Trimble

BuildingPoint™

Virtual Design & Construction Services

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2D DRAWING PRODUCTION

2D Drawing Production Options

2D drawings remain the contractual design deliverable and are the way to communicate design intent to the field. Workers benefit from a clean set of drawings which communicates everything that is required. For this reason many contractors have established a practice of generating trade-specific drawings to simplify management and communication. Choosing the right content for each drawing requires judgment and supplementing the drawings with all the required dimensions, tags, and annotation is labor-intensive. Trimble can provide both in 2D Drawing Production service.

- **Drawing Deliverable**
  Structural drawings (foundation drawings, concrete layout drawings, framing drawings, slab penetration drawings, wall penetration drawings)

  Architectural drawings (slab edge drawings, floor plan drawings, reflected ceiling drawings, elevation drawings)

  MEPF Drawings (trade specific drawings, MEPF – composite drawings, MEPF – sections of congested areas)
- **Scale**
- **Sheet View in Software / PDF / DWG**
- **Title Block**
- **Scope of Content and Annotation** - e.g. system size, penetration size, penetration length, distance from structural grids or control lines, vertical distance from the top of structural slab, elevation, etc.

MEPF Coordination Drawings

3D MODELING FROM 2D DRAWING

3D Modeling from 2D Options

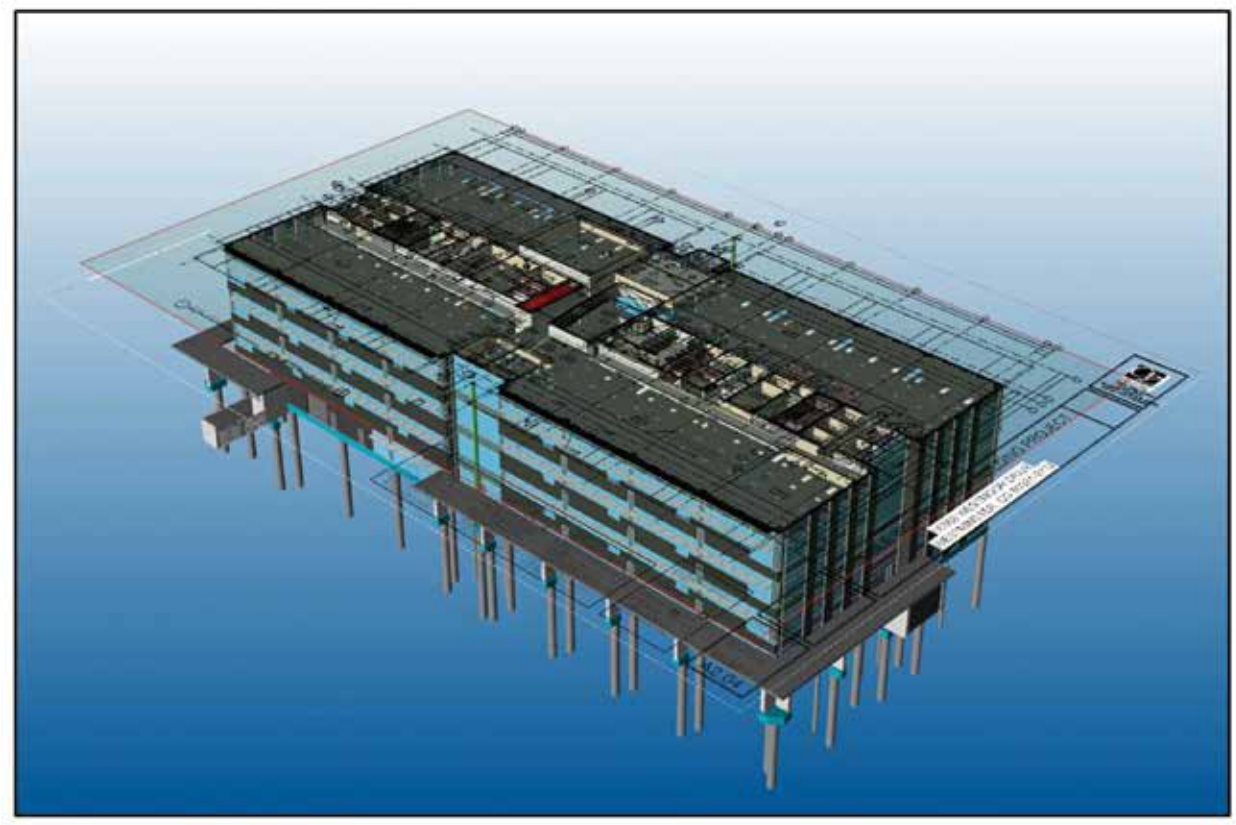
Although the preferred approach of a contractor is to utilize models authored by design teams and subcontractors, not all extended project teams have players who can model for construction purposes. Design model quality may not be sufficient for coordination or a subcontractor whose scope is critical for coordination or quantity take-off has not even been bought out yet. Sometimes subcontractors are not willing to model and have to outsource their modeling anyway. In this case, it is often more cost effective for the contractor to buy modeling services from one source so that the models will have consistent quality and to allocate the cost by invoicing the subcontractors.

- **All Design Disciplines**
- **Level of Detail for Each Discipline** (LOD 100, 200, 300, 350, 400)
- **Modeling Platform**: Revit, Trimble SketchUp, Trimble Tekla, Archicad, Autocad
- **Bronze, Silver, Gold Package**
  Bronze: just the 3D model, no allowance for changes, no constructability report, follow assumptions rather than asking RFI's

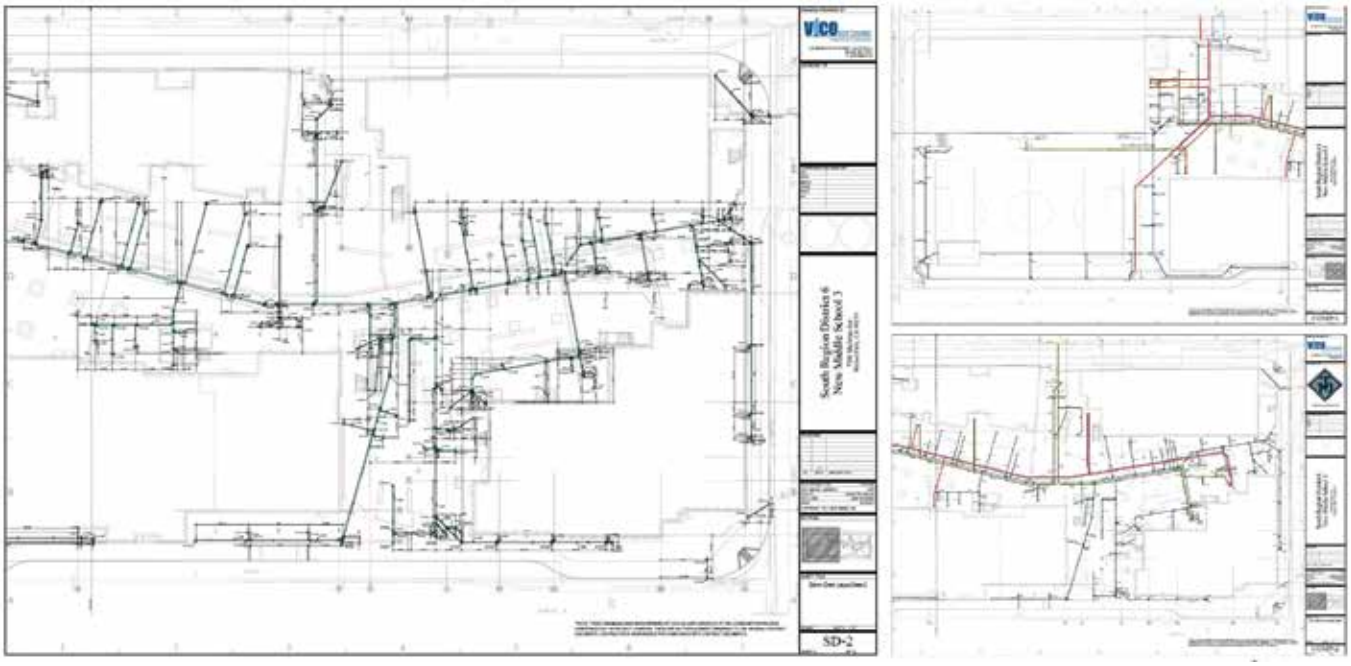
  Silver: 3D model, fast-track RFI discussion, constructability report in Excel, no allowance for changes

  Gold: 3D model, more time for RFI's, constructability report in Excel + viewpoints in Tekla BimSight, contingency for changes

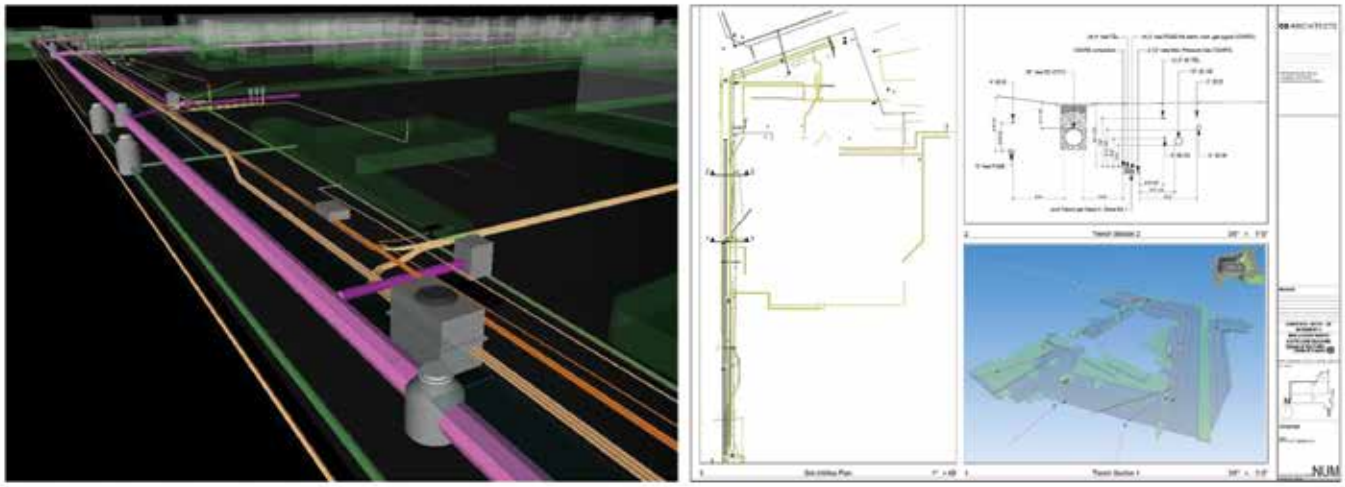
3D Modeling from 2D



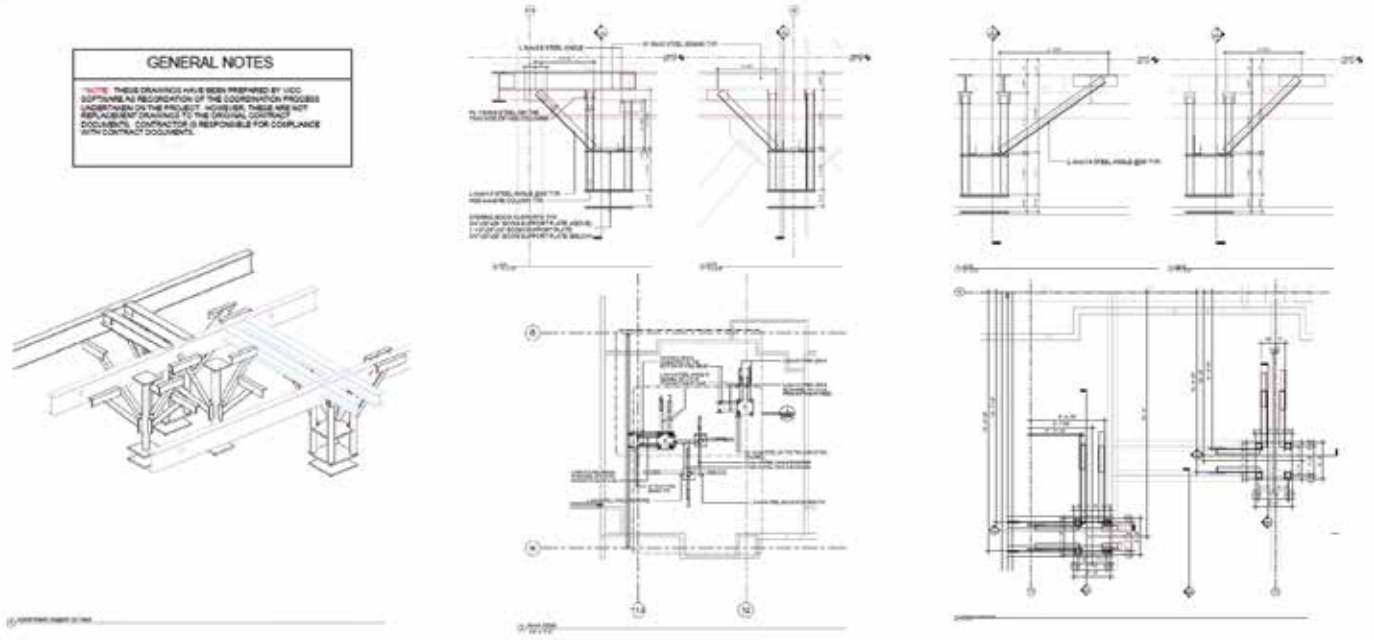
Site Utilities Coordination & Layout Drawings



