

CS224014

The Step Child Named BIM

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Learning Objectives

- Learn how to correctly capitalize on software for the task at hand.
- Learn how to successfully get a less-tech-savvy team up to speed.
- Learn how to break down the “We don't need BIM” attitude
- Learn how to address modeling scope gaps.
- Learn how to address language and culture barriers with outside consultants.

Description

Learn how to get your team up to speed with the latest technology in construction. Gain insight into problems commonly, or maybe not so commonly, facing BIM (Building Information Modeling) related to construction, such as scope gaps, language barriers, and quality assurance. Learn from our experiences on some of our premier projects, including Little Caesars Arena; Mount Carmel Hospital, Grove City; Aloft Magnificent Mile, Chicago; Oak Park South Boulevard; and Miami Dolphins' Hard Rock Stadium. See how capitalizing on software such as Revit software, BIM 360 Glue software, Navisworks software, and BIM 360 Field software can make your life easier in solving some of these problems.

Your AU Experts



Cliff Ragan
VDC Engineer CM-BIM
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Cliff is a VDC Engineer for AECOM Hunt, the Construction arm of AECOM. He works out of the AECOM Hunt Innovation Center based in Indianapolis, Indiana. He is responsible for BIM implementation in all aspects of the construction progress including business pursuits, design assist, pre-construction, construction, and closeout. Cliff is also responsible for all 360 Field training for the company across the nation. With 15 years of experience in the AEC industry including Construction Laborer, Revit Specialist, Mechanical Designer, and BIM Project Manager, Cliff's experience gives him a unique understanding of all aspects of the construction of a building from design to completion. He is a Certified Professional in both Revit MEP and Revit Architecture. Cliff is also a certified UAS Pilot and flies for AECOM Hunt and helped develop AECOM's strict safety guidelines and processes for flying drones within AECOM. He is also experienced in laser scanning and uses it on many projects.



Andrew Cooper
VDC Engineer
AECOM Hunt

Andrew is a VDC Engineer for AECOM Hunt, the Construction arm of AECOM. He works out of the AECOM Hunt Innovation Center based in Indianapolis, Indiana where he is responsible for the BIM needs of many projects, such as coordination, laser scanning, and UAS. Andrew started his career in 2003 at an architecture and engineering firm designing every aspect of projects from civil to MEP. He later moved to an engineering firm where he designed a variety of facilities ranging from pharmaceutical labs to engine manufacturing plants. Andrew most recently made the jump from the design side of the world to the construction side working on multiple projects such as sports venues, hospitals, hotels, and condominiums. Andrew has gained insights on coordination and other valuable lessons while working on a variety of projects such as Allison Transmission, AM General, Cummins, Eli Lilly, Little Caesars Arena, Miami Dolphins, Philips Arena, USTA Louis Armstrong Stadium, Aloft Magnificent Mile Chicago.

Leveraging Software to Maximize Benefit

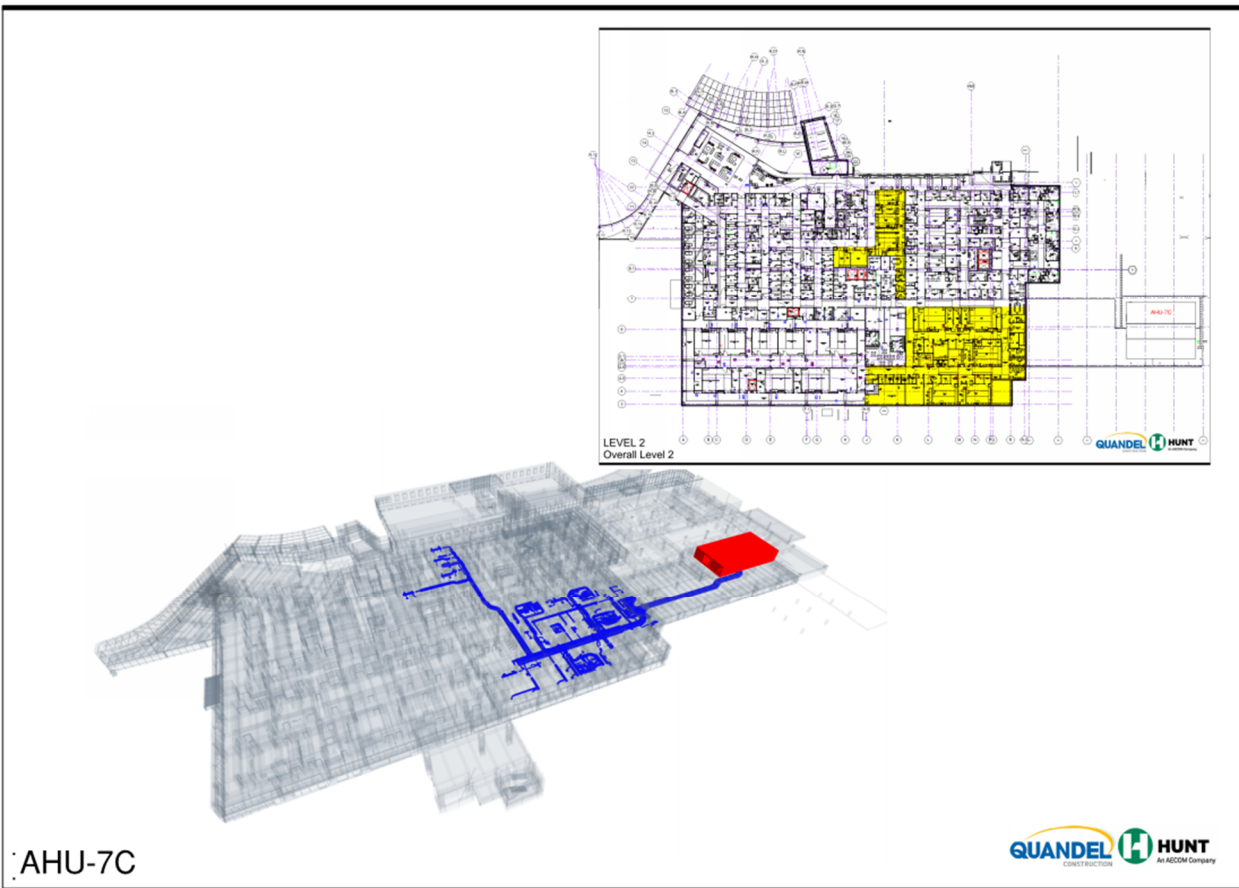
Many of us in the AEC industry, specifically in the BIM realm, are exposed to many different software. Just like searching for that unicorn, it has been our experience that there is not a one-stop-shop for some tasks. The last thing someone wants to hear is “we can’t do that.”

