Excavation looks simple from the street. Dirt goes in trucks, a hole appears, everyone moves on. But if you have ever managed a project in Sacramento clay, around century-old utilities, with PG&E, AT&T, the city, and the fire department all weighing in, you know the real story is different.

Choosing the right excavation method can make the difference between a clean inspection and a shut-down jobsite, between a routine day and a broken gas main. Vacuum excavation has become one of the most useful tools on tight, utility-heavy sites in the region, but it is not a cure-all. To use it well, you need to understand how it fits among the classic types of excavation and where it genuinely pays off.

This guide walks through the *bessutilitysolutions.com Sacramento Vacuum Excavation* four main excavation categories, then drills into vacuum and hydro excavation specifically for Sacramento conditions: soil types, groundwater, codes, utility congestion, and pricing realities.

The four main types of excavation

Contractors and engineers describe excavation in different ways: by purpose (cut, trench, borrow), by soil type (earth, rock, muck), or by method (mechanical, manual, vacuum). For practical planning and coordination on Sacramento jobs, the most useful split is by function on a site.

Here are the four types you will encounter most often.

1. Topsoil and stripping excavation

This is the shallow, early-phase work that removes organic material, vegetation, and weak surface soil. On a subdivision site in Elk Grove or a commercial pad in Rancho Cordova, the first machines in usually strip 6 to 12 inches of topsoil before grading.

The goal is to get down to competent, non-organic material that will not compress and rot under slabs or pavements. It also shapes the rough grade and stockpiles usable topsoil for later landscaping.

There is rarely a role for vacuum excavation here. Large dozers, scrapers, and excavators with wide buckets handle this work at very low cost per cubic yard. Vacuum excavation is simply too slow and too precise for wholesale stripping.

2. Trench excavation

If your project involves utilities, you are in trench territory. Water, sewer, storm drain, fiber, gas, electric conduit, irrigation, dry utilities for a new subdivision - all of that is trench work.

Trenches in Sacramento are complicated by a few recurring issues:

- Existing utilities in older neighborhoods, sometimes unmarked or shallow.
- Variable fill material from previous decades of construction.
- High water tables near rivers and levees.
- Roots from large street trees.

Traditional trench excavation relies on backhoes and excavators. You calculate volume in cubic yards (length × width × depth, then divide by 27) to estimate hauling and bedding. For example, a 100 foot *Sacramento Vacuum Excavation* trench that is 2 feet wide and 4 feet deep is 800 cubic feet. Divide by 27, and you are at just under 30 cubic yards of soil.

The safety side matters just as much as the production numbers. OSHA's general rule is that unprotected trenches 5 feet deep or more require a protective system such as shoring, shielding, or benching, unless the excavation is entirely in stable rock. Many contractors ask about how deep you can dig without shoring. In practice, on most Sacramento commercial projects, anything approaching 5 feet will trigger trench protection or a specific design from the engineer, because inspectors look closely at this.

Vacuum excavation fits trench work in two ways: daylighting (exposing existing utilities) ahead of a mechanical trench, and cutting small trenches where big equipment will not fit or carries too much risk.

3. Basement, footing, and foundation excavation

This is the deeper, larger volume work for building foundations, basements, parking structures, and elevator pits. On a mid-rise project downtown or an infill site near the grid, you might see:

- Over-excavation to remove poor soil, then recompaction.
- Benched excavations to control slope and meet OSHA and geotechnical requirements.
- Tight work near property lines, often with shoring systems.

Here, shoring and OSHA rules become central. People often ask about the 4 foot rule in excavation or the 5-4-3-2-1 style rules they have heard in classes. The truth is, there is no single magic number that covers every condition. OSHA has broad standards, including:

- Protective systems for trenches at 5 feet or deeper unless stable rock.
- Safe access (ladders or ramps) for trenches 4 feet or deeper within 25 feet of workers.
- Requirements on spoil pile distance from the edge.

The exact configuration can also be driven by local code, engineer of record, and soil classification. In soft or saturated Sacramento soil, we often treat cuts as "less stable" than the generic textbook cases.

