A CONTRACTOR'S GUIDE TO

Digital Construction Drawings and Documents

AUTODESK® **BIM 360**™

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Introduction

Challenges & Goals

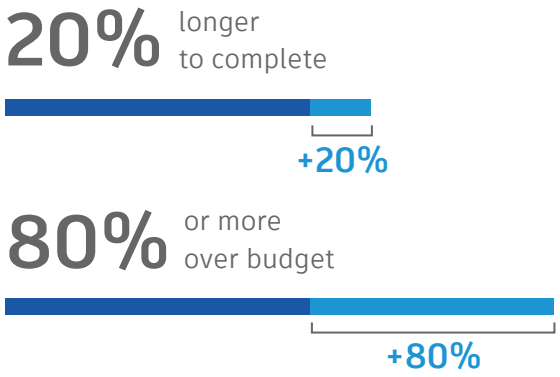
The construction industry is experiencing a period of unprecedented change. Driven by global population growth and an increasing demand for sustainable solutions, breakthroughs in construction, design and engineering technologies are redefining possibilities in our building projects. The resulting complexity in design pose new challenges to small to mid-sized firms, which often find themselves struggling to keep pace and properly allocate resources to address their clients' needs.

According to a recent McKinsey & Company report, the average commercial construction project takes 20% longer to complete than planned, and ends up being upwards of 80% over budget.

On a related note, when the Associated General Contractors (AGC) of America stated in its construction employment statistics report for August 4, 2017, that while employment rates are steadily climbing, contracting firms are still struggling to fill job vacancies, even with hourly rates exceeding the national average by 10%.

Amidst these obstacles and managing more complex contracts, many firms find themselves in a constant struggle to bid competitively while remaining profitable.

The average commercial construction projects takes:



The Competitive Edge: How To Do More With Less

While it is true that some of these changes are outside the control of individual companies, there is one key resource every firm has at its disposal that, if used strategically, can dramatically level the playing field and, in some cases, turn a company's apparent disadvantages into robust competitive assets.

That resource is time. Everybody has the same amount of it. Not everybody uses it wisely.

The good news is that powerful time-saving technologies do exist in today's construction software marketplace, and while more and more firms are reaping the benefits of these solutions with each passing year, the rate of adoption is still surprisingly low.

The JBKnowledge 6th Annual Construction Technology Report (2017) surveyed nearly 2,700 industry professionals about their technology usage. One noteworthy survey respondent, dripping with sarcasm, commented that:

> *"We LOVE manual data entry. Our Estimating to Operations project turnover files look like someone put a copy of Tolstoy's 'War & Peace' on a copy machine and hit 500 copies. Then it's up to the PM to 'digitize'."*

That tongue-in-cheek sentiment is a prevailing one among those in the industry, as indicated by the report finding that 2017 was the very first year that manual data entry has decreased since 2014. Granted, that decrease was only <1%, but it signals that more firms are looking ahead to more efficient processes.

According to the report, after accounting software, the second-most popular workflow software adopted by 22% of respondents was Project Management software. The area where the fewest number of respondents had implemented software was Preconstruction, which still is firmly rooted in spreadsheets.

Firms that are implementing technologies now—rather than later—will be at an advantage, having made it a seamless part of their processes compared to those who are late to the party. Firms that adopt a robust software platform that touches all aspects of a project—rather than using a patchwork of different software solutions that aren't able to be integrated—will be able to form a more cohesive strategy for accomplishing a project on-time and on-budget.

What It Means

Construction's transformation into a tech-based industry is happening at a rapid pace, but those companies with the foresight to accelerate adoption and integration of emerging technologies will find themselves more than a few steps ahead, while those who fail to prioritize the same will quickly fall behind until they are left in the dust.

If the overall performance of today's construction industry is lagging, it is only because there is no meaningful system currently available for establishing "par" with respect to project budget, quality, scheduling, and safety. This problem will soon be a thing of the past, as advanced data collection systems have already been deployed to aggregate and analyze the average time and cost required for every aspect of a construction project from start to finish.

Soon, the industry will possess a standard set of guidelines, and companies will be expected, at the bare minimum, to meet them. Those firms that consistently deliver projects on time, on budget, and at the targeted quality and safety specs will rise above their competitors. In particular, they will:

- ✓ Win more work and handle it more efficiently.
- ✓ Build stronger relationships with clients.
- ✓ Grow and manage their teams and businesses.
- ✓ Become or remain competitive against larger firms with big tech budgets.

Meanwhile, those companies that can surpass standard expectations will claim their position at the top.

The way up that hill is early adoption and effective integration of construction software solutions into your firm's daily operations and project management strategies, both in the office and on the jobsite.

Why All Companies Need to Invest in Digitizing Their Drawings & Documents

Today, new technologies are emerging that are transforming the playing field, allowing companies with smaller staffs to compete with established industry players. Outnumbered and out-budgeted, these historical underdogs can now get the job done faster and more efficiently than some of the top industry players.

With the right software tools, they can not only give their larger competitors a serious run for their money, but can even turn their own apparent limitations into formidable strengths.

For Example

Smaller staff sizes used to mean longer project timetables. Now it translates to money saved. Capital expenditures, once constrained to making ends meet, are now free to be invested in areas that expedite company growth and marketplace visibility. Shorter timetables and turnarounds from small to mid-sized projects bring greater recognition as agile companies quickly develop a reputation for consistent delivery of high quality work product, maximizing their chances at winning desirable bids previously considered out of their league.

The Result

Team morale goes up and momentum increases accordingly.

A positive feedback loop is initiated and real opportunities for growth continue to emerge.

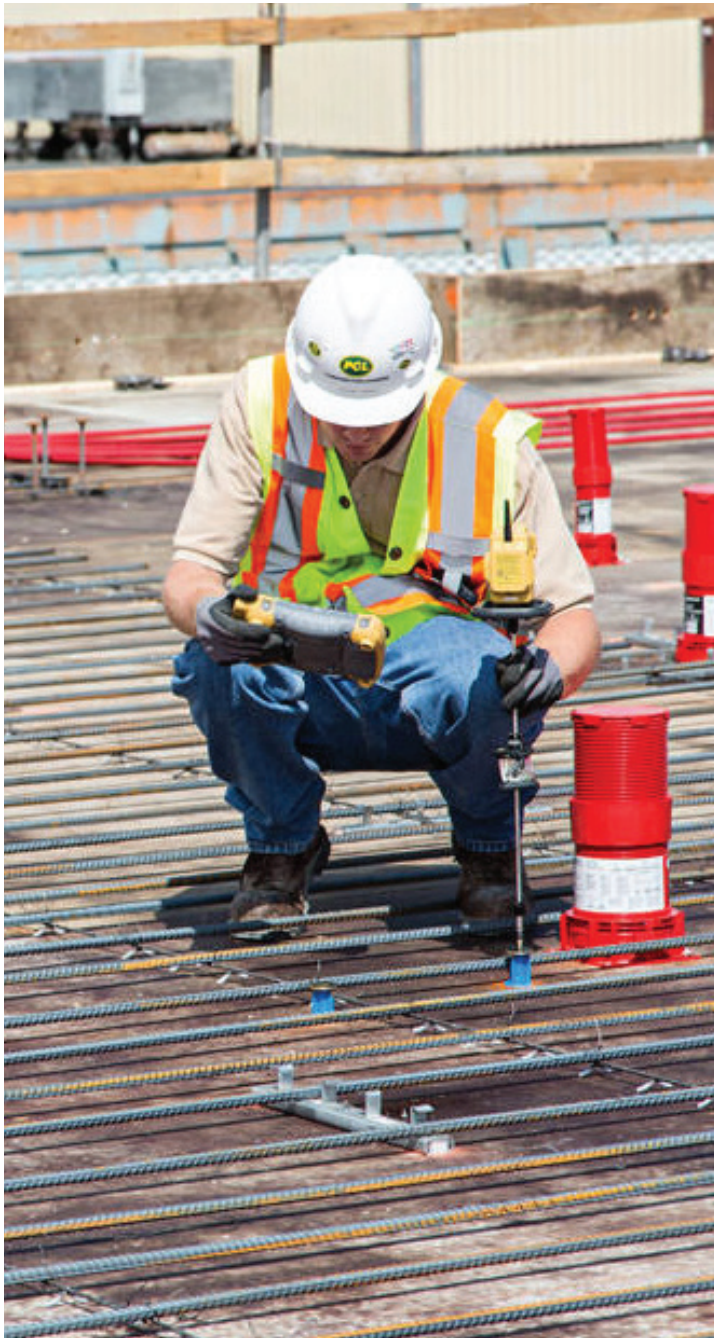
Digital Documents and Drawings

Digital Documents and Drawings

In an increasingly digital world, the construction industry is one of the last holdouts to hang onto blueprints and other paper-based methods of project management. As the world moves at a faster, digitized pace, many firms have realized that they're being left in the dust by not adapting to newer, more flexible systems.

