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Going Digital on Large Projects: BIM 360 Markups, Issues, and Reviews

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Learning Objectives

- Discover each module, its functionality, and its application within the review workflow
- Learn how to set up BIM 360 folders, title blocks, and attributes to maximize review efficiency
- Learn how to define review workflows for diversified teams and project phases
- Discover some of the challenges encountered when migrating to a 100%-digital, cloud-based review environment

Description

The BIM 360 cloud collaboration services are enabling teams to work within an enriched review workflow and letting them execute markups, track issues, and conduct traditional page-turn audits with unprecedented access. We'll explore the evolving possibilities provided by these Autodesk services to digitize and centralize what is typically a detached workflow. Focused on each module, we'll demonstrate their applications and best practices, discovered through large project use, which enables the team to become 100% digital using the web interface or mobile applications. We'll highlight solutions for transitioning a team into BIM 360 software to conduct reviews and discuss some of the common challenges encountered during this migration.

Speaker(s)

Matthew Anderle is the Building Information Modeling (BIM) director for the Buildings+Places business line of AECOM, with focus on the Americas. He is a BIM and technology evangelist with over 19 years of experience establishing global BIM workflows and standards around content, computational BIM, interoperability, and BIM consultation as a service. His experience spans over multiple market sectors with emphasis on large healthcare facilities, data centers, aviation, government projects, and science facilities. Mr. Anderle serves AECOM as a leader in the advancement and efficient implementation of BIM processes for a variety of project types. He manages and directs large distributed project teams to successfully implement BIM collaboration workflows, enabling global offices to work as one entity.

Dennis McNeal is a licensed architect and BIM Manager for AECOM in Roanoke, Virginia and veteran speaker at Autodesk University. At AECOM, Dennis guides BIM planning, standards, project setup, and he assists project teams with their design efforts. He is also responsible for training BIM staff, investigating new technology, and promoting and refining project workflow improvements.

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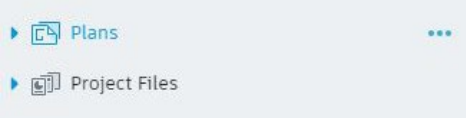
Discovering the Modules

Markups, Issues, and Review workflows, while universal across the BIM 360 platform, are most relevant within a few modules. Understanding how to leverage these functions within BIM 360 will help you to navigate the digital transformation from paper or hybrid review processes to a fully-digital, holistic, and centralized workflow. In this paper we will focus on the primary modules that leverage the tools available in BIM 360 for design and QA/QC reviews.

Document Management

Document Management (Docs) is the main module within the BIM 360 Design platform and is typically where most of the Markup, Issues, and Review workflows take place. BIM 360 Docs is intended to allow team members to work, share, and review documents. This module is used to manage all the folders and files within the project and is the primary location for managing permissions for the team. There are two primary directory trees: Plans and Project Files. Each serves different roles for document review and sharing.



Plans

The Plans folder has advanced functionality which reads the internal structure of files and extracts their contents into individual views and/or sheets. Examples include Revit models which extract into Views and Sheets within the Publish Sets, DWG files which extract into model space and paper space views, and PDFs which extract into individual pages.

Project Files

The Project Files folder is used for work-in-progress files and functions similarly to other cloud-based shared drive platforms. Documents may be uploaded, viewed, downloaded, and edited. When considering the use of Project Files in your project workflow, note that Revit models are traditionally stored in this directory tree along with Microsoft Office 365 documents. The integration of both of these software packages allow for live editing in BIM 360 Docs.

Model Coordination

What was traditionally known as BIM 360 Glue, the Model Coordination module brings clash detection and issue tracking directly into BIM 360 Design. Using a select folder under the Plans directory tree, your team will need to establish coordination spaces in the Project Admin section of the site with the Model Coordination services settings. Coordination spaces are configured to specific folders which contain models you wish to coordinate and clash together. Model coordination will automatically clash any models uploaded to coordination space folders.

Field Management

It is important to note that the Field Management module is another avenue to create Issues which are universally trackable in BIM 360, however the focus of this document is around Markups and Reviews does not include this module.

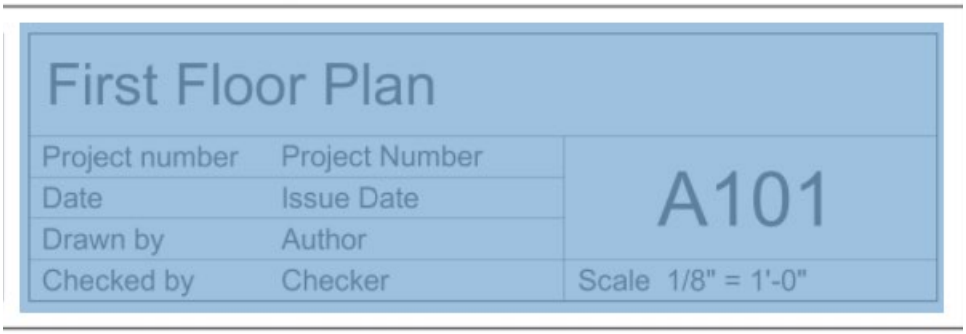
BIM 360 Folders and Metadata

Metadata can be a very powerful review tool when using BIM 360 Design and should complement your review processes. Defining additional Attributes within a folder structure will allow you to quickly analyze critical information directly from each sheet, without even opening them.