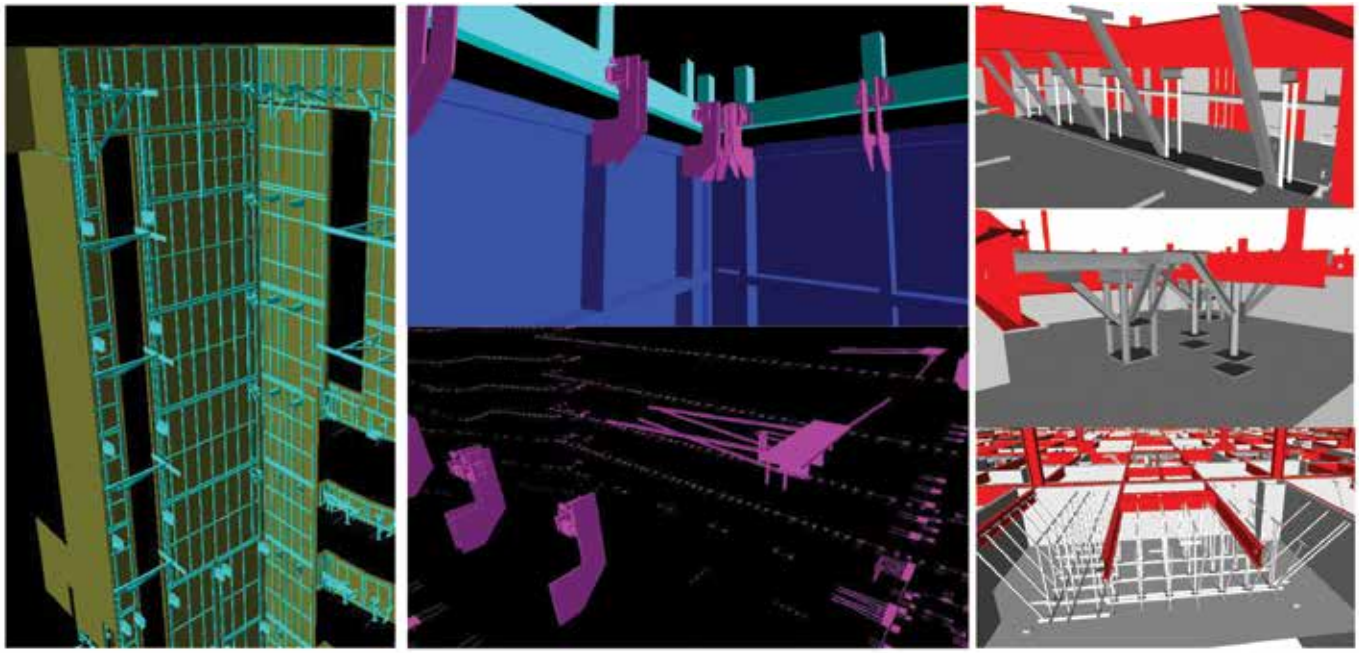
Site Utilities Coordination & Trench Sections



Miscellaneous Metals: Shop Drawings



Miscellaneous Metals: Interior & Exterior Support Steel for Coordination



3D MODELING FROM POINT CLOUD

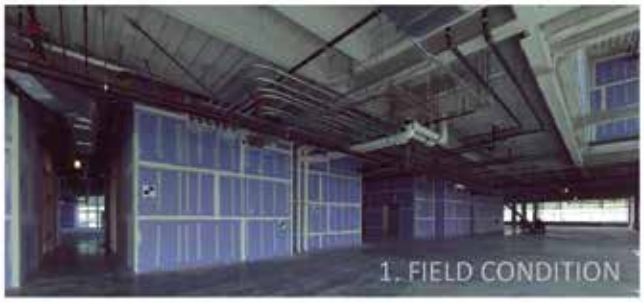
Scan-to-Model Services Options

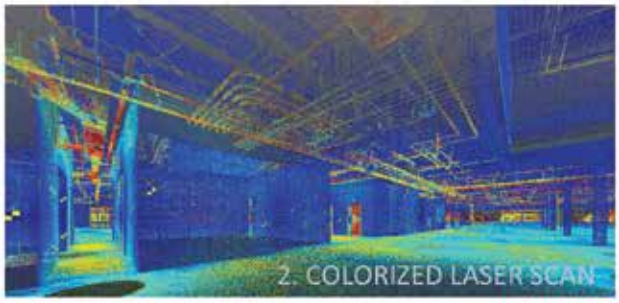
Laser scanning is a quick and accurate way to get data on existing conditions. Use cases for a contractor include understanding as-built conditions for coordination in renovation projects, calculating quantities for demolition, and quality checking work in place. Many use cases can be handled by simply investigating the point cloud in Trimble RealWorks software, but some use cases require converting the point cloud data into a BIM model. For example, using the point cloud for coordination or quantity take-off requires the modeling of intelligent and quantifiable BIM elements based on point cloud geometries and within construction tolerances. Currently, this is a manual process requiring significant effort and subject matter expertise. The resulting point cloud-based model represents an as-built environment that can be used for the lifetime of the building, for planning and tracking maintenance or renovation. The model can be measured and quantified in areas that are often difficult to access, and can be queried using a number of user-defined parameters via the BIM database.

- **3D Scan in the Field using a Trimble TX6 or TX8 Scanner**
- **Point Cloud Registration Using Trimble RealWorks**
- **Level of Detail (LOD) for Each Discipline, Including Tolerance**
- **Modeling Platform for Each Discipline**

3D Scan-to-Bim for Renovation Planning

As-Built Scan to 3D Bim for Digital Handover





BIM QUALITY ASSESSMENT

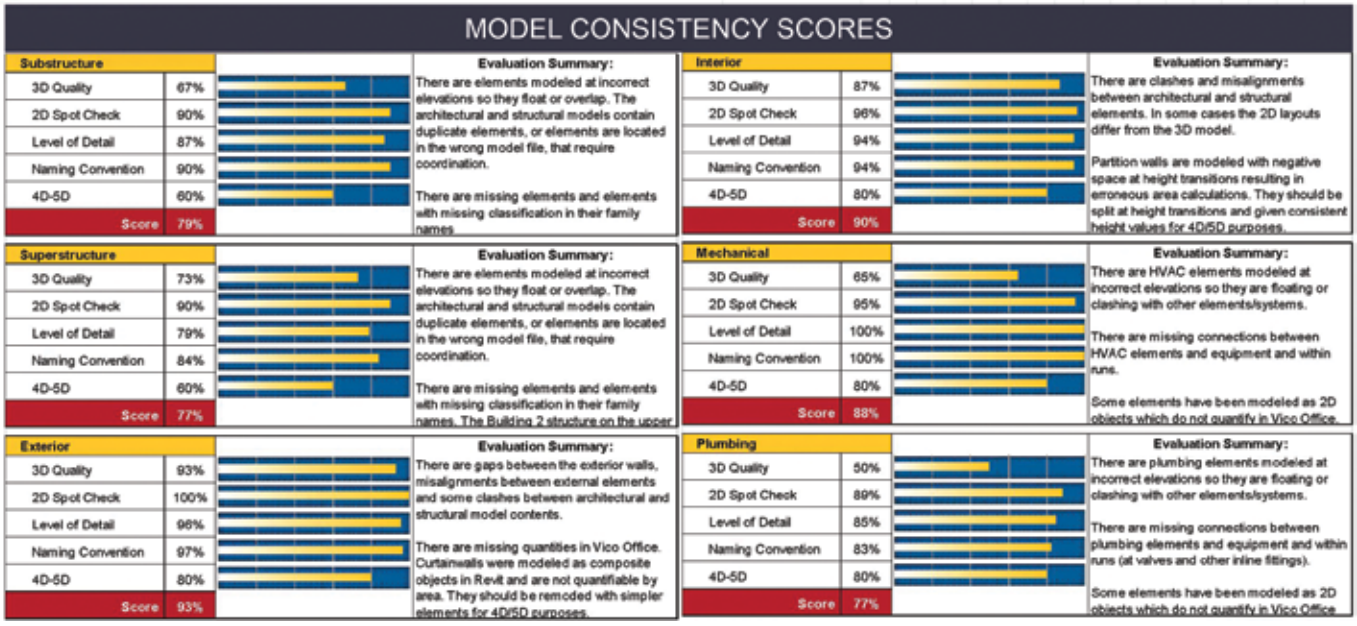
3D Model Assessment Service Options

In a perfect world the owner should only have to pay to model their building once. In reality, however, reusing a design team's BIM models during construction can pose a major challenge for General contractors and construction managers. 3D models are used by the design team to validate design concepts and to generate and manage 2D drawings. They often are not created with the level of detail or structure required for use in coordinating with other systems, estimating cost, scheduling, or layout of a construction project. To use the design team's model for these downstream processes the contractor needs to know which parts of the modeled scope can be safely used and which elements may result in incorrect information.

Model quality can be evaluated for use in one or all of the following use cases:

- **Model-Based Layout**
- **3D / MEPF Coordination**
- **5D / Model-Based Quantity Take-Off**
- **4D / Model-Based Scheduling**
- **6D / Digital Handoff/Facilities Management**

Bim Quality Assessment Report



MODEL CONSISTENCY SCORES

Substructure	
3D Quality	67%
2D Spot Check	90%
Level of Detail	87%
Naming Convention	90%
4D-5D	60%
Score	79%

Evaluation Summary:
There are elements modeled at incorrect elevations so they float or overlap. The architectural and structural models contain duplicate elements, or elements are located in the wrong model file, that require coordination.

There are missing elements and elements with missing classification in their family names

Interior	
3D Quality	87%
2D Spot Check	96%
Level of Detail	94%
Naming Convention	94%
4D-5D	80%
Score	90%

Evaluation Summary:
There are clashes and misalignments between architectural and structural elements. In some cases the 2D layouts differ from the 3D model.

Partition walls are modeled with negative space at height transitions resulting in erroneous area calculations. They should be split at height transitions and given consistent height values for 4D/5D purposes.

Superstructure	
3D Quality	73%
2D Spot Check	90%
Level of Detail	79%
Naming Convention	84%
4D-5D	60%
Score	77%

Evaluation Summary:
There are elements modeled at incorrect elevations so they float or overlap. The architectural and structural models contain duplicate elements, or elements are located in the wrong model file, that require coordination.

There are missing elements and elements with missing classification in their family names. The Building 2 structure on the upper

Mechanical	
3D Quality	65%
2D Spot Check	95%
Level of Detail	100%
Naming Convention	100%
4D-5D	80%
Score	88%

Evaluation Summary:
There are HVAC elements modeled at incorrect elevations so they are floating or clashing with other elements/systems.

There are missing connections between HVAC elements and equipment and within runs.

Some elements have been modeled as 2D objects which do not quantify in Vico Office.

Exterior	
3D Quality	93%
2D Spot Check	100%
Level of Detail	96%
Naming Convention	97%
4D-5D	80%
Score	93%

Evaluation Summary:
There are gaps between the exterior walls, misalignments between external elements and some clashes between architectural and structural model contents.

There are missing quantities in Vico Office. Curtainwalls were modeled as composite objects in Revit and are not quantifiable by area. They should be remoded with simpler elements for 4D/5D purposes.

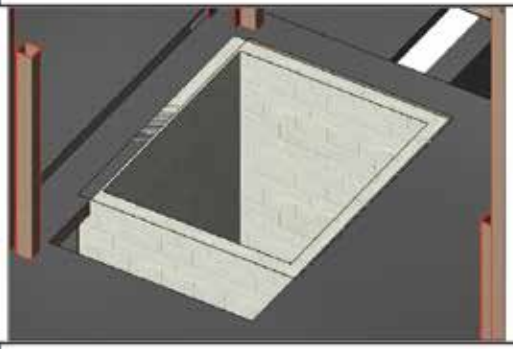
Plumbing	
3D Quality	50%
2D Spot Check	89%
Level of Detail	85%
Naming Convention	83%
4D-5D	80%
Score	77%

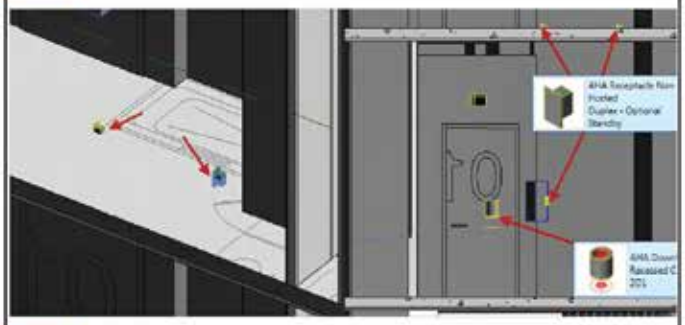
Evaluation Summary:
There are plumbing elements modeled at incorrect elevations so they are floating or clashing with other elements/systems.

