PIX4D

U.S. utility engineering

Closing the data fragmentation gap

SOC 2 Type II

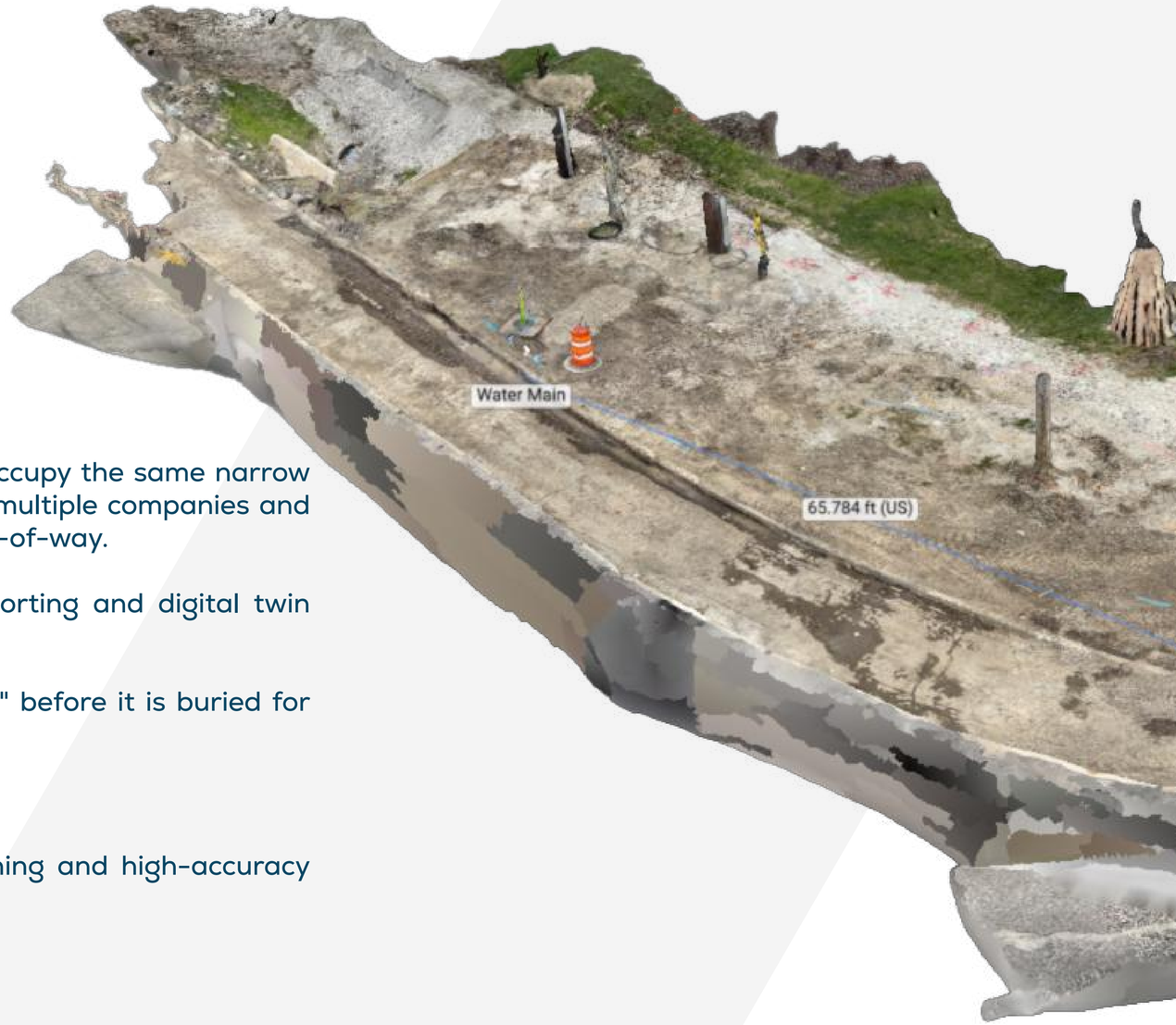
ISO 27001

INDEX

01 / The 2021 Infrastructure Act: Why U.S. trenching is spiking

The Infrastructure Investment and Jobs Act (IIJA) has triggered a massive, multi-year increase in U.S. excavation. It is the largest long-term, infrastructure investment in U.S. history, mandating a higher volume of projects for utility operators. This has resulted in growing nationwide backlogs and a critical need for accurate documentation.

Call Before You Dig: the surge from the growing backlog is managed through the "Call (811) Before You Dig" system. This is a trigger for data capture as it provides the perfect window to replace "approximate" paint marks with precise digital documentation while the trench is open.



THE DOCUMENTATION CHALLENGE

Increased volume: More digging leads to a higher risk of utility strikes.

Overcrowded corridors: Multiple utilities (water, power, fiber) often occupy the same narrow physical space. The U.S. underground is a complex patchwork where multiple companies and departments manage different networks within the same narrow right-of-way.

Asset transparency: Federal funding often comes with stricter reporting and digital twin requirements.

