce at a different rate than a mini with a 0.15 yard bucket. A vac ex truck removes a different volume per hour than a standard hoe with a spoil pile.

Third, they blend labor, equipment, trucking, and overhead. Excavation cost per hour in Sacramento for a mid sized excavator with operator often runs in the ballpark of 175 to 275 dollars per hour. Hydrovac or vacuum excavation trucks run higher, frequently 300 to 450 dollars per hour or more, sometimes with minimum charges.

The numbers shift every year with fuel, wages, and regulations, but the structure remains the same: cubic feet to cubic yards, cubic yards to machine hours, machine hours to dollars.

Vacuum excavation and why yards still matter

Vacuum excavation, sometimes called vac ex, is increasingly common in Sacramento around utilities, streetscapes, and tight downtown projects. The math for volume does not change, but the production and pricing do.

What is vacuum excavation

Vacuum excavation uses high pressure air or water and a powerful vacuum to break up soil and suck it into a debris tank. Hydro excavation uses water as the cutting medium, air vacuum excavation uses compressed air. In practice, people often use “hydro excavation” and “vacuum excavation” interchangeably, but strictly speaking hydro excavation is a type of vacuum excavation that uses water.

Contractors use vac ex when they are working near fiber, gas, or other sensitive lines, or when traditional digging would be too risky or disruptive.

How much can a vac ex excavate in a day

Production depends heavily on soil conditions and the type of rig. In soft, granular soil with good access, a hydrovac truck might remove 5 to 15 cubic yards per hour of spoil. In hardpan, heavy clay, or cobble, that can drop to 2 to 6 yards per hour.

Across a full day, once you include setup, traffic control, moving the truck, and disposal, many Sacramento vac ex outfits plan around 30 to 80 cubic yards per day per truck. Some days you beat that, some days buried concrete, utilities, or groundwater cut that in half.

How much does vacuum excavation cost

Vac ex is almost always billed by the hour, not by the cubic yard, but contractors still think in yards for planning.

In this region, a vacuum excavation truck with crew frequently runs in the few hundred dollars per hour range. A rough ballpark, subject to market conditions, is 300 to 450 dollars per hour with fuel and disposal separate or included as a line item.

If that truck averages, say, 8 yards per hour on a realistic job, your effective cost per cubic yard might sit around 40 to 60 dollars. The whole reason owners accept that higher unit cost is risk management. One poorly located gas main strike can cost far more than a day or two of hydrovac time.

How deep can vacuum excavation go

Vacuum excavation depth is usually limited more by hose length, soil stability, and practical productivity than by absolute suction. In the field around Sacramento, vac ex is routinely used from shallow potholes down to the 8 to 12 foot range. With staged digging and shoring you can go deeper, but every additional foot slows production and raises safety concerns.

Safety rules that affect how much dirt you move

The math of cubic yards is simple. The safety rules that decide whether you are allowed to keep digging at a given depth are not.

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Two OSHA related concepts come up constantly in excavation planning:

First, the 4 foot rule in excavation. Once a trench is 4 feet or deeper, OSHA requires a safe way in and out, such as a ladder within 25 feet of workers. Other protective measures increase as depth and soil risk increase.

Second, the general rule on how deep you can dig without shoring. In many soils, 5 feet is treated as a critical depth. Beyond that, OSHA expects a protective system, such as trench boxes, sloping, or benching, unless the

excavation is entirely in stable rock. Some local inspectors are stricter and effectively lower that threshold depending on conditions.

These requirements affect how you calculate and price. If your trench depth increases from 4 feet to 6 feet over a 200 foot run, the volume change, in cubic yards, might seem modest. But the safety step change is large. You might need shoring, you might widen your slopes, and suddenly your excavated volume grows dramatically.



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Contractors who understand their obligations under OSHA are not just keeping workers safe. They are also avoiding one of OSHA's three most cited violations in construction, which consistently include fall protection, hazard communication, and scaffolding or related safety failures. Trenching issues show up in enforcement when things go wrong, especially in unstable soils or where there is no protective system.

Vacuum excavation, licensing, and training

Owners sometimes assume that operating a vac ex truck is less regulated than running a conventional excavator, because the digging looks "gentler." In practice, there are more layers.

A hydrovac or vacuum excavation truck is often a large commercial vehicle that carries water and spoil as a liquid slurry. On many rigs, the operator needs a commercial driver's license. Whether a specific job requires a tanker endorsement depends on how the truck is configured and how the load behaves under the regulations, but in practice, many hydrovac operators carry tanker endorsements because they are moving significant volumes of liquid material.

As for operating the excavation system itself, California does not require a unique statewide certification just for vacuum excavation, but it does require that anybody running excavation equipment be trained and competent. That typically includes:

- Formal or on the job training on vacuum excavation systems, including high pressure water hazards.
- Confined space, trenching, and shoring awareness where applicable.
- Utility locating procedures and coordination with 811.