There are missing connections between plumbing elements and equipment and within runs (at valves and other inline fittings).

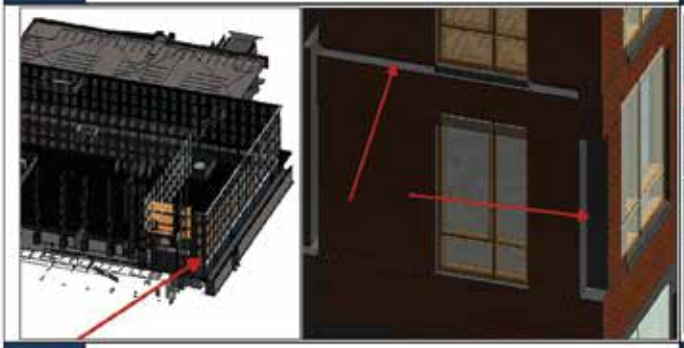
Some elements have been modeled as 2D objects which do not quantify in Vico Office

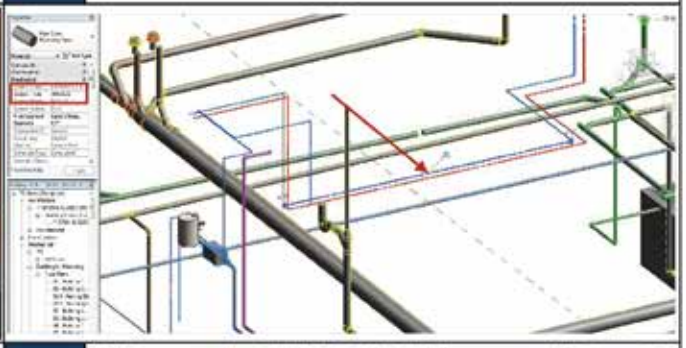
Quality Assessment for 3D Coordination

ID	013	Floor	GROUND FLOOR	Grid Reference	2-A - 2-A.3 / E-9 - E-10
Model Reference	Parking Deck Structural.rvt				
Description	There are hard clashes between CMU stair core walls and the structural slab. Also, the wall layout and slab edge dimensions are not in alignment.				
					
Impact	Misaligned elements will need to be relocated with potential impact to systems coordination.				

ID	005	Floor	All level	Grid Reference	General
Model Reference	Buildings 1 & 2 - M0181-010.00 - ELEC.rvt				
Description	There are floating wall and ceiling fixtures throughout the model. These elements have been modeled at a position / elevation inconsistent with the architectural and structural models.				
					
Impact	These elements have to be set to the proper elevation for 3D coordination or should be deleted if they are unnecessary.				

Quality Assessment for Model-Based Estimating and Scheduling

ID	011	Floor	Level 2	Grid Reference	1-K/E-1
Model Reference	ARCH_Building 1 & 2.rvt				
Description	There are gaps and incorrect connections in the exterior enclosure between levels and between floors and at corners of exterior walls.				
					
Impact	The gaps in the exterior enclosure will affect quantity calculations for exterior walls which will impact cost estimates and schedules driven by this model.				

ID	016	Floor	All level	Grid Reference	General
Model Reference	Building 3 - M0181-010.00 - PLUM - Central.rvt				
Description	Plumbing pressure pipes were modeled without consideration for installation sequence. The system type is defined but risers, main, and branch runs are not separated in any way.				
					
Impact	Plumbing pressure pipes will not be isolated by installation sequence which will complicate the decision-making process during 3D coordination. Modeled elements will have to be manually counted as riser, main, and branch for quantity, cost, and schedule planning/tracking.				

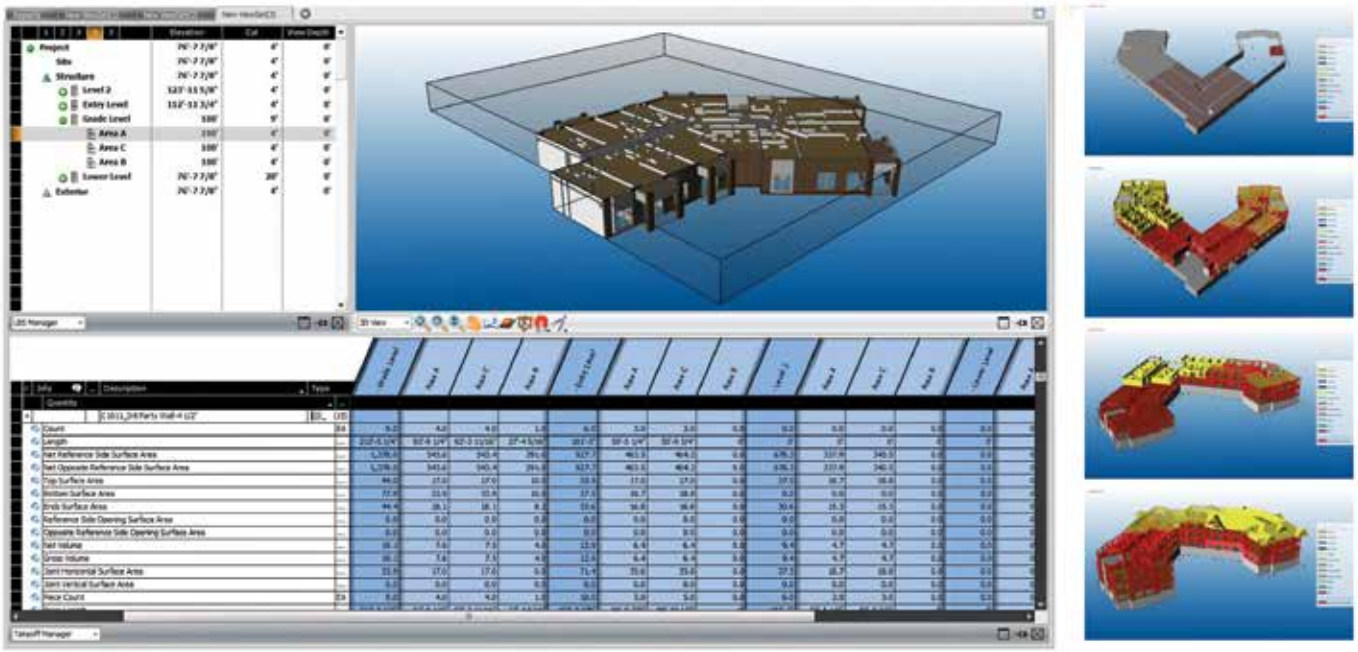
BUSINESS DEVELOPMENT

Business Development Services Options

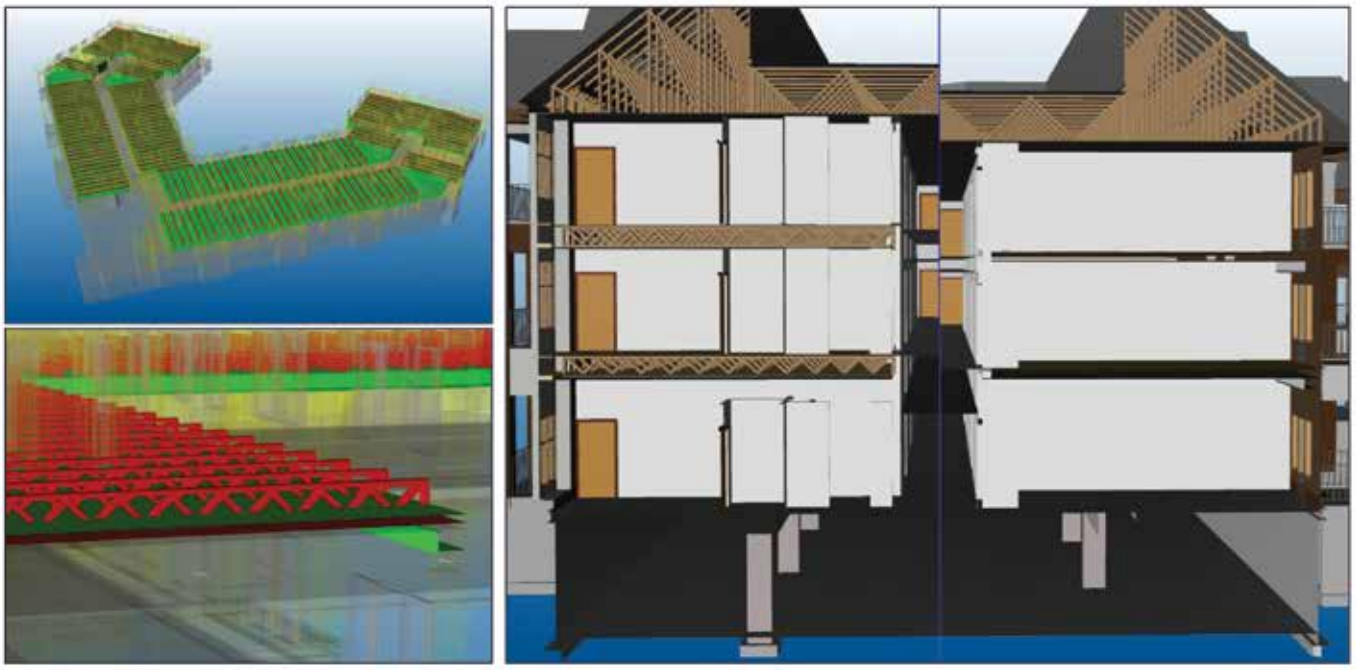
In today's competitive bidding environment winning new business means positioning your company ahead of the pack. During a pursuit presentation, contractors must communicate a detailed understanding of the project, demonstrate a project management strategy in a way understandable to a layperson, and illustrate the risks and techniques unique to the proposed method of construction. An integrated 5D approach using BIM tools and data-based analysis through Vico Office can be used as such a differentiator.

- **Scope of Modeling**
  - Core and Shell
  - Site Logistics
  - Interiors / MEP
- **Scope of Model-Based Quantity Takeoff and Estimate**
- **Scope of Model-Based Scheduling**
- **Scope of Animated 4D Construction Simulation**
- **Renderings of Major Construction Milestones**

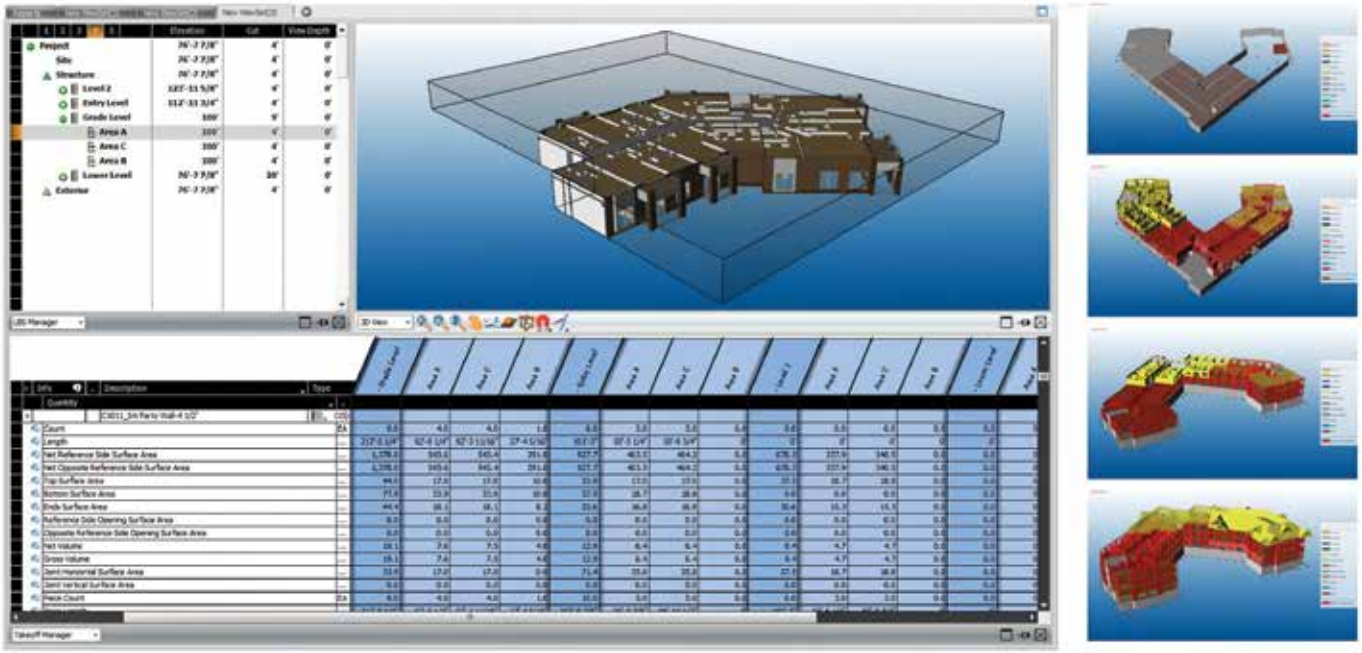
Business Development Construction Simulation