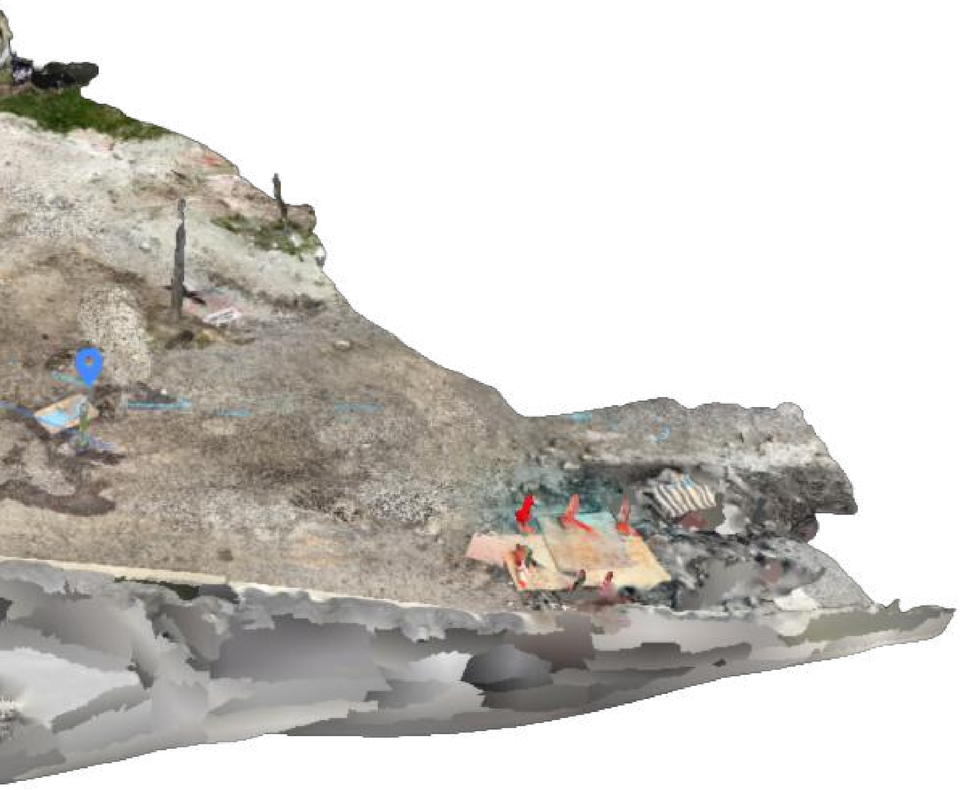
The window: An open trench is the only time to verify "Ground Truth" before it is buried for decades.

THE SOLUTION

The industry is shifting from manual sketches to smartphone scanning and high-accuracy digital documentation to capture assets in real-time.

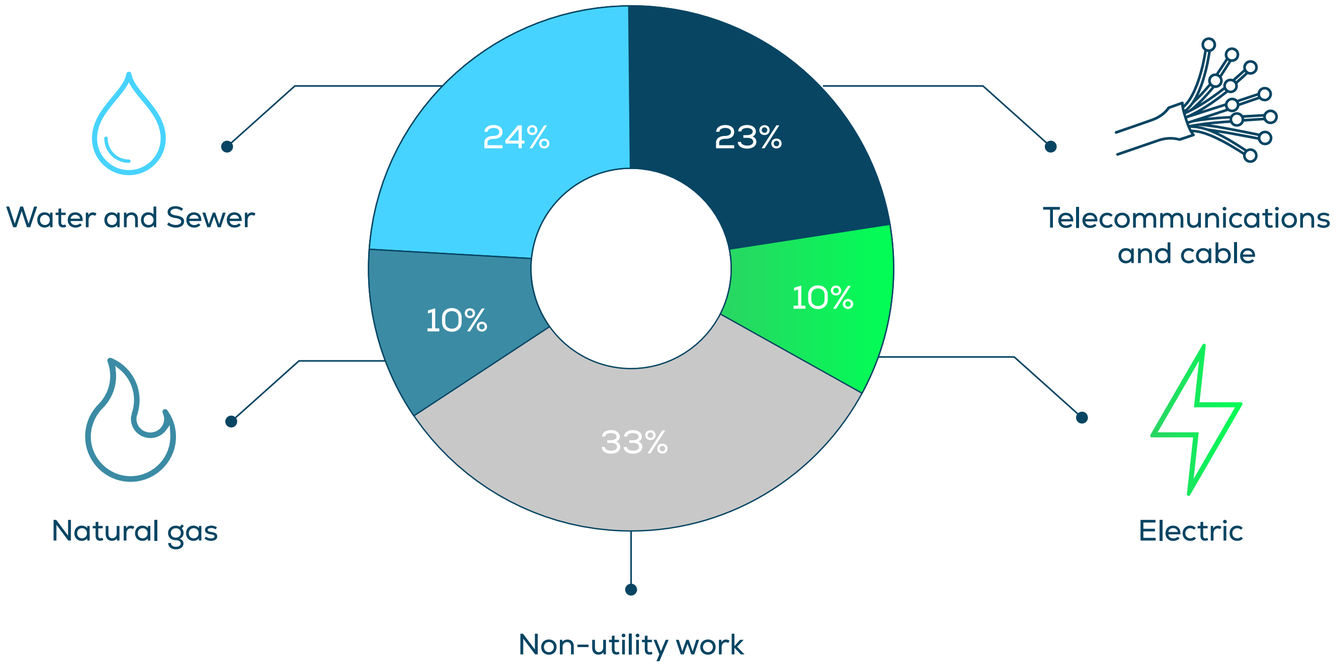
THE DATA

43.5 million locate requests were recorded in 2024, revealing the massive scale of active excavation occurring nationwide. This high level of activity shows a critical and growing need for accurate and accessible utility documentation.



