

CCS320698

Verify! Verify! Verify! Create, Coordinate, and Prefabricate for Subcontractors

Katelyn Sanchez
Cache Valley Electric

Learning Objectives

- Learn how communication and collaboration help with cost, safety, and overall quality
- Discover the difference between being a BIM coordinator for a subcontractor vs. a general contractor
- Preparing your project for virtual coordination and prefabrication
- Learn about the process, workflow, and timeline needed to stay ahead of the general contractor

Description

We had a discussion at Autodesk University Las Vegas 2018 that focused on what a BIM coordinator does for the general contractor through processes and workflows—do's and don'ts and so on. We'll now explore the process and workflow of a BIM coordinator from the subcontractor side! Our coordination team's established methods not only help our field crews with the install and on-site verification, but they help catch things that sometimes slip through the cracks. Learn how to utilize BIM coordination to improve project outcomes for all parties. We'll discuss how communication, safety, collaboration, prefabrication, quality, and cost can impact what we do to help the industry with tools like Revit software, Navisworks software, BIM 360 Glue software, and more.

Speaker

Katelyn Sanchez
VDC/BIM Coordinator,  CACHE VALLEY ELECTRIC



Having an early love for woodworking, I participated in Skills USA to win state multiple times in cabinetmaking. This became a major building block for my career in the AEC industry over the years. Just as technology has been ever-changing, my role in this industry has as well. Through my eleven years' experience, I am accomplished in mechanical design, BIM coordination, and specialize in virtual coordination of major commercial projects in general contracting. I currently work with Cache Valley Electric (CVE) as a VDC Coordinator and coordinate electrical systems. I help with BIM implementation, process workflows, optimizing efficiencies and work directly with AEC and field teams to improve and solve project system challenges before issues arise on job sites. Additionally, I provide training courses for the software utilized on my projects which include Revit, Navisworks, AutoCAD, BIM 360 Glue, Bluebeam, Dynamo, BIM Track, and Procore. I continue to expand my knowledge in all trades and am looking forward to new and interesting demands in the construction industry!

Being a BIM Coordinator for a Subcontractor!

There are many different variations of a BIM Coordinator in our industry. At AU 2018, we spoke about what a BIM Coordinator typically does for the general contractor. At CVE (subcontractor), a BIM Coordinator virtually coordinates major electrical systems within a building. Typically, the direction is made by the general contractor to perform coordination tasks and fabrication drawings through Revit, AutoCAD, BIM 360 Platforms, Navisworks, and most recently BIM Track. We communicate with our Project Managers and the general contractors about the contract and deliverable requirements. The BIM Execution Plan (BEP) is then analyzed. We will review all contract documents, specifications, and submittals before modeling or coordination begins. The BIM Coordinator will develop an in-house team to help with modeling and coordination efforts. Once the necessary information is developed, the general contractor will direct all trades to begin their process of coordination with each other. After coordination, the subcontractors will develop field use drawings for field crews to build from. We will often provide drawings of items within our systems to be prefabricated and speed up install and fabrication timelines. When install begins, the field foreman will communicate any install changes that are needed to the BIM Coordinator for model as-builts.

Let's break it down!



Communication and Collaboration helps with cost, safety, and overall quality

- Cost
- Safety
- Quality

VDC/BIM Coordinators in our industry are set forth to be pre-planners! Without communication and collaboration to pre-plan, a spiral effect takes place. Instead of saving in cost and safety, the cost to have a BIM team now increases project budgets and possible onsite outcomes.

Note: *One of the many big issues we face in our industry is that information is not passed on from design to preconstruction to construction then back for as-builts.*

- *Information tends to not be shared between the subcontractor and subconsultant teams*

Communication happens in many ways. Three important topics from a VDC/BIM sub-contractor position are:

- Communication with the General Contractor
 - As a subcontractor, we work for the GC and want to ensure that we are providing information, and receiving information for our projects



- Communication within your company
 - We need to communicate with our own internal clients, providing and receiving information from our Project Managers (PM)
 - Providing information for content and construction schedules to our VDC/BIM departments
 - Exporting information to our fabrication shop

- Utilizing feedback and how to proceed for future projects
- Communication with the field
 - This is a huge component of being successful on a VDC/BIM project. We need to provide field crews with necessary accurate information in a timely manner so they can install products, assemble quickly, accurately, and safely.

Cost

Communicating is key to reducing costs. Knowing when, where, and what needs to be completed, the subcontractor can schedule and provide resources. As a result, milestones greatly increase.



According to For Construction Pros (<https://www.forconstructionpros.com/profit-matters/press-release/21015974/plangrid-poor-communication-rework-bad-data-management-cost-construction-industry-177b-annually>)

Almost \$65 Billion U.S. construction spending went towards rework by the end of 2018

- About 30% of construction data is lost from design, through construction, to turnover.
- On average, globally 52% of claims are due to inaccurate field data and miscommunication
 - Over \$31 billion of rework in the U.S. in 2018
- Construction workers lose almost two full working days each week solving avoidable issues and searching for project information

When there is communication between trade groups and the entire team, this eliminates re-work and helps mitigate risk onsite.