This guide will focus on one of the easiest (and best) areas to tackle the development of your company's document management strategy. By building out your company's document management strategy, you can provide a measurable increase in overall efficiency and profitability.

Implementing digital document management software to centralize your data, and inform your construction and design workflows is one of the simplest (and most valuable) ways to begin developing your company's document management strategy. Even on its own, this one move can provide a measurable boon to overall efficiency and profitability, as it allows you to target and control numerous aspects of the building process, and to patch up some common holes left open by the traditional paper-based approach, where time and money are most likely to leak through your bottom line.



Limitations of Paper-based Workflows

- ✓ **Cost**: Paper is expensive, and there's never enough of it.
- ✓ **Latency:** One piece of paper can't be in two places at once. By the time a revision has been approved, printed and delivered to the field, there's a good chance it's changed again. Even worse, in the event of a change order, work may have already begun on the abandoned spec before workers receive the updated drawings. That lost time and money is never coming back.
- ✓ **No Single Source of Truth:** While email and .PDFs have certainly cut some of the latency out of the problem, they still don't allow for updates in real-time. No latency is good latency, and partial solution is still a partial problem.

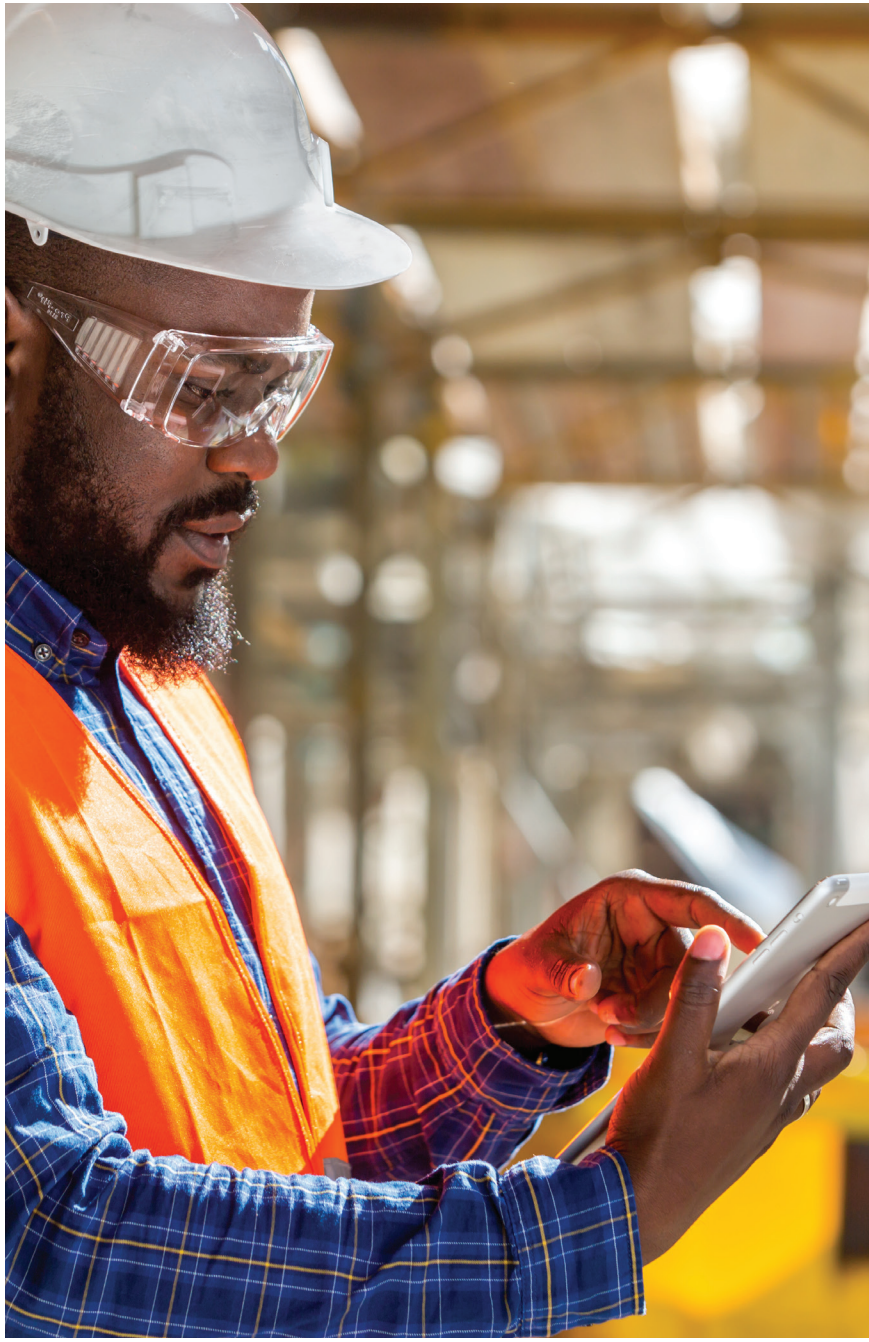
While paper isn't going away anytime soon, firms can benefit from a digital-first approach that makes them less reliant on paper-based workflows.

Digital, cloud-based platforms offer a single source of truth for multiple team members to draw from, rather than relying on multiple versions of paper documents floating around that may or may not be current. As a result, less time is spent verifying which is the most recent version and ensuring everyone on various project teams is working from it—and more time is spent actually driving a project toward completion.

As an added bonus, digital drawings and documents have paved the way for use of 3D models in addition to more conventional 2D sheets. This innovation gives all stakeholders the ability to see a more holistic view of the project and the critical context needed for constructability reviews, such as foundation walls, pipes, HVAC, and electrical. Even notations on as-built conditions such as matching paint colors to specific structures can be added to this context as markups.

This type of context is critical, as the buildings of today are far more complex with a variety of sophisticated systems. In addition to the complexity of projects, the building process is more fast-paced than ever, too. Whereas 50 years ago, it could take nearly a decade or longer to construct a high-rise, 20-story building projects of today can be constructed in under two years.

When delivering projects at a rapid-fire pace, there are many challenges a project team has to overcome—and switching to a digital system can help mitigate many of those challenges. Digital document management helps to eliminate some of the unknowns that can impact a project—unknowns that can sometimes become harder to flag when there are multiple paper documents instead of a single source of truth.



Beyond providing anytime, anywhere access to documents, a singular hub of information, and better context, here are a few more benefits to implementing a digital document management platform:

✓ Continuous Improvement in Waste Reduction

Lean Construction is not just a buzzword for an eco-conscious building philosophy. It's a practice that imparts immediate gains to those companies that employ its principles. A smart digital document management plan can allow your company to spot problems such as improper materials or inadequate design specs well before they turn into costly mistakes. With real-time collaboration between office and field, everyone is notified the instant an issue arises so it can be dealt with swiftly and cost-effectively.

✓ Greater Room For Innovation and Quality Control

Once you get the hang of the new system and the improvements it provides to your workflow, you'll discover even more creative uses for it from project to project. The benefits of familiarity compound over time.

