

Vacuum excavation changed how we expose utilities around Sacramento. The first time you watch a hydrovac truck uncover a live 12 kV line without a single shovel strike, it feels like cheating. Crews are safer, locates are cleaner, and inspectors tend to relax when they see a vac hose instead of a steel bucket.

But after a couple decades around dirt work and underground in this region, I have yet to see vacuum excavation replace traditional digging. It is a powerful tool with real boundaries, especially when you look at production, soil conditions, depth, and cost on Sacramento jobs.

This is a practical look at where vacuum excavation shines, where it struggles, and when you are better off with a conventional excavator, backhoe, or even a laborer with a shovel.

## **What vacuum excavation actually is**

At its core, vacuum excavation is a non-mechanical way to remove soil. Instead of a bucket or a trencher chain, you use high-pressure water (hydro excavation) or compressed air (air vacuum excavation) to loosen the ground, then a powerful vacuum to suck the material into a debris tank.

So when people ask, "What is vacuum excavation?" there are really two common field setups:

1. Hydro excavation: Water under pressure cuts the soil and turns it into slurry. The vacuum pulls the slurry into a tank. It works very well in compact clays, hardpan, and frozen ground.
2. Air excavation: High-pressure air breaks up the soil, which is then vacuumed dry into the tank. Spoils can be reused as backfill, which can be a big advantage in tight urban sites.

On Sacramento projects, "vac truck" or "vac ex" usually means a hydrovac system, because our clay and hardpan make air excavation slow and frustrating.

When someone asks, "What is the difference between hydro excavation and vacuum excavation?", the honest answer in the field is this: hydro is a type of vacuum excavation. You still rely on the vacuum to remove soil. The distinction is really about whether you are cutting the ground with water or with air.

## **How deep can vacuum excavation go in practice?**

Manufacturers like to promote depth numbers that are technically achievable but not realistic on a day-to-day job. On paper, a large hydrovac truck can pull material from 30 feet or deeper. I have seen lines exposed at around 25 feet through a sloped trench, and it worked, but it was slow and expensive.

Two separate questions matter for real work:

- "How deep can you vacuum excavation?" or "How deep can vacuum excavation go?" in the absolute sense.
- "How deep can you excavate without shoring or benching?" from a safety and OSHA standpoint.

For the first question, the limit comes from hose length, lift height, and the physics of moving a slurry under vacuum. The deeper you go, the slower production gets, especially in sticky clays. Once you are working more than 15 to 20 feet down, you are typically in one of three scenarios:

- A small, focused daylighting hole, like confirming a deep transmission main.
- A support excavation for a structure where access for an excavator is terrible.
- A specialty job where the client accepts high cost for the sake of risk control.

For the second question, OSHA trenching rules are usually more important than the truck's mechanical capability. Crews regularly ask, "How deep can you dig without shoring?" or "What is the 4 foot rule in excavation?" and that factors into whether vacuum excavation is even appropriate for larger cuts.

Under OSHA's Subpart P, a few practical thresholds matter:

- Once you are deeper than 4 feet, you need a safe way in and out, like a ladder or ramp.
- At 5 feet and deeper, you generally must protect workers with sloping, benching, shoring, or shielding, unless a competent person can justify an exception in very stable rock.
- Spoil piles and equipment must be kept back from the edge, commonly referenced with rules of thumb like 2 feet away or more.

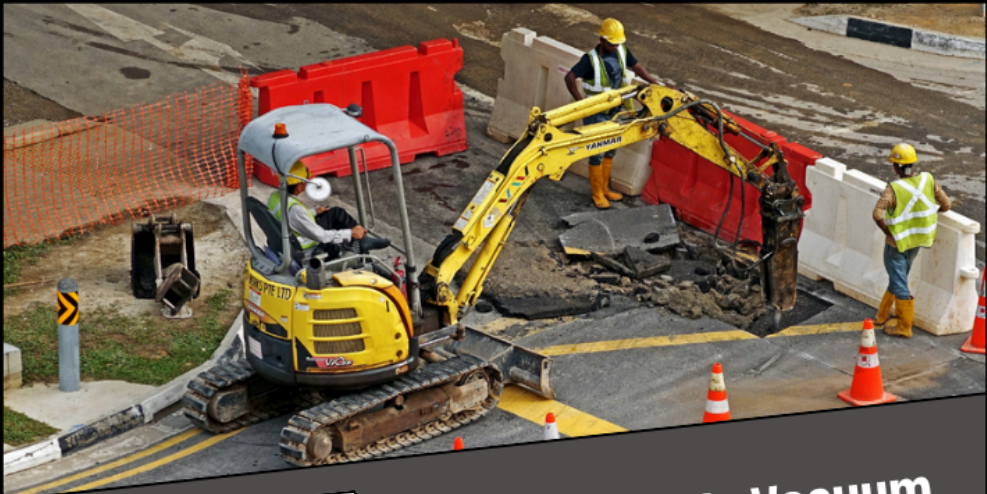
You will sometimes hear field shorthand like the "3/4/5 rule for excavation" or "5 4 3 2 1 rule for excavation." These are informal teaching tools. They are not standalone legal codes, and they vary between companies. The same goes for "rule 1413 for excavation" or "35 foot rule" references that float around tool-box talks. When safety is on the line, do not rely on a nickname; pull the actual regulation or manufacturer guidance.