Some benefits:

- Preconstruction visual before built onsite
- Improved scheduling
- Increased productivity
- Improved coordination and clash detection

Note: *It is very important to understand what scope of work is required for specified trades within the contract and BEP. This will give the ability to plan and build the appropriate BIM team.*

Example:

- Data Center- Electrical scope- Building Management System (BMS) Controls
 - Communicate with PM and pre-plan BIM team
 - BIM modeler, BIM Detailer, BIM Consultant, etc.

Quality

Most would agree that communication and teamwork skills are essential for providing quality projects. When teams collaborate effectively, they can improve project deadlines and budget helps prevent errors, improve efficiency and increase client satisfaction.

- Innovation
- Time
- Cost-saving

Good project quality collaboration is more than just getting tasks done on time. Building strong relationships with all team members is vital!

- Within your company
- General Contractor
- Other subcontractors

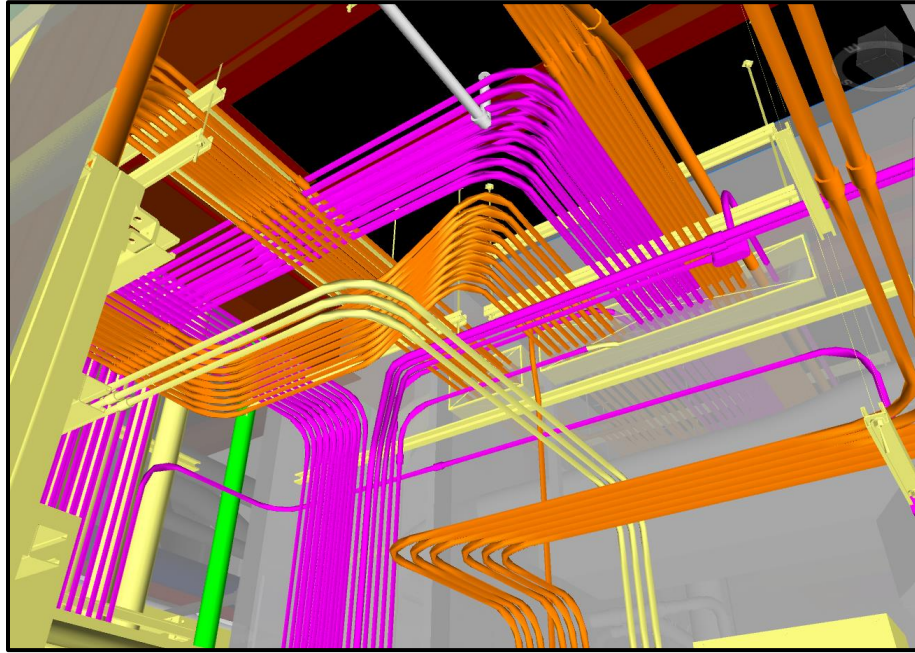
Note: *Training our field crews with software utilized onsite is a big component when communicating project information.*



Over recent years, cloud-based software has made it easier to communicate and manage construction projects.

- BIM 360 Platforms
- Navisworks
- BIM Track

When team members have access to the same information in real-time, it is easier to build processes, communicate, and increase productivity.



Model

Credit: CVE



Install

Credit: CVE

Safety

The most effective form of a safety program starts at the planning and pre-construction stages. When we communicate where work is to be, we can plan and schedule resources in a safe manner.



Applying relevant BIM technology in our construction industry can improve safety. BIM teams enable opportunities to detect and design health and safety risks from the start. Utilizing software tools speed up reporting processes. Risk analysis and safety evaluations that previously could only be carried out visually can now be automated ahead of time.

- Working spaces and clearance zones of different types of equipment such as electrical panels
- Model-driven prefabrication and off-site fabrication enables the ability to be in a controlled environment
- Identify collisions and mitigate them before they are constructed
- Accessing models on job sites can help improve inspections and validate safety deliveries are being met



Credit: CVE

Differences between a VDC/BIM Coordinator for a general contractor vs. subcontractor

The greatest difference between a Subcontractor (trades) and a General Contractor is we work for the GC. But there are some commonalities and differences beyond the obvious.



A VDC/BIM Coordinator for the GC is somewhat a “jack of all trades”. They typically know a little bit about every trade but a master of none.