Know the Limits and Boundaries of Your Software, Then Brake Them

When you are in the software every day and know its limitations, that sometimes can keep you thinking “inside the box”. Spending time talking to your field team is invaluable. Ask them the question, “let’s pretend there are no limits, what is something you need that you may think I can give you?” Make your step parent proud!

MCGC AHU Diagram

This is exactly the question I asked one of our MEP Projects Managers at the Mount Carmel Grove City hospital that we are building on the south side of Columbus. His answer was that he wanted a visual of each Air Handler and what areas it served both in 3D model and 2D paper.

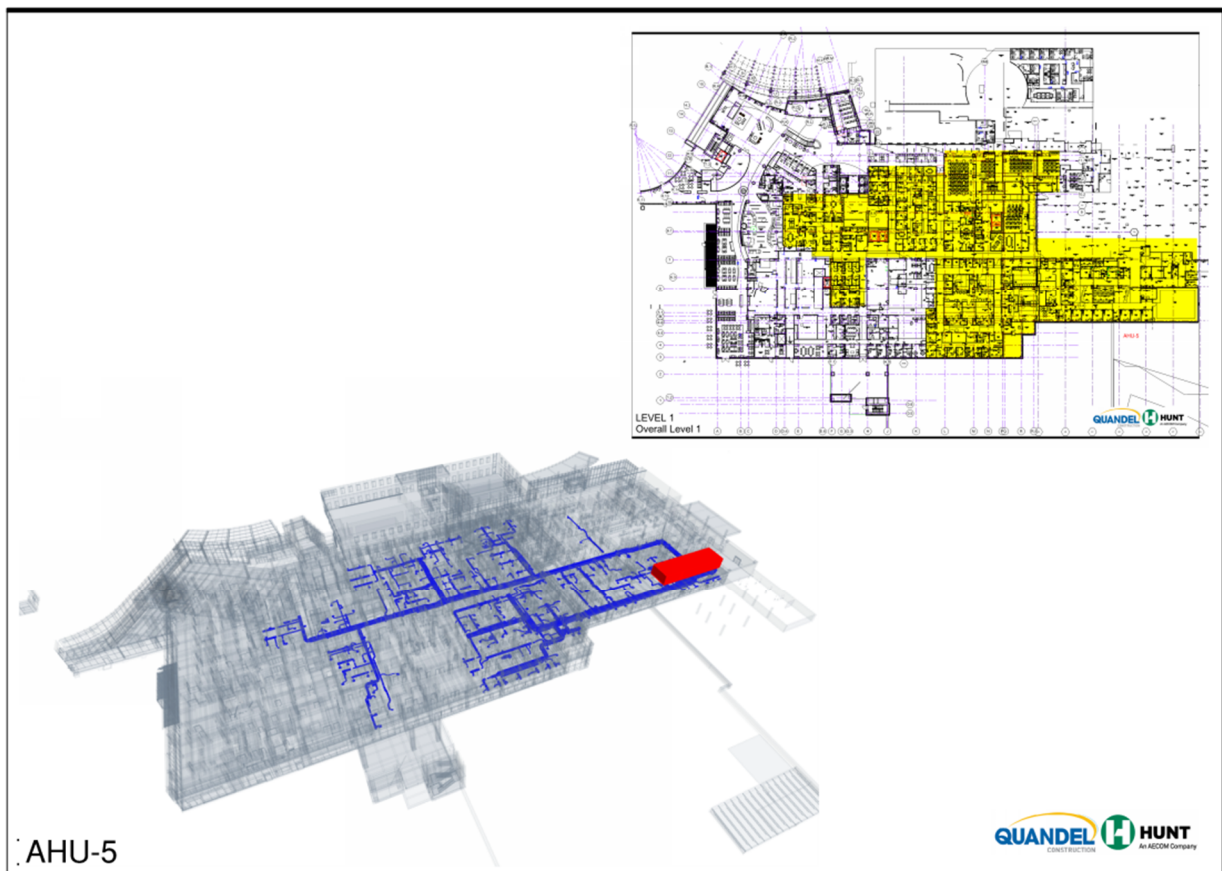


Mount Carmel Grove City Hospital

I knew that I could probably accomplish this task solely in Revit but I know Revit well enough that I thought maybe it would not be the easiest and cleanest way to deliver what was asked of me. What I did instead was:

1. Isolated the entire supply of Air Handler 7C in Navisworks.
2. I saved those parts and pieces as a set and hid all other ductwork.
3. I section clipped the top of all Architecture and Structure down to the highest part of the supply duct for each air handler
4. I put a transparency on all the Architecture and Structure, so the system would be very apparent.
5. I exported this image out of Navisworks and placed it on a sheet in Revit.
6. I also had a smaller sheet setup in Revit for an overall floor plan using masked regions to highlight what rooms that Air Handler supplied air to.
7. I printed both sheets out of Revit and used Bluebeam to combine them.

This is just one example of how using multiple software and pushing past the known limitations can be a great benefit to your project when a certain deliverable can be found useful or beneficial to the project.



Mount Carmel Grove City Hospital

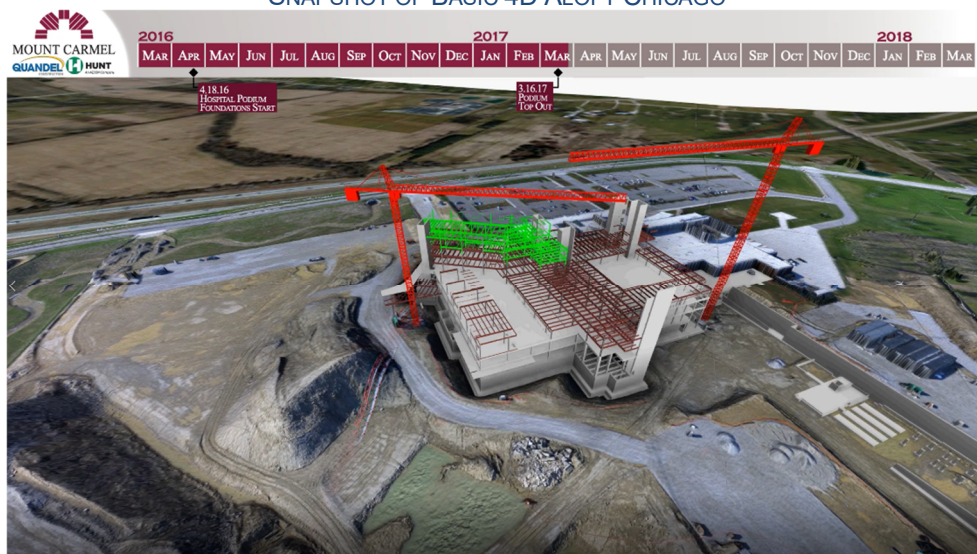
4D Timeliner Graphics

On many projects we use Navisworks tied to our actual construction schedule for many different applications. It can be used during the pursuit of a project to show people, who aren't familiar with reading schedules the way the building will be built or logistic implications to their site. It can be used to identify safety issues in the schedule. It also can be used to validate constructability of the schedule and get buy-in from all stakeholders.