WHAT'S IN THE TRENCH?

Utility-related work dominates excavation activities:



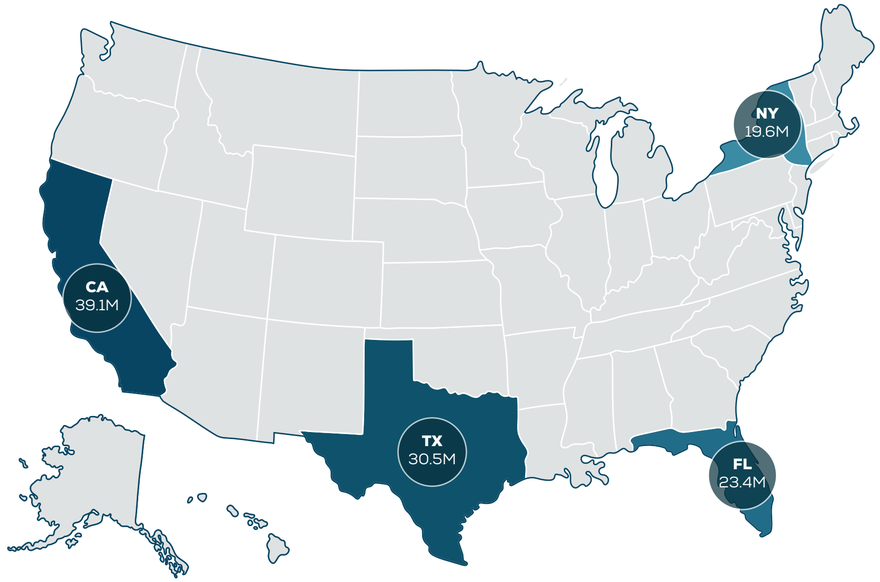
THE DOCUMENTATION GAP

Despite this activity, we rarely capture utility data systematically while the ground is open. Once a trench is backfilled, the physical visibility of the utility is gone. We lose the chance to record its exact location, depth, and context.

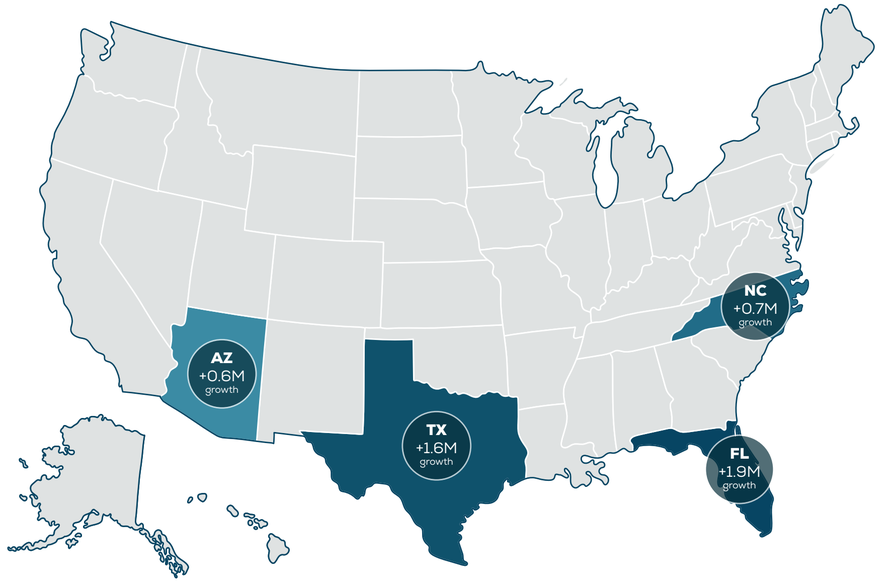
Every open trench represents a rare opportunity to capture the "ground truth" of our infrastructure.

More people, more utilities: As populations grow, the number of utilities per linear foot increases. More residents means more water service connections, sewer laterals, and fiber lines into the same right-of-way.

HIGH-DENSITY HUBS = OVERCROWDED CORRIDORS: Total population by state. As these numbers climb, the concentration of service connections, water, sewer, and fiber, within the same limited right way leaves less margin for error.



HIGH-GROWTH ZONES (from 2020 to 2024): High-growth zones are where new infrastructure is being laid at a pace that traditional surveying can't keep up with, creating a massive documentation backlog.



*Source

THE SCALE OF U.S. INFRASTRUCTURE

Water: Over 2.2 million miles of drinking water and wastewater pipes in the US.

Electricity: Over 5.5 million miles of electric distribution lines.

Fiber: Now reaches 60% of U.S. households, with record growth in states like North Dakota and Rhode Island. In 2025 fiber broadband passed 11.8 million new locations

In these high-growth zones, the ground is becoming increasingly crowded. The "approximate" mapping of the past is no longer sufficient to manage the density of the modern utility corridor.

02 / Is the U.S. utility environment fragmented?