GC Coordinator will typically:

- Provide communication threads and start discussions on issues
- Coordination kick-off meeting
 - Discuss BEP guidelines and requirements
 - Discuss the BIM Expectations Doc
 - Discuss the Level of Development (LOD)
 - Software to be utilized
- Create a contact list
- Build a virtual coordination schedule
- Host coordination meetings
- Mediators to resolve clashes and issues between trades
- Monitor models and software used for coordination purposes
- Delegate necessary tasks to each trade in a timely fashion
- Assist in gathering information for each trade in need
- Verify as-built modeling to install





Credit: CVE

A VDC/BIM Coordinator for the subcontractor is a master of their specific trade. It is their responsibility to develop a relationship with GC Coordinators and work as a team.

Subcontractor Coordinator will typically:

- Communicate with GC to know when and what information needs to be provided
- Create an internal BIM team
 - BIM Modeler, BIM Detailer, BIM Consultant, etc.
- Join kick-off meeting from GC
 - Discuss BEP guidelines, requirements, and ask questions
 - Discuss the Level of Development (LOD)
 - Software to be utilized
- Obtain contact list
- Follow coordination schedule
- Review specifications
- Be aware of changes in scope, schedule, submittals, etc.
- Partake in coordination meetings
- Model per equipment submittals
- Resolve clashes/issues per means and methods
 - Order of Operations/Sequencing
- Collaborate with internal Project Managers (PM)
- Communicate with other trades
- Create prefabrication drawings for fab shops
- Develop clash-free shop drawings to field
- Stay up to date with modeling as-builts



Example:

- Electrical
 - Brain/nervous system of a building
 - Understand your trade and be sure to stand for your space and content in models

Note: The focus of a VDC/BIM Coordinator in our industry, is to provide for our field crews and make life easier and better for their install.

Preparing your project for virtual coordination and prefabrication

Each subcontractor needs to be informed early which tools will be used during virtual coordination. This is normally determined by the GC during the BIM Kick-off meeting.

Example:

- BIM 360 Glue
- Navisworks
- BIM Track



How virtual BIM coordination is utilized before construction starts will include understanding the project contract, preconstruction involvement, knowing the subcontractor/detailing team, and identifying what software will be used. 90% of what a VDC/BIM Coordinator will be involved in, is during the preconstruction process of a project. The VDC/BIM Coordinator is so far ahead of the actual construction, they find issues sometimes months before the install.

Note: As BIM coordinators, we must know every detail about the project in order to communicate and collaborate effectively.



As a subcontractor, you will have developed your BIM team. Provide any training on any software tools needed to keep up with the pace of coordination.

Stay up to date:

- Addendums
- RFIs
- Change orders

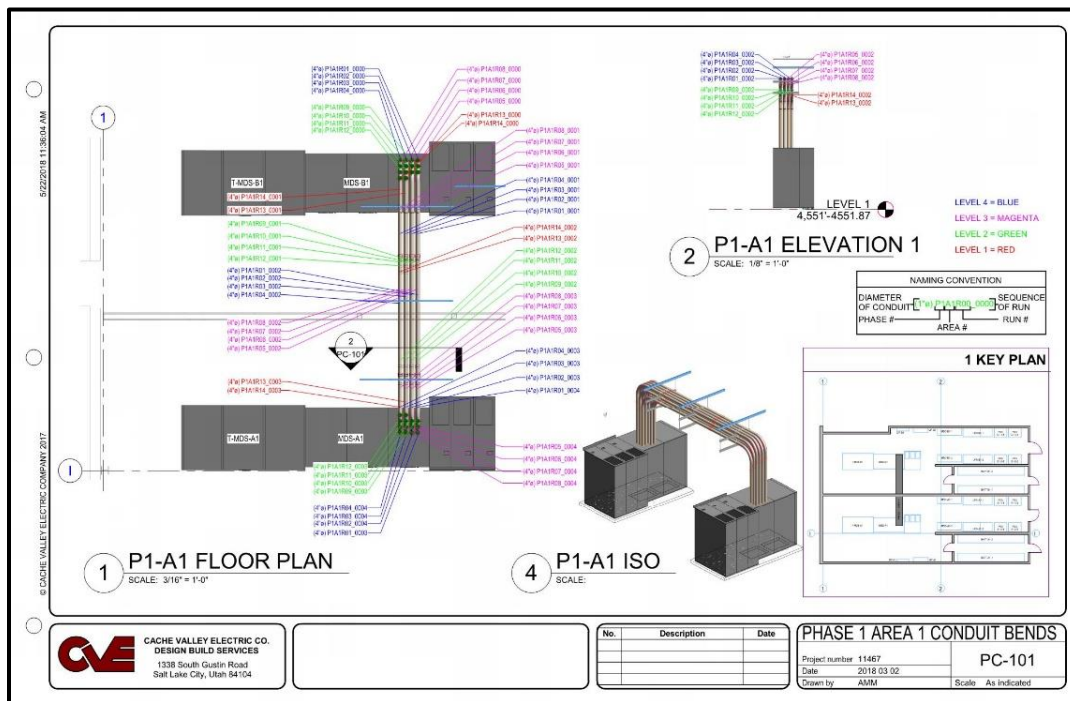
Note: Utilizing BIM technology is a big component when prefabricating is an option.

