

A photograph of a large, industrial construction site, likely a warehouse or factory under renovation. The ceiling is high with exposed wooden beams and metal trusses. The floor is concrete and cluttered with construction materials, including a large stack of wooden planks in the foreground. A worker is visible in the background near some equipment.

# 5 Drawing Management Mistakes You're Making

And How to Avoid Them

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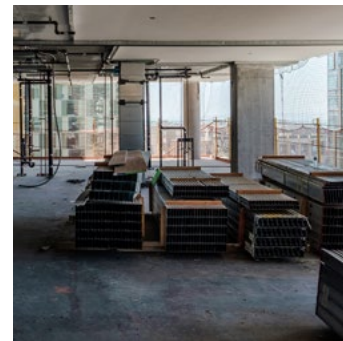
01

## Paper-based Drawings

**DEPENDING ON YOUR ROLE IN THE PROJECT, YOU MAY NOT HAVE ANY CONTROL OVER THE DECISION TO USE PAPER-BASED PLANS.**

You do, however, have a choice in how you manage those paper drawings.

Best practices begin with maintaining one repository for the most recent plans, as well as dedicating time to keeping the plans updated and properly circulated to key stakeholders. However, even if the distribution of current drawings is managed well and the construction team maintains a redlined, RFI-posted copy of plans in their trailer, the drawings workers depend on in the field won't reflect the most recent version posted in the office trailer. This leads to expensive errors and delays, as drawings must be altered, and in some cases completely redone and reissued. Version control of drawings continues to be a major pain-point within the construction industry, contributing to an estimated \$15 billion spent annually on rework, according to the Construction Industry Institute.