Unlike centralized systems, the U.S. underground is a complex patchwork of ownership and data. This fragmentation makes objective, spatially accurate as-built documentation essential for safety and project efficiency.

Thousands of stakeholders: Thousands of utility owners and operators manage different networks.

Shared corridors: Multiple utility types (Water, Power, Fiber) occupy the same narrow physical space.

Varied standards: Practices, standards, and coordinate reference systems vary significantly from state to state.

The as-built hand-off: Critical information is passed between contractors, surveyors, and public agencies, often losing context along the way.

If as-built data cannot be integrated into engineering and GIS workflows, the "ground truth" is lost the moment the trench is backfilled.

Data must be: Spatially accurate, georeferenced, consistent with project and state coordinate reference systems. Utility records that rely heavily on sketches, notes, or non-georeferenced photos often fail to scale across organizations and jurisdictions.

Common standards exist, but implementation varies

Over the past decade, national standards and guidelines for how to capture and document underground utility information have emerged.

National standards like ASCE 38 and ASCE 75 provide the framework for reliable, reusable utility data.

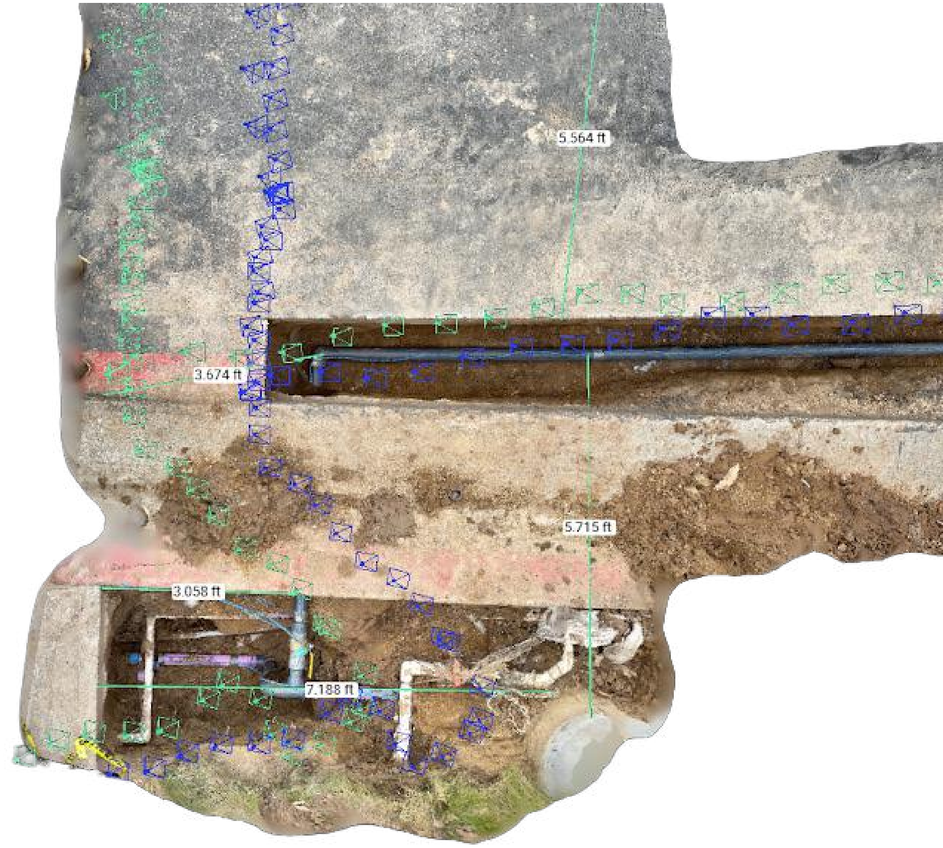
However, data is only truly reliable when it is captured at the moment of exposure and spatially referenced for engineering and GIS systems.

For trench documentation to be valuable beyond the initial construction, it must be:

Spatially accurate:
Precise location and depth.