Prefabrication “connects” it all:

- Controlled environment
 - safety
- Cost savings
- Quality increase
 - Innovative ideas form the model to installation
- Less material waste

From our electrical subcontracting side:

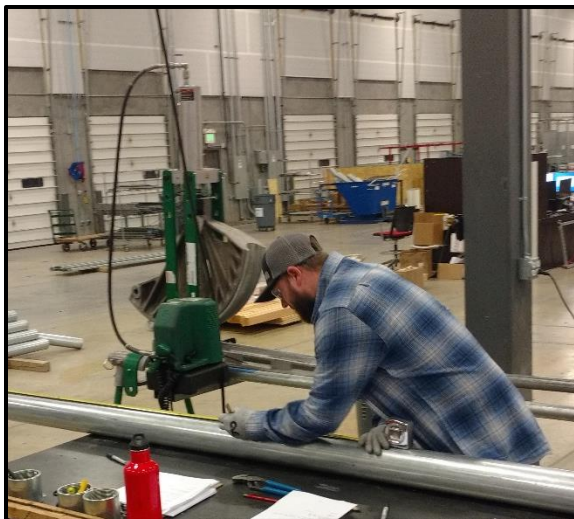
- Electrical normally isn't the main focus when the software to prefab is considered
 - Software:
 - Greenlee Bendworks
 - Created most electrical content in-house
- Create bend reports
 - Internal process checklist



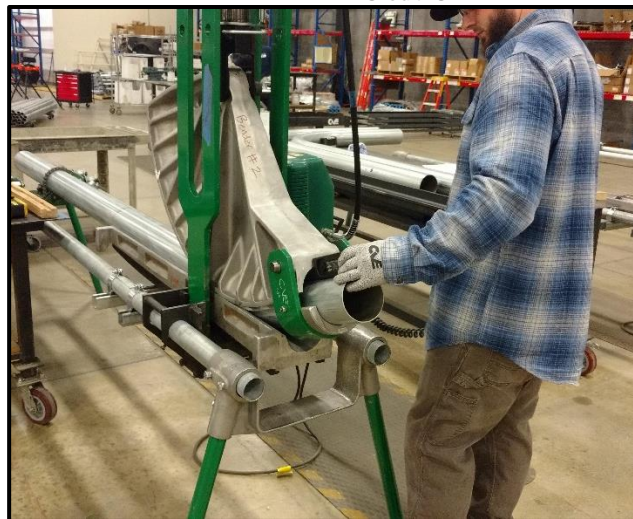
- Once bend reports and drawings have been created for our prefab shop, the bending process can begin.



Credit: CVE



Credit: CVE

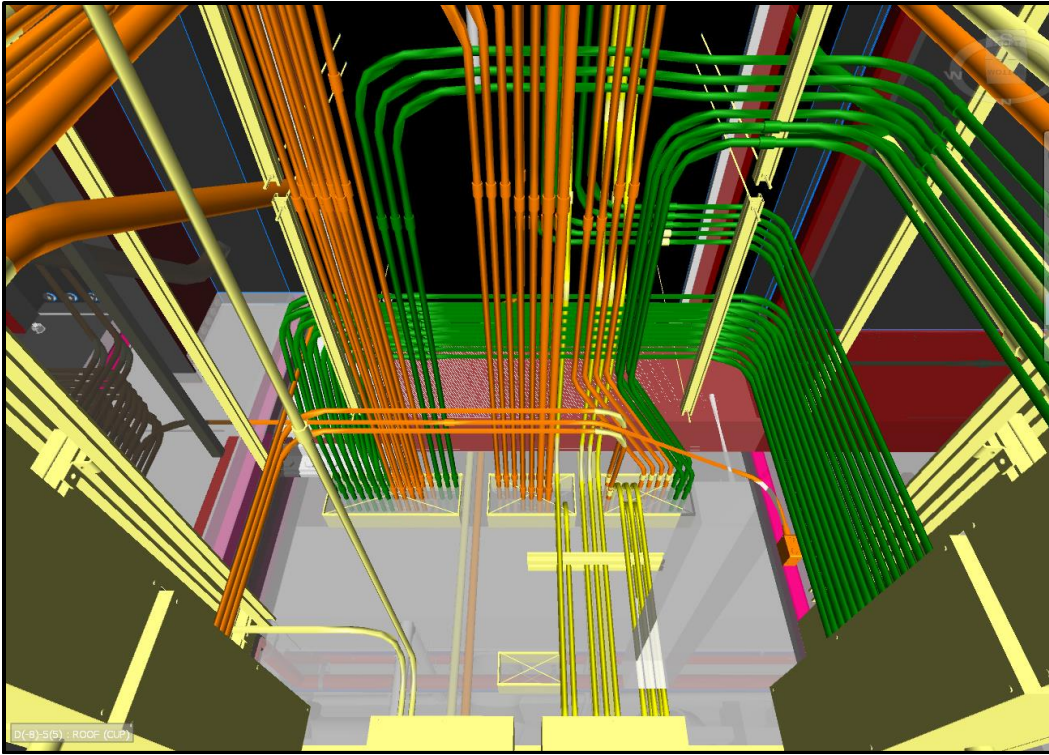


Credit: CVE

If prefabrication is performed early enough within the preconstruction stage, almost all of it can be produced and built before it ever touches the Jobsite!

