

Anyone who has watched a contractor jackhammer into a live power duct or flood a driveway by breaking an unmarked water service only needs to see it once to become a believer in proper utility locating. In Orange County, where aging infrastructure sits under new construction and remodels, the question is not whether you need utilities located, but how to do it correctly and what tools the pros actually rely on.

This is where the equipment mix matters. Ground penetrating radar, electromagnetic locators, tracer wires, sondes, GPS, and even vacuum excavation, each has a role. When used in the right sequence by a trained locator, they turn guesswork into a defensible map.

This article walks through how utility locating works in practice in Orange County, what equipment is used, the limits of that equipment, and how that ties into common questions about 811, permits, costs, and liability.

Why utility locating matters before anyone digs

On an active project, the stakes are simple. You are balancing safety, schedule, and liability against the cost and time to get utilities marked correctly.

Damage costs add up quickly. Hitting a small residential water service might run a few hundred to a couple thousand dollars in repairs and restoration. Damaging a gas main, fiber bundle, or high voltage conduit can easily climb into tens of thousands of dollars, along with schedule delays and, in the worst cases, injuries or evacuations.

Beyond the direct repair cost, the owner, contractor, or homeowner may be liable for:

- Utility repair charges and emergency callout fees
- Lost service claims from impacted customers
- City or state penalties for failing to notify 811 or follow safe-digging laws
- Costs to re-excavate and rebuild damaged work

California treats this seriously. Digging without proper notification and locating can trigger enforcement under Government Code 4216. For most work in Orange County, the first legal step is calling 811, then deciding whether that is enough or whether you also need a private utility locator with more specialized equipment.

Public vs private utility locating in California

A lot of confusion comes from not understanding who 811 actually covers and what they do on site.

What is utility locating?

At its core, utility locating is the process of finding and marking buried utilities before excavation. That includes water, sewer, gas, electric, communications, and sometimes other lines like irrigation or fuel. The work can range from a basic 811 public utility markout to full subsurface utility engineering (SUE) with surveyed coordinates, depth data, and vacuum potholing.

What does a utility locator do?

In the field, a locator does more than wave a wand and spray paint. A typical day in Orange County might involve:

- Reviewing plans and 811 tickets
- Walking the site to understand proposed excavation limits

- Using electromagnetic (EM) locators tied into known points like meters, pedestals, or valves
- Scanning open areas with ground penetrating radar (GPR) for non-metallic or unknown lines
- Marking findings on the ground with color coded paint and flags
- Taking photos, notes, and sometimes GPS positions for documentation

Good locators also spend time explaining what their marks do and do not mean. They know the difference between “we traced this from a live conductor” and “GPR hit suggests something here, but it needs confirmation.”

Is calling 811 the law in California?

Yes. In California, notification to 811 before excavation is required by law. In most cases you must notify at least two working days before you dig. This applies to everyone: homeowners, contractors, public agencies, even landscapers installing a fence or tree.

When you call 811 in Orange County, the One Call center notifies the public utility operators that have facilities in your dig area. Those operators, or their contracted locators, then come out and mark their lines.

Is utility locating free in California?

Public utility locating through 811 is free to the person requesting it. The utility companies fund that work. That covers facilities they own and maintain up to their demarcation points, such as:

- Mains in the street and public right of way
- Service laterals up to the meter or point of service in many cases

What does 811 not locate? Does 811 locate private lines?

811 does not send a locator to mark everything on your property. They only arrange locating for participating utility owners, and only for the part they own. Common examples of lines 811 does not mark in Orange County include:

- Electrical conduits between a house and a detached garage
- Private parking lot lights and landscape lighting
- Fire lines or private water services past the meter in some setups
- Irrigation, pool piping, and many storm drains
- Private sewer laterals once they leave the public right of way, depending on jurisdiction
- Private fiber or data lines inside business parks, campuses, or large HOA communities

These are considered private utilities. Public 811 locators are not responsible for them, and the free 811 service does not cover them, even though they might be just as dangerous or expensive to hit.