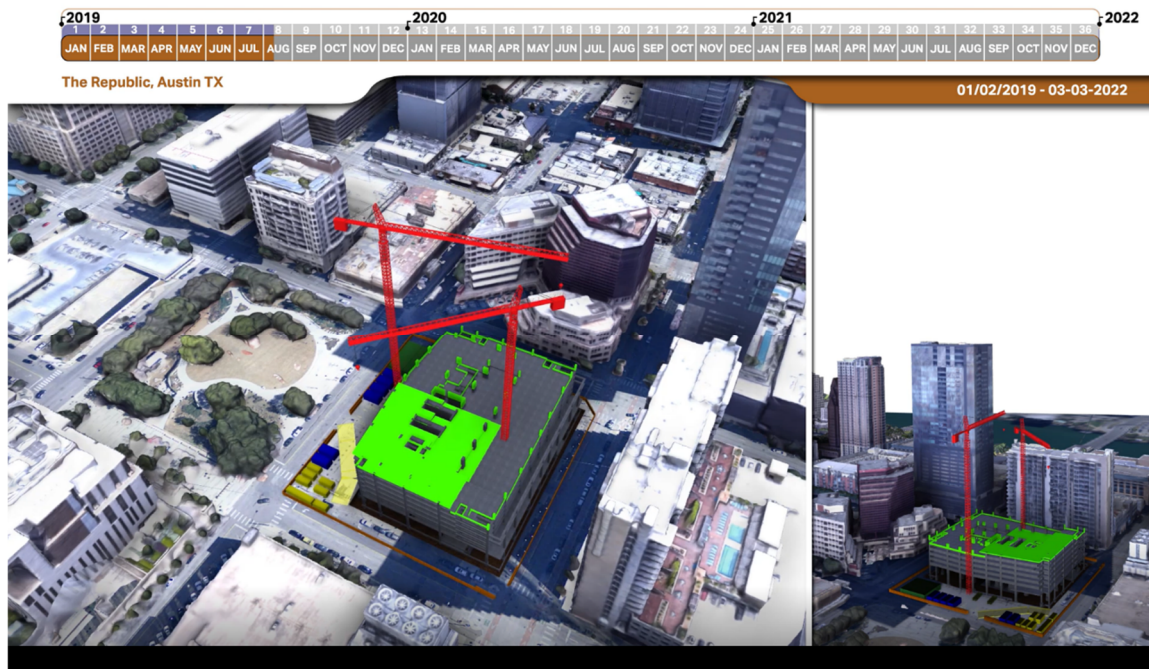
While Navisworks does a great job of tracking the schedule and tying model elements to that schedule, if we think outside the box a little bit we can really show some amazing things. Using picture in picture to show the 4D in two separate views can help you focus on a certain aspect of the construction of your building while not breaking away from the view of your entire building. With a little post processing we can also add the cash spend, sometimes referred to as cash flow, to the 4D to show a client when they will be spending their money over the course of the project. Here are some examples of how 4D videos can vary.