The same pattern applies to conventional excavator operators. There is no single national card that magically allows you to run a 20 ton excavator everywhere, but most reputable contractors rely on a mix of operator school certificates, manufacturer training, union programs, and internal qualification before turning someone loose on a job.

For people considering a career change, the common question is whether 50 is too old to become a heavy equipment operator. In practice, no. I have seen operators start in their late 40s or early 50s and build solid careers, provided they are physically able to handle the work, willing to learn modern safety practices, and patient during the early low productivity phase.

On the pay side, the highest salary for an excavator operator in busy markets can climb well above 100,000 dollars per year when you include overtime, night work, and specialized skills like deep shoring, complex utility work, or vac ex operation. Average wages are lower, but the ceiling is real for skilled operators.

What drives excavation pricing per cubic yard in Sacramento

Once you understand why contractors divide by 27 to get into cubic yards, the next question is why the number per yard is sometimes 10 dollars and other times 60.

Several main factors push unit prices up or down:

1. Access and hauling distance, including whether trucks can back right up to the excavation or if you need to stockpile and reload.
2. Soil conditions, from easy loam to hardpan, rock, or high groundwater that turns everything to slurry.
3. Method, particularly whether you can use conventional machines or must rely heavily on vacuum excavation or hand digging.
4. Safety constraints, such as depth requiring shoring, nearby structures, or streets that require traffic control and night work.
5. Scale and continuity, since moving 2,000 cubic yards on an open lot is more efficient than chasing 20 cubic yards at a time around tight backyards.

When you hear a big range, from something like 8 to 20 dollars per cubic yard for bulk earthmoving on a flat lot, up to 40 to 80 dollars per yard for complex urban utility work with vac ex, it is those five levers doing the pulling, not any difference in the basic math.

How long it really takes to dig a 100 foot trench

"Just a 100 foot trench" might be the most misleading phrase a contractor hears.

If you specify that the trench is 2 feet wide and 3 feet deep, the math is straightforward:

Length 100 feet × width 2 feet × depth 3 feet = 600 cubic feet

$600 \div 27 \approx 22.2$ cubic yards.

On clean ground with a mini excavator, good access, and no utilities, an experienced operator might dig that in an hour or two. But several realities push on that tidy estimate:

- Add buried utilities and you may switch to vac ex, which can extend digging time to most of a day, even though the cubic yards do not change.
- If you are in a street and the trench comes close to or deeper than 5 feet, you might need shoring or a trench box, which slows production and increases the effective volume.
- If the haul off site is long or the disposal facility closes early, you lose productive digging time waiting on trucks.

The divide by 27 step tells you “we are dealing with about 22 cubic yards.” The rest of the job planning tells you whether that is a two hour chore or a two day production.

Questions owners often ask about the math

People who do not work in construction every day are understandably cautious about any formula that they do not use themselves. A few recurring questions come up.

Why not work directly in cubic yards from the start instead of cubic feet and then dividing by 27? In theory, you could convert all dimensions to yards first. A 150 foot footing would be 50 yards long, 2 feet wide would be two thirds of a yard, and 2 feet deep again two thirds of a yard. You would then multiply $50 \times 0.67 \times 0.67$ directly to get cubic yards. In practice, almost nobody works that way because plans are dimensioned in feet and inches, and the mental math becomes more awkward than one clean division by 27 at the end.

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Why do excavation and concrete suppliers both care about cubic yards? Because both trades live in the same unit world. Excavation volumes, truck loads, and ready mix orders all use cubic yards as the base. If a concrete supplier tells you that their truck holds 10 cubic yards, the excavator wants to know how many cubic yards of spoil must be removed to make room for that concrete. They are speaking the same numeric language.

What about square feet and the “cost of 1000 square feet” of slab or floor? Those are surface area based costs. Excavation is volume based. If you see a figure like a cost per 1,000 square feet of building pad preparation, make sure you know what depth of cut or fill that number assumes. The minute you dig deeper or build on a sloped site, the cubic yards change, even if the square footage stays the same.

Tying it back to Sacramento jobs

Sacramento presents its own mix of constraints that amplify the importance of correct yardage calculations.

Older neighborhoods have intricate webs of utilities, which drives increased use of vacuum excavation. New subdivisions often sit on flat but variable fill, which can make footing depths unpredictable. River proximity brings high groundwater into play. Local inspectors tend to be cautious about trench safety, which can push you into shoring earlier than you might expect.

In all of those settings, a contractor starts exactly where the simple examples in this article did. They take lengths, widths, and depths in feet, find cubic feet, divide by 27 for cubic yards, then layer on access, safety, and method.

If you are reviewing bids, the best thing you can do is run your own rough numbers first. Count how many cubic yards are realistically involved, at least to the nearest ten. Then, when you look at a price to excavate 200 cubic yards or dig that 100 foot trench, you have a reference point.

The contractors may disagree over production rates, hourly costs, or risk premiums, especially where vac ex and deep trenches are concerned. None of them can escape the fact that there are 27 cubic feet in a cubic yard, and every realistic estimate in Sacramento’s excavation world flows from that constant.