What is the difference between public and private utility locating?

Public utility locating is performed on behalf of utility owners after an 811 request. It is limited to their facilities and usually to the accuracy standard defined in law.

Private utility locating is hired directly by the property owner, contractor, or design team. The private locator uses a wider toolset to find lines that 811 will not mark, often including:

- Building-to-building power and communications
- Private water, fire, chilled water, and reclaim lines

- Sewer laterals, septic tanks, and leach fields
- Unknown abandoned utilities that still pose a risk

If you plan to dig on private property in Orange County, you typically need both: 811 for the public side, and a private utility locator for the rest.

How utility locating works on a real site

From the outside, utility locating can look like paint and flags appearing overnight. In practice, the process is more structured.

Step 1: Call 811 and define the dig area

For Orange County projects, 811 is the starting point. You describe the location, type of work, and area of excavation. The more precise you are, the better the locators can prioritize and plan.

As part of this step, you typically mark your proposed dig area with white paint. That answers a common question: what is the white paint on the ground for? White indicates the planned excavation zone, not an existing utility.

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Step 2: Public utilities are marked

Depending on utility workloads, locators typically arrive within two working days, though high demand or holidays can stretch that. That schedule ties directly into a common planning question: how far in advance do you need to call before digging? In practice, smart contractors in Orange County give themselves at least three to five business days, especially for larger or more complex sites.

How long does utility locating take on site? For a small residential job, public locating might take less than an hour. For commercial sites with complex infrastructure, a locator may be there for half a day or more. Private locating for all utilities on a large site can easily stretch into a full day or multiple visits when GPR and detailed mapping are involved.

Step 3: Private utility locating fills the gaps

After 811 marking, a private locating company is often brought in. Their work typically includes:

- Reviewing the public marks, site plans, and any as-builts
- Walking the property to identify private power panels, irrigation controllers, hose bibs, septic cleanouts, etc.
- Using EM locators and GPR to trace private lines
- Marking additional utilities in the same national color scheme used by the public locators

That last point is important. Private locators follow the same color code, so everyone speaks the same language on site.

What do the utility marking colors mean?

The standard APWA color code applies in Orange County, just as it does elsewhere in the United States. Here is how to interpret the most common colors field crews see every day:

- Red paint or flags mean electric power lines, cables, conduit, and lighting.
- Orange utility flags or paint identify communications, alarm or signal lines, cable TV, and fiber optics.
- Blue means potable water.
- Green marks sewer and drain lines.
- Yellow is gas, oil, steam, petroleum, or other gaseous materials.

There are a few more niche colors, like purple for reclaimed water and pink for survey markings, but the ones listed above are the ones that drive most day-to-day excavation decisions.

Core equipment utility locators use in Orange County

“What equipment do utility locators use?” is one of the questions I hear most, especially from homeowners watching a locator work and wondering how much is science versus art. In reality, it is both.

Here are the main tool categories you will see in the field, and what they are best at:

1. Electromagnetic locators (EM) - Used to trace conductive utilities like power lines, metallic water or gas pipes, and tracer wires by sending or detecting an electromagnetic signal.
2. Ground penetrating radar (GPR) - Sends radar pulses into the ground and reads reflections to detect changes in material, often used for non-metallic pipes, unknown utilities, and concrete investigation.
3. Tracer wires and sondes - Conductive wires or small transmitters attached to or pushed through non-metallic pipes, allowing them to be traced with EM locators.
4. GPS and mapping tools - Used to record utility positions, depths, and notes for SUE mapping and as-built records.
5. Vacuum excavation (potholing) - Non-destructive digging with air or water to physically expose a utility and confirm location and depth.

Each of these tools has strengths and blind spots. Experienced locators choose the right combination based on soil type, utility material, site congestion, and the level of accuracy the project requires.

Electromagnetic locators: the daily workhorse

If you watch a locator using something that looks like a long handheld wand, often paired with a box connected to a cable or clamp, you are probably seeing an EM locator at work.