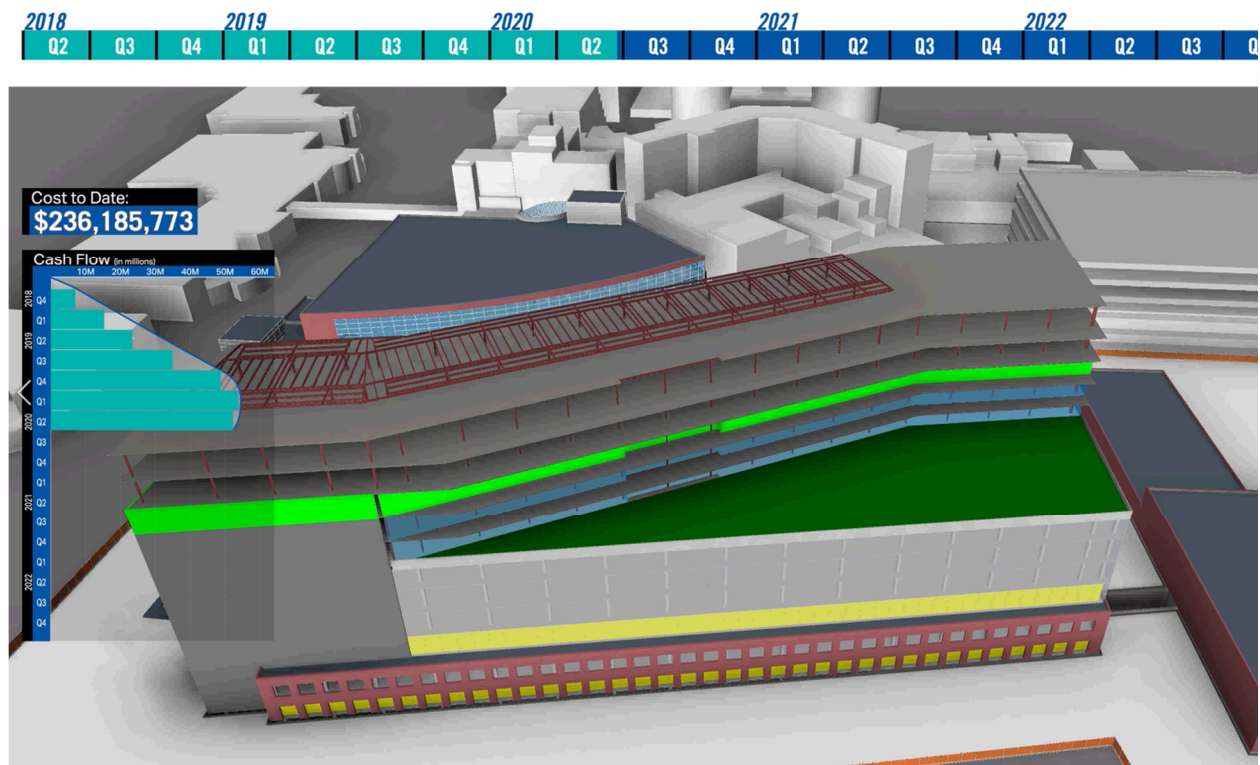
SNAPSHOT OF BASIC 4D ALOFT CHICAGO



SNAPSHOT OF ENHANCED 4D WITH DRONE BACKDROP & TIMEBAR



SNAPSHOT OF ENHANCED 4D WITH PIP

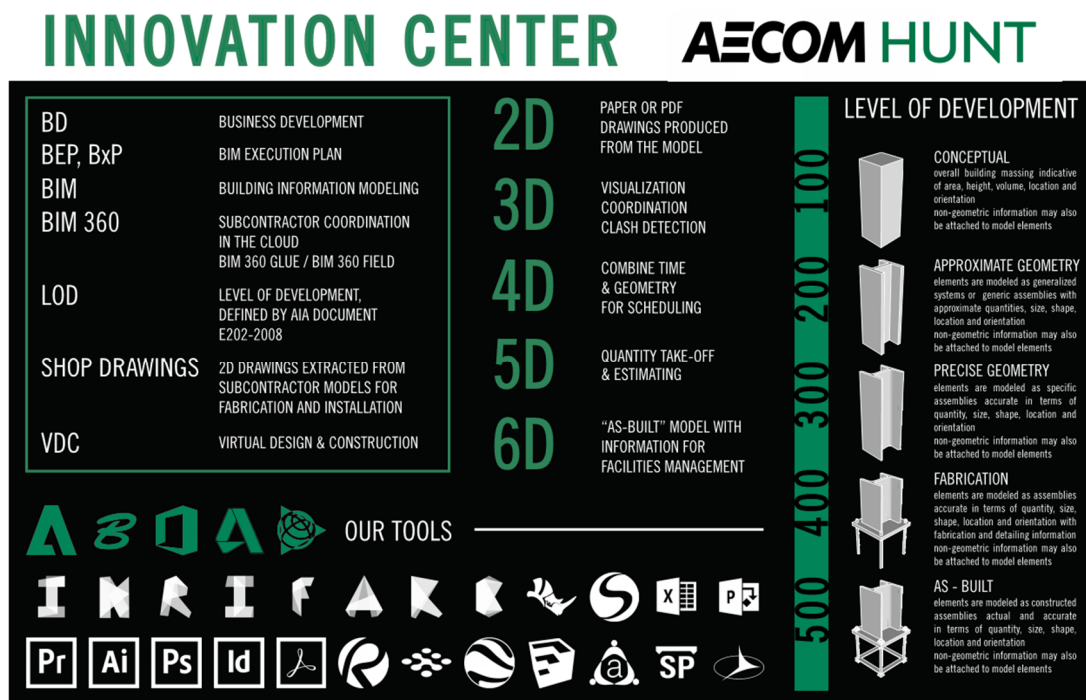


SNAPSHOT OF ENHANCED 4D WITH CASHFLOW

Prerequisites for BIM

Software, especially the BIM360 product line, is getting easier and easier to navigate and use. However, there are some very basic computer skills required to access this software. You should be able to remember passwords, turn a computer on, open a PDF, move files, and have a basic understanding of the internet. Us BIM folks, as the step child, usually get the pleasure of being the ones to blame when things “don’t work.”

In the BIM world we have a wide range of experience when it comes to our field team. We at the Innovation Center created this infographic that we go over and handout to all field members during the onboarding process.



Create Rapport with Your Team

You need them to know they can trust you. You must find a way to prove the value of BIM early in the project. It doesn't always have to be through a successful coordination. Like shown in the graphic earlier in the handout on page 3, I was able to gain the trust of the MEP Project Manager by getting him something that was going to make his life easier at this job over the next couple of years.

Be Available to Answer the Most Common Questions

ANSWER YOUR PHONE. Be available. no matter how good you are at your job, you'll be worthless if those in need have trouble getting ahold of you. Again, you are looking to make your step parents proud! We all get busy but at least answering your phone, taking the call, getting an understanding of what they are needing, and giving them a timeframe of when you can get it done is something we can all do. Also, **STAY AWAY FROM EMAIL**, use email to document if needed after a call but avoid using it as your main form of communication. It will be much appreciated!