✓ Better Risk Mitigation

As you will soon discover, a good digital document management platform affords you a degree of oversight through version tracking and access control that is simply not available without it. A digital solution allows you to review a project's history -- and even overlay documents and plans over one another to see what's changed or if a detail is missing.

5 Ways Digital Construction Drawings & Documents Can Improve Your Next Project

5 Ways Digital Construction Drawings & Documents Can Improve Your Next Project

1. Mobile Access To Drawings

24% of Rework Claims are Filed Due to Lack of Detail and Inaccurate Specs and Logistics.

A good digital document management platform solves this problem by linking office and field through real-time communication and document exchange.

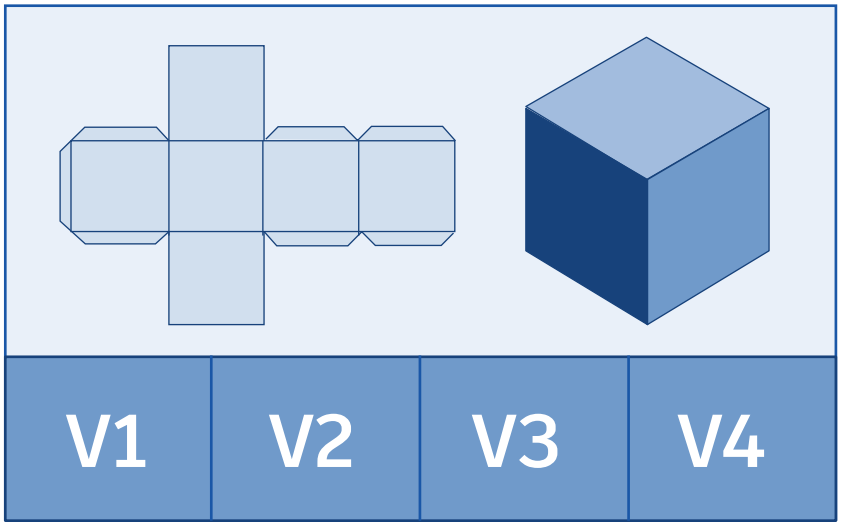
Using a single, cloud-based storage solution for project documents allows field workers to access the most up to date versions of digital plans and models on their mobile devices. Updates sent from the office are immediately visible to team members in the field. The entire project team is notified in real-time the instant a change is made, allowing them to comment on or question any points requiring further clarification. With delays in communication virtually eliminated, the net result is fewer RFIs and increased accuracy of work done on site.

Almost 1 out of every 4 rework claims are filed due to lack of detail and inaccurate specs & logistics.

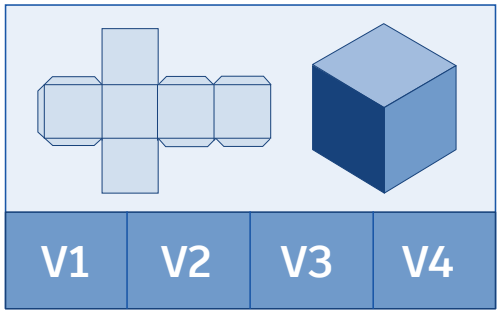
2. Document Control & Versioning

55% of construction rework is caused by inaccurate documentation

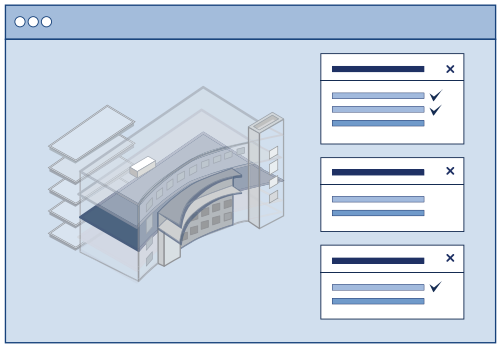
Digital document management software affords project managers the ability to record every change made to a given project file, With versioning and permissions controls, a complete “virtual paper trail” is created, not only chronicling a project’s entire life cycle from start to finish, but also providing the ability to hit rewind.



Concurrence: Building something wrong is worse than not building it at all. Rebuilds are costly—even when they're spotted on time. Spot them too late and your exposure to litigation increases substantially. Versioning tools can dramatically reduce liability and unnecessary costs by ensuring everyone is literally on the same page at the same time.



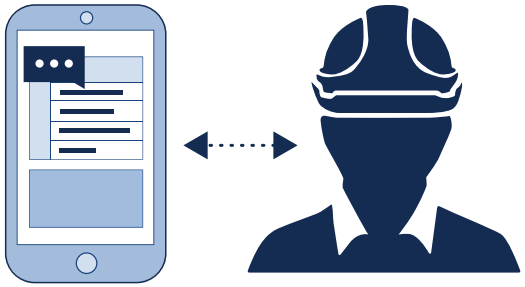
Comparison: Design changes are a fact of life in the construction industry. Every time a new drawing comes along, builders must evaluate the changes for their impact on cost, schedule, procurement, and whether or not a change order is required. With hard deadlines driving the building process, crucial decisions must be made quickly and correctly. Version comparison tools allow users to compare documents side by side, noting any changes that have been made from one drawing to the next. In the event that a mistake did enter into the plans, it can be spotted rapidly and excised before it results in a costly problem.



Versioning tools can be employed for a variety of purposes resulting in net gains of time savings and increased accuracy.

Customization: While up-to-date documents are a must for everyone involved, not all subs require the same type or level of detail to complete their tasks. Plumbers, for instance, may not need to know the intricacies of the electrical system to the extent electricians do, and vice versa. Customizable folders with permissions allow you to create custom views of project drawings tailored to the needs of individual team members and subs. These specialized drawing sets include all the essential details they require while removing any information that, for them, only amounts to clutter.

Permissions Controls: Provide another addition to the project manager's virtual toolbox. Team members are granted permission to read or edit relevant documents according to their respective roles and the needs of the project. With them, project managers can ensure that the right team member has access to the right documents at the right time.



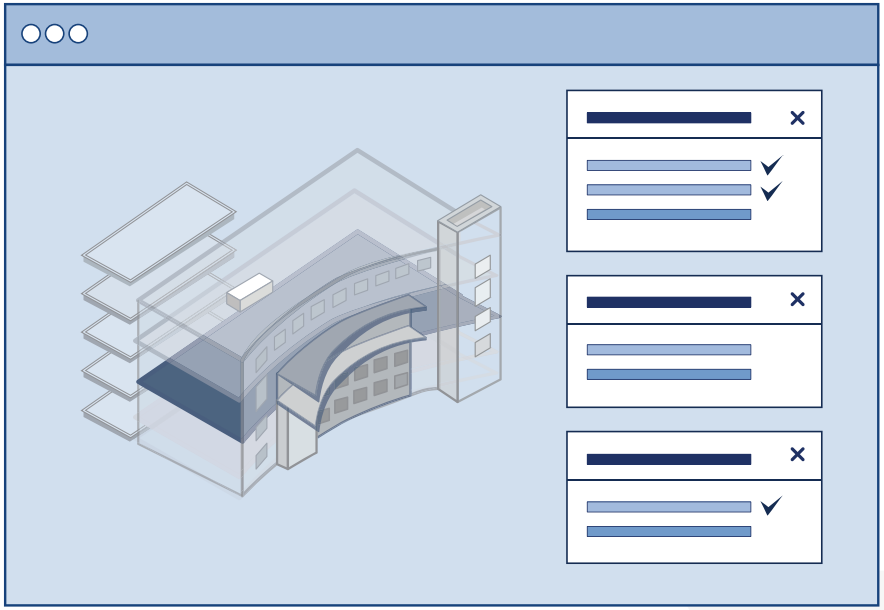
Together, these tools function synergistically to minimize the likelihood of mistakes, and may reduce a firm's liability surface in the event a legal defense is ever needed.

