



AUTODESK **CONSTRUCTION CLOUD**™

**MCCARTHY**®

## How McCarthy Upgraded and Delivered a 200-year-old Subsurface Infrastructure Project in 12 Months

In the world of construction risk management, subsurface utility projects are some of the most challenging to navigate. Buried utility lines, underground hazards, and inaccurate utility line records can cause unnecessary risk and rework. These situations become even more complex on dense, urban sites.

McCarthy Building Companies is no stranger to the complexities of subsurface utility projects. McCarthy's operations, Virtual Design and Construction (VDC), civil, and subsurface utility mapping teams are known for their powerful union of proven preconstruction and construction technology capabilities to deliver these complex builds efficiently and successfully.

McCarthy recently put those skills to work on the oldest university west of the Mississippi River, Saint Louis University. In just one year, McCarthy leveraged a powerful design-build partnership between its internal teams and external trade partners to complete an extensive infrastructure upgrade on the university's 200-year-old north campus. The partnership consisted of McCarthy's Operations, Mapping, and VDC Teams combined with its sister company Castle Contracting, and key trade partners in Corrigan Company and Sachs Electric. Leveraging the combination of BIM 360 within Autodesk Construction Cloud™, Autodesk's AEC Collection, and underground mapping capabilities, McCarthy's multi-disciplinary teams were able to design, coordinate, and install over 30,000 linear feet of new infrastructure, including electric, gas, chilled water, and communication systems with zero significant utility strikes from start to finish.



**Customer Snapshot**

FIRM SIZE: >5000  
FIRM TYPE: GENERAL CONTRACTOR  
REVENUE: \$2 BILLION  
FOCUS AREA: INFRASTRUCTURE, INSTITUTIONAL  
HQ: ST. LOUIS, MO, US

**PHASE:**



**PRODUCTS:**



**VALUE DRIVERS:**



### Taking a Strategic Approach from the Beginning

One of the most significant setbacks that can occur when working on a subsurface utility project is discovering underground hazards during the course of construction activities. Waiting to find these hazards until construction can lead to safety, scheduling, and budgeting issues. Instead of identifying hazards during construction, McCarthy took a proactive approach with Subsurface Utility Mapping (SUM). This strategic approach allowed the team to minimize risk and prioritize safety without unnecessarily relocating utilities.

The SUM process proved crucial for creating the most comprehensive view of the existing underground utilities on the north campus, built two centuries ago. It also helped McCarthy reach project milestones and stay on schedule over the course of a tight timeline.

Alex Belkofer, McCarthy Building Companies, Inc.'s Virtual Design & Construction (VDC) Director, emphasized the importance of process to the project's success, saying, "Our underground utility mapping, VDC, and self-perform capabilities, alongside Castle's utility expertise were a differentiator. Without these capabilities the project would not have been as successful."

### How McCarthy Aligned People, Process, and Technology from the Start

The use of SUM helped McCarthy take a strategic approach from the very beginning of the project. With the condensed timeline and scope of the project, the



team knew they needed to do everything possible to set themselves up for success. McCarthy leaned on its Integrated Virtual Builder (IVB) initiative – a new mindset and approach to planning, designing, coordinating and building virtually before building physically – to align all people, processes, and technology from the start. This initiative included the following major steps:

- Virtually building before physically building
- Training the project team on how best to use the available construction technology to their advantage
- Collaborating and coordinating with all project stakeholders to achieve the best project outcomes

The IVB initiative leveraged backward-planning to answer the question, “How are we going to use 3D modeling to accelerate subsurface utility design and coordination on a complex design-build project?” The answer was a targeted approach to map, design, coordinate, layout, and build.

The team used several geophysical locating technologies, including electromagnetic locators, acoustic pipe locators, closed-circuit television cameras, and ground-penetrating radar. These technologies accurately locate and depict the existing underground infrastructure, creating a reliable two and three dimensional foundation.

The information was then incorporated into Autodesk Navisworks connected to BIM 360, where the team could visualize their design concepts with 3D model mapping for accurate proposed alignments and high-level execution plans. These models helped stakeholders and owners visualize and analyze any potential design, construction, or site-specific challenges.