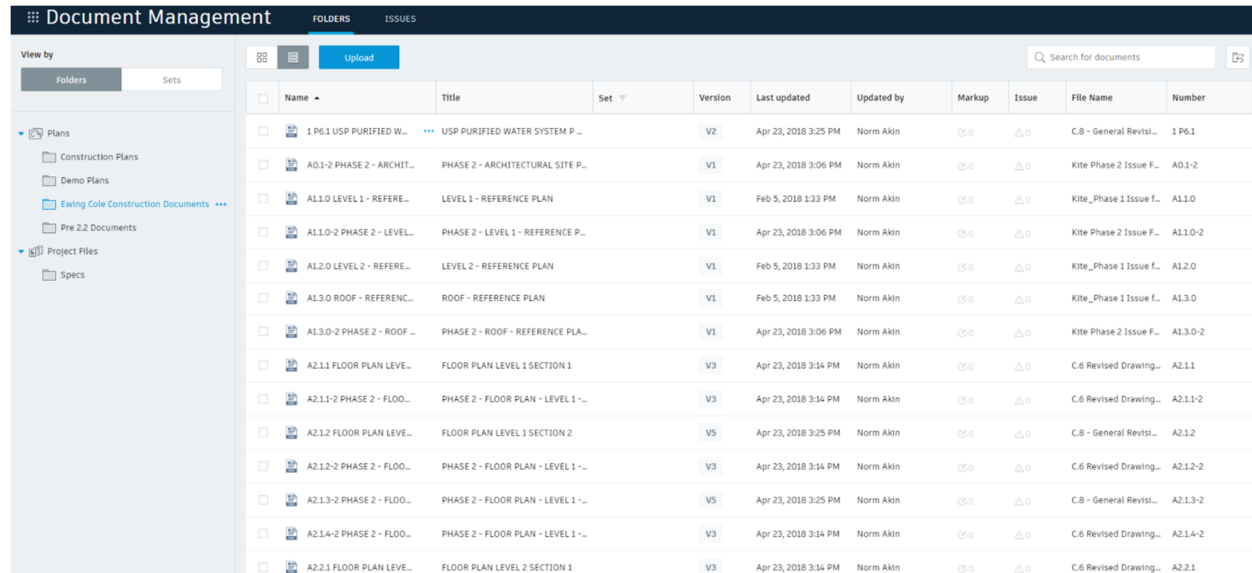
We Don't Need BIM.....Uh, Yeah You Do

Sometimes your step parents need reminded that you love them whether they like it or not. No matter the size of the project, there is always a place for BIM in some capacity.

BIM is Scalable

Maybe your small renovation project doesn't make sense to create a 20-page BIM execution plan and buying coordination from all your subcontractor for the 10' 1/2" pipe you need installed. But there is nothing wrong with putting all the drawings on BIM 360 Docs and using it to track issues. There is still value in the "BI" without necessarily including the "M".

There are many ways to implement "field" BIM This can allow you to keep all the most current drawings in the hands of those that need them most. We are trying to move away from paper drawings to avoid two major issues: waste and having the wrong information. BIM 360 Docs is providing a great platform to get us there.