3. Real-Time Drawing Markups

The “Chain of Custody Model” Is A Momentum Killer

The document markup process has historically been one of the most time consuming and tedious procedural aspects of building design. Traditionally, markups are made by one individual at a time, then handed off to the next person for review and revision, until finally arriving at the project manager’s desk for ultimate approval.

This model suffers from serious deficiencies with respect to time management and communication, as it can often take days or even weeks for knowledge of the changes to trickle out to everyone involved. The dilemma is compounded when someone needs to know immediately who has the most recent version of the drawings when those documents could be in any number of hands at any given time.



The .PDF Model: For many years, the industry standard has been to create .PDF documents for all project drawings and email them to team members on an as-needed basis when questions or issues arise. This process has led to considerable confusion as members quickly lose track of who has the most up-to-date version of the .PDF at any given time. Often, key players are left with no clue as to whether an issue has even been resolved or not.

The Go-To-Meeting Model: In recent years, virtual meetings have become the default industry practice for markups requiring input from multiple team members. Although an improvement upon the old custodial model, phone or virtual meetings only permit collaboration during the brief window when team members are gathered for scheduled discussion. Contributors have only a limited timeframe to get their questions and ideas on the table, and to brainstorm appropriate solutions. Under such conditions, questions are easily forgotten and problems can be overlooked. Scheduling follow-ups can be time-consuming, with the task of member coordination invariably falling to a single (often over-worked) person. Furthermore, sometimes the best solution to a problem comes through when least expected. Great breakthroughs rarely wait around for the stars to properly align.

The .PDF process leads to confusion as members quickly lose track of who has the most up-to-date version of the document.

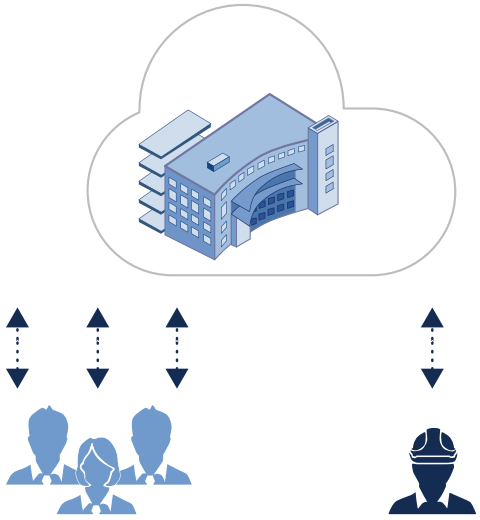
The Go-To-Meeting model leaves contributors with a very limited timeframe to get their questions and ideas on the table.

The Real-Time Drawing Markups Model:

Real-time drawing markups solve all three of the problems posed by the above situations. First, they eliminate chain of custody issues by providing all team members with access to a single source of truth in the cloud that automatically updates to the latest version of a set of drawings at every login. The question of who has the most recent version of the drawings always turns up the same answer: Everybody.

Secondly, the need for scheduling is cut out altogether as team members do not need to simultaneously occupy the same physical or virtual space to present their ideas or questions. Instead, the process functions much like group text messaging: Simply post your input to the group and wait for a reply!

Finally, it becomes far easier to capture and share a great idea when all there is to do is make a quick notation in a mobile app. Even if you're not sure right away whether the idea is a keeper, you can always archive it and come back to it later. Compare this to trying to figure out how to unroll and mark up a large sheet of paper when you're sitting next to someone on an airplane and the advantage becomes strikingly apparent.



Real-time drawing markups put an end to these problems by syncing the markup process with the flow of work as it arises dynamically on the jobsite.

Real-time markups also provide a great way to highlight an issue as soon as it comes up, as you can even link to photos of the problem area taken on site and address it immediately from the field.

4. Big Picture Advantage

If a picture is worth a thousand words, thena collection of pictures can certainly tell an entire story.

Digital document management makes it easy to track a project's lifespan over time by creating the equivalent of a digital filing cabinet dedicated to housing every drawing in your project portfolio. Unlike a physical filing cabinet that may contain multiple folders and binders, a good digital solution will include a "virtual binder" where you can place all relevant project documents in one location, making it easy to view a project's entire lifecycle with a few simple mouse clicks.

Big Picture Benefits

- ✓ **Greater Scope:** The “virtual binder” is not limited to housing drawings alone. Photos, specs, issues, and version history are among the many document types team members can reference for a holistic view of the project throughout all phases.

- ✓ **Simplified Issue Tracking:** Click on an issue to call up a complete set of notes detailing its creation date, current status, actual or expected completion date, current required action(s), estimated or adjusted costs, and team member(s) assigned to the task.

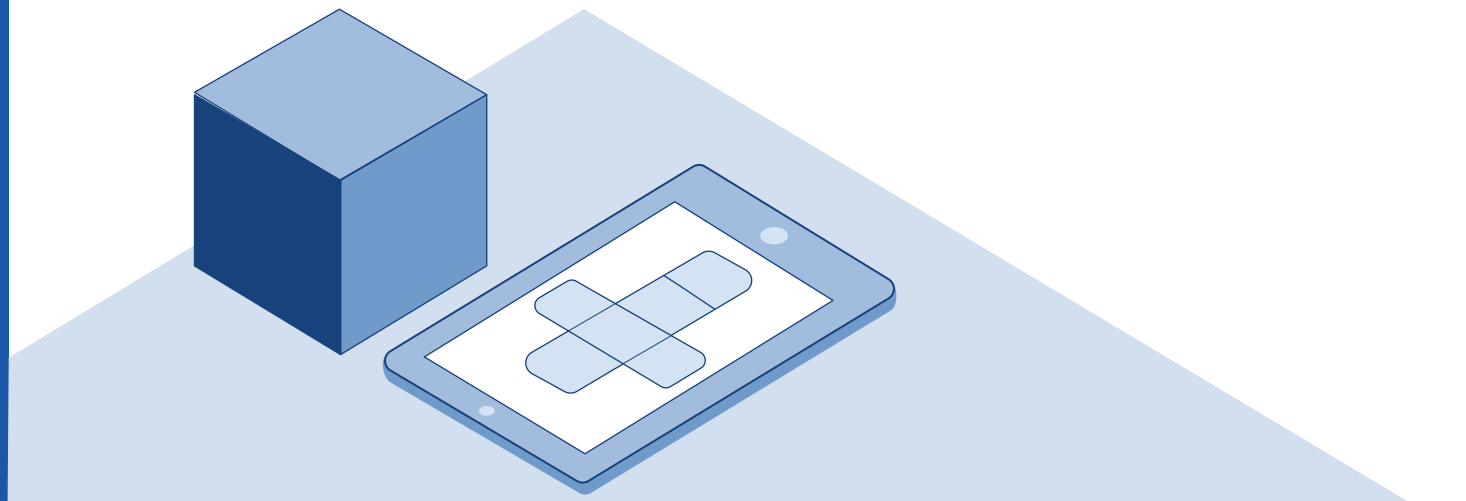
- ✓ **RFIs and Submittals:** Keep track of all RFIs and Submittals in real time and never be left to wonder if mission-critical questions have been answered on time.

- ✓ **Compounding Gains:** Regular ability to quick-reference an individual drawing against the project as a whole can make it easier to spot short-term issues and patterns of issues, and swiftly resolve them. In turn, this can carry over into future projects, leading to even greater momentum and facility of workflow with extended use of the software.

5. 2D & 3D in the Field

Having the ability to compare 2D drawings against 3D models takes the guesswork out of trying to visualize the exact design intent from a drawing. The standard BIM model imposes issues of access and progress-checking that consistently result in delays and rework. When models are locked up in a BIM box or an office accessible only to authorized personnel, field workers are often left with no way to check drawings at the most important location; the jobsite itself.

A jobsite-ready digital document management solution ensures field workers not only have the ability to access up-to-date drawings and models on site, but can go a step farther by providing both 2D and 3D views that bring fine points of detail into vivid realism. Workers can see the precise location of a required action, along with all its measurements, materials descriptions, and any advisory notes concerning estimated time required and appropriate technique for spec implementation.