Constructability Analysis - Stick Frame VS. Truss Floor Framing



Business Development Presentation Material



MODEL-BASED QUANTITY TAKEOFF

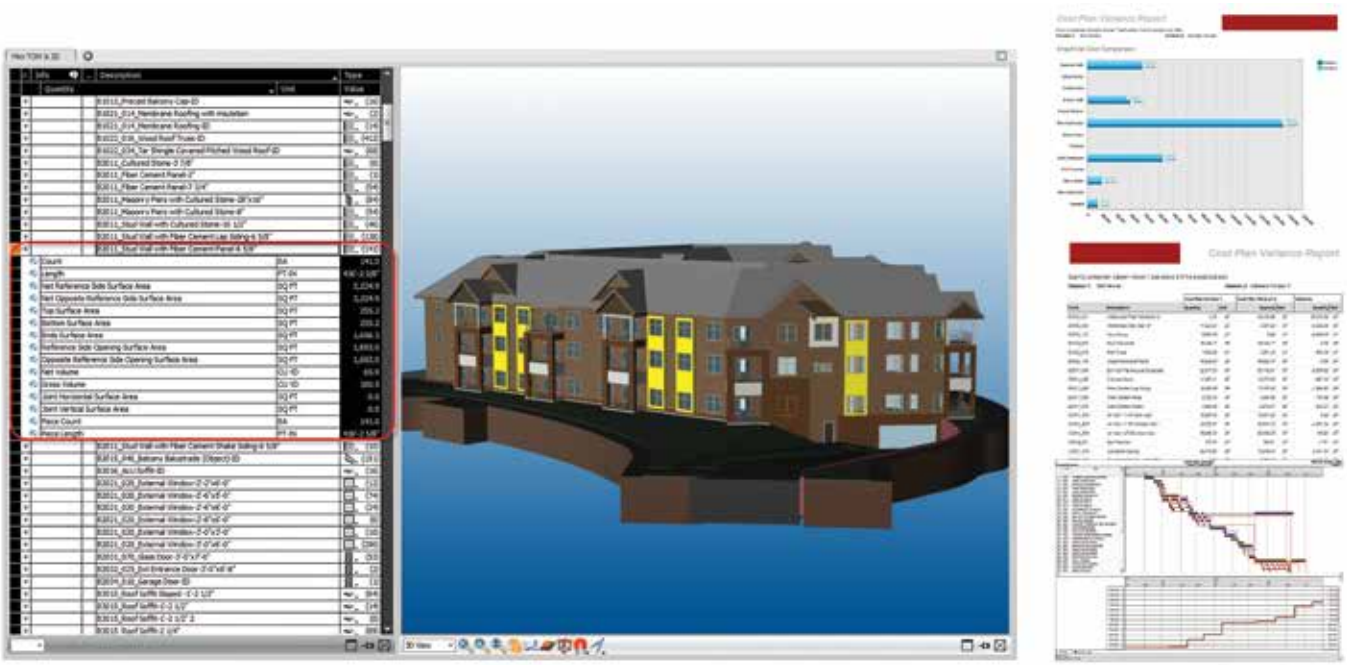
Model-Based Quantity Take-Off Options

BuildingPoint™

Vico Office is the first BIM-neutral platform that calculates construction-caliber quantities from several BIM platforms and provides them for downstream use in scheduling and cost estimating. Model-based quantity take-off is faster, more accurate, and easier to communicate than manual quantity take-off; however, model quality and the naming and organizational standards used by the model author may limit the benefits. Utilizing quantities from a 3D model effectively requires knowledge of the level of detail and accuracy of the 3D model and insight into the methods of creating that content. Whether it is your first time working with another company's modeling standards (and are simply trying to understand the content), or you want to reform a model to communicate directly with an established cost estimating or scheduling database, there is often a large amount of processing time required to arrive at a usable dataset. Trimble can help streamline the process.

- **Required Quantities for Take-Off**
- **Report Format**
  Trimble Standard
  Customer Specified
- **Input Models** (Architectural, Structural, MEPF)

Business Development Model-Based Quantity Takeoff



Trimble

PRESENTATION MATERIALS

Presentation Materials Options

Visual communication is one of the simplest and most effective ways to convey an idea. Images are an important tool for marketing and result in a better understanding of the project. Rendered images of a 3D model can be photorealistic and can show detailed materials. These images allow the end user to experience the facility in a realistic way prior to construction. This decreases the amount of end user changes because everyone can have a shared understanding of project outcome prior to finishes, fittings, and fixtures procurement. Creating a high quality rendering involves more than just a few clicks in a BIM software. Additional detail or new elements may need to be added to the existing design models and lighting sources and materials need to be accurately defined for the rendering to look realistic. This is often a time-intensive challenge and Trimble has the resources and skills to help.

- **Required Viewpoints and Visible Elements**
- **Rendering Quality Requirement**

  Low: Material views and rendering settings in the modeling application

  Medium: Material views and rendering settings are set up in the modeling application. Rendering is done using an external application

  High: Views and materials exported to an external application (such as 3DSMAX or C4D) where rendering properties are set up
- **Aspect Ratio**
- **Resolution**
- **Image Size**
- **File Format**

Rendered Images

Exterior Skin Virtual Mock-Up





Vivarium Virtual Mock-Up





2D Changes Analysis

2D Change Management Options

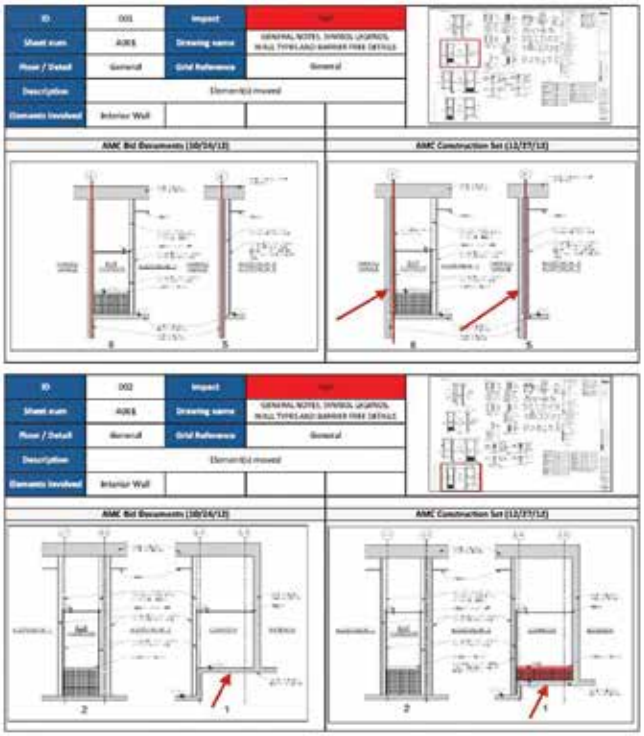
Contractors often receive several large document sets during the course of a project. Sometimes, not all of the changes contained in the new drawings are clouded by the design team. Each missed change can have significant cost and schedule impacts and finding all the changes between the versions of drawings is a time-consuming process. Trimble has developed software to automate the process of change management called Document Controller. The software works like a virtual light table allowing the team to review changes by using a slider between drawing versions or by seeing all the changes highlighted and color-coded. The 2D Changes Management service includes using this software to locate changes and creating a report which lists all the changes and can be quickly processed by the contractor's team.

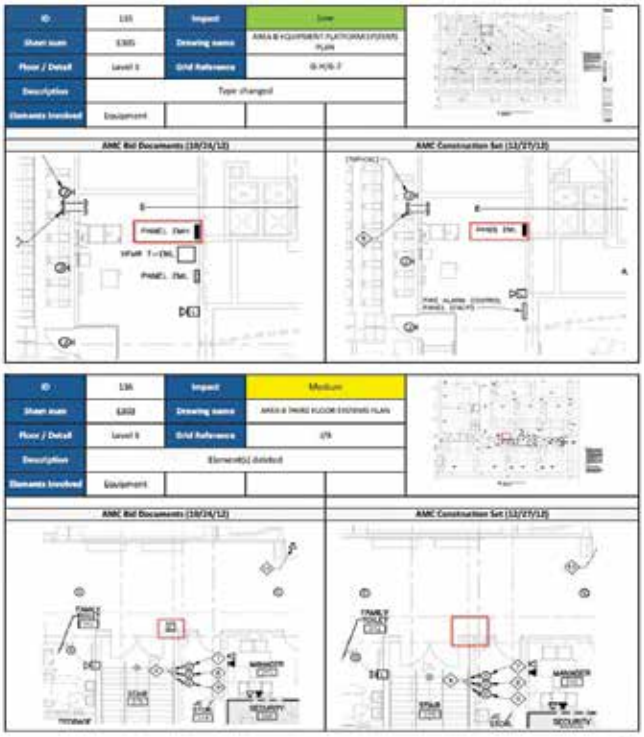
- **Deliverables:**
  Report in Excel/PDF format
  Vico Office project containing changes highlighted in Document
- **Controller**
  2D drawing set with changes clouded (Vico Office)

Identify Changes in Contract Documentation

ID	072	Impact	High
Sheet num	E105	Drawing name	AREA B EQUIPMENT PLATFORM LIGHTING PLAN
Floor / Detail	Equipment Platform	Grid Reference	G-H/7
Description	Element(s) added, Element(s) deleted		
Elements Involved	Equipment		

Identify Changes in Contract Documentation





3D Coordination Management Assistance

Coordination Management Assistance Options

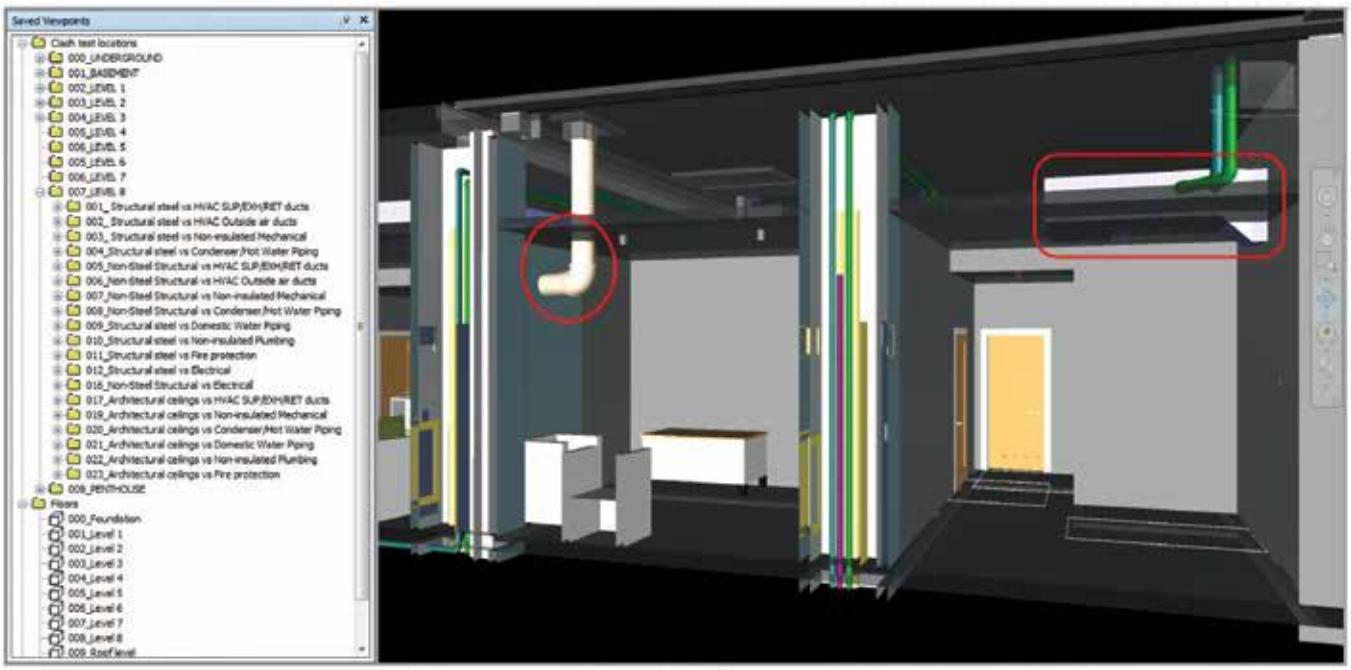
In a standard BIM coordination process, the contractor integrates 3D models from design teams and subcontractors, runs clash detection, checks for clashes between systems, and runs coordination meetings to review conflicts and resolve issues. Many of these steps require a significant investment of time to do properly and it is often one BIM / VDC person left struggling to get everything done while chasing the design teams and subcontractors for input. A common complaint from the personnel responsible for Coordination Management is that there is not enough time to adequately report and investigate issues and the lack of preparation decreases the productivity of coordination meetings.

Trimble scope can include:

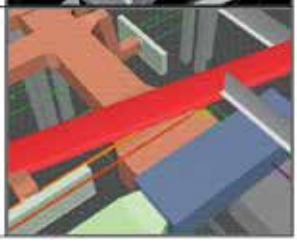
- **Integrating 3D Models** from design teams and subcontractors in the chosen coordination platform.
- **Performing Clash Detection Checks** between systems.
- **Reporting Clashes** in a constructability report.
- **Adding Viewpoints** in the chosen coordination platform.
- **Running Coordination Meetings**

Deliverables can be one-off or delivered continuously, for example, weekly.