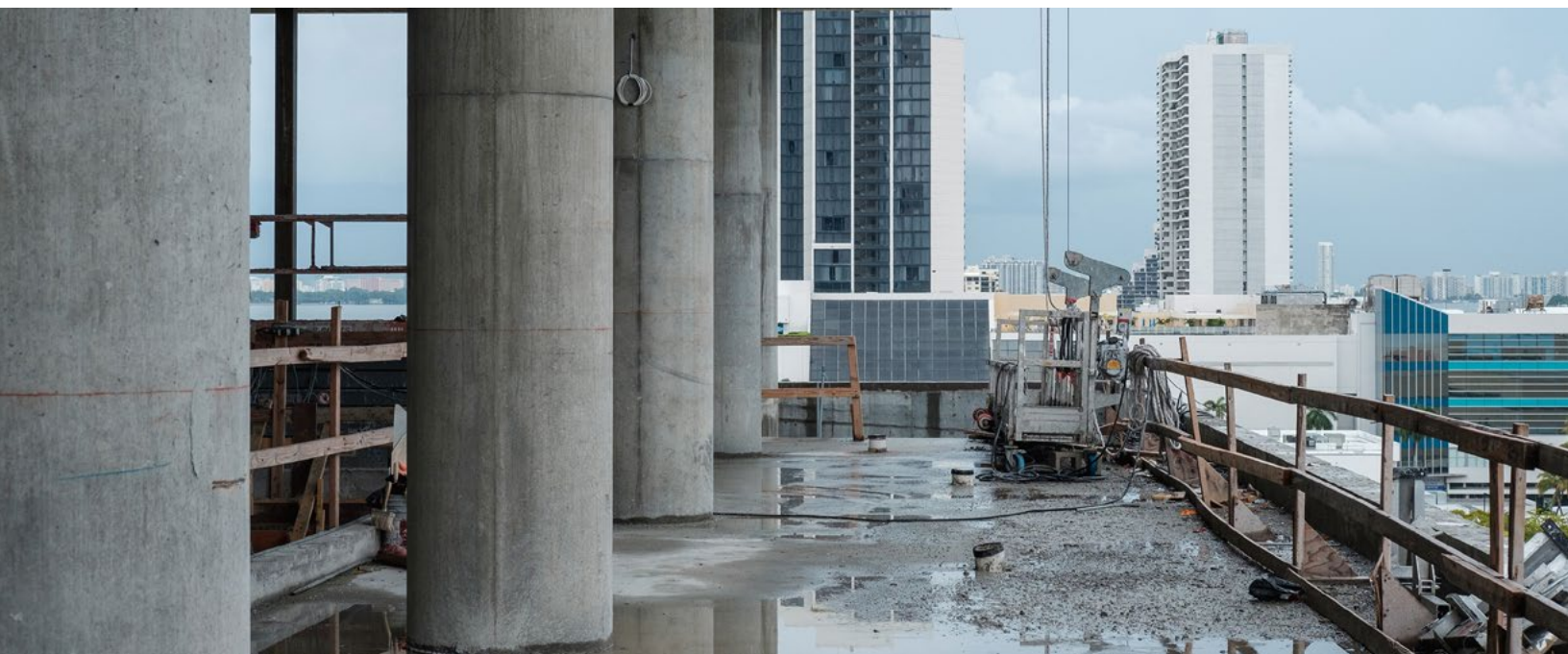


A large part of these rework costs are directly related to the multiple drawing sets issued throughout the course of a construction project. If you control the system of record for plans, it's a mistake to continue using paper drawings. Besides needing a common space to house paper drawings, redlining, reprinting, and redistributing paper-based drawings is expensive, laborious, and almost impossible to manage in a timely manner—often leading to outdated material where changes have fallen through the cracks.

With paper-based drawings, an individual must physically receive supplemental information, make duplicates, collate, annotate, and disseminate it to everyone on the project team. This requires a large effort to keep drawings up to date in the trailer, as the only current set resides on the plan table with smaller, outdated, half-size sets in the hands of employees spread out across the jobsite, or even in remote offices.

**Digital drawings save thousands of dollars in reduced printing costs from drawing revisions and hundreds of hours lost, to manual distribution of new drawing sets to project team members. Initially, many people in the industry began converting paper drawings to PDFs.**

While PDFs are digital documents, they can be just as onerous to manage as paper if they're not handled within a drawing management system. When the plan set is one large PDF file, there's a lot of work required to implement changes. If a single sheet in the PDF file changes, someone is responsible for locating the change, replacing it, saving it, uploading, and redistributing the PDF—leaving room for error across those many remedial steps. While simply converting documents from paper to digital is a good first step that allows for more rapid distribution, a drawing management system remains the best solution to save you time and money.



From a design, engineering, and viewer perspective, the benefits of a cloud-based solution include:

- + Drawings are more digestible and role-specific.
- + It's not necessary to cram numerous notations on a single sheet to save on printing and distribution costs.
- + RFIs and submittals become digital supplemental sheets, reducing the need to create entirely new sheets.
- + Collaboration is simpler and more timely when drawings are a cloud-based, shared digital set, because everyone on the team retrieves plans from the same repository and are immediately notified via email when changes are made to that commonly accessible single set.
- + Digital plans are also immediately viewable from any location, at any time of day or night, as they can be retrieved from the cloud with any Internet-connected device.

Moving your drawings to a cloud-based management system eliminates many costly mistakes by keeping your entire team connected through real time, single-set drawings. When you manage digital drawings in a cloud environment, project teams can not only review sheets, but also mark up drawings with annotations or text comments, approve changes, and distribute updated plan sets out to the entire project team in a matter of minutes. Cloud-based applications offer even greater potential for increased efficiency with the ability to manage projects anywhere, at any time, with any Internet-connected device including iPads, iPhones, Android devices, laptops, and desktop computers.





02

## Drawing Management System Without Version Control

**FROM AN INDUSTRY PERSPECTIVE, POOR VERSION CONTROL DRASTICALLY INCREASES THE TOTAL COST OF REWORK ACROSS THE AEC SECTOR.**


Part of the problem stems from the multiple drawing sets issued throughout a project's lifetime. It begins with the bid set, followed by the construction set, which is then revised throughout construction. According to Aberdeen Group, changes that occur after construction begins are the greatest culprits for inefficiency on construction projects. The primary advantage of having effective version control is ensuring teams are working off current plans at all times, eliminating the need for costly rework.