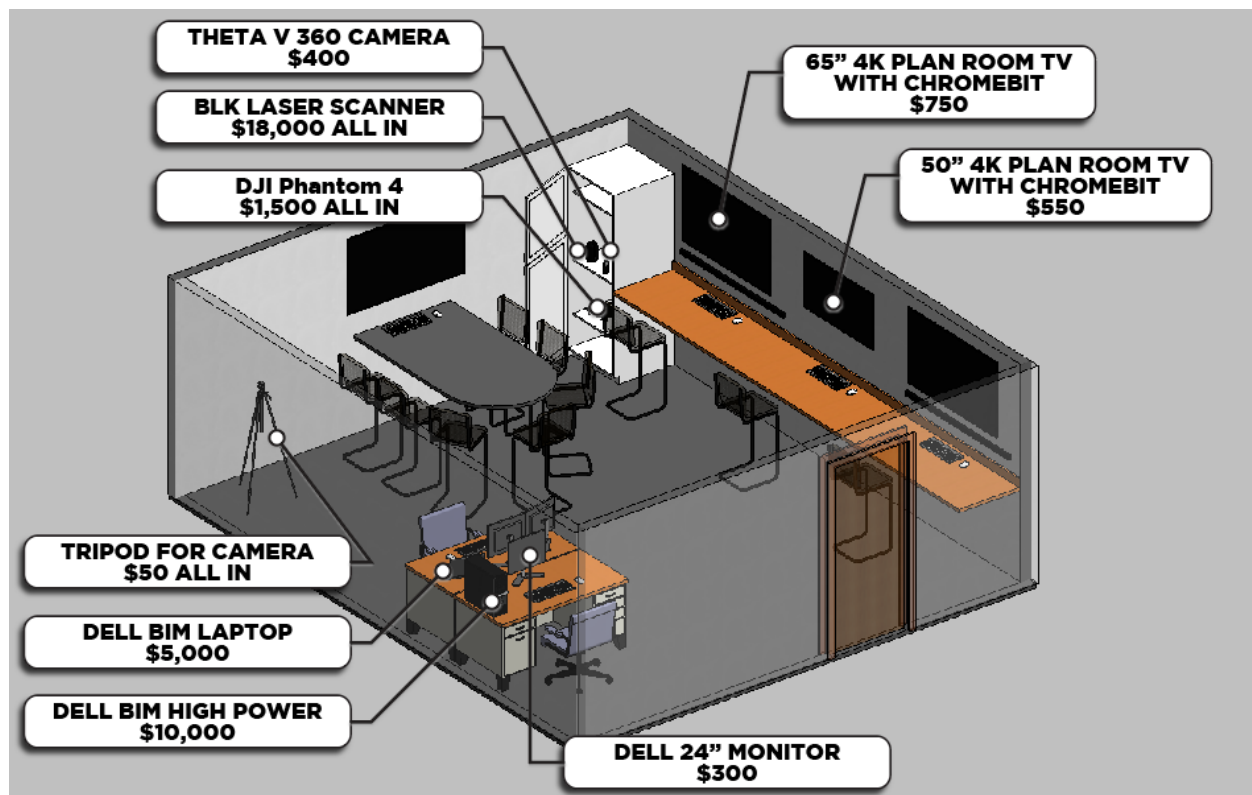


Name	Title	Set	Version	Last updated	Updated by	Markup	Issue	File Name	Number
1 P6.1 USP PURIFIED W...	USP PURIFIED WATER SYSTEM P...		V2	Apr 23, 2018 3:25 PM	Norm Akin			C.8 - General Revist...	1 P6.1
A0.1-2 PHASE 2 - ARCHIT...	PHASE 2 - ARCHITECTURAL SITE P...		V1	Apr 23, 2018 3:06 PM	Norm Akin			Kite Phase 2 Issue F...	A0.1-2
A1.0 LEVEL 1 - REFERE...	LEVEL 1 - REFERENCE PLAN		V1	Feb 5, 2018 1:33 PM	Norm Akin			Kite_Phase 1 Issue f...	A1.0
A1.0-2 PHASE 2 - LEVEL...	PHASE 2 - LEVEL 1 - REFERENCE P...		V1	Apr 23, 2018 3:06 PM	Norm Akin			Kite Phase 2 Issue F...	A1.0-2
A1.0 LEVEL 2 - REFERE...	LEVEL 2 - REFERENCE PLAN		V1	Feb 5, 2018 1:33 PM	Norm Akin			Kite_Phase 1 Issue f...	A1.0
A1.0-2 PHASE 2 - ROOF ...	PHASE 2 - ROOF - REFERENCE PLA...		V1	Apr 23, 2018 3:06 PM	Norm Akin			Kite Phase 2 Issue F...	A1.0-2
A2.1.1 FLOOR PLAN LEVE...	FLOOR PLAN LEVEL 1 SECTION 1		V3	Apr 23, 2018 3:14 PM	Norm Akin			C.6 Revised Drawing...	A2.1.1
A2.1.2 PHASE 2 - FLOO...	PHASE 2 - FLOOR PLAN - LEVEL 1 ...		V3	Apr 23, 2018 3:14 PM	Norm Akin			C.6 Revised Drawing...	A2.1.2
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A2.2.1 FLOOR PLAN LEVE...	FLOOR PLAN LEVEL 2 SECTION 1		V3	Apr 23, 2018 3:14 PM	Norm Akin			C.6 Revised Drawing...	A2.2.1

SNAPSHOT OF BIM 360 DOCS ON A SMALL PROJECT

Remember, there are techniques in bringing 2D AutoCAD drawings and pdfs into Navisworks so coordination is not just with 3D models. It's everything you can get your hands on.

On the other end of the spectrum make sure you are prepared for the large project that will need and can support lots of aspects related to BIM. Our job site BIM planning graphic helps the team decide exactly what items and resources they want and can afford on their project. From digital plan tables to laser scanners we give them a quick rundown of some of the cost associated.



Modeling Gaps

With coordination being at the epicenter of the BIM world it is important that we cover our bases when it comes to who and what is playing in the sandbox.

Cover Yourself by Contract

We have worked vigorously with our project executives to develop an attachment that is now part of our standard subcontract. This ensures that we can contractually obligate all the necessary parties to participate in modeling and coordination. Most MEP FP subcontractors are up to speed and know what to expect when it comes to successful model coordination on a project. However, there are some that are not and there are other trades that may not commonly participate in coordination. In these cases, you need to be ready to train and get them up to speed.