Drawings in Context: A Real World Example

3D models often include metadata that isn't typically spelled out in great detail in a 2D drawing. Architects & subcontractors frequently include their own custom data in the model that is very specific to their process and reasoning. When included in a 3D model, this information helps explain the "why?" behind a given spec.

For instance, maybe someone on the team wants to know about a particular mechanical component, such as an HVAC attached to an air handler in the ceiling. What floor is it on? What system is it connected to? All of this information can be specified in the 3D model, right down to the QR codes and RFID tags.

This is great news for subs, since they are the ones who work with the "guts" of these systems that have to be assembled component by component. 3D drawings can remove confusion about which parts or systems must be installed first when the proper installation sequence is in question.

For instance, if two systems are intended to occupy the same space, a 2D drawing won't necessarily show you that a duct needs to be installed before a pipe. By toggling the 3D model, everyone can see the proper order of operations right on the spot. This creates an added benefit of reducing the potential for arguments in the rush of trying to get a project done on time.

Taken together, these benefits reveal the key advantage of having the ability to correlate 2D drawings with 3D models is a more integrated understanding of the project nuances at both micro and macro levels.

Success Stories

STORIES FROM THE FIELD

Company Success Story #1

PARIC Corporation VDC Director Explains Awesome Impact of Enhanced Team Communication During Preconstruction with BIM 360 Docs

When cutting-edge St. Louis, Missouri general contractor / design-build contractor PARIC took on Andy Leek as its Virtual Design and Construction Director, he was faced with the daunting task of streamlining preconstruction efforts among a growing in-house team and ever-changing project teams comprised of subcontractors, project managers, engineers, and architects. With several new projects on the table -- spanning the gamut from office buildings and higher-education to high-rise apartments and a new hospital -- he knew his work was cut out for him.

STORIES FROM THE FIELD: COMPANY SUCCESS STORY #1

Committed to crafting a simple and elegant solution, Leek determined that a single source of truth in the cloud was key to coordinating PARIC's ever-expanding team, maximizing efficiency, and preventing needless delays.

The firm adopted BIM 360 Docs as its enterprise solution. The result?

- ✓ **Expanded access to internal documents** allowed superintendents to prepare for the complexities of a job two to three months prior to arriving on site.
- ✓ **Increased overall productivity** by allowing team members to access 3D models on their own time (even at home!) rather than having to be physically present at the office.
- ✓ **Decreased work-related stress factors** by creating an opportunity to view models in advance and communicate with other team members before beginning construction phase.
- ✓ **Achieved better alignment across multi-disciplinary teams** by working from a single source of truth.
- ✓ **Improved accuracy and decreased risk** because all team members were working form the most up-to-date versions of plans.

> *"Somebody could look it over on a Saturday or Sunday when they're home and just thinking about it. I could pull up my iPad and just surf around the model. And that's what our staff is doing. They don't have to come to the office to look at drawings or models. They don't need a super-powered computer to spin a model around. They can do it on their iPad, and that's radically awesome."*

— **ANDY LEEK, VICE PRESIDENT**
TECHNOLOGY & INNOVATION
AT PARIC CORPORATION

STORIES FROM THE FIELD

Company Success Story #2

JJ Rhatigan Construction Projects Saw a 75% Increase in Time-Savings After Implementing BIM 360

The benefits of a solid digital document management strategy go well beyond a project's preconstruction phase, with the ultimate impact showing in a company's bottom line. And if time is money, then a savings in time is a worthwhile investment.

STORIES FROM THE FIELD: COMPANY SUCCESS STORY #2

In addition to seeing a 75% time savings across projects after adopting BIM 360, JJ Rhatigan saw a host of other benefits, including:

- ✓ **Faster, Better QA / QC:** With BIM 360, engineers and field personnel were able to take QA/QC notes directly on their iPads and attach them into the related sheets. This process took mere minutes, relieving them of end-of-day admin work, while delivering information to all relevant stakeholders instantly.

- ✓ **Simpler Markups:** Markups and RFIs were able to be done in the field, directly inside the drawings. Using BIM 360, each markup is assigned a number and is communicated to the designer immediately. When the designer opens the files, they quickly sort markups and RFIs to see the most recent and relevant notations, making it easy to create an RFI schedule in minutes.

- ✓ **Fewer Record Keeping Errors:** Placing drawings, documents, and communication into a unified platform helped to reduce opportunities for errors to be introduced at each stage of the project.

- ✓ **Cost Savings:** JJR's use of BIM 360 resulted in fewer mistakes, faster resolutions, faster communication, greater visibility, and greater efficiency—all of which translated to fewer dollars wasted.

- ✓ **Greater Confidence:** Greater visibility and communication helped give everyone on the project a higher degree of confidence that they're doing the right work at the right time.

STORIES FROM THE FIELD: COMPANY SUCCESS STORY #2

- ✓ **Better Workflows:** BIM 360's permission settings granted instant access to every subcontractor and trade on the site, giving them what was needed at all times. Notifications ensured that everyone on the project was notified as soon as a change was made to any relevant document. Improved RFI and markups processes offered designers and field personnel the ability to respond quickly and efficiently to conditions as they change.

- ✓ **Greater Safety:** When everyone can see what is going on at each stage of the project, it's easier to see where hazards may arise. Everyone on the project can mark potential hazards, and see the hazards that others have marked.

Celine O'Connor, BIM Manager for JJR mentioned that one of the biggest benefits her team saw as a result was better collaboration, noting that:

> *"With all the project data available at the click of a button, collaboration is made easy between stakeholders involved in the build, from the design teams and contractors, to subcontractors and consultants. This has helped us reduce bottlenecks, streamline project coordination, and improve overall project delivery."*

– **CELINE O'CONNOR**
BIM MANAGER FOR JJR

Getting Started

Convinced? Great! Let's Talk Options.

Now that you're well-acquainted with the benefits of adopting a digital solution for your firm's document management needs, let's drill down into the available options.

It begins with you selecting your preferred platform. Presently, there are five (5) notable solutions to choose from:

- Email/FTP
- PDF software
- Cloud-based file sharing
- Sharepoint
- Construction-specific cloud-based document management

While each of these solutions is a more cost-efficient option than traditional paper, they all have their own unique strengths and weaknesses when compared to one another. It's important to have a basic understanding of the pros and cons in order to select the best platform for your company's particular needs and unique business model.

Let's take a closer look at each platform.

Email/FTP

This is perhaps the simplest model. With email, you simply scan your documents into a visual image format such as .PDF or .TIFF, then send them in the form of a group message to the appropriate members of your team.

Similarly, you can use File Transfer Protocol (FTP) to post the drawings into a designated database. Permissions can be granted accordingly to your team members. This option allows project managers a bit more control than standard email in that they can determine whether a particular team member can edit the file, or if that member can simply read the file without making changes.

FTP is a slightly more advanced option than email, but it affords a quick learning curve. In either case, the advantages and disadvantages are quite similar.

Email/FTP

Pros:

Cost-effective: Both options can be implemented free of additional cost. All you need is an Internet connection and you're set to go.

Access-Control/Support For Large File Sizes: In either instance, you can choose who gets to read or write to the files. Files can be quite large so long as you've got enough bandwidth to handle the transfers.

Cons:

Internet Connection Required: You must be online to upload or download files.

Limited Version Control & Collaborative Capabilities: These methods still employ the old fashioned "chain-of-custody" approach, which doesn't lend itself to keeping everything on the same page with respect to the most current versions of your drawings or models.

Unreliable Viewing Experience: Not everyone on your team will necessarily be viewing the files with the same software. Some extra steps may be required to ensure everyone has the same ability to view the content. Furthermore, files run the risk of becoming corrupted or difficult to read depending upon the devices your team members are using to access them. They may have to install additional apps (such as a PDF reader or design software) to view native files.