Vacuum excavation is typically not used for mass foundation digs, because the volumes are too large. You might bring in a vacuum unit to expose utilities that cross the future footing, or to clean up around an underground structure, but not for the bulk of the earthwork.

4. Cut, fill, and site balancing

On larger parcels outside the urban core - think 10 acre commercial sites near the airport or new housing tracts - a big part of the excavation plan is simply moving soil around the site. Some areas are cut below existing grade, others receive fill, and your civil engineer tries to balance the two so you do not haul excess soil offsite or import fill.

Equipment here tends to be larger: scrapers, dozers, large excavators with 2 to 4 cubic yard buckets, articulated dump trucks. Production is measured in hundreds or thousands of cubic yards per day.

Again, vacuum excavation does not make sense for the bulk earthwork. It appears only in targeted tasks: cleaning around utilities or structures, potholing for preconstruction surveys, or handling sensitive areas such as existing pipelines or fiber routes that cross a new road alignment.

What is vacuum excavation?

Vacuum excavation is a non-mechanical way of digging that combines a high-powered vacuum with either air or water to loosen soil. You might see people refer to "vac ex," "vacuum excavation," "hydrovac," or "air-vac," and the terms can be confusing.

Here is the practical breakdown.

With air vacuum excavation, compressed air is injected into the soil through a lance. The air fractures and loosens the soil, and the loosened material is sucked into the vacuum hose and stored in a debris tank. Because you are only using air, utilities and tree roots are less likely to be damaged, and the spoil can usually be reused as backfill.

With hydro excavation, high pressure water cuts into the soil as the vacuum removes the resulting slurry. The water jet is more aggressive than air, so production rates in tight or compacted soil are typically higher. The downside is that you create a slurry that may need to be hauled to specific disposal sites, and you saturate the work area, which can be an issue in weak soils.

People often ask what the difference is between hydro excavation and vacuum excavation. Strictly speaking, both are vacuum excavation methods; “hydro” just specifies that water is the cutting medium. In everyday jobsite talk, “vacuum excavation” often implies air, and “hydrovac” implies water, but companies use the terms loosely, so it is worth clarifying when you book a truck.

In Sacramento, hydrovac is particularly useful in compacted urban fill and older road sections where air alone can be slow. Air-vac is preferred where reuse of dry spoil is important, or where water would worsen an already soft or saturated soil condition.

How deep and how fast can vacuum excavation go?

Depth and productivity questions drive most budgeting conversations. Owners want to know how long it will take to dig a 100 ft trench with vacuum and what it costs per day compared to a mini-excavator.

Practical depth limits

Hydrovac and air-vac systems can reach impressive depths. On paper, some units can pull material from 30 feet or more vertically. In the field, the real limit is a mix of hose length, friction losses, soil conditions, and how much time and money you are prepared to spend.

For most Sacramento utility work, contractors use vacuum excavation between 3 and 15 feet deep. A typical example is daylighting a 6 foot deep gas line that crosses a proposed storm drain, or exposing a 10 to 12 foot deep sewer lateral in a tight alley.

People sometimes ask how deep can vacuum excavation go. Under ideal conditions, 20 to 30 feet is technically possible, but production per hour drops as you go deeper, and the safety and logistics of working in and around a deep hole become much more complex. By that depth, engineers are usually specifying shoring systems and larger mechanical excavations.

Production rates

Production varies widely, so any number is an estimate, not a guarantee.

For planning purposes on cohesive Sacramento soils:

- Daylighting utilities: 10 to 30 utility potholes in a day is common, each 1 to 2 feet wide and 4 to 8 feet deep.
- Narrow trenching: A hydrovac might cut a 6 to 12 inch wide trench at 2 to 4 feet deep at something like 50 to 150 feet per day, depending on soil, access, and how clean and precise the trench must be.
- Bulk removal in tight spaces: When you use vac ex to remove backfill around a structure or tank, expect production in the range of 5 to 20 cubic yards per day.

People often ask how much a vac ex can excavate in a day. The honest answer is that for precision work around utilities, you size it in holes or trench feet rather than cubic yards, because the limiting factor is care, not pure volume.

Comparing this to a small excavator, which might handle 30 to 60 cubic yards in a day on an open trench, shows why vacuum excavation is not used as the primary method for long, open runs of pipe in clean ground.