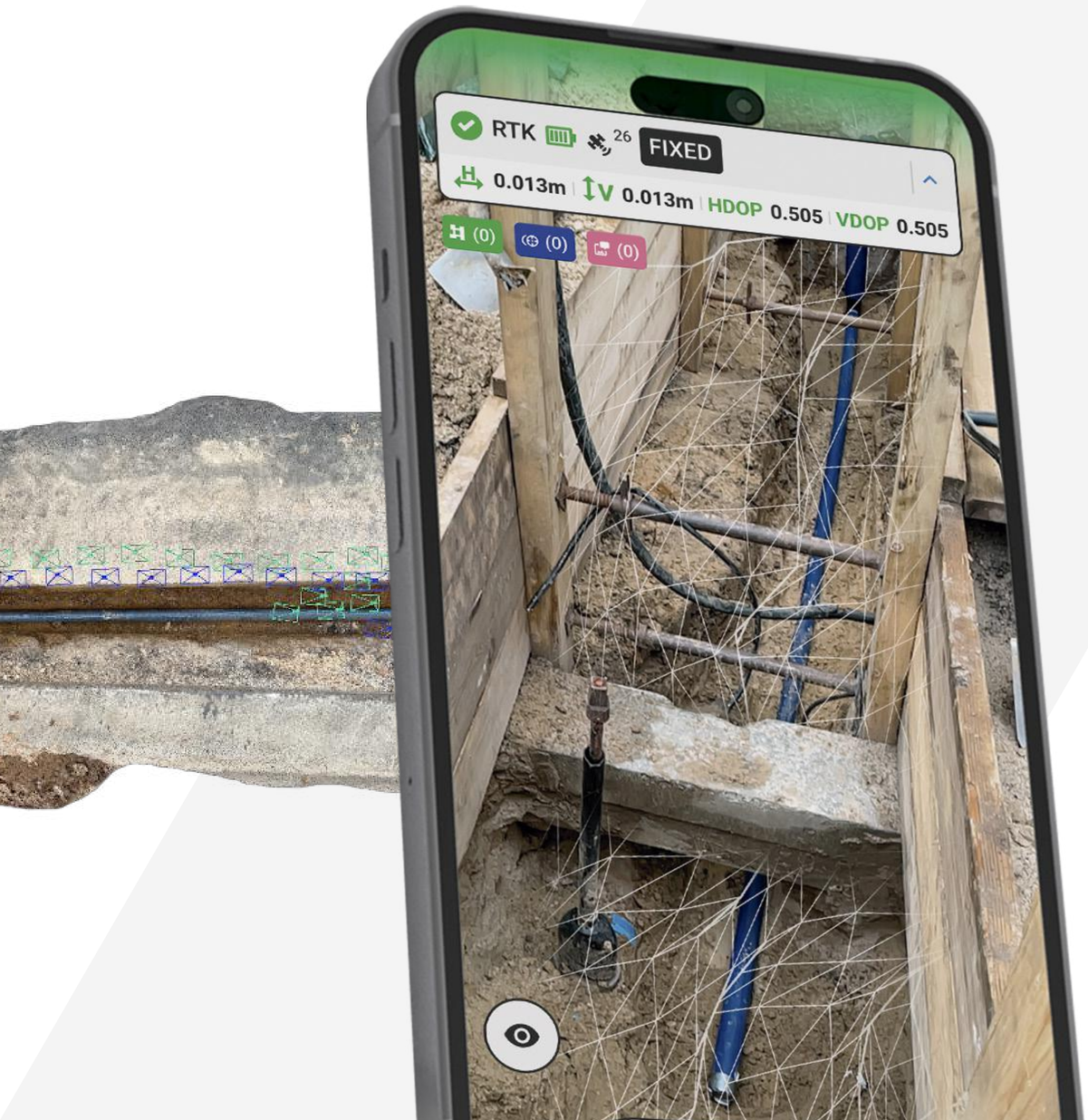
Georeferenced:
Aligned with project and state coordinate reference systems.

Consistent:
Compatible with modern CAD and GIS databases.



Standardizing and digitizing workflows means engineers and contractors can integrate field data directly into CAD/GIS without manually fixing or aligning coordinates; furthermore, proper documentation ensures that future teams can trust the records.

03 / Why capture methods matter as much as accuracy



SPEED VS. PRECISION:
Meeting data standards requires capture methods that align with tight construction timelines. Accuracy is a requirement, but it is only successful if it can be achieved at the speed of construction.

TIMELINE CONSTRAINTS:
Utility projects operate under strict schedules where roads must be reopened and crews are transitioned quickly.

THE EXPOSURE WINDOW:
Utilities are often visible for only a short duration before trenches are backfilled.

EASE-OF-DEPLOYMENT:
Empowering teams already on-site with accessible tools ensures that georeferenced data is captured at the only moment it's fully available, avoiding secondary site visits.

END-TO-END WORKFLOW:
Digital capture creates a direct feedback loop between the field and the office. By capturing site reality in real-time, the office can immediately verify that as-built matches as-designed, ensuring the final record is validated before the trench is backfilled.

THE CONSEQUENCE

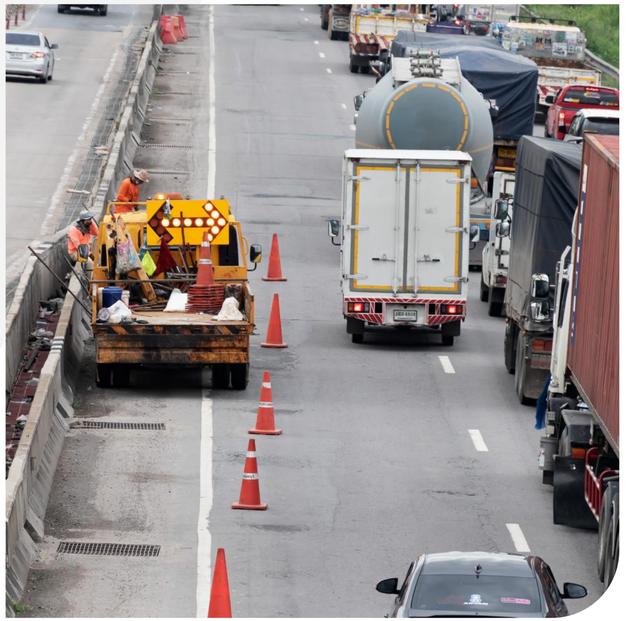
The cost of poor unreliable utility data leads to measurable project delays and significant cost overruns.