Bottom Line:

Email and FTP are tried and true technologies that offer a fine starting point for companies looking for an easy transition into the world of digital document management. The tradeoff for their relative simplicity is that they are quite limited in functional capabilities and have no industry-specific features to assist with workflows and project management.

PDF Software

When making the transition from paper to digital, many firms begin to explore new options for document creation and markup. The goal is to cut out the use of paper entirely, thereby saving time and cutting down on ink and paper costs. One of the most common ways to achieve this is through the use of .PDF software like Adobe Acrobat, which typically include rich feature sets and robust markup tools for getting the job done fast.

Pros:

Ideal For The Office User: Drawings can be made relatively quick and uploaded directly to the cloud or your company's FTP server from the comfort of your office chair.

Robust .PDF Creation & Markup Tools: A good .PDF software package is designed with business needs in mind. As such, it will offer advanced editing and markup tools and flexible permissions controls that can be set on a user by user basis.

Cons:

Limited Usability In The Field: .PDF software is typically designed around the needs of the office environment, with little to no accommodation for field-specific applications even among high-end options.

Expensive: Some .PDF software requires per-user licenses, which can add up depending on how many people may need to use the software.

Limited File Format Support: Not all programs are compatible with .PDF software and won't translate from their original format to a .PDF that is easy to read. This can make it difficult for different team members to have the accuracy required to resolve issues or correctly mark up a project.

Bottom Line:

.PDF software tends to work best when used as an individual component in a larger scheme than as a standalone option.

Cloud-Based File Sharing

A somewhat more versatile approach would be to adopt a cloud-based solution such as Google Drive, Box, or Dropbox.

Presently, this is one of the best known and most commonly used means of document sharing in the industry. It's quick. It's easy. And there's virtually no learning curve required beyond a quick glance at the "Getting Started" section of the product manual for your chosen cloud storage solution.

Pros:

Ease of Sharing: Cloud-based file sharing is built on the idea that getting information from Point A to Point B should be as simple as possible. As long as any two or more devices are linked to the same account in the Cloud, any file uploaded or edited by one user is immediately accessible to other users who have permission to view or write to the file.

Offline Syncing: Updates to any file you've backed up in the cloud can be made to automatically update the original document on your chosen device. Although an Internet connection is required for syncing to occur, you never have to worry about manually updating file versions on your other devices. Simply "set it and forget it," then get on with business as usual.

Basic Permission-based Access: Permission setting in most cloud storage apps is as simple as entering a team member's email address and choosing whether to grant her read/write or read only permission to the file. This way, you keep all of your files in one place and set permissions on a file-by-file basis.

Low Cost: Most simple cloud-based solutions are relatively inexpensive for low storage requirements.

Cloud-Based File Sharing

Cons:

Steep Cost Increases: As a project evolves, new drawings and models will be added, necessitating an expansion of the number of users who must be brought in to contribute their own expertise to the markup process. Enterprise-level users will quickly find that storage costs can scale up rather dramatically during this process. Fortunately, all major cloud storage companies are well aware of this phenomenon and competition among them to provide the most cost-effective solution is often quite hot.

No Construction-specific Tools: As the construction industry moves deeper into tech-aided document management, expectations are constantly on the rise that a given piece of software should be capable of addressing construction-specific needs. Unfortunately, the average cloud-based solution does not offer such essentials as markup or sheet extraction capabilities. Furthermore, there is no 3D model viewing functionality built into any of these solutions. Hence the reason that so many firms are looking towards new construction-specific cloud-based solutions to meet their business needs.

Bottom Line:

Cloud-based solutions are a simple and robust option for storing and editing large numbers of documents with versatile permissions controls implemented on a per user basis. However, costs add up quickly even in the short run, and some users may find the absence of construction-specific tools problematic.

Sharepoint

Microsoft Sharepoint is another popular solution with a relatively long-standing presence compared to other software options used in the field.

As a web-based platform that can operate inside most commercial web browsers, Sharepoint offers a considerably wide range of business solutions across multiple industries and functional applications. The inherent flexibility of Sharepoint is at once its greatest strength and most notable weakness.

Pros:

Easy To Access: The world is teeming with Windows users, and this is certainly true of the construction industry. As such, the chances are rather high that your business is already using numerous Sharepoint features, as these are already built in to Microsoft Office 365. The software is also designed to afford a more nuanced level of permissions control than what is possible with more generalized digital solutions.

Highly Versatile: Another of Sharepoint's strengths is its ability to perform a variety of separate but related business functions and an ability to operate as either an online or offline solution. Specifically, Sharepoint employs dedicated modules for collaboration, content-management and even social networking. Licenses may be purchased for either online (Internet) or offline (intranet, extranet) platforms in the form of structured packages provided along a range of price points depending on the features your business requires.

Capable of Generating Construction-specific Workflows: Perhaps the strongest selling point that sets Sharepoint apart from other general purpose document management software is its flexibility with respect to designing customized workflows for specific purposes. While not inherently construction-specific, this feature does allow for manual template creation of workflows that can be calibrated very specifically to facilitate industry and company-specific tasks.

Sharepoint

Cons:

Costs Mount Rapidly: Sharepoint is not without its weaknesses, and some of these can be quite formidable. It can, for instance, be prohibitively expensive for small to mid-sized companies to deploy the software on-premises, as doing so involves purchasing one or more Sharepoint servers (each of which commands a minimum $2,500 price tag for the most basic setup) and Client Access Licenses which are billed “per user.”

Learning Curve: Time and budget must also be set aside to train a team on how to use the software. Often, companies must bring in an outside expert just for training alone and to handle user questions as they pop up.

Limited Offline Syncing: If you don’t have access to a wired or wireless internet connection, you won’t be able to receive the most recent version of a document. This can create problems down the line if a team member assumes they are working with an up-to-date file.

Manual Templates: Although creating high-quality, customized workflows with Sharepoint is well within the range of its capabilities, the software was not designed as a construction-specific solution, so workflows must be built from scratched and saved as templates for future use.

No Dedicated Mobile App: Finally, some users have complained of poor mobile experience due to the fact Microsoft has not yet developed a true, dedicated mobile app that can access all of the software’s nuanced features.

Bottom Line:

Sharepoint is certainly one of the most powerful and versatile solutions for companies willing to invest the time and effort into making it work for them. However, its progressive pricing structure and complex environment will require a certain degree of patience and persistence to take full advantage of what it has to offer.

Construction-Specific Cloud-Based Document Management

An ideal solution for most contracting firms would likely come in the form of industry-specific software that aggregates as many benefits from existing solutions as possible, while minimizing their drawbacks. Fortunately, products such as Autodesk's BIM 360 Docs are very much on the rise and are quickly re-shaping the project management landscape. These types of solutions offer several clear benefits.

Construction Drawings & Document Management Software

Construction-Specific Cloud-Based Document Management

Pros:

Construction-specific Workflows: Made with users in the AEC industry in mind, the interface replicates the look and feel of paper blueprints, but in a digital format that allows for easy markup and sharing among team members.

Version Control and Comparison: With built-in version comparison functionality, you can open any two documents, side by side, and see a highlighted list of every change that has been made from one drawing to the next.

Support for 2D Plans and 3D Models: This feature works just as well with 3D models, and the latest applications can even compare 2D against 3D.

Online and Offline Access: As with other cloud-based solutions, online and offline syncing are par for the course. Backups can also be stored on your desktop or mobile device for anywhere, anytime access.

Improved Security: Flexible permission-based access control is a particularly noteworthy strength of any construction-based document management app worth its salt. Project managers can control who gets access to what right from the dashboard. Permissions can be tailored to each team member or group, allowing them to view or edit files according to situational need and their role in the project. Additionally, everything is logged so there's never any question as to when a change was made, and by whom.

Cons:

Pressure to Collaborate: Some users may find that the ease of collaboration creates an expectation that they should do so more than they have in the past. The temptation to "overdo" it may arise in the early stages of adoption while the sense of novelty is still fresh.