Custom Views with Crystal Clear Mark-Up

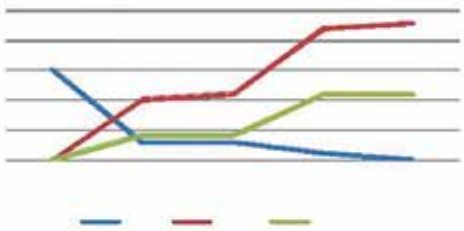


Issue Tracking and Coordination Metrics

Trimble	Navis model setup for Clash detection			A vs B	
Batch Item	Clash test item name	Clearance added		Selected instances "A"	Selected instances "B"
001	Structural steel vs HVAC SUP/EXH/RET ducts	3 1/2"		93030.3Q, 93230.3Q, 93330.30	03060.3Q, 01060.3Q, 01060.30
Clash ID	Comment	Clash Details	Status	Image	
4	There is a clearance clash between structural steel fireproofing and exhaust duct riser insulation. Measured distance between duct face and W-section steel flange is 3 1/8". Required clearance is 3 1/2". There is 11" of space to the north side of shaft opening. Suggest shifting duct riser north to avoid clash.	Type - Clearance Level - Level 1 Grid - F/2.2	Closed		
5	There is a hard clash between structural steel and exhaust duct mains at the entrace to riser shaft. Duct is clashing with steel by 1 1/4". Required clearance is 3 1/2". There is 1" of space between bottom of duct and ceiling framing at this location. Suggest changing aspect ratio of duct main and lowering ceiling or adding soffit to allow the appropriate clearance between steel and duct.	Type - Hard Level - Level 1 Grid - F/2.2	Closed		
8	There is a hard clash between structural steel and supply duct main. Duct is clashing with steel by 1". Required clearance is 3 1/2". There is 6" of space between bottom of duct and ceiling framing at this location. Suggest lowering duct to allow the appropriate clearance between steel and duct. **Update 1 :** Duct was lowered by 2" to avoid hard clash but clearance clash remains.	Type - Clearance Level - Level 1 Grid - E/4	Open		

Summary Report

Trimble	Navis model setup for Clash detection		
Batch Item	Clash test item name		
001A	Structural steel vs HVAC SUP/RET ducts		
	New	Open	Closed
23-Apr-14	15	0	0
28-Apr-14	3	10	4
12-May-14	3	11	4
6-Jun-14	1	22	11
29-Jul-14	0	23	11



3D Coordination Resolution

3D Coordination Resolution Service Options

In a standard BIM coordination process, the contractor integrates 3D models from design teams and subcontractors, runs clash detection checks for clashes between systems, and runs coordination meetings to review conflicts and resolve issues. Although this is much better than a 2D-based coordination process (using light tables) it is filled with inefficiencies. As one trade moves an element to resolve a clash it creates two more clashes down the line. Subcontractors spend a lot of time sending RFI's to the design team because it is impossible to make their systems fit within the given ceiling space. The goal of Trimble's coordination resolution service is to resolve clashes among all trades before the subcontractors begin the detailed shop drawings process. We accomplish this by following a set of rules which define typical system elevations and determine system priority in shared spaces called System Priority Structure. This process can decrease the duration of 3D coordination by 40%, decrease the number of change orders caused by RFIs, and if implemented before buyout can result in lower subcontractor bids due to the lower perceived risk associated with pre-coordination.

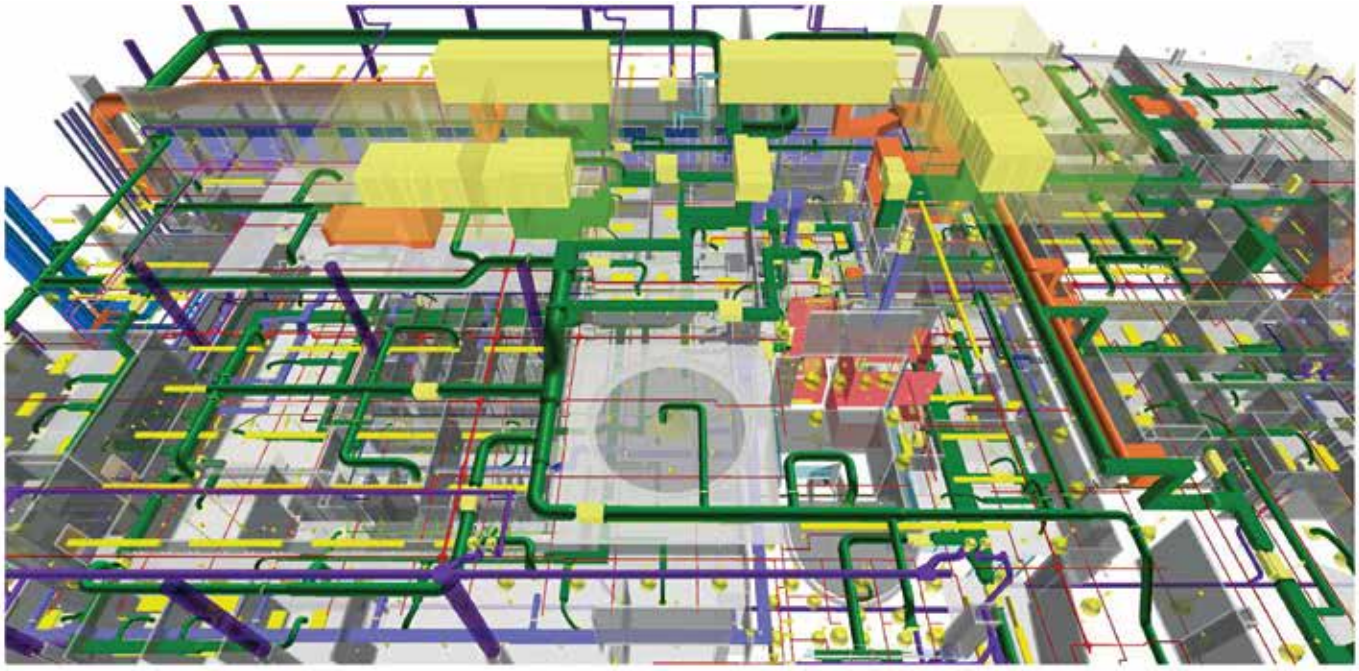
- **Included Design Disciplines**
- **Level of Detail for Each Discipline**
- **Modeling Platform for Each Discipline**
- **Coordination Resolution Type:**

  Design Coordination Before Buyout: The goal is to identify and resolve major coordination issues prior to MEP buyout.

  Design Coordination After Buyout: The goal is to work ahead of the typical coordination process, identifying design issues so they can be resolved before they are encountered by MEPF subcontractors during their coordination process

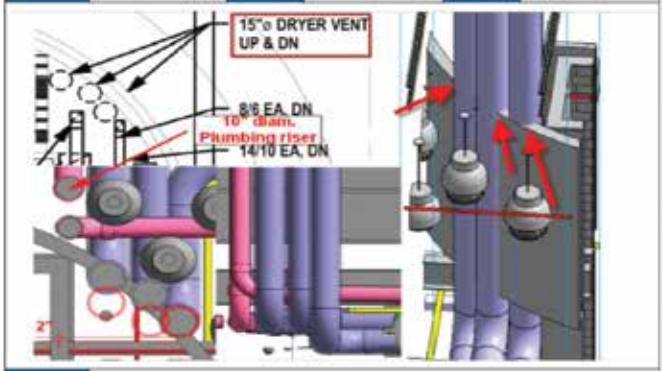
  Fabrication Coordination: The goal is to use shop/coordination drawings provided by MEPF subcontractors and identify and resolve issues prior to fabrication and/or installation

Co-Located Systems 3D Modeling



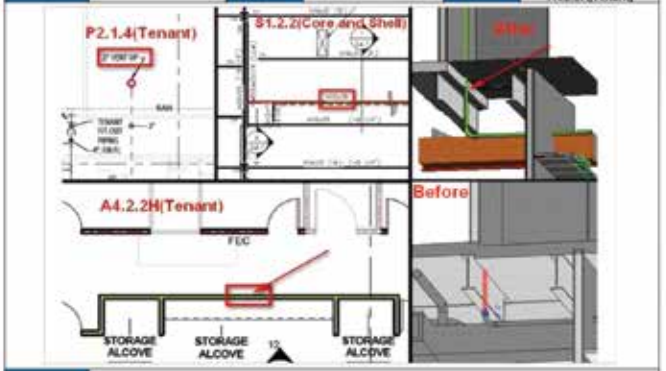
Coordination and Constructability Report

CRI Number:	MEPF-Loc_G-004	Trades:	MA	Severity:	Medium
Description:	Group of three (3) dryer vent ducts are clashing with an interior partition wall. There is insufficient space for three 15"diam. vertical dryer vent ducts in the designated shaft.				
Floor:	Level 2	Grid Reference:	hM-hN/h1-h2	Sheet Reference:	H2.2.2.2H(tenant)



Modeling Assumption:	Modeled the 15" diam. vertical dryer vent ducts according to the H2.2.2H HVAC floor plan; they are in conflict with interior partition wall pending redesign.
Owner:	Mechanical
Referring RFI:	
Comments:	
Status:	New
Date:	
Status:	
Date:	7/25/2013

CRI Number:	MEPF-Loc_E-013	Trades:	PAS	Severity:	High
Description:	A 2" diam. sanitary vent pipe clashes with structural beam. The pipe is planned to be carried in a wall (highlighted yellow) but there is a W-section beam running parallel below.				
Floor:	Level 1	Grid Reference:	hD-hE/h4-h5	Sheet Reference:	P2.1.4H(Tenant); S1.2.2(c&s); A4.2.2H(Tenant)



Modeling Assumption:	Vent pipe was moved outside of the corridor wall, into the storage alcove room, to avoid clashing with steel beam below. Submit as RFI to architect; request for 6" furring wall.
Owner:	Plumbing
Referring RFI:	
Comments:	
Status:	New
Date:	
Status:	
Date:	8/14/2013