The rework penalty

Rework accounts for at least 5% of total U.S. construction costs.

Schedule risk

Utility conflicts are a primary cause of schedule overruns in civil infrastructure.



Operational overhead

Returning to a site to fix data gaps requires expensive mobilization and new traffic control permits.

Georeferencing utilities during the initial trenching avoids these downstream costs by preserving the site reality when it is fully accessible.

04 / Traditional surveying tools vs. modern capturing

While traditional surveying remains a benchmark for accuracy, its logistical requirements often conflict with the volume and pace of modern utility trenching.

The smartphone revolution More than 80% of U.S. construction professionals already utilize smartphones daily for field reporting. Using the tools already in their pockets is the primary driver for improving project timelines and reducing costs.

Proven performance

Transitioning from manual sketches to digital validation reduces documentation effort by double-digit percentages.

Maintenance of standards

Digital capture delivers the rigorous engineering precision required by ASCE standards without the typical survey delays.

Real-time sharing

Refined field data capture ensures information is shared across the organization instantly, not weeks later.

Digital replicas from your pocket the industry is shifting to handheld-first workflows that deliver the precision of a surveyor with the speed of a smartphone.

LiDAR + photogrammetry: This combination enables the rapid capture of full trench geometry and high-resolution visual context. You get a color-accurate 3D model in seconds.

RTK positioning: Using an RTK device on your smartphone provides the centimeter-level georeferencing required for professional engineering and ASCE standards.

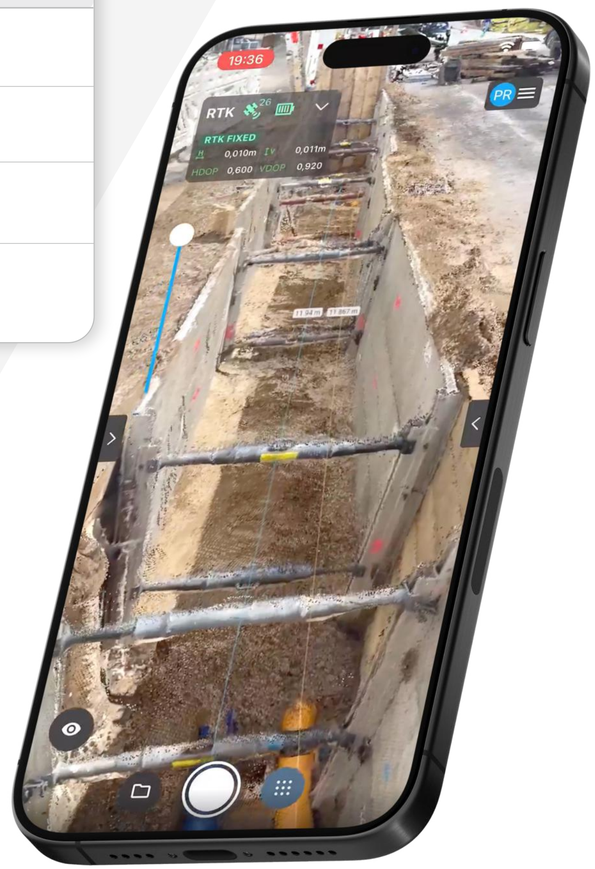
Coordinate alignment: Smartphone data now aligns perfectly with project and state coordinate reference systems for immediate use in GIS and CAD.

AR visualization: with digital capture, technology like augmented reality is possible, allowing teams to view a digital overlay directly on the physical site. This enables real-time verification and the ability to view underground utilities even after the trench has been backfilled.

Survey-grade accuracy is no longer tied to specialized crews. Field teams can now capture reliable data without disrupting the construction schedule.

04 / Traditional surveying tools vs. mobile capturing

	TRADITIONAL METHODS	SMARTPHONE + RTK
FIELD TIME	Measured in days	Measured in hours
LABOR	Requires specialized crews	Any crew can capture
DATA ACCESS	Takes days to process	**Available immediately**
EFFICIENCY	High risk of site returns	**97% faster field work**



05 / From technology to practice

To be successful in the field, smartphone capture must meet three conditions simultaneously:

Operational speed: The technology must be fast enough to use during active trenching without causing construction delays.

Engineering reliability: It must deliver georeferenced data that is immediately suitable for professional engineering and GIS workflows.

Natural integration: The tool must fit into existing construction and surveying practices without requiring extensive specialized training.

The PIX4Dcatch smartphone scanning app was designed to combine survey-grade accuracy with everyday practicality. It allows teams to map trench conditions using a smartphone—combining LiDAR, photogrammetry, and RTK positioning to get precise, georeferenced results without slowing down construction.

Using PIX4Dcatch smartphone capture provides a measurable edge for utility operators:

SPEED

Field-ready data is captured in minutes, not days.

EFFICIENCY

Reduces the need for expensive return visits to verify missing data.

SAFETY

Minimizes time spent by personnel inside the trench.

LONGEVITY

Creates permanent utility records that support long-term infrastructure planning.

Create a permanent, accurate, and measurable record of underground utilities before they are obscured by backfill.

What makes PIX4Dcatch different?