Example #1 (below):

- Electrical room install
 - 90% of the entire room was prefabricated
 - Backing behind sheetrock, support panels, gutters, labels w/ circuit numbers built-in prefab shop in packages and sections
 - 20 electrical panels per room
 - Mainly a one-person install



Model

Credit: CVE



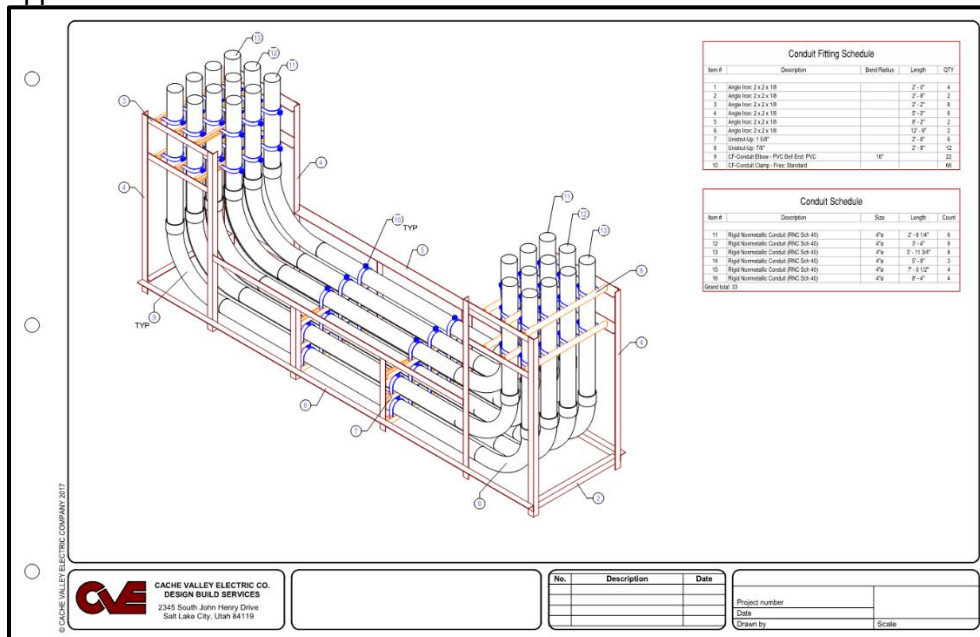
Install

Credit: CVE

Example #2 (below):

- Electrical underground conduit assembly
 - 100% prefabricated
 - One modular unit
 - Cost efficient

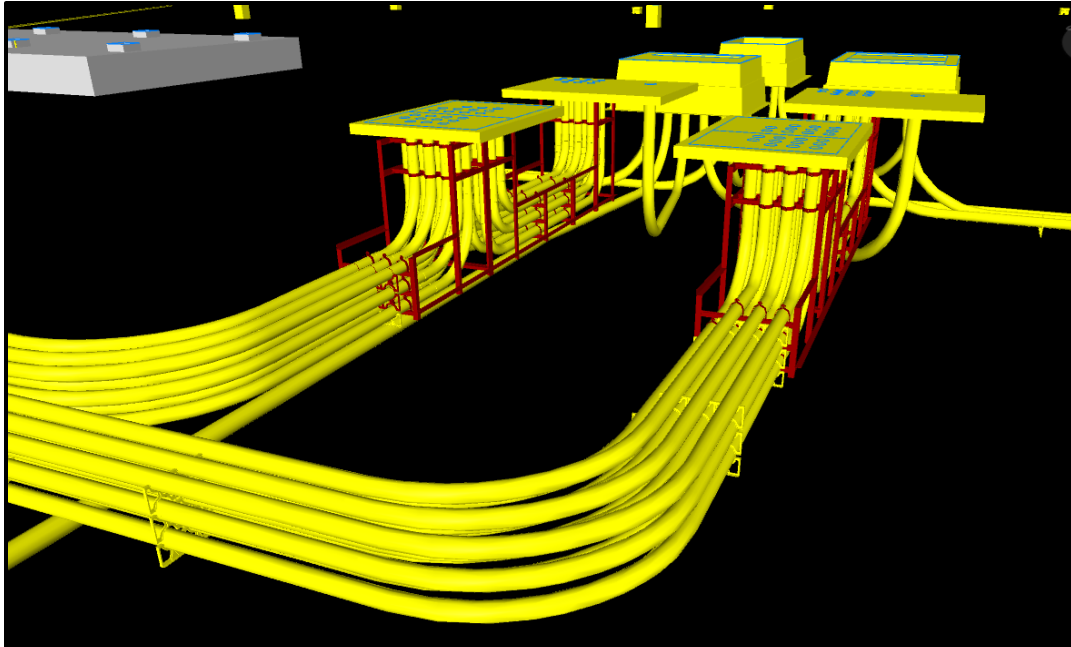
One of the first underground prefab assembly installs CVE has done. With a learning curve (field and prefab), we came in 14% under-budgeted labor hours. We were able to identify material opportunities to decrease material costs overall and the grand total came in 65% of the overall budget. CVE anticipates reaching a 30% labor savings during future prefab opportunities.