How does electromagnetic locating work?

EM locating relies on conductive materials and electromagnetic fields. There are two main ways it works:

First, induction or direct connection. The locator connects a transmitter to a conductive utility (like a metal pipe or cable) at an access point, such as a valve, meter, pedestal, or exposed conduit. The transmitter sends a signal down the line, and the handheld receiver picks up that signal from the surface as the locator walks the route.

Second, passive detection. The receiver listens for existing signals on live power or communication cables, without the locator connecting a transmitter. This is useful where there is no easy connection point, but it can also be noisy and ambiguous on congested sites.

How do you find a buried electrical line? In practice, the locator will connect to the line at a panel, pedestal, or transformer, set the transmitter to a suitable frequency, and walk the area with the receiver. They adjust frequency and gain to separate the target line from adjacent conductors.

How deep can utility locators detect with EM?

In good conditions, EM locators can trace utilities to depths of 10 to 15 feet, sometimes more. In Orange County soils, practical limits often fall in the 8 to 10 foot range before signal strength and interference become serious issues. Accuracy and signal clarity drop as depth increases, and crowded utility corridors can confuse even good equipment.

Limitations: Can utility locators find plastic pipes with EM?

EM locating requires something conductive. Bare plastic pipes cannot be traced with EM unless they have:

- A tracer wire buried with them
- A metallic tape or mesh
- A sonde or transmitter inserted into the pipe or duct

This matters for many Orange County water and sewer systems, which use PVC or other non-metallic materials. Locators often have to combine EM with GPR or internal transmitters to get a reliable path.

Ground penetrating radar: seeing patterns in the subsurface

GPR is the box on wheels or cart that locators push back and forth like a lawn mower. It is one of the most powerful and misunderstood tools in the locating toolkit.

What is ground penetrating radar used for?

GPR sends high frequency radio waves into the ground. When those waves encounter a sudden change in material, such as the boundary between native soil and a pipe, void, or concrete, part of the energy reflects back to the antenna. The system records these reflections and displays them as hyperbolas and bands on a screen.

In utility locating, GPR is used to:

- Detect non-metallic pipes like PVC, HDPE, and some clay pipes
- Confirm or refute suspected utilities found on old plans
- Locate unknown lines or abandoned infrastructure
- Map rebar, post tension cables, and conduits in concrete slabs

If a client asks, "Can you locate a septic tank?" GPR is usually the first tool considered. A buried tank or leach field typically creates a distinctive signature compared to surrounding soil.

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How deep can GPR detect utilities?

Depth depends heavily on soil conditions. In Orange County, coastal and alluvial soils, with varying moisture and salts, often limit practical utility locating depths to the 4 to 8 foot range for the higher frequency antennas commonly used for utilities. Lower frequency antennas can go deeper but sacrifice resolution, which makes it harder to distinguish individual pipes in a congested corridor.

How accurate is ground penetrating radar?

For utilities within a few feet of the surface, GPR can be very good at horizontal positioning, often within a few inches for a skilled operator. Depth estimation is more variable, because it depends on the assumed speed of the radar signal in that specific soil type and moisture. Depth estimates are often considered approximate without calibration from a known point or test hole.

GPR also has blind spots. Highly conductive soils with a lot of clay or salt, saturated ground, and reinforcing steel in concrete can scatter or absorb the signal. In some cases the screen looks more like static than clear hyperbolas.

That is why the answer to “How accurate is utility locating?” often includes “It depends on soil conditions, construction history, and how much cross checking we can do.”

Tracer wires, sondes, and rodders: giving plastic pipes a voice

When someone asks, “How do you locate a buried water line or gas line if it is plastic?” the honest answer is that you need something added to it that the equipment can see.

Tracer wires are thin conductive wires installed along non-metallic lines. Locators connect EM transmitters to these wires just like they would to a metal pipe. Many modern plastic gas and water mains in Orange County include tracer wires for this reason. Where they exist and remain intact, locating is much easier and more accurate.