Bottom Line:

Although they are not the only solution, dedicated construction document management systems, such as Autodesk's BIM 360 Docs, do represent the cutting edge in the world of digital document management.

Benefits:

- Increased time and budget efficiency
- Real-time collaboration
- Granular control over virtually every aspect of project management

How to Achieve Your Construction Goals

How to Achieve Your Construction Goals

Now that you've decided on your platform, it's time to think about implementation.

✓ Enhanced Agility of Attention and Customization

The upshot of not being an enormous firm is that you don't have the built-in cost of updating a lot of devices throughout your company. That means fewer cumbersome procedures and less red tape. These built-in advantages make it comparatively easy to install and deploy a smart, company-wide digital document management strategy.

✓ Maximize Time and Talent

Have you heard the phrase, "Many hands make light work."? Well, that blade cuts both ways. Lighter work also makes many hands. Those hands can accomplish quite a bit more when tasks don't take as much time as they used to.

✓ Do More with Fewer Resources

Smaller team size can become an advantage as there may be fewer channels to go through for approval. As a resource, mobile technology can help simplify critical duties such as quality and safety controls, punchlists, photos, and daily logs.

NOTE: *Smaller teams have inherent advantages when it comes to tech adoption, so may experience accelerated success in some key areas.*

Gain a Competitive Advantage With Education and Internal Training

Regardless of which option you've chosen, a degree of education will be required to get your team up and running. Fortunately, this is typically a straightforward process that can be facilitated at reasonably low cost. Here's how you do it.

- ✓ **Designate an internal point person who has direct access to vendor and customer success specialists.**
- ✓ **Make this point person in charge of conveying information back to fellow employees, serving as a liaison who can bring their questions concerning use of the technology to the vendors and specialists.**
- ✓ **This point person can also be charged with educating the team as to company best practices around collaboration and workflows.**

Have a clearer picture of what a construction document management system can do for you? Good! Let's dive into the steps to take to make it work for your team.

How to Setup 4 Critical Workflows with Cloud-Based Document Management

Workflow Basics

Designing workflows to accommodate your firm's business and operational needs is often a highly personal matter. No two firms have exactly the same staff, the same resources, or the same services. Moreover, internal dynamics among company personnel and their preferences will more often than not dictate how a job gets done. Nonetheless, there are some key pointers that should apply to all construction firms, regardless of size, scope of work, or internal SOPs.

✓ Understand the Project Going In

Develop a standard and stick with it. Many of your team members on this project will be working on others with you in the future.

✓ Be Sure Everyone Is On the Same Page

Let everyone on the team know up front which digital document management solution you'll be using. Everyone should be on board from day one.

✓ Keep It Simple

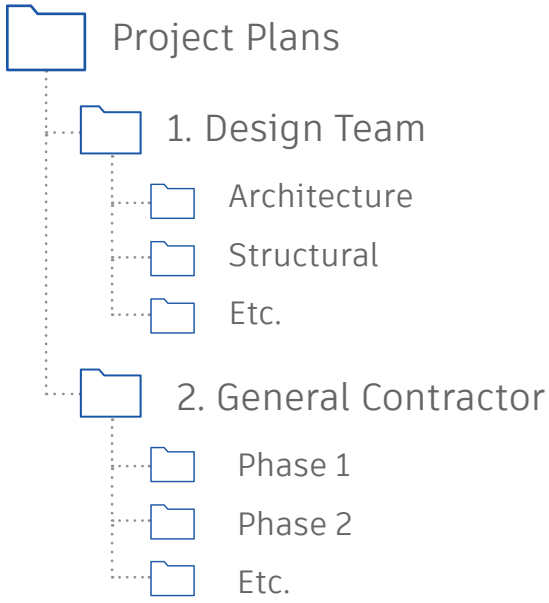
Keep folder structure as simple as possible for the project so team members can find what they're looking for quickly.

✓ Separate Your Work Phases

Create separate folder sets for preconstruction and construction documents. Preconstruction drawings will often change frequently before construction begins. Roles and permissions may also be different by the time a project's building phase begins. In both work phases, subfolders can be grouped by discipline.

A Simple Folder Structure

At the highest level, your folder structure might look like this:



Establish Naming Conventions Before Building Begins

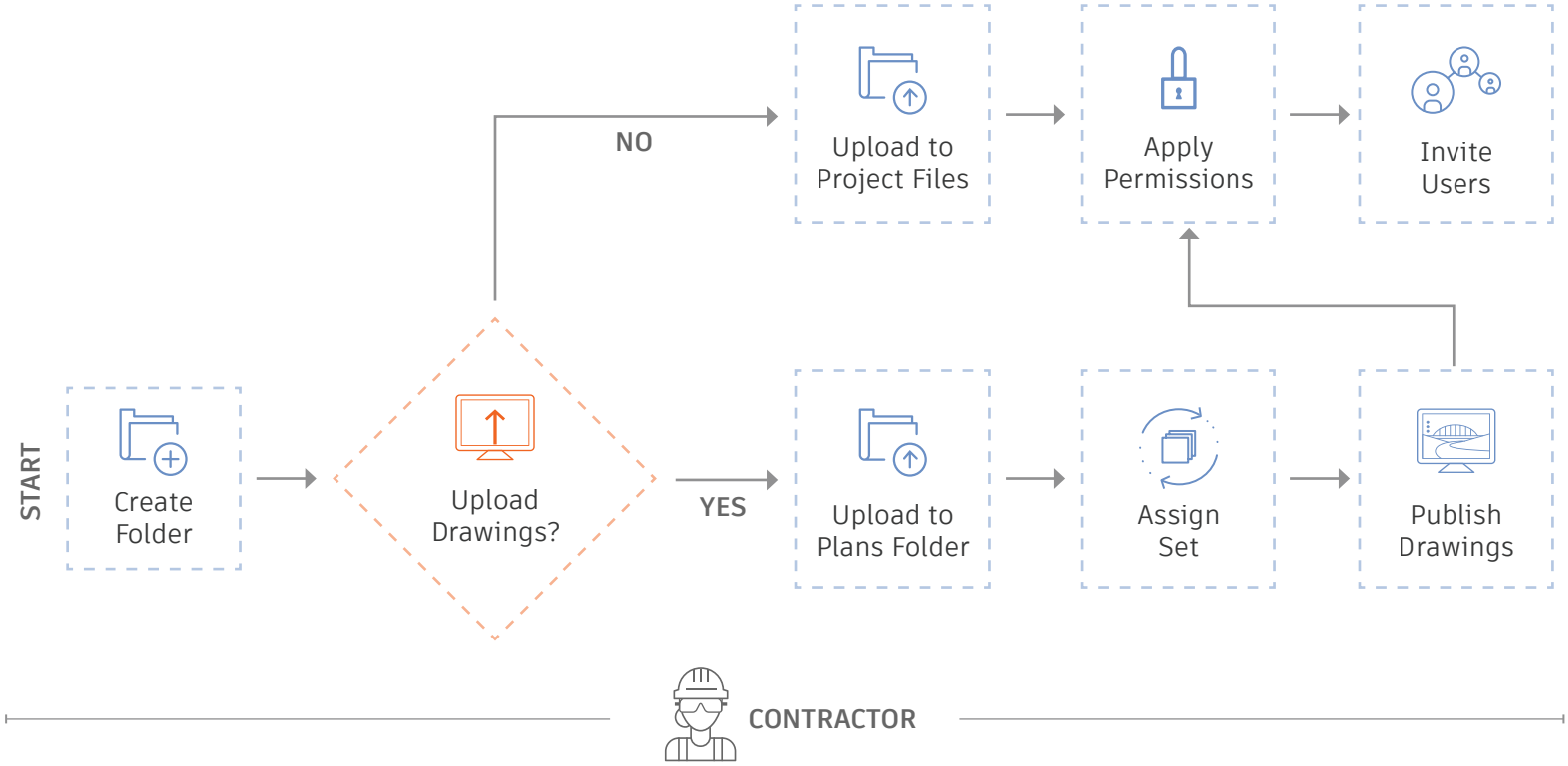
Be sure sheet names & numbers are firmly established by the time you get to the construction phase. Preconstruction is the time for establishing naming/ numbering conventions. Once the actual building begins, these things need to be set in stone.