Vacuum excavation does not exempt anyone from OSHA rules. If a worker is down in a hole cut by a hydrovac, the same protective system requirements apply as if an excavator dug it.

## Production: how much can a vac truck actually excavate?

The most common surprise for owners and general contractors is production. They see a vac truck and expect bulldozer-level earthmoving. That is not what the equipment was built for.

"How much can a vac ex excavate in a day?" is highly sensitive to:



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- Soil type (Sacramento clay vs sandy loam vs rocky cuts).
- Access (hose runs, overhead power, traffic control).
- Purpose (surgical potholing vs general bulk excavation).

On a good potholing day in typical Sacramento streets, a skilled crew might daylight 40 to 60 utility conflicts, each one a hole of 1 to 2 cubic yards. That might be 60 to 100 cubic yards total, sometimes more if the locates are accurate and the soil is friendly.

But if you ask the same truck to open a long, narrow trench, production can fall off. Compared to an excavator, you will almost always move fewer cubic yards per hour.

So when someone asks, "How much does an excavator excavate in one hour?" versus "What does excavation cost per hour?" with a vac truck, my rule of thumb is simple: for bulk movement, a mid-size excavator or a dozer will out-dig a vac system several times over. That is one reason you do not see vac trucks mass grading 10 acres of land or cutting building pads on 1,000 square foot addition projects. They are the wrong tool.

If a client asks, "How much to excavate 200 cubic yards?" or "How much would it cost to excavate 10 acres of land?", I mentally separate "precision" yards from "commodity" yards. Vac trucks handle precision. Dozers, scrapers, and excavators handle commodity. The price difference reflects that.

## **Cost realities: buying, running, and hiring vacuum excavation**

There are two different cost questions that show up around Sacramento jobs.

First, "How much is a vac ex to buy?" or "How much is a vacuum excavation truck?" The purchase price for a full-size hydrovac rig is typically in the several hundred thousand dollar range. By the time you have a truck with a large debris tank, boiler for hot water, blower, and all the safety systems, you are tying up the same kind of capital as a new 20-ton excavator plus a dump truck. Then you have maintenance, insurance, and operator training on top.

Second, "How much does it cost for a vac excavation?" or "How much does vacuum excavation cost?" when you hire it out. In the Sacramento region, most vacuum excavation is billed by the hour, often with a minimum. Rates vary, but a fully crewed hydrovac truck commonly runs several hundred dollars per hour. That sounds high until you remember you are paying for the truck, a CDL driver, at least one laborer, fuel, dumping, and mobilization.

From a contractor's perspective, the more focused and risk-heavy the work, the better that rate pencils out. Daylighting a dozen unmarked fiber lines in a congested street may save you from a single utility strike that could cost more than a week of vac truck time.

Compare that with a standard excavator. A midsize machine might rent for a few hundred dollars per day or less, and a skilled operator can move far more dirt. If you are pricing general work like "What is the cost of 1000 sq ft" of pad excavation or "How much to excavate 200 cubic yards" in a new subdivision, the math favors traditional digging almost every time.

When clients ask, "How to price out excavating jobs?" I usually walk them through four pieces:

1. Access, mobilization, and trucking.
2. Risk profile and proximity to critical utilities or structures.
3. Required tolerances and restoration standards.
4. Production constraints like working hours, traffic control, and noise.

Vacuum excavation scores well on number 2 and 3. Traditional machines win on 1 and 4.

# Where vacuum excavation struggles in Sacramento conditions

Our region has particular soil and infrastructure conditions that highlight the weaknesses of vac systems. A few patterns come up repeatedly.