Credit: CVE



Credit: CVE



Credit: CVE



Credit: CVE

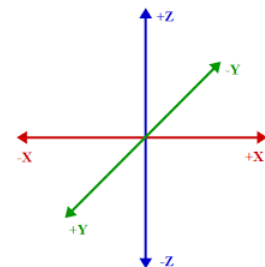
Process, workflow, and timeline needed to stay ahead of the general contractor

Staying ahead of the GC is imperative! If a subcontractor falls behind, entire projects could be at risk.

Many factors play a role in staying on schedule and on budget during coordination processes.

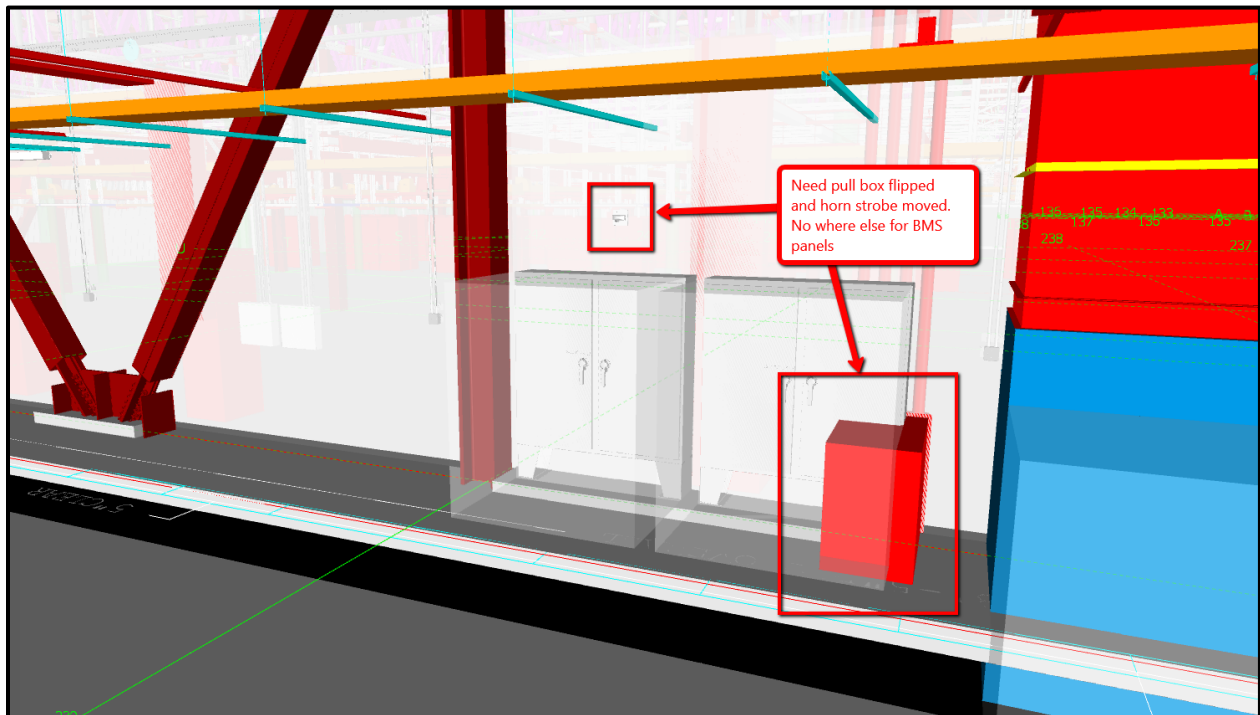
At the beginning:

- Review BIM Execution Plan (BEP)
 - Version/type of software
 - LOD
 - Subs required to provide BIM information
- Contracts or other formal documentation
- Understand the scope of work
 - Question any possible scope gaps that may affect your trades coordination efforts
 - i.e. Light switches from another trade were not modeled due to scope gap. Needed information for BMS along the wall
- Contact information
 - GC
 - BIM subcontractors
- GC to provide project coordinate information
 - Survey site control
 - *Correct coordinates are important when locating all models across multiple software platforms*
 - *Manual coordinate input*
 - *Grid layout*
 - *Shared and acquired coordinates*
 - *Dynamo routines*
- Reviewing specifications, submittals, one-line diagrams, and contract document drawings
- Create an internal BIM team
 - BIM Modeler, BIM Detailer, BIM Consultant, etc.