**With cloud-based platforms like procore, construction drawings are organized into one digital master set, and automatically named, numbered and linked on upload.**

Automatic version tracking prioritizes the most recent drawing set to ensure project teams never work off of outdated drawings. With this type of drawing management software, the entire change history for a drawing set is available, allowing users to see exactly what has changed across versions, and providing crucial documentation as to who made those changes. Best-in-class construction management software also increases transparency and accountability by allowing project managers to track if anyone has failed to view the most recent set of plans. Regardless of the project phase, inaccurate documentation creates rework, safety issues, and conditions that can lead to litigation.





**As construction continues moving to manufacturing principles—where modular building components are constructed off site to be added to the build on site—version control becomes even more critical.**

Changes at the factory often require complementary, structurally accommodating changes at the site. Those changes might include alterations to materials and parts, but oftentimes they also include changes to process. That's a key aspect to version control that, if missing, quickly negates any version control advantages. Having a central repository for files, however, doesn't necessarily guarantee that people will check this central hub of data. Version control used to require workers to check the plan table housed on site to find the most recent drawings. But now, digital drawings and drawing management systems do guarantee teams will receive automatic notifications via email when markups or annotations are made.

03

## Inability to Mark up Drawings and Attach Content



**JUST AS PAPER PLANS REQUIRE PHYSICAL PEN TO PAPER FOR MARKUPS, DIGITAL DRAWINGS ALSO REQUIRE A MARKUP TOOL SUCH AS ADOBE'S NATIVE PDF MARKUP TOOL.**

However, as previously mentioned, these digital drawings can still create version and distribution problems. Efficiently combining all the markups made by multiple people on one version of the document can prove very difficult. Then too, some people might use an app on a mobile device for markups. Others might print the document and mark it up with a pen, scanning the amended document back into the computer. Tracking and combining the variety of possible inputs becomes a big challenge.

This is where a drawing management solution that streamlines the markup process becomes essential. Seamlessly combining and synchronizing markups from multiple sources across multiple devices, digital drawing management removes confusion and brings clarity to the markup process.

**Real time as-builts allow contractors, designers, and other key team members to collaborate on drawings with digital annotation tools for highlighting specific areas, drawing lines, and adding comments.**

To stay organized with your annotations, be sure to maintain a standard glossary. Be consistent with the words you use for labeling drawings and make it a point to use the words best suited to the definitions or descriptions. Avoid using words that deviate from standard terminology: a DWG file should always be a DWG file and not a Cad file or a CAD file, for instance. Consistency is everything when labeling drawings.

The ability to integrate drawings with related content—other drawing sheets, RFIs, punch list items, contracts, and photos—is another crucial necessity made simpler through the medium of digital drawings. Many drawings, particularly floor plans, refer to other pages in the set for more information. Whenever a digital drawing contains a reference to another sheet, the one sheet digitally links directly to the other within the set. Time formally spent flipping through sheets in search of the related drawing is replaced by an instantaneous digital connection.. In practice, the viewer simply taps on a highlighted hyperlink and is sent instantaneously to the referenced drawing. Any documentation attached to that referenced drawing is then accessible for all involved parties to view as well.