McCarthy also focused on shared responsibility and risk ensuring alignment at the start of design coordination. Every stakeholder had a vested interest in the process because the models were approved and signed off by the owner before the layout began.

“Without a truly integrated team effort, this project would have broken down. Aligning expectations early surrounding member responsibilities and how the existing and proposed data would be collected, protected, and communicated was critical to the team buy-in and success of this project,” says Matthew Fitzgerald, Senior Business Development Manager, Mapping at McCarthy Building Companies, Inc.

## Leveraging a Collaborative Delivery Model

The Saint Louis University North Campus project highlighted McCarthy’s abilities to tackle a challenging project with new technology to drive process and execution. The team focused on a collaborative delivery model to meet timelines and build transparency.

For the start of the project, McCarthy honed in on workflow coordination. They used BIM 360 as their cloud-collaboration hub for project deliverables and model-based coordination and layout. The platform created a single source of truth where everyone was aware of field changes in real-time. Adjustments could be made immediately in the cloud to keep all field personnel informed of changes. Doing so helped to create a sense of collaboration amongst all players while keeping on budget and schedule.

Belkofer explains how BIM 360 helped to ensure accuracy: “The live linking of all project models ensured a ‘single source of truth’ for the most current design models. This approach was critical for our model-based field-layout process from cloud-hosted models to data collectors. Our field operations layout crews served the ‘point of attack’ to ensure 100% accuracy for field installations where rework was not an option given the schedule.”





## A New Level of Coordination Across Multiple Divisions and Partners

Coordination was critical to the success of this project, in more ways than one. McCarthy needed to accurately coordinate underground conditions on the project, which consisted of almost entirely horizontal utility upgrades.

Due to the tightness of existing conditions, McCarthy needed to ensure alignment on modeling accuracy given the model-based approach for site layout. The model had to serve as a source of both truth and trust and needed to be drawn correctly so it would work in the field.

McCarthy leaned on BIM 360 to create transparency and awareness in the coordination process. Belkofer explains, “We were making sure that we’re driving a model-based sign-off and digital layout process. So nothing was being laid out from paper. The model became that single source of truth. Everyone had to trust it. There was no option.”

Coordinating the design-build approach across multiple divisions and partners required continuous communication through regular meetings, daily check-ins, and adherence to the project-specific VDC plan. The model-based field-layout approach helped McCarthy take BIM to the field and get onsite workers in the field to trust the 3D model. Everyone involved in the project could review each other’s models at the field level through the different photo structures in the BIM 360 environment.

This phase of the project helped establish a new standard for horizontal work at McCarthy and Castle, as it challenged the team to take extra care in the model coordination process.

“The development of the new standards and processes ensured teams were communicating and coordinating closely to reduce rework,” says Kurt Dulle, Project Director at Castle Contracting. “Having visibility into the most up-to-date model on a centralized platform promoted value-added decision-making.”

## A Common Data Environment Optimizes Handoff and Deliverables

The use of BIM 360 as a common data environment also made handing over data to the owner at the close of the project a breeze. All of the federated models were updated and centralized in a common repository for the owner at the end of the project. Saint Louis University received geospatial deliverables, which showed the campus in 3D, both above surface and below.

For ongoing facility maintenance, the University has access to historical project data with as-built documentation of the new infrastructure. This information allows their team to know precisely where installations are located to minimize downtime and streamline maintenance activity.

## McCarthy Continues to Build on Success

“McCarthy’s unique and integrated plan resulted in precise project execution,” says Chris Boerger, Project Manager at Sachs Electric. “We would not have been successful in delivering a high quality project without the use of Mapping and VDC.”

The integrated approach McCarthy took with this complex design-build project resulted in 40% less risk than traditional utility delivery methods. By aligning people, process, and technology, McCarthy’s teams delivered the project on time and under budget while creating a successful partnership with Saint Louis University.

“McCarthy’s proactive approach to identifying subsurface utilities at the start of the project was key to completing the job safely and on schedule. The overall footprint was minimized as the team knew where to dig and where not to dig based on the 2D and 3D mapping information,” says Nik Corno, Project Manager, McCarthy Building Companies, Inc.

As a result of their strategic approach and performance on the north campus, McCarthy is looking forward to continuing their relationship with Saint Louis University through several recently awarded projects.

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-Chris Boerger  
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