Sondes are small battery powered transmitters that are pushed through accessible pipes with a rod or jetter hose. The sonde emits a signal that an EM receiver can track on the surface. They are commonly used for sewers, storm drains, and conduits where you can get access from a cleanout or manhole.

Duct rodders with built in copper or steel conductors can also [Orange County Utility Potholing](#) be pushed through ducts, then energized and traced.

For locating sewer laterals, septic laterals, or private drain lines, a locator may send a sewer camera with a sonde or simply push a beacon into the line. That is often how you answer: how do you locate a sewer line or septic tank that was never shown on a plan.

Other tools professionals rely on

Experienced utility locators do not stop with EM and GPR. A few other tools are common in Orange County field work:

Handheld metal detectors help pick up shallow metallic objects like irrigation valves, small junction boxes, or metallic tracer tapes.

Acoustic and pressure tools occasionally help with leak detection or confirming a suspected line, especially for water.

GPS and survey equipment are used in subsurface utility engineering to capture the exact coordinates and elevations of utilities. This is crucial when utilities need to be integrated into BIM models or full design drawings.

Vacuum excavation, sometimes called potholing, is the final arbiter. When a project needs high accuracy, locators work with a vacuum truck crew to daylight selected utilities. That is how you get from “within one or two feet” to “we can see the pipe and measure depth with a tape.”

How accurate is utility locating overall?

Utility locating is a mix of science, interpretation, and risk management. The question “How accurate is utility locating?” has different answers depending on the level of service.

Basic 811 locating typically targets a tolerance zone defined by law, often 18 to 24 inches on either side of the mark horizontally. Depth is not guaranteed and may not even be provided.

Private locating can tighten that, especially when combined with GPR and potholing. For many Orange County projects, a responsible locator will say:

- Without potholing, expect a horizontal accuracy of roughly 6 to 24 inches depending on depth, soil, and congestion.
- Depth estimates are approximate unless verified by exposure.

For high risk crossings, especially gas, high voltage, or critical fiber, vacuum excavation to verify is standard best practice, no matter how confident the locator is.

Costs, timing, and liability in Orange County

How much does utility locating cost in Orange County?

Public 811 locating is free to the caller, but limited in scope as described earlier.

Private utility locating cost in Orange County varies by site size, complexity, and whether GPR and mapping are part of the scope. As rough ranges:

- Simple residential private locating might start around a few hundred dollars for a short visit, focused on one or two specific lines.
- Small commercial jobs with both EM and GPR often land in the 500 to 1,500 dollar range.
- Larger SUE projects with mapping, GPS, and multiple days on site can reach several thousand dollars.

Those numbers are general ranges, not quotes, but they give context when someone asks, "Who pays for utility locating?" For public 811, utilities absorb the cost. For private locating, the property owner, contractor, or design team typically pays, and often treats it as cheap insurance compared to the cost of a strike.

Who is liable if I hit a utility line?

Liability depends on whether you followed the required steps. If you dig without calling 811, and you damage a public utility, you can be held fully responsible for repair costs and penalties. If you called 811, followed instructions, respected the tolerance zones, and still encountered a poorly mapped line, responsibility may shift back toward the utility owner.

For private lines, if you chose not to hire a locator, or ignored the marks, you are almost always carrying that risk.

What happens if you cut a utility line? For low risk services like irrigation or some private power, it may be a repair and inconvenience. For gas and electric, it can mean immediate danger, emergency response, evacuations, and investigations. What happens if I dig without calling 811 in California is not theoretical; there are documented cases of significant fines and, in severe incidents, criminal investigations.

Do I need a permit to dig in Orange County?

Permitting depends on where and what you are digging. Work in public right of way typically requires an encroachment or street opening permit from the city or county. Many cities also require permits for certain private property excavations, especially when they affect grading, retaining walls, or utilities tied into public systems.