When vacuum excavation makes sense in Sacramento

Vacuum excavation earns its keep where risk is high and space is tight. In the Sacramento region, there are patterns that almost always justify bringing a vacuum truck to site.

Here are situations where it is worth serious consideration:

1. Working near dense, mismarked, or old utilities in downtown streets or older suburbs.
2. Crossing existing utilities with new services where you need exact depth and alignment.
3. Exposing services near hospitals, data centers, or critical facilities where outages are intolerable.
4. Tight access jobs in alleys, backyards, and interior courtyards that cannot take a full-size excavator.
5. Tree-sensitive excavation around roots, especially under municipal tree ordinances.

On a downtown rehab, for example, you might have original cast iron water lines at unpredictable depths, later PVC services, and fiber spliced in wherever a crew could find room. If you send a backhoe operator in blind, even a good one with a spotter, you are taking a real risk. Vacuum excavation lets you “truth” the locates and expose the utilities before a bucket ever gets close.

The same logic applies for road diets and complete streets projects along older corridors like Freeport or Franklin. The drawing might say one thing, the ground another. A hydrovac crew can daylight every conflict point ahead of the main trench crew so the excavator is working with eyes open.

Safety, OSHA rules, and how vacuum excavation fits

Vacuum excavation improves safety around utilities, but it does not exempt you from OSHA excavation standards. The questions about the 3/4/5 rule for excavation, 5-4-3-2-1 type rules, or whether 4 feet is “safe” without shoring get thrown around a lot. Those are usually classroom simplifications of what is really a combination of regulations and soil judgment.

At a basic level:

- Trenches 5 feet and deeper require a protective system such as sloping, benching, shoring, or shielding, unless in stable rock.
- Trenches 4 feet and deeper require safe access like ladders within 25 feet.
- Spoil piles and equipment should be kept at least 2 feet from the edge.
- A competent person must inspect excavations and surrounding areas daily and after events such as rain.

People also ask how deep you can dig without shoring or how deep you can excavate without shoring. In typical Sacramento soils, which include clays and loose fills, you do not have the luxury of stretching those limits if you care about worker safety and inspections. Even at 4 feet, sidewall stability can be questionable, especially after irrigation, rain, or leaks.

Vacuum excavation changes the shape of the work in your favor. You can often keep the worker out of the hole entirely, standing at grade operating the wand while the machine does the digging. That greatly reduces exposure to cave-ins. You can also keep openings narrow so they are less likely to fail. But once you start entering or enlarging those holes to work inside them, the standard excavation rules apply again.

OSHA's three most cited violations change slightly year to year, but fall protection, hazard communication, and scaffolding or ladders consistently top the list. Excavation hazards are serious, but they cluster in fewer projects, so they do not always show up in the top three nationwide. Locally, inspectors pay close attention because when excavation accidents occur, they are often fatal.

The net result: vacuum excavation is a powerful safety tool, not a substitute for competent excavation planning and soil judgment.

Cost: what vacuum excavation really runs

Owners and GCs often start with simple questions: How much does vacuum excavation cost? How much does it cost for a vac excavation per hour? The short answer is that it is more expensive per hour than a small excavator, but cheaper than hitting a gas main, fiber backbone, or power duct bank.

Typical cost structures in the Sacramento region for a hydrovac truck with operator and disposal can look like this, as a ballpark:

- Hourly rates: commonly somewhere in the range of a few hundred dollars per hour, often with a minimum call-out (for example, 4 hours).
- Day rates: often priced at a modest discount to the hourly rate times 8 hours, sometimes including a certain disposal allowance.

The type of soil, access, and location of the dump site impact effective cost per cubic yard heavily. A crew that can daylight 20 utilities in a day in light soil near a disposal site will have a very different per-utility cost than a crew stuck in tight access with long travel distances.

To compare, people sometimes ask what excavation costs per hour for a small excavator or how much to excavate 200 cubic yards with conventional equipment. A rubber-tracked mini excavator with operator might bill at a much lower hourly rate than a hydrovac, and a single excavator with two trucks could move 200 cubic yards in a day under clean conditions. The per-yard cost can be a fraction of vac ex, but with much higher risk around unknown utilities.