Have Resources

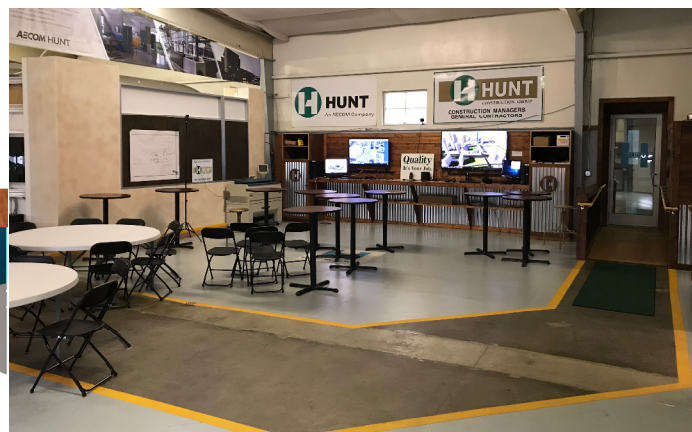
It's important to have at your fingertips service providers that can take on modeling and coordination work. Creating these partnerships can help you out in a pinch or when you have a contractor that is willing to participate in BIM but is being transparent in the fact that they have not had much experience or that their resources can't facilitate the large project.

Be Ready to Step in and Train if Needed

At AECOM Hunt we have our Studio H lab which we have set up to host training sessions for many different applications. It is a great resource to corral all the contractors in one place and get them up to speed on an upcoming project or do some task specific training for an individual contractor's BIM team.



STUDIO H



When You Are Not Covered.....

If the scope of modeling has somehow slipped through the cracks of what was included in the design model and slipped through the cracks of you and your project management team then you need to be ready to find these missing pieces and make sure your accounting for them in some fashion. Maybe it's using your own modeling skills to fill in the gaps or maybe it's hiring a 3rd party to take care of the omissions. Either way, it needs to get done or you are setting yourself up for disaster. All the hard work that you and your team accomplished through coordination can be ruined by the scope of some work that did not get modeled. If you are unsure of the exact specifics of the content for that scope, model some clearance areas or no fly zones until you can get more detailed information for that work.

I was once involved in a project where the steel packages were separated out between the major structure and miscellaneous metals. Unbeknownst to me, one contractor, the major structure was contracted for BIM, the other was not. It was a healthcare project so much of the overhead MEP was very busy and congested. There were some restroom partitions that had miscellaneous metals overhead to support the hanging supports. Unfortunately, there was very large duct work that was designed as well as coordinated right over the top of where these partitions were to be located. We now had a huge problem on our hands with no real path to resolution as the duct had already been installed blocking any attachment to available structure. Fortunately, in this case the partition installer had submitted an alternate system to that change it from ceiling mounted to floor mounted nullifying the need for overhead supports.

We got very lucky. The point here is that we need to stress stories like this to our project managers that have a history of letting subcontractors talk them out of participating in coordination. Most of the time what I hear is that the contractor was going to charge us double if they had to participate in modeling and coordination. This is absolutely absurd. If you have a contractor telling you this, they likely just do not know what they are getting into and are scared. If this is the case review their scope, take on the modeling yourself, give them a number to include in their bid, and back charge them at the appropriate time. This safeguards you and your entire team from missing scope and overpaying for coordination involvement.

Communication Barriers

Outsourcing modeling can be a great way to offload a busy workload. There are many great service providers outside the country but it's important to let the team know when there may be some language barriers and communication gaps.

Language

Language or ineffective communication barriers can be very challenging at times. It also can be hard to try to improve without coming across as insensitive. When you have to keep asking for clarification or someone is asking you to constantly repeat yourself, it can be very aggravating for both parties. The need to be understood is deeply engrained into ourselves and as such makes conversations about not being able to understand someone that much more sensitive.

I have experienced a few barriers and would like to share some tips that helped the whole team become successful in communicating. When there were significant concerns about being able to understand someone on the phone, I followed up every call with an email confirming what we talked about and asking if I missed anything. We would then continue to maintain frequent communication via e-mail to ensure clarity on what was being asked and needed for follow-up. I also recommend having some additional 1-on-1 calls with the individual you are having difficulty communicating with because the more time you spend talking with someone, the easier they are to understand (whether this is due to a language barrier or someone who has difficulty explaining things verbally). In an extreme case, when the above-mentioned tactics did not assist with clearing up the confusion, I did ask for a different person to be on the calls. When the change was made we were able to move forward quickly and efficiently, which is the goal of the coordination process.

“Lingo”

BIM, in general has a vocabulary all on its own. A coordination meeting to you might mean something very different to a superintendent. Superintendents might see a coordination meeting sitting down with the subcontractors to review the upcoming work.

The same statement goes for Revit, Navisworks, and lots of the software we use. Be aware of your audience's background and make sure they are on the same page as you when you agree to execute a task or are asking some to do a task for you.