Regardless of permits, the legal obligation to notify 811 before excavation still applies.

Common homeowner questions about locating on private property

Homeowners in Orange County often find themselves torn between "just renting a trencher" and doing it the right way.

Can I locate my own underground utilities? To a limited extent, yes. Hand digging around obvious utility entries, using a simple metal detector, or following visible surface features can help. But you will not be able to safely identify live power feeds, gas lines, or buried communications to a professional standard with hardware store tools.

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How do I find underground utilities on my property? The safest sequence is: call 811 for public lines, then hire a private locator for anything that 811 will not cover or that seems unclear. This is especially important if you have added pools, guest houses, detached garages, or major landscaping over the years.

Should homeowners hire a utility locator? If you are planning anything deeper than a few inches, such as footings, tree planting, trenching, or major landscaping, yes, it is a sensible investment. A homeowner hitting a buried electrical line or gas service with a rented auger is exactly the type of avoidable disaster utility locating is meant to prevent.

Who do I call before digging in Orange County? For public lines, you always start with 811. For private utility locating, you contact a qualified locating company directly. If you are working near public streets or easements, you may also need to contact your city's public works or permitting department.

What is the best utility locating company in Orange County? There is no single answer. Look for firms that specialize in utility locating and SUE, carry proper insurance, use both EM and GPR, and have experience in the type of project you are doing. References from local contractors and engineers are often more reliable than generic online reviews.

Subsurface utility engineering: beyond paint on the ground

For larger projects, especially in transportation, healthcare, campuses, or redevelopment areas, simple locating is not enough. This is where subsurface utility engineering comes in.

What is subsurface utility engineering? SUE is a structured process for identifying, locating, and mapping underground utilities with defined quality levels, from D (records only) up to A (exact location and depth verified by exposure). A full SUE effort in Orange County typically involves:

- Collecting and reconciling existing records
- Field locating with EM, GPR, and other tools
- Surveying utility positions and depths
- Vacuum excavation to expose critical crossings
- Delivering CAD or BIM-ready utility models

The equipment is similar to standard utility locating, but the level of documentation and verification is higher. For projects with tight tolerances or heavy utility congestion, SUE can mean the difference between constructible designs and endless change orders.

Bringing it all together on a busy Orange County site

Picture a mid sized commercial infill project in Santa Ana or Costa Mesa. The team wants to know: how does utility locating work here, and what gear will actually keep them out of trouble?

First, they submit a detailed 811 ticket. Public locators arrive and mark gas in yellow, power in red, communications in orange, water in blue, and sewer in green. The GC repaints the white outline of the planned excavation so everyone sees the dig area.

Next, a private locator walks the site. They note the 811 marks, then look for private panels, backflow devices, cleanouts, and irrigation controls. They connect an EM transmitter to a private 480 volt panel feeding parking lot lights and trace the conduit to a transformer. Another EM run on a metallic water line reveals a bend that does not match old plans.

To find a suspected PVC fire line crossing the new footing, they roll a GPR cart across the area, slowly, in two directions. A clear linear reflection about 3 feet down appears. Depth estimation and pattern suggest a pipe sized consistent with a fire loop. Because that crossing is critical, they bring in vacuum excavation to daylight it and measure exact depth.

In one corner, the client wants to know whether there is a septic tank from a 1950s structure. The locator sees no records and no EM hits, but GPR shows a rectangular anomaly at about 4 feet deep. A small test excavation confirms an old abandoned tank, which is now addressed in the demolition scope instead of surprising the crew later.

Across that project, the locator cycles through EM, GPR, tracer wires, GPS, and vacuum potholing. Every tool has a reason to be there. The goal is straightforward: provide utility information accurate enough that when the excavator teeth bite into the soil, nobody is surprised.

That combination of process and equipment is what modern utility locating in Orange County really looks like. Not magic, not guesswork, but a deliberate use of specialized tools to turn unknown underground risk into something visible, markable, and manageable before anyone breaks ground.