Vacuum excavation is usually justified not by the lowest unit cost, but by the cost of a mistake. Breaking a 6 inch water main on a city street, cutting a major fiber run, or rupturing a gas service can easily eclipse a week of hydrovac charges once you factor in emergency repairs, claims, and schedule hits.

Training, licensing, and certifications

Running excavation equipment safely in California, including Sacramento, involves three layers: commercial driving requirements, equipment operation skills, and safety or OSHA training.

For hydrovac trucks, which are often built on heavy commercial chassis, a commercial driver's license (CDL) is commonly required. Whether you need a tanker endorsement for a hydrovac truck depends on how the state and your carrier classify the water and debris tanks. Many hydrovac operators do carry a tanker endorsement, because the vehicle meets the volume and configuration definitions for tank vehicles.

On the vacuum side, people ask what kind of training is required for vacuum excavation. There is not a single federal vacuum excavation license, but best practice includes:

- Formal operator training from the equipment manufacturer or dealer.
- Site-specific safety training covering utilities, confined space hazards, and soil stability.
- OSHA 10 or OSHA 30 for construction, depending on role.

For excavators and other heavy equipment, the question of what certifications you need to run an excavator has a similar answer. California does not require a specific state “excavator license,” but employers, unions, and large GCs often require documented training, competency evaluations, and compliance with OSHA operator requirements. On prevailing wage and union jobs, operators are typically dispatched through the locals, already trained and certified.

People sometimes wonder if they are too old to get into this line of work. Is 50 too old to become a heavy equipment operator? Physically, the job demands attention, good reaction times, and the ability to climb on and off machines, but it is not like framing or rebar tying in terms of strain. I have seen operators in their late 60s still running machines with no issues. For someone at 50 with good health and a solid work ethic, it is entirely realistic to enter the field, especially if you bring other skills like site supervision or logistics.

At the other end of the spectrum, questions like what is the highest salary for an excavator operator are hard to answer precisely, because it depends on overtime, locality, union vs non-union, and type of work. Six-figure years are not unusual on heavy civil projects with lots of overtime and night work, though base hourly rates can vary widely.

Limitations of vacuum excavation

Vacuum excavation is not a magic bullet. There are clear limitations that should factor into your method selection.

First, production volume is limited. For mass earthwork, footing excavation, or long open trenches in clean, utility-free ground, mechanical excavation beats vac ex by a wide margin on cost and speed.

Second, wet spoil handling becomes a constraint with hydrovac. The tank fills faster with slurry than with dry soil, which means more offloading trips and disposal fees. In saturated ground or during rainy periods, you may struggle to keep up production without running into handling headaches.

Third, reach and hose management matter. Tight alleys, overhead power lines, and low trees can limit where you can park the truck, which in turn affects hose length, vacuum efficiency, and crew fatigue.

Fourth, regulations still apply. If your hydrovac trench ends up over 5 feet deep and workers must enter it, you are in normal trenching territory in OSHA's eyes, regardless of how you removed the soil.

The smart use of vacuum excavation is surgical. Identify where it truly reduces risk or gives you capabilities you cannot match with a machine or a shovel, and deploy it there, while letting conventional equipment handle the bulk dirt.

Bringing it together for Sacramento projects

On a typical Sacramento job, all four types of excavation show up in some form: stripping topsoil, trenching for utilities, digging foundations, and balancing cuts and fills. Each has a main method that dominates on cost and speed.

Vacuum excavation slots in as a specialist tool, not a replacement. It shines when:

- Utility risk is high.
- Access is constrained.
- Tolerances are tight.
- Safety margins around buried infrastructure really matter.

If you are planning a project, the best time to decide where to use vacuum excavation is during preconstruction. Walk the plans with the civil engineer, locator, and excavation contractor. Mark every utility crossing, every tight area, and every known unknown. Budget a vacuum truck where the downside of guessing wrong is unacceptable.

Used that way, vacuum excavation does not just prevent disasters. It also simplifies field decisions, reduces inspections headaches, and gives your crews confidence to work in the most complicated parts of the site, knowing that what is under their feet has already been exposed and verified.