## Hardpan and heavy clays

Sacramento's famous hardpan and cemented clays are unforgiving. Hydro excavation with hot water can cut them, but production can be painfully slow. Air vacuum excavation in those conditions is almost unusable except for very shallow and very small holes.

The question "Is it better to dig a hole when the ground is wet or dry?" gets very practical here. Hydrovacs benefit from some moisture, but after a heavy rain, saturated clay turns into sticky slurry that fills tanks quickly and clogs lines. Traditional excavators actually do well in that mess because the bucket can pry out big chunks that do not have to be pumped or hauled as liquid.

## Long trench runs

Vac trucks excel at spot digs: valve boxes, service stubs, conflict potholes. When someone asks, "How long does it take to dig a 100 ft trench?" with a vac setup, the honest answer is, "Much longer than with a small excavator, almost every time." Even when the soil cuts easily, you are limited by hose handling, debris tank capacity, and disposal trips.

By contrast, a mini excavator working in sensitive soils can dig a 100 foot trench in a few hours, then backfill with screened native material. The key is having good locates and a cautious operator.

A common mistake I see is trying to use a hydrovac truck as a primary trenching tool simply because there are utilities nearby. A smarter approach is often to pothole all conflicts with the vac truck, then let an excavator connect the dots.

## Depth combined with access

The question "How deep can you dig without shoring?" intersects badly with narrow city streets, tall hoses, and existing utilities. If you are exposing a deep utility and you cannot shore or bench the cut due to space limitations, a vac truck might be your first thought. But remember, crew members eventually need to inspect, measure, or tie into that line. At that point you are back into OSHA protective system territory.

Traditional excavation with a properly sized trench box or slide rail system can be more efficient and sometimes safer once you go beyond a small daylight hole. Especially if you anticipate multiple entries into the excavation, relying solely on vacuum excavation does not eliminate your trench safety obligations.

## Training, licensing, and safety considerations

Vacuum excavation feels gentler than a steel bucket, but that does not make it casual work. The questions "What kind of training is required for vacuum excavation?" and "Is a CDL required for hydrovac jobs?" come up for good reason.

In most cases:

- A hydrovac operator driving a full-size truck on public roads needs a commercial driver's license, commonly a Class A or B with air brakes. Depending on the size and configuration of water and debris tanks, you may also

trigger tanker endorsement requirements. So “Do you need a tanker endorsement for a hydrovac truck?” is a real compliance issue, not a theoretical one.

- A vacuum excavation operator needs task-specific training on high-pressure water, hose handling, confined space awareness, buried utilities, and job-site communication. It is not just “run the wand and point the hose.” Poor technique can still damage coatings, conduits, and even concrete.

Utility owners and risk managers tend to like vac trucks because they reduce direct strike risk. That does not mean other OSHA rules fade away. Excavation work still has to address the “5 OSHA requirements” that show up in many company policies: written programs, hazard assessments, training, communication, and enforcement. You will also still see citations around spoil placement, access and egress, and cave-in protection.

# SACRAMENTO UTILITY POTHOLING

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Someone usually asks at a safety meeting, “What is OSHA’s 3 most cited violation?” The exact list changes, but fall protection, hazard communication, and ladders are often near the top across all industries. For excavation specifically, failures in protective systems, access, and competent person oversight show up again and again.

On the heavy equipment side, “What certifications do you need to run an excavator?” and “Is 50 too old to become a heavy equipment operator?” come up from career changers. In California, there is no universal state license just for operating an excavator on private construction sites, but employers, unions, and insurers often require documented training, practical evaluations, or NCCER-type certifications. I have seen operators in their 50s pick up excavation work and do very well. The biggest factor is willingness to learn and respect for the safety envelope.

Vacuum excavation and traditional equipment both demand disciplined operators. The idea that a hydrovac truck is “safe enough for anyone” is how accidents start.

# Common misconceptions: pressure washers, backyard holes, and other shortcuts

Any time vacuum excavation is mentioned, someone will ask, half joking, “Can I dig a trench with a pressure washer?” From a physics standpoint, yes, water at high pressure will cut soil and concrete. From a practical and safety standpoint, no, this is not a substitute for a controlled hydrovac system.

A pressure washer does not provide vacuum to control spoils, and it does not incorporate the grounding, wand design, and flow limits that utility owners expect for safe excavation around live lines. Spraying water into a trench near energized facilities or gas lines with no vacuum recovery is a recipe for washouts and strikes.