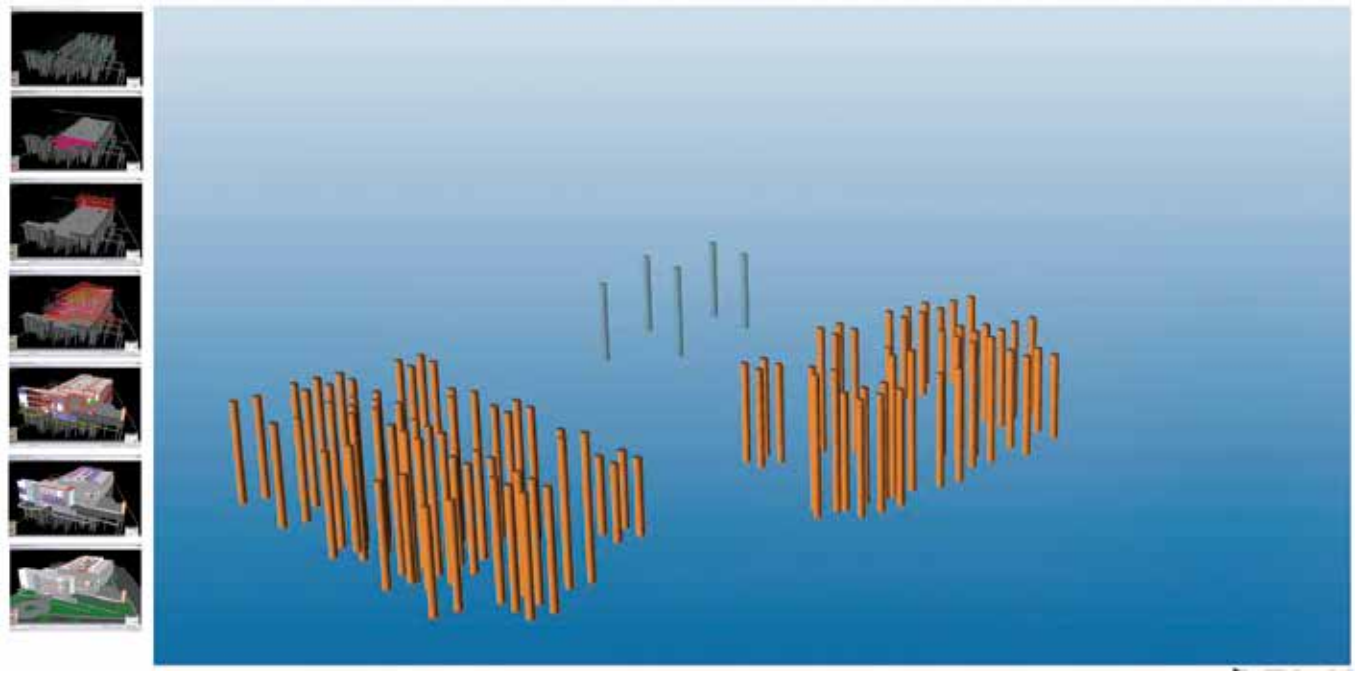
4D Construction Simulation

4D Construction Simulation Options

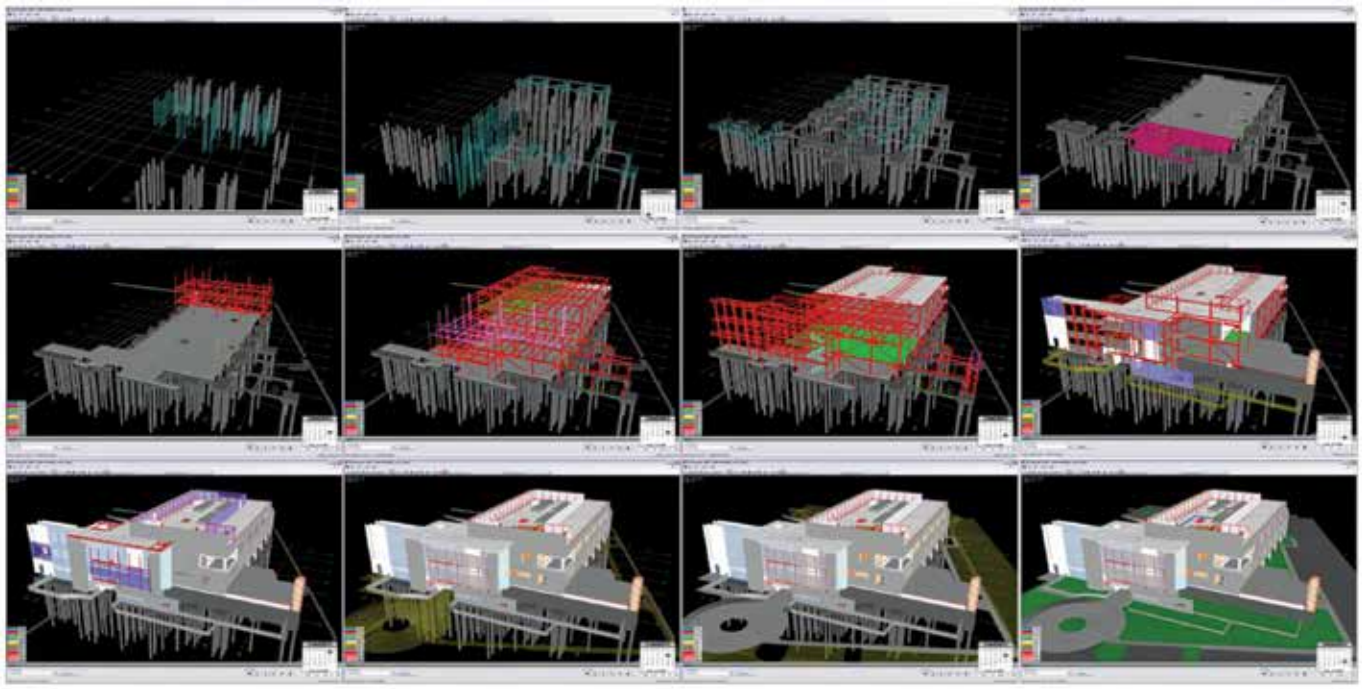
Visual communication is one of the simplest and most effective ways to convey an idea. 4D Construction simulations can be used to quickly communicate the building construction sequence and intended workflow to all stakeholders. Rather than reviewing and trying to understand a complex schedule 4D simulations provide a dynamic way to experience the schedule by showing the virtual construction of a 3D model over time. Typical use cases for a 4D simulation can be the communication of construction phases and milestone dates, site logistics and materials staging plans, a representation of the flow of crews through work areas, or a rendered, photo-realistic representation for marketing purposes. 4D simulation in Vico Office is a by-product of the model-based scheduling process and can be used to visually confirm the plan before signing off. Photo-realistic simulations require time-intensive steps to represent detail which may include modeling new elements and defining lighting sources and materials.

- **3D PDF Output**
- **Google Earth Integrated Output**
- **Pre-Rendered Photo-Realistic Simulations**
- **Interactive Walkthrough**
- **Vico Office 4D Simulation**
- **Movie File Formats:** .avi, .wmv, .mov, other

4D Construction Simulation



4D Construction Simulation



Schedule Analysis

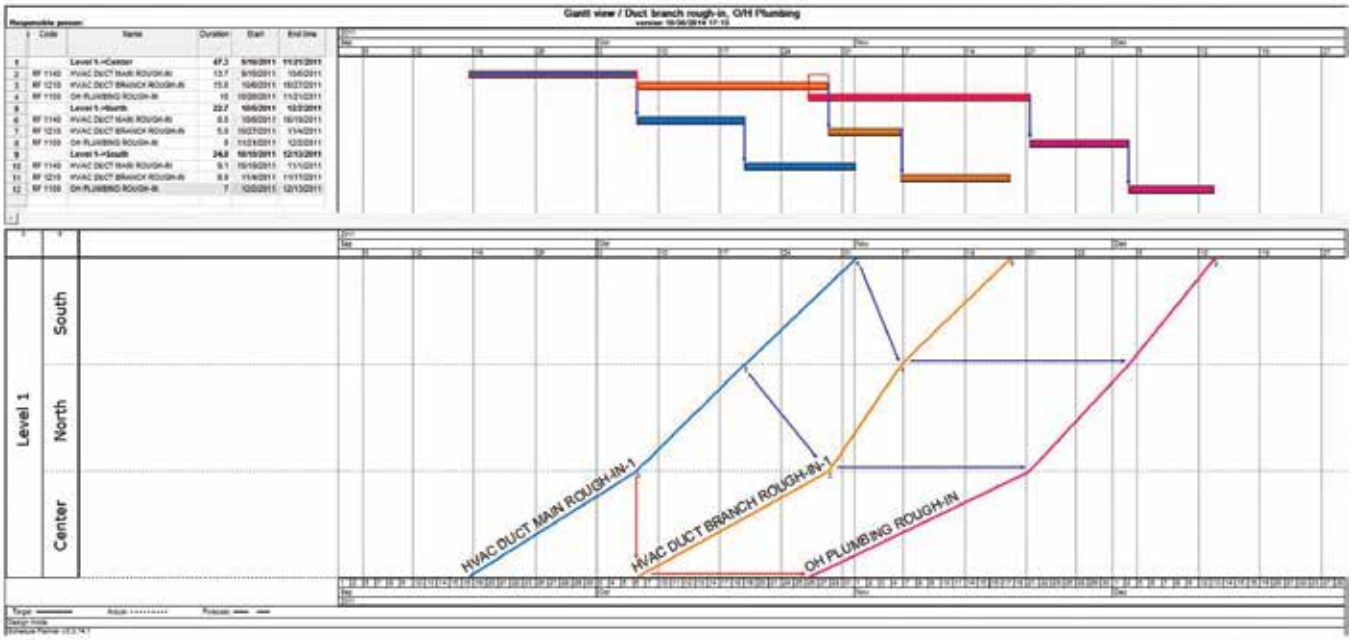
Schedule Analysis Summary

Using Location-Based Management Systems (LBMS) can save 10% or more of project duration without increasing project risk. Vico Office includes the Schedule Planner module which enables using model-based quantities for location-based management. Although the use of LBMS is gaining popularity in the United States and Europe, most projects have an existing CPM (Critical Path Method) schedule. The best way to get started with LBMS is to take the existing CPM schedule, link it to a 3D model and analyze it using LBMS principles to find opportunities for improvement. The analysis can be used as a starting point for LBMS implementation or as a way to identify potential risks in the schedule.

Why Use Trimble for CPM Schedule Analysis?

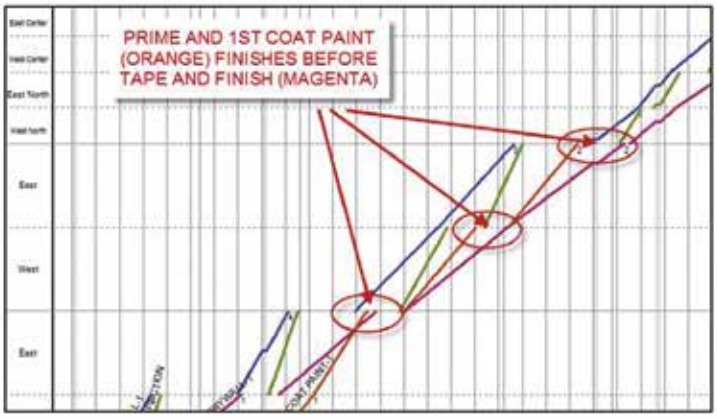
Trimble's LBMS solution has thousands of users worldwide. Schedule Planner is a mature software package grounded on decades of LBMS research and implementation. Trimble's VDC Services team has completed schedule analysis for dozens of projects, including hotels, residential construction, museums and hospitals. The CPM schedule analysis service helps to jump-start LBMS implementation. In just two-to-four weeks, an exact match of the CPM schedule is linked to a 3D model, quantities of work are calculated based on modeled geometry, and required manpower is calculated using industry standard productivity rates. The results are visualized using Flowline and an analysis report highlights potential areas for improvement. After CPM Schedule Analysis, the project team can take the data and continue improving the CPM schedule using LBMS or use the results to drive improvement using a standard CPM software package.

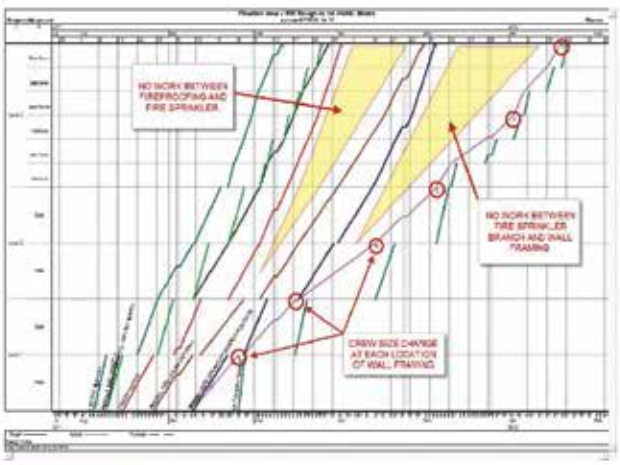
Convert Gantt Chart to Flowline Schedule



Flowline Schedule Analysis

- Identify Discontinuities in Critical Tasks
- Identify "Busts" in Logic
- Identify Issues of Crew Variance
- Gaps and Bottlenecks in Production



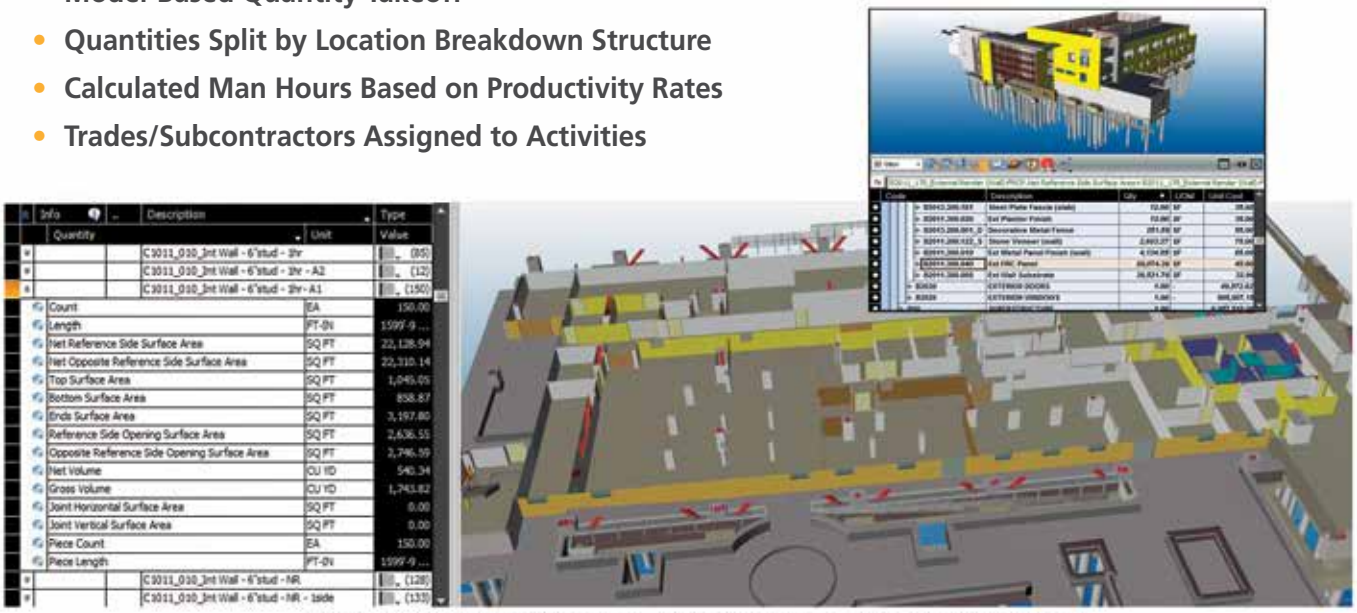


Potential problems:

- Fireproofing production rate vs. Wall Framing production rate is causing large areas of no work between November 2011 and January 2012.There is a 10 week gap between completion of Fireproofing and completion of Wall Framing on Level 3 East.
- Variance in the quantity of work for Wall Framing from location to location requires a change in crew size at each location to match the baseline durations (5 men, 7 men, 6 men, 8 men, 6 men, 10 men)
- Fire Sprinkler Mains, Branch and Wall Framing activities are discontinuous on Level 1 and Level 2

Quantity and Resource Loaded

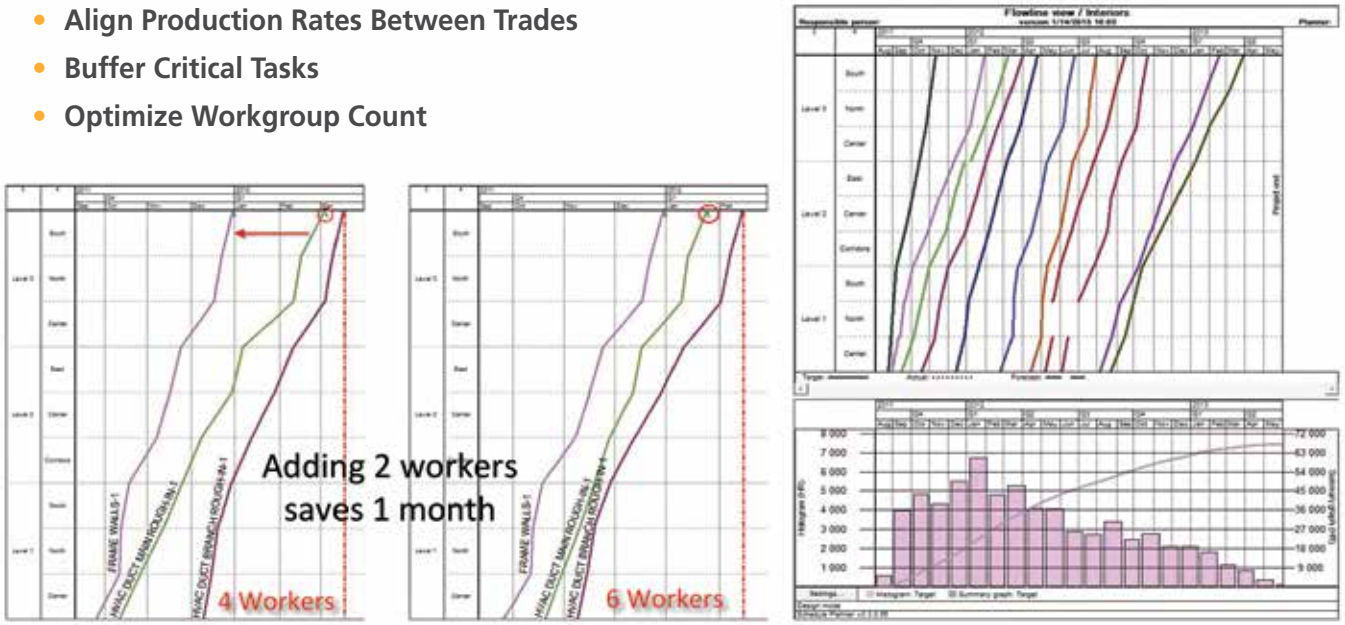
- Model-Based Quantity Takeoff
- Quantities Split by Location Breakdown Structure
- Calculated Man Hours Based on Productivity Rates
- Trades/Subcontractors Assigned to Activities



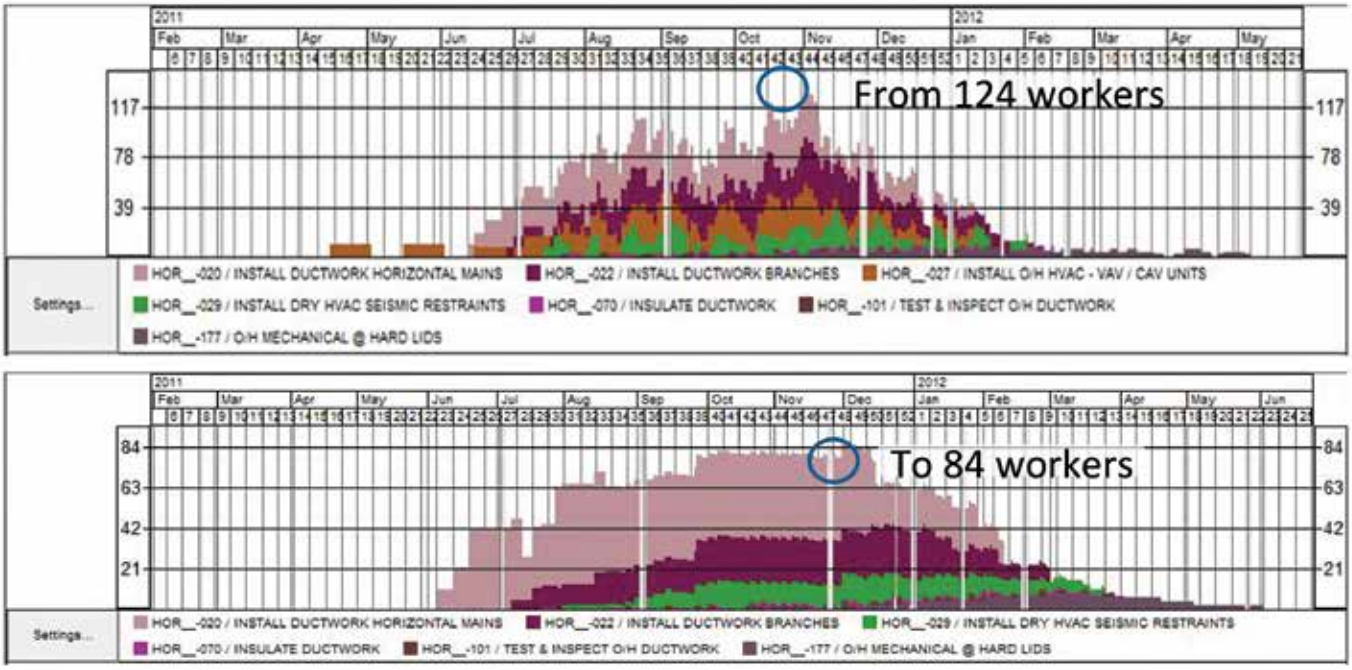
Hang Drywall: 44,439 SF x .008 MH/SF = 356 Total Manhours

Balance Production

- Minimize Undertuilized Work Areas
- Align Production Rates Between Trades
- Buffer Critical Tasks
- Optimize Workgroup Count



Level Resources



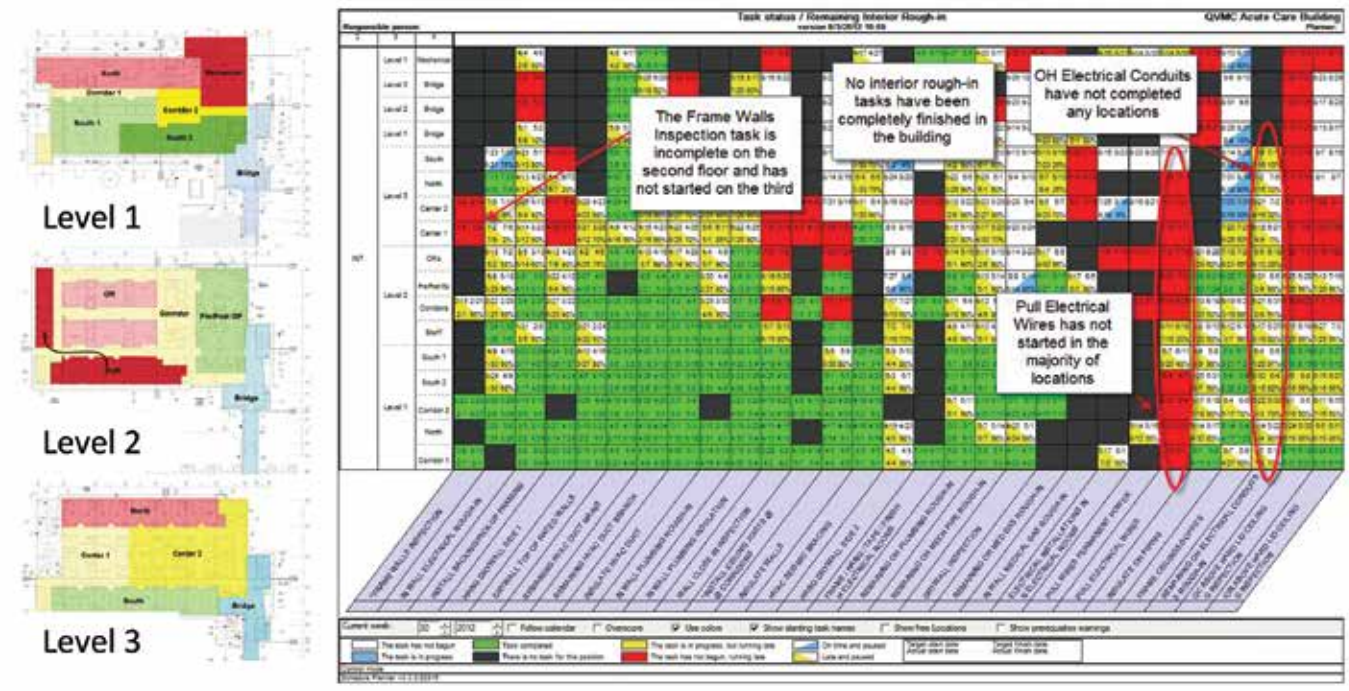
Production Control

Production Control Summary

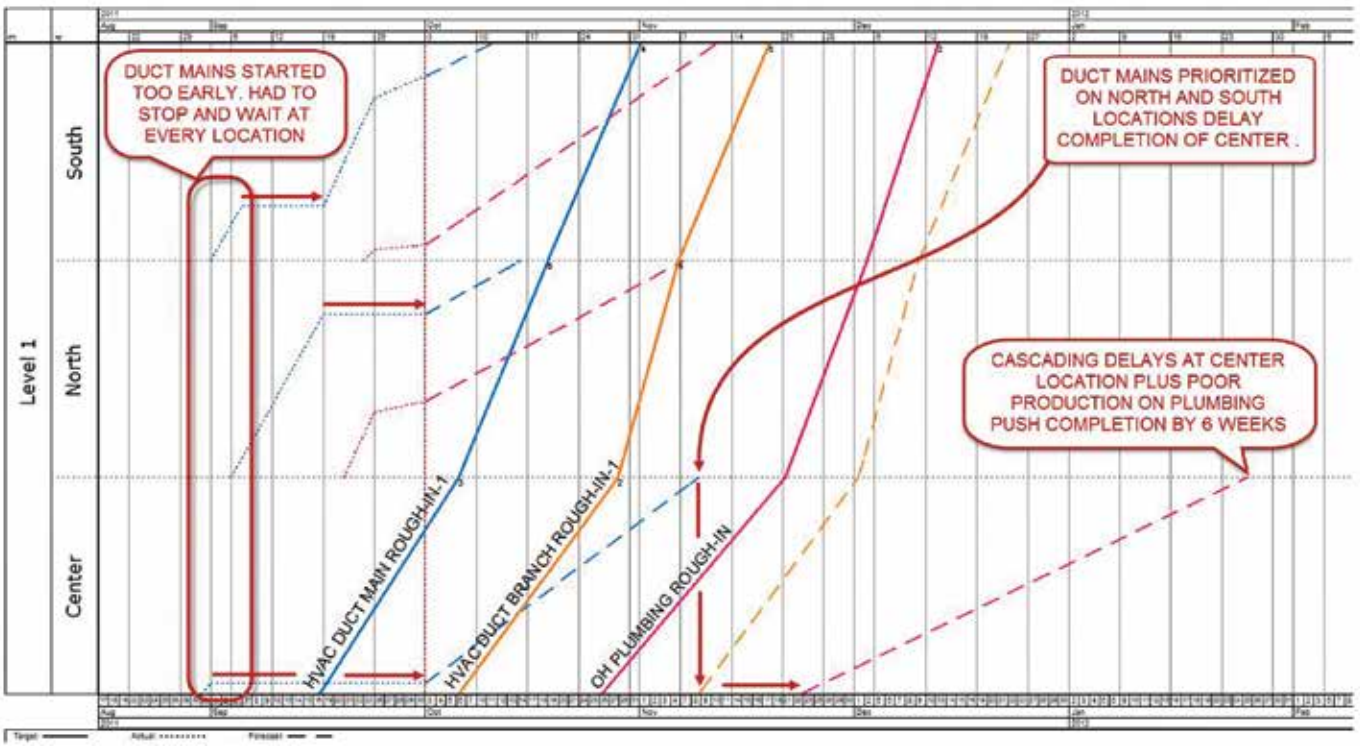
Implementing production control based on Location Based Management System (LBMS) principles can decrease project durations by 10% and improve productivity by 30% or more by eliminating cascading delays. To realize these benefits the production control process requires detailed progress data to be collected on site on either daily or weekly basis. These data should be entered to the production control system, analyzed and documented, and the results communicated to Superintendents and subcontractors in structured meetings designed to evaluate options and capture action items. All project stakeholders can benefit from the process if the data is used to make decisions before production is impacted but the process requires commitment and collaboration. Because the process is new to most GCs, having external on-site support can help to get started.