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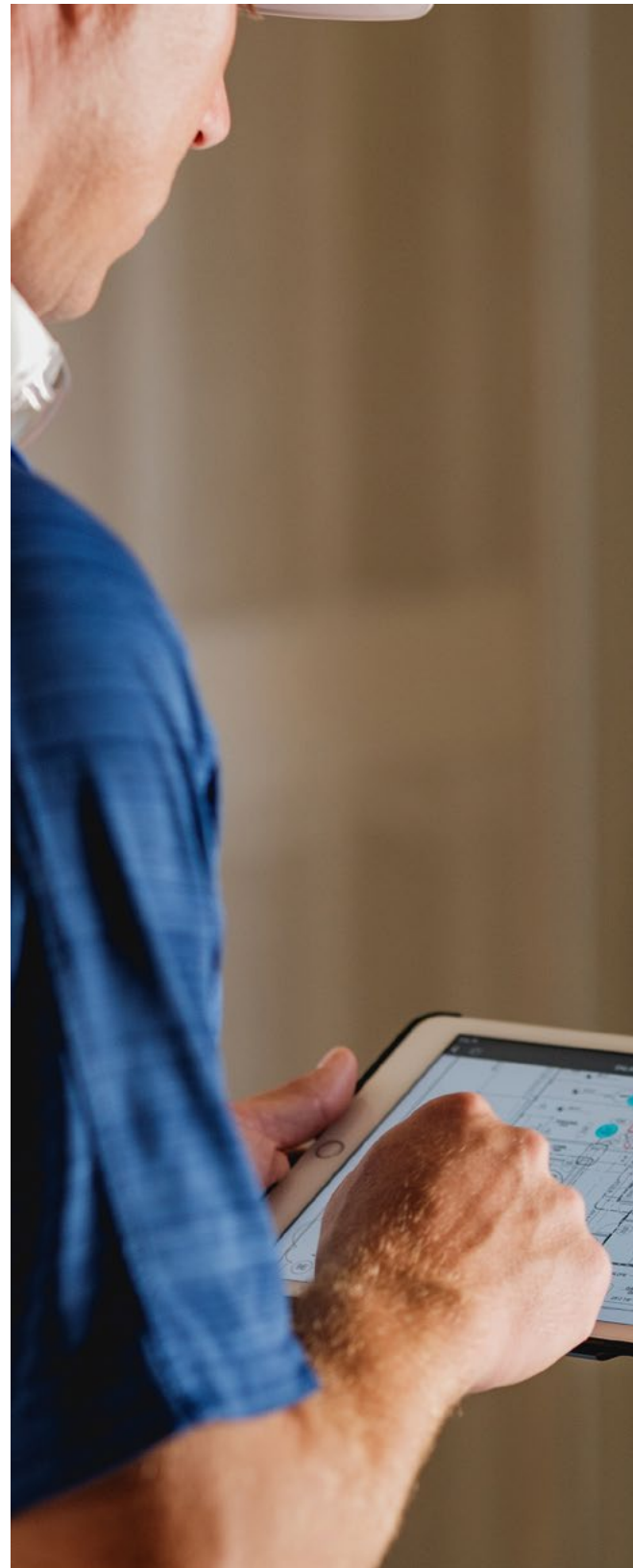
## Poor Change Tracking and History

THE GOAL OF DRAWING MANAGEMENT IS TO EFFICIENTLY AND EFFECTIVELY ORGANIZE, DISTRIBUTE, UPDATE AND CONTROL PROJECT DRAWINGS.

If there's no way to track who is currently updating a drawing, there's no way to effectively manage drawing versions.

For collaboration to work, there has to be a way for individuals to singularly check out documents for a designated period of time, in order to eliminate multiple changes occurring at once.

To successfully manage drawing versions, be sure to enforce check-out and check-in procedures.



Version histories are also key for following up on changes. It allows for a complete record of the drawing's history, providing stakeholders with full visibility into what changes were made, when they were made, and by whom.

Workflow generated to-do lists and notifications help keep drawings on track and moving forward. If the workflow includes going through engineering, to the builder, and back to engineering with submittals or shop drawings, your solution should provide updated to-do lists and issue notifications as predefined dates arise. This keeps everyone up to date on the drawing's status and highlights problem areas if deadlines aren't met.



05

## Not Leveraging Drawing Management as Risk Management

**SINCE MANY CONSTRUCTION DRAWINGS ARE PART OF THE CONTRACT, THEY CAN POSE MAJOR RISKS.**

Incomplete or erroneous drawings can lead to dangerous situations and can contribute to costly change orders and rework. Even drawings not considered to be part of the contract, such as shop drawings, carry similar risks. Due to the fluid nature of drawings on a project, mitigating the risks posed by ever-changing drawings is no easy task.

From a risk management perspective, good drawing control helps you:

- + Compare changes over time.
- + Identify modifications that are causing problems.
- + Locate where a design problem originated.

Another risk-limiting strategy is to be directly involved during the design and engineering phase. This is the time to locate all prospective design issues that could conceivably interfere with construction. If you are directly involved in the building, then you have valuable insights to offer—beyond mere clash detection—that can help keep the project on track. You will also want to examine processes and materials, first from an holistic perspective, and second with a view to constructibility related to currently accepted practices.



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