Another version of the same idea is homeowners wondering, “Is it illegal to dig a hole in your backyard?” On private property, small projects like fence posts and garden beds are generally legal, but you still have to respect utility locate laws. In Sacramento, calling 811 before you dig is not optional for substantial work, even if you own the property. And once a trench hits depths where cave-ins are possible, OSHA rules apply to employers, regardless of whether you use a shovel, a vac truck, or a backhoe.

Vacuum excavation is not a legal shield. If a worker is hurt in an unprotected hole, investigators will not care that a hydrovac dug it instead of a bucket.

## Comparing vacuum excavation with traditional equipment

The real question on most projects is not “Is vacuum excavation better?” but “Which approach reduces risk and cost for this task, in this place, with these constraints?”

Here is a short field guide to when vacuum excavation makes sense versus when traditional equipment is still king:

### 1. Precision near critical utilities

If you are working around high-pressure gas, high-voltage electric, or dense fiber bundles, vacuum excavation is usually the best way to daylight these lines. The cost of a single major strike dwarfs a day or two of hydrovac time.

### 2. Congested urban corridors

Downtown Sacramento streets and older neighborhoods often have utilities stacked vertically with poor records. In these zones, vac trucks dig potholes and bell holes so excavators can connect them. Using a bucket blindly in the middle of that is gambling.

### 3. Large volumes and open work

For mass grading, new subdivisions, flood control channels, or “How much would it cost to excavate 10 acres of land?” type projects, traditional excavators, dozers, and scrapers are far more efficient. Vacuum excavation would be the wrong tool for 90 percent of that volume.

### 4. Depth combined with repeated access

When you know you will be entering the excavation repeatedly for tie-ins, structures, or inspection, traditional excavation with proper shoring or trench boxes is usually more efficient than relying strictly on a vac truck.

### 5. Spoil reuse and restoration

Air vacuum excavation lets you reuse dry spoils as backfill, which can be great for small, clean sites. Hydro excavation generates slurry that must be transported and disposed of. If disposal costs are high or the site

demands clean backfill, traditional digging with controlled stockpiles may be simpler.

## Costs, rates, and the cubic yard question

A lot of confusion around excavation pricing comes from units. You hear “per hour,” “per cubic yard,” “per square foot,” and sometimes rules of thumb like “divide by 27 for cubic yards.”

That last one is a simple conversion: there are 27 cubic feet in a cubic yard (3 ft x 3 ft x 3 ft). When contractors talk about “What is the cost of 1000 sq ft” of excavation, they usually mean some assumed depth. To get volume, you multiply area by depth in feet, then divide by 27 to [Sacramento Vacuum Excavation](#) get cubic yards. Only then does it make sense to talk about cost per yard.

Vacuum excavation is rarely priced strictly by the cubic yard, because production is lumpy. You might spend two hours chasing a mis-marked service to remove half a yard, then clear ten easy potholes in the next two hours. So you **Sacramento Vacuum Excavation** more often see vac trucks priced hourly, sometimes with a separate disposal or water fee.

Conventional excavation can be priced either hourly or by volume, because production is more predictable. A midsize excavator might realistically move dozens of yards per hour on a straightforward cut. If someone asks, “How much does an excavator excavate in one hour?” the answer might range from 20 to 100 yards, depending on haul distance, soil, and bucket size. Nobody will quote those kinds of numbers for a vac truck unless they are talking strictly about very soft soil in shallow cuts.

## When vacuum excavation is the wrong choice

Vacuum excavation earned its place on Sacramento job sites. It is one of the best ways we have to control risk around buried assets. But it is not a universal solution.

Over the years, I have seen it misused in a few consistent ways:

- Treating a hydrovac like a mass excavation tool for pads, roads, or ponds.
- Using vac trucks as an excuse to skip proper trench protection, on the mistaken belief that “we are just vacuuming.”
- Relying solely on vacuum excavation plans to satisfy OSHA or utility owner requirements without training operators or clarifying tanker and CDL endorsements.
- Bringing in hydrovac trucks late as a rescue tool after a job is already behind schedule, then being surprised by rates and production.

On the other side, I have seen traditional excavators unfairly dismissed as “too risky” near utilities, when a competent operator with good locates and potholes could do the job faster and safely.

The real skill is in choosing equipment the same way you choose any method: by matching its strengths and limitations to the soil, depth, risk, access, and schedule in front of you. In Sacramento’s mix of old clay, aging infrastructure, and tight streets, that still means a balance between vac trucks and iron.