Trimble has a large virtual construction team with a decade of experience. The team has been trained on LBMS software, process, and best practices. Team members are able to relocate to your location and help to kick-off and ramp up your LBMS efforts. The on-site Production Control Engineer is supported by an off-site LBMS Expert with years of experience in implementing production control systems on a variety of projects. He or she is able to collect the progress data from subcontractors, enter the data to the system, analyze the data together with the off-site expert and communicate the results to the team. The off-site expert will travel on-site for meetings when necessary. In our experience, customers who have embedded an On-Site Production Control Engineer been able to implement LBMS more successfully helping to set expectations for the team and streamlining learning curve leading to a quicker ROI.

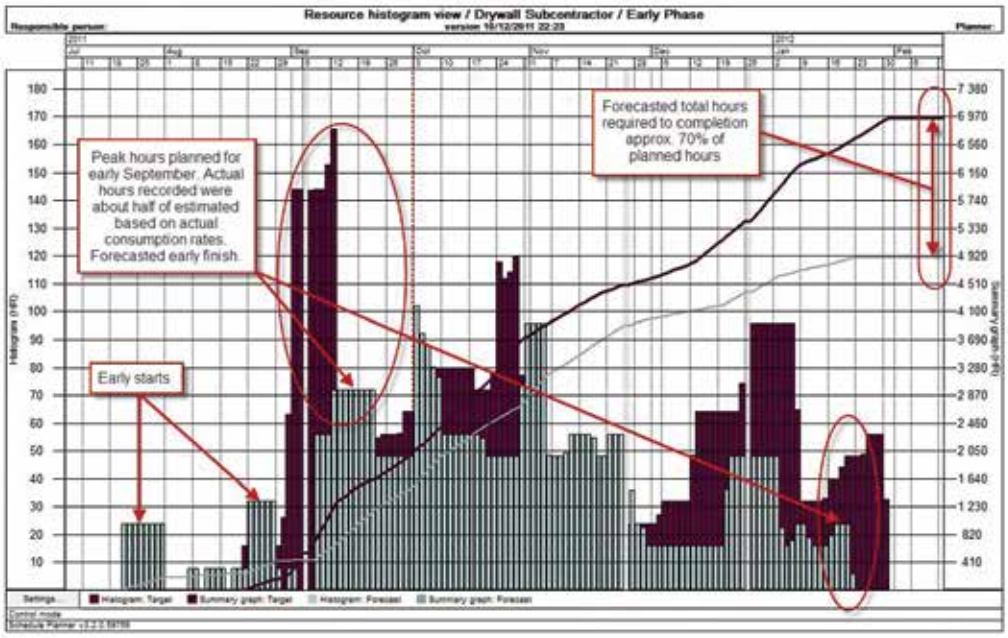
On-Site Production Tracking

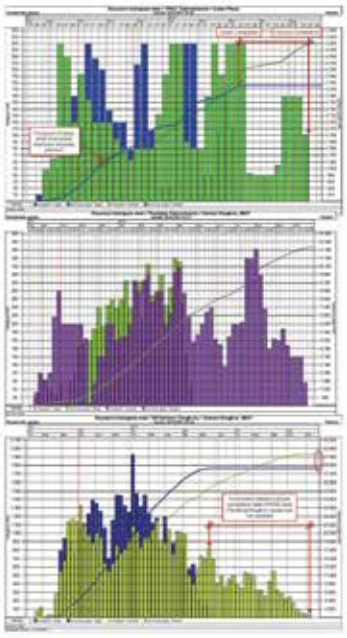


Schedule Forecast and Analysis



Resource Histogram and Trending





On-Site Project Support

Scheduling, Production Control, Layout, 3D Scan

Trimble BuildingPoint has a large virtual construction team with a decade of experience. Over 400 projects have been modeled for construction purposes. Most of our modeling experts have completed dozens of projects and they are able to relocate to your jobsite to help get the BIM effort started right. All of our Experts have extensive experience in BIM authoring and coordination software and have been trained in the use of Vico Office for cost and schedule integration. BIM Experts can provide deliverables, lead coordination efforts, manage Trimble back-office teams or provide coaching to the General Contractor's team. In our experience, customers who have embedded a Trimble On-Site BIM Expert have been able to implement the technology and processes faster and stimulate tighter collaboration across the construction team leading to a quicker ROI.

On-Site Construction Layout Expert

Construction Layout:

- Efficient, reliable, and accurate construction layout is vital to the success of any size construction project. Trimble BuildingPoint layout services provides the contractor with detailed locations needed to accurately construct buildings and improvements. Utilizing robotic total station's and GPS we can cater to the specific needs of the GC/CM.

Layout services provided are:

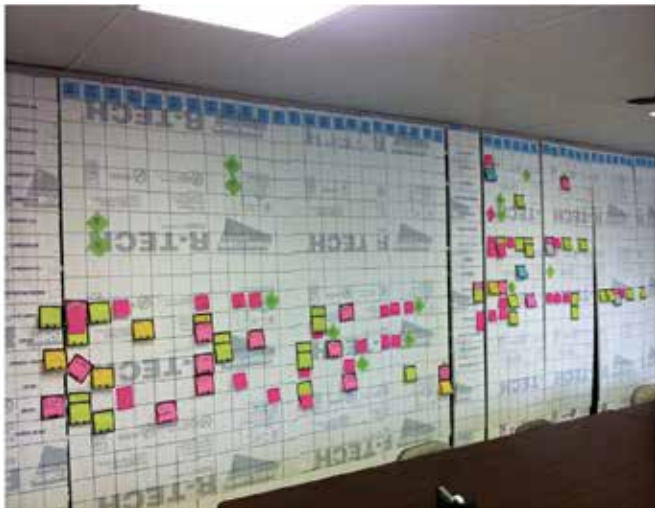
- **MEP:** ducts, cable trays, conduit, and hangers
- **Concrete:** rough grade, foundations, and gridlines
- **Structural Steel:** anchor bolts and base plates
- **Carpentery:** wall, hold downs, anchor tie downs, framing

On-Site BIM Expert

- Define standards for BIM development
- Manage 3D Coordination process
- Support project team with BIM data
- Manage remote modeling team for special projects

On-Site Production Control Engineer

- Collect and validate weekly progress on-site
- Input and analyze data
- Report analysis and host review meetings
- Record commitments and distribute to team



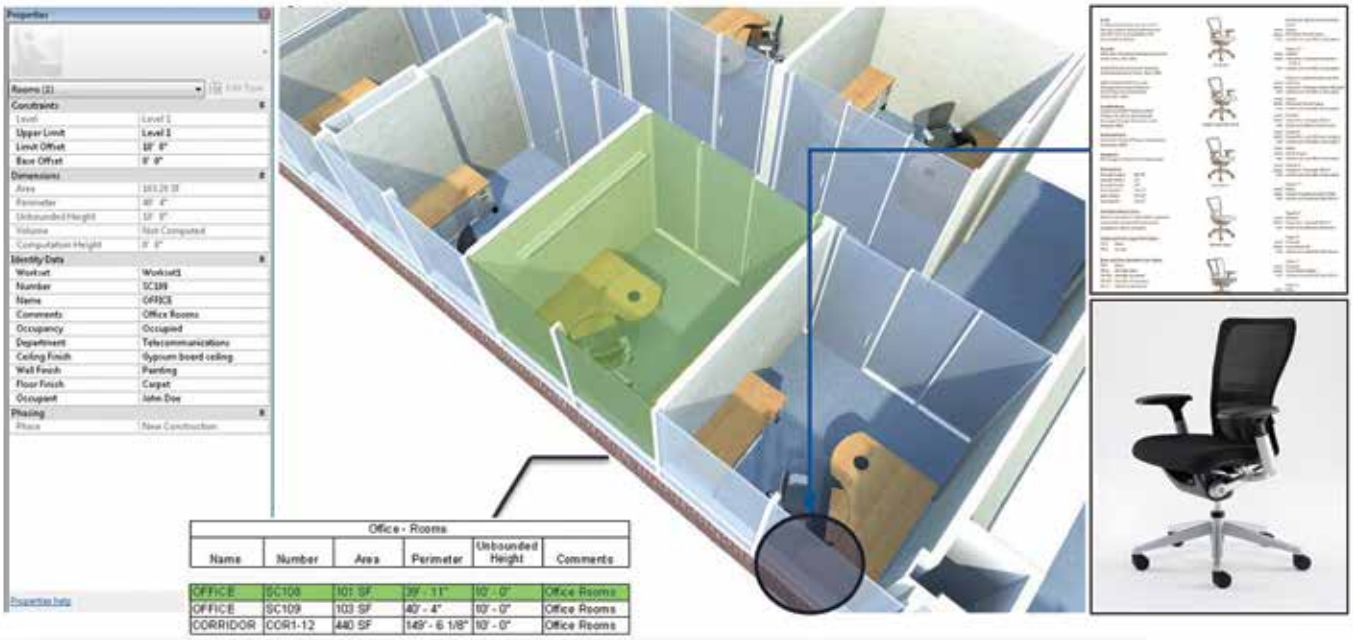
Facilities Management Data Entry

Facilities Management Data Entry Options

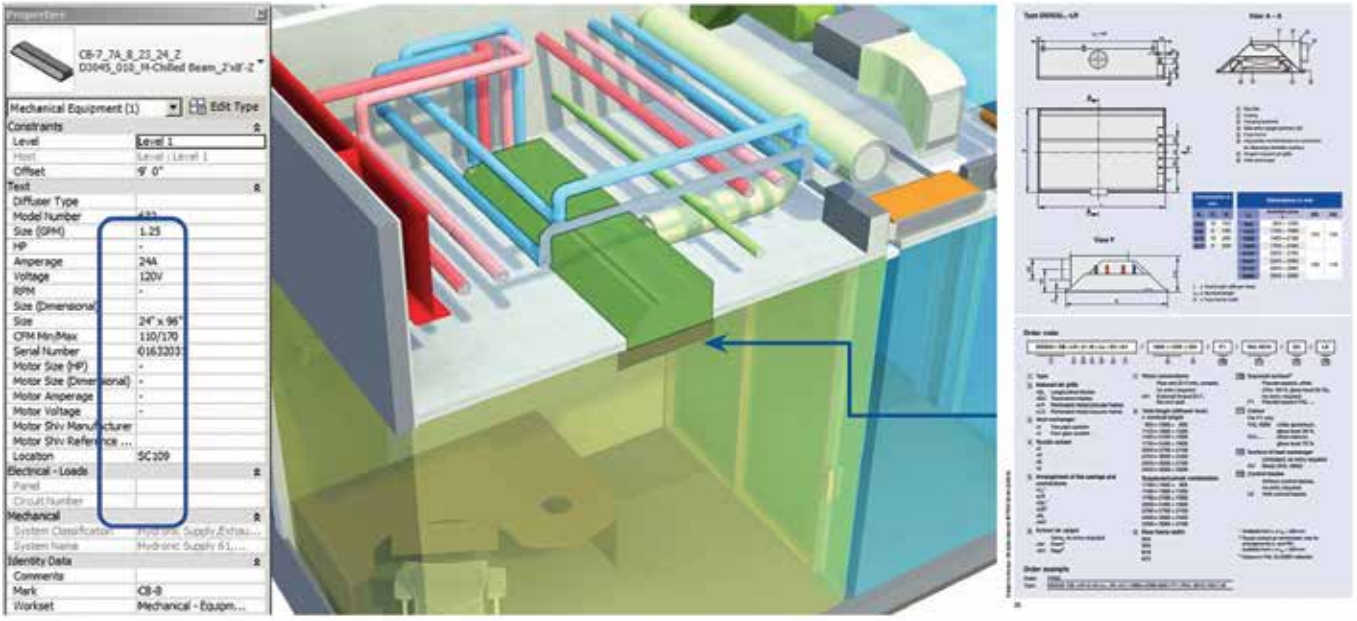
Initial construction costs are small in comparison to the costs incurred by owners to operate and maintain a building throughout its lifecycle. Operations and Maintenance (O&M) data and documentation can be integrated to the project's 3D model when it becomes available and the General Contractor / Construction Manager can provide a digital handover. Rather than sifting through the mountain of paperwork the Owner's personnel will be able to visually search the building elements to access the data they need. The information tagged to elements in the 3D model is easily customizable to meet the needs of the Owner. Typical examples include product cut sheets, O&M manuals, performance data, and spare parts lists. BIM software applications provide a flexible platform which allow for a host of different facilities management solutions such as the creation of custom schedules for equipment inventory, spatial analysis for facility use, and data export for integration with CAFM, CMMS and IWMS software applications. Finally, by combining O&M data with the 3D model the building and its contents can be updated in the future as the building matures to continually serve as a live as-built representation of the facility.

- **Downstream FM System**
- **Data to be Tagged**
- **Q & M Data Source**

Add Space Type/Component Data to BIM Model



Populate BIM Elements with Submittal Data



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