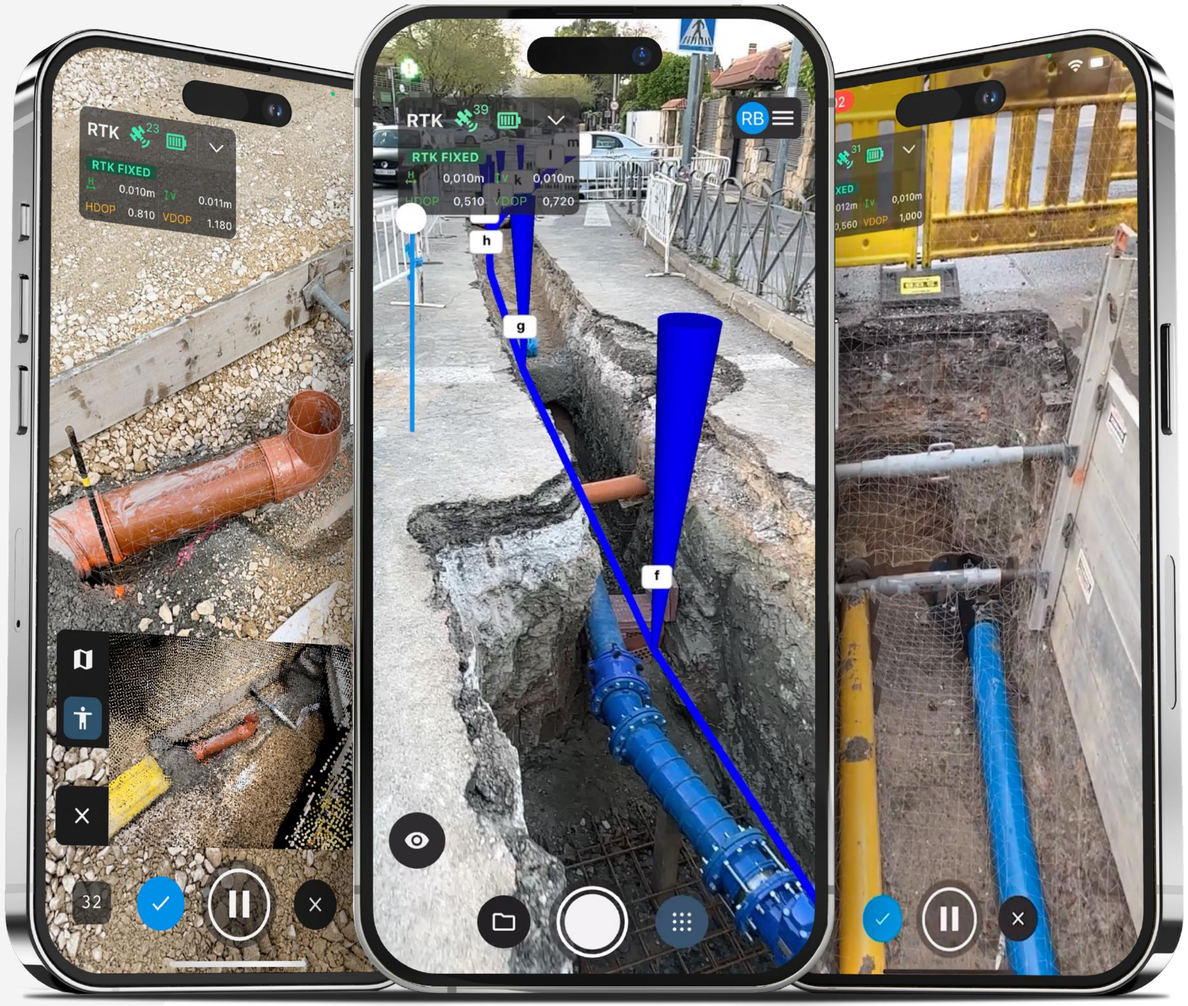
EASY TO USE

RTK DEVICE COMPATIBILITY

GEOREFERENCED 3D SCANNING

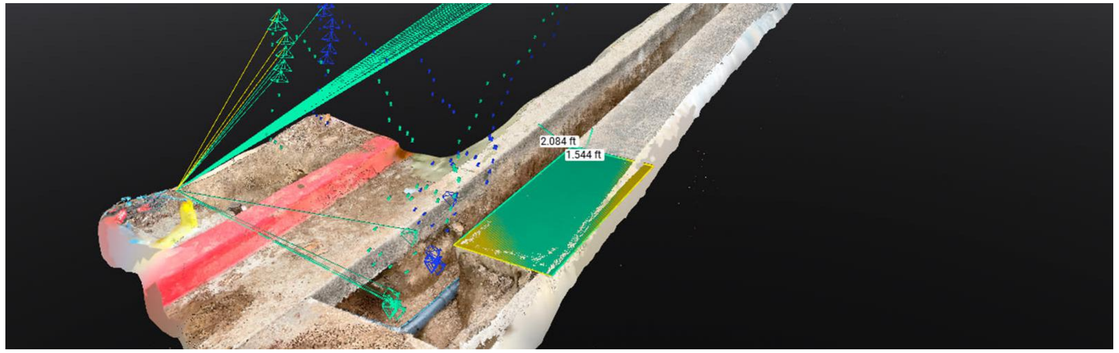
SAVE MONEY & GAIN TIME

VERSATILE PROCESSING OPTIONS



Applications & testimonials

Generating GIS-compliant utility maps with PIX4Dcatch

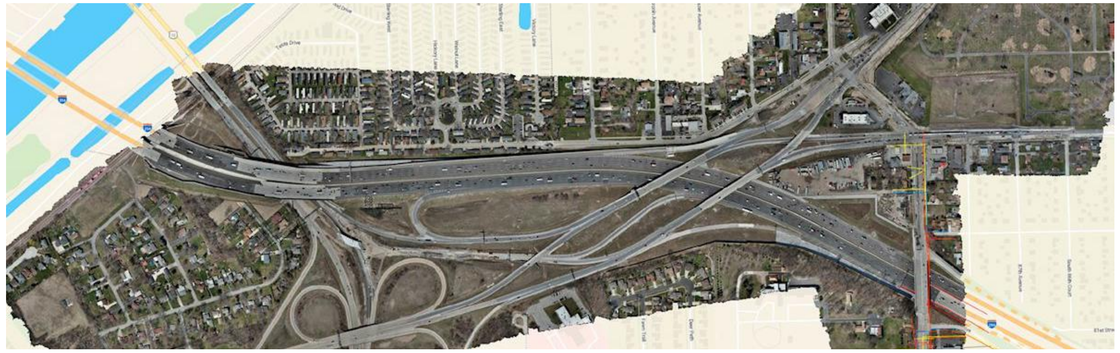


PIX4Dcatch with an RTK device is an easy way to collect utility installations. I liked the ease of use and fast procesing. From collecting to printing out a map, this effort transforms how to collect utility installations for construction or facility operations. PIX4Dcatch leverages the global utility, which is the GPS/GNSS reference frame, to map vital utility information once collected and mapped with analogue hand tools.

Gabriel Armas,
Asset Systems Development Manager,
Planning, Operations, and Construction

PEPPERDINE UNIVERSITY

Locating underground pipes with PIX4Dcatch



We have been using PIX4Dcatch on projects for over a year, with testing beforehand to establish the capabilities. We currently have 21 mobile devices with PIX4Dcatch – some are used by our team directly to support our survey projects, others with the FTTx construction teams to document the built network in real time. The subsurface infrastructure can be scanned easily by on-site staff and then uploaded to PIX4Dcloud, where it's automatically processed and then accessed by the surveyor at the office.

Robert Greenhalgh,
3D Speacialist

DÆGES
Ingenieurbüro für Verkehrs- und Freianlagen