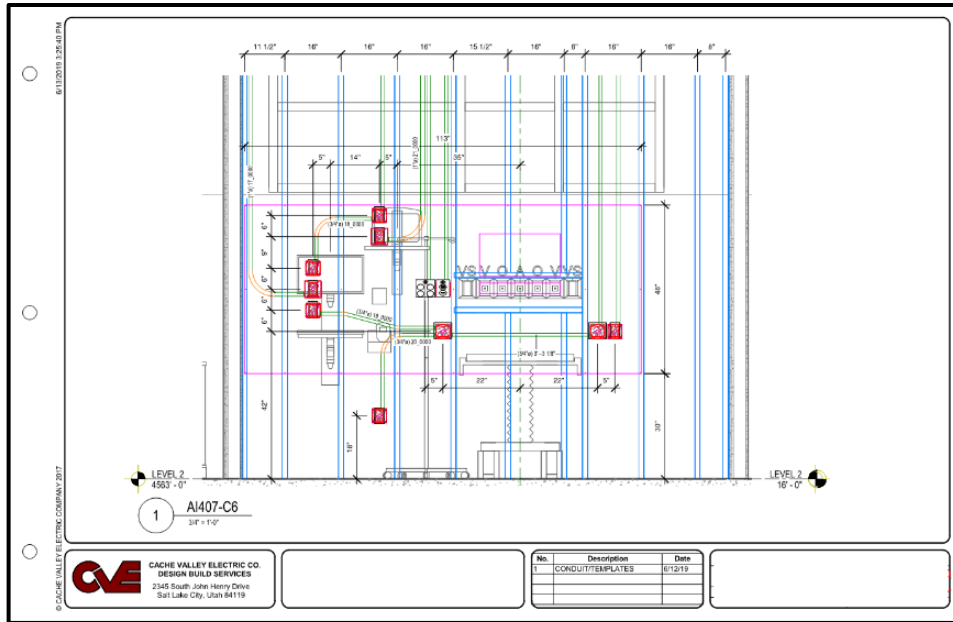
In the middle:

- Modeling
 - Equipment by submittals
 - 2D info to 3D constructible info
- Coordination meetings
- Resolve clashes/issues per means and methods
 - Order of Operations/Sequencing
 - Communicate and collaborate with other trades



Credit: CVE

- Providing information within your company
 - Field crews
 - Fabrication shop
- Clash-free shop drawings to field
- Prefabrication drawings for the fab shop



Credit: CVE



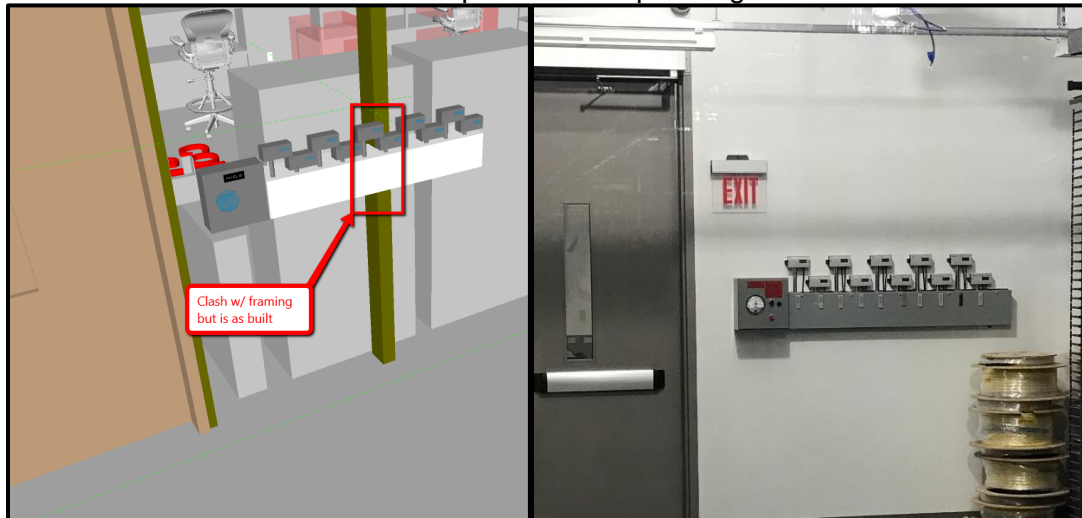
Credit: CVE



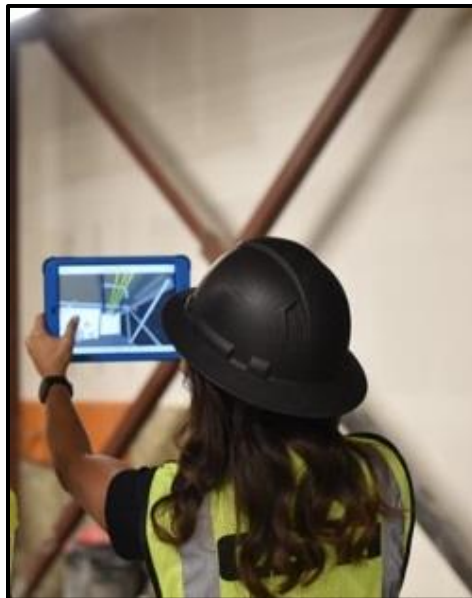
Credit: CVE

At the end (ish):