Document Management Workflow

Teams can maximize the benefit of cloud-based file sharing by enforcing a “best practice” workflow. The graphic below outlines the suggested document management workflow using BIM 360.

Why Follow This Workflow?

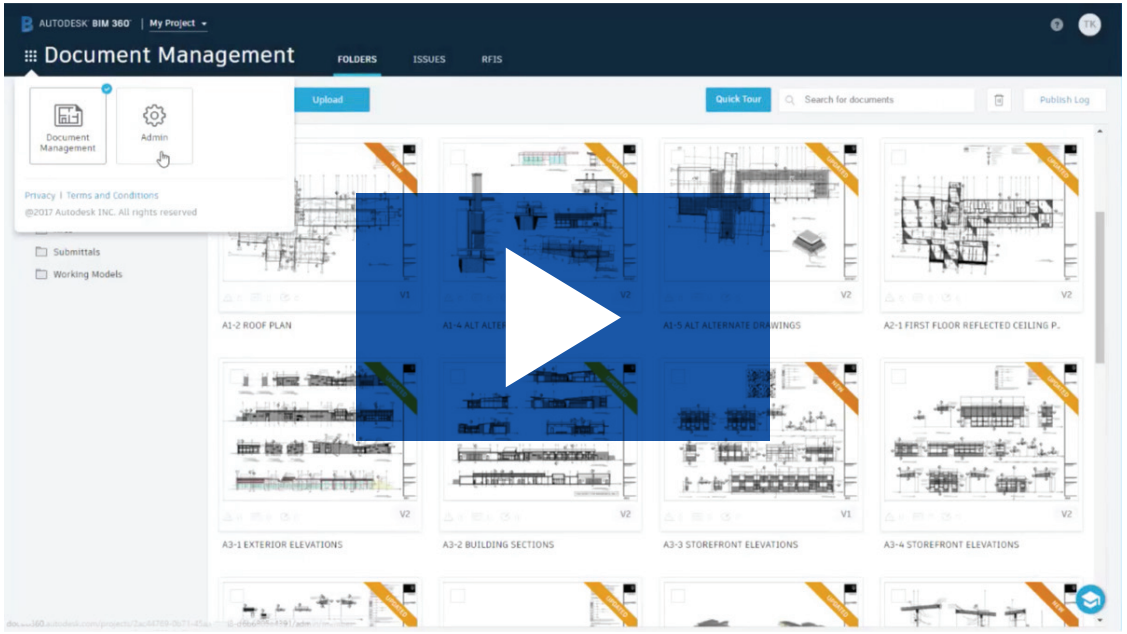
- ✓ Streamline file organization
- ✓ Save time and maintain consistency
- ✓ Control sharing of information with the entire project team



Document Management

By storing all documents in one place and having a centralized hub to pull from, you eliminate the guesswork of wondering where the most recent version lives. Everyone has real-time access to the correct documents, making them easy to find—and easy to annotate. Everyone stays on the same page (literally and figuratively).

Getting Construction Drawings Right...the First Time

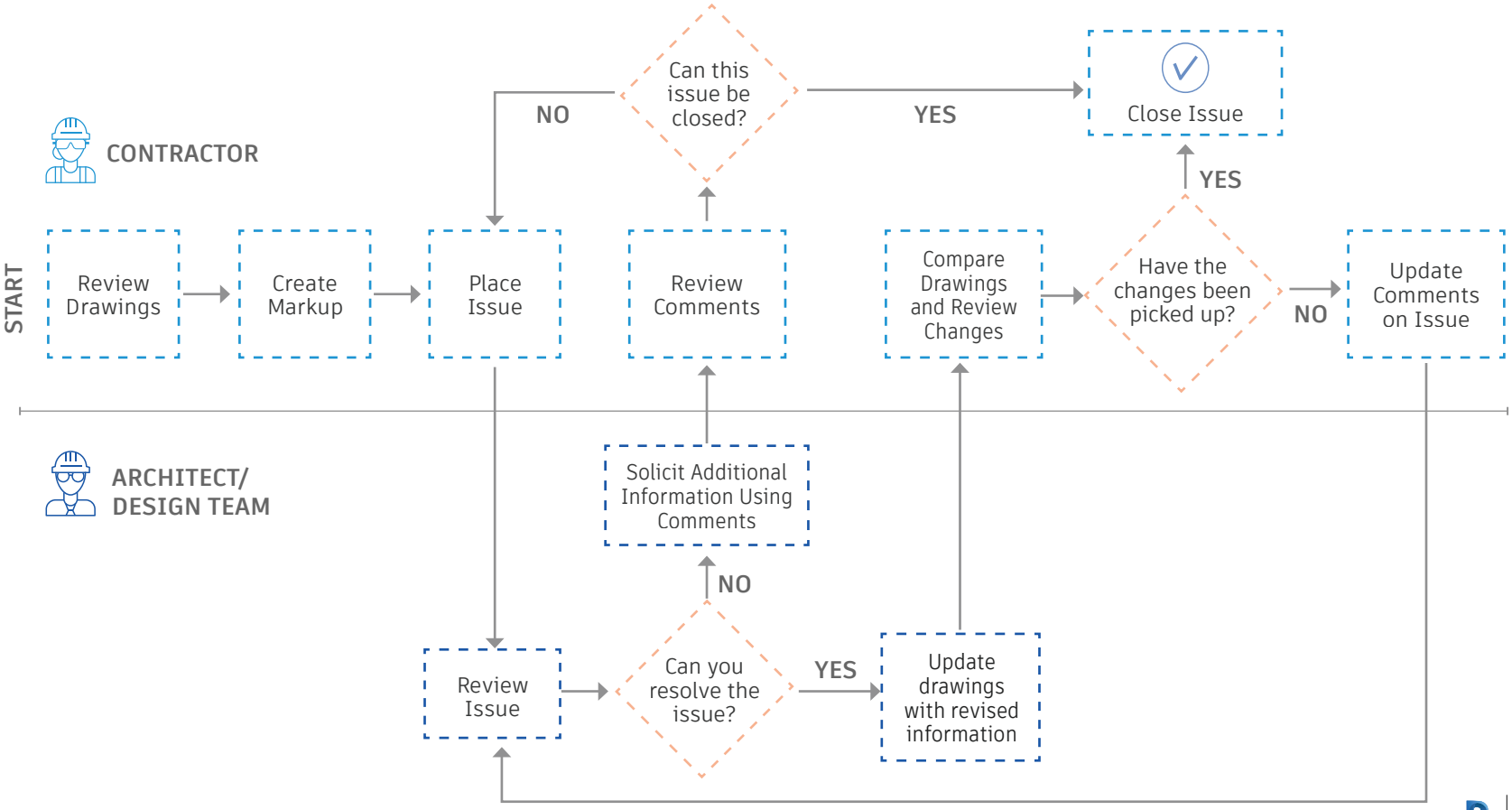


Design Review Workflow

Easily collaborate with the team during the design review process by implementing a streamlined workflow. The graphic below outlines the suggested Design Review workflow using BIM 360.

Why Follow This Workflow?

- ✓ Streamline design reviews across team members anytime, anywhere
- ✓ Aggregate comments and markups in a single location
- ✓ Easily compare versions for both 2D & 3D drawings



Conclusion

Ready to get started?

Switching from a paper-based system to a cloud-based construction document management system won't happen overnight. Realistically, you can expect to transition fully over the course of two years. However, it's time well-spent that can save your team time, money, resources, and frustration in the long run.

LEARN MORE ABOUT DOCUMENT MANAGEMENT ›