PIX4Dcatch served as my primary tool for capturing ground-level data, which has had a gigantic impact on this project. Monitoring and planning were just a small part, believe it or not! I'm being fed utility DXF files from the engineer working with the city to plug into my models and verify locations. Once they're loaded, I'm able to use PIX4Dcatch's AR augmented reality to verify the accuracy and update not only the engineering schematics for the project, but also utility locations for the city records.

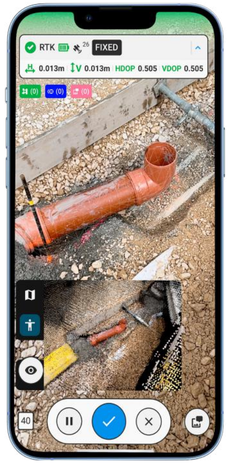
Brian Layhew,
Founder

9 LINE AERIAL MEDIA
VETERAN OWNED

A seamless workflow: Trenching to digital twin

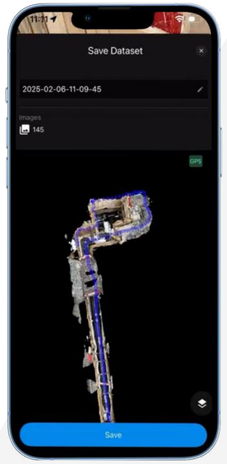
CAPTURE GROUND DATA

Walk along or around the trench to scan utilities, and PIX4Dcatch will automatically save images according to a defined overlap.



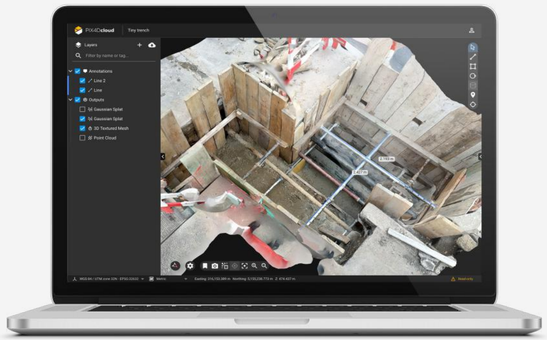
ENSURE COMPLETENESS

Experience real-time AR feedback on our scan's coverage and completion with a 3D mesh overlay and point cloud live viewer.



GET INSTANT RESULTS

Verify your capture with a quality report. Visualize the capture directly in PIX4Dcatch for a quick analysis on-site.



PROCESS OR EXPORT

Upload the images to PIX4Dcloud to generate measurable 3D models and point clouds or export to PIX4Dmatic for advanced control.

VIEW SUBSURFACE UTILITIES AFTER TRENCH CLOSURE

PIX4Dcatch's augmented reality feature allows you to view trench utilities beneath the surface even after closure.

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Developed in **Switzerland**