- Current as-built modeling
 - Verify install to your modeling
 - Communication with field install crews
 - Other trades
 - Order of Operations/Sequencing



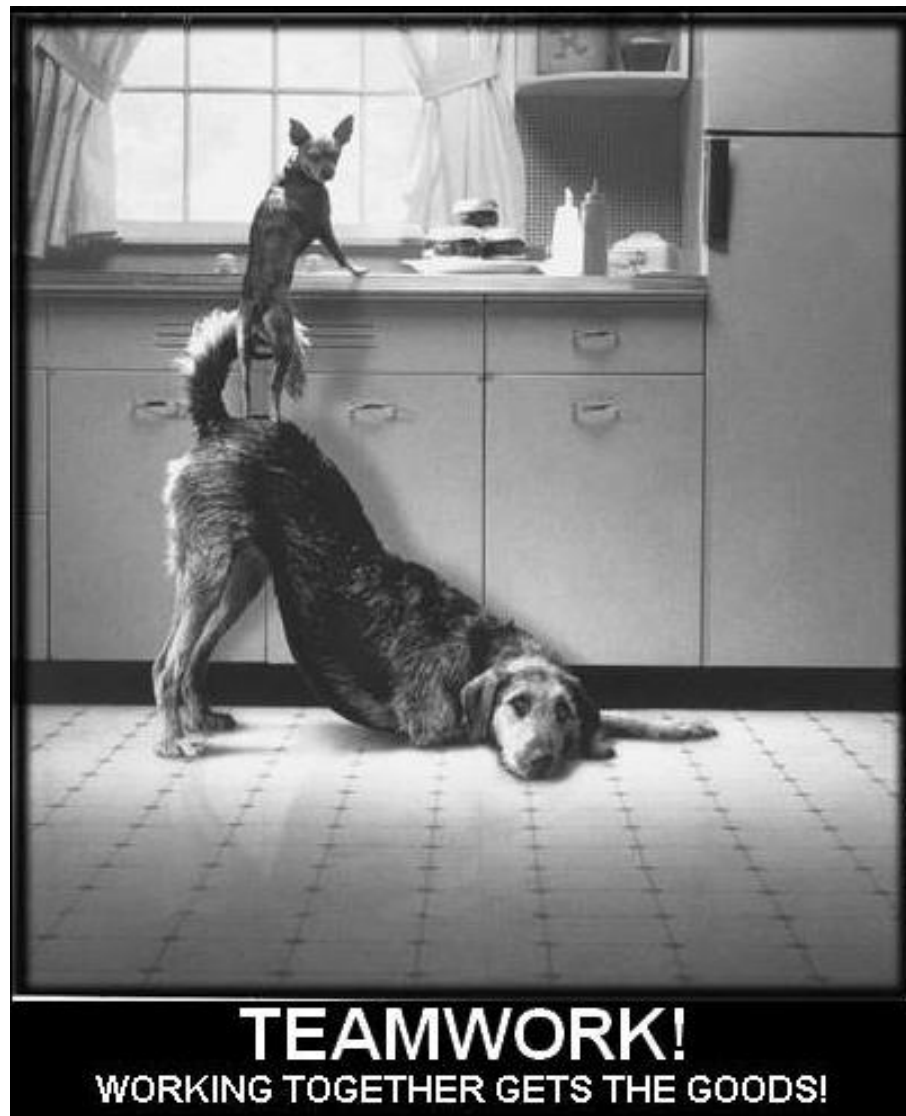
Credit: CVE



- BIM turnover to Owner
 - ***Guidelines and requirements should be laid out in the beginning in the BEP by the GC***
- Facilities Management
 - What will happen with all our content?
 - How will it be utilized?
 - Continued support from all trades

In Closing

Although our ever-changing technology has helped improve collaboration and communication amongst all project team members from design to construction, it still does not eliminate human error and stubbornness. For our entire industry to work better and more efficiently, we must work as one team and one unit. Training our clients how our content will be used from the start of our projects from design to facilities management is also very important. Learning how to create and provide processes and workflows through each other and share information, will, in turn, make a successful product shine through.



Credit: <https://quotesgram.com/inspirational-teamwork-quotes-and-sayings/>