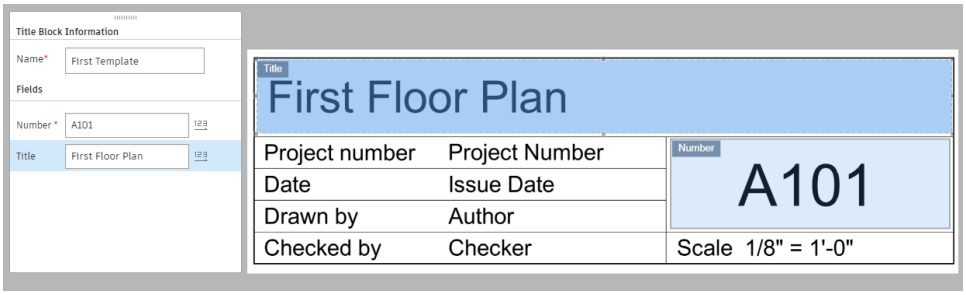
Attributes are essentially adding a parameter to BIM 360 Design which you populate within the Title Block definition using Optical Character Recognition (OCR) directly from PDF sheets. This feature provides tremendous value to BIM 360 allowing the team to use it as the sole, software-agnostic source for reviews. BIM 360 will read the output of any software as long as the Title Block is defined and consistent. Tracking and reviewing information such as issuance definitions, project information, submittal dates, and other specific Title Block parameters can be quickly identified as different, or missing, directly within the sheet folder listing.

Defining Title Blocks

Document Management locates metadata in drawing sheets and extracts information including Sheet Name, Sheet Number, Project Name, Address, and other information using Title Block templates. This feature is available for PDFs in the Plans folder. Multiple Title Blocks may be defined for each discipline, for QAQC reviews, for various deliverables, for submittal milestones, and other metadata capture scenarios.



Title Blocks have two default attributes: Title and Number. Users can define additional attributes such as Project Number, Issue Date, Draftsman, Author, and Checkers.



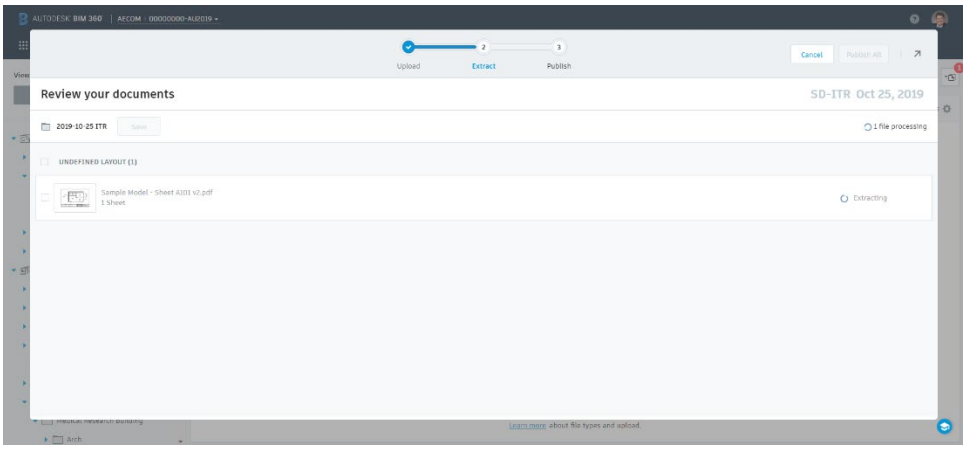
During document upload, each sheet uses the defined Title Block to extract specified data. If an error occurs, the user is prompted to make corrections.

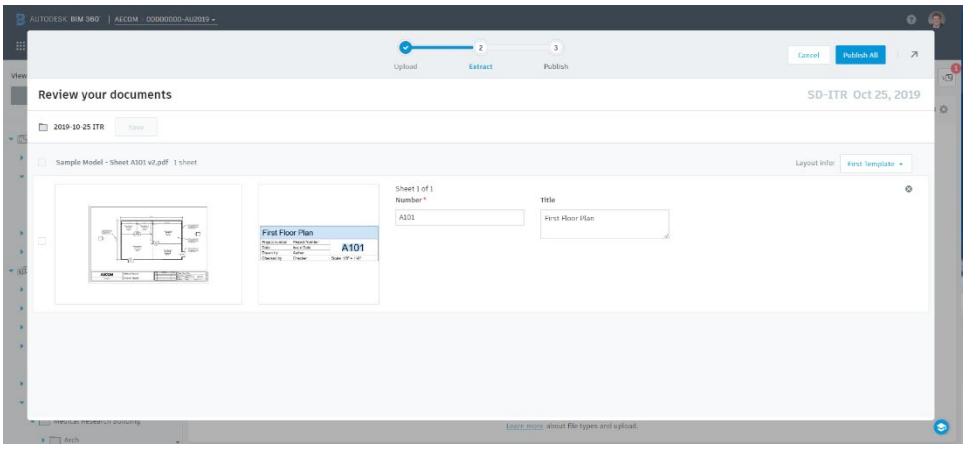
Publish Drawings

Uploading combined PDF sets to the Plans folder requires a multi-step process. When a PDF set is uploaded, a Title Block template must be selected in order for BIM 360 Design to extract metadata to process the files. At a minimum, Sheet Number and Sheet Name must be identified. BIM 360 Design then divides the drawing set into individual sheets, allowing the team to evaluate each sheet individually and track Markups and Issues by sheet.

TIP: Larger project sets may require additional processing time; however, publications process in the background. Currently, a PDF set larger than 500 sheets must be divided into smaller, separate uploads.

After the documents are published, the extracted data is automatically saved in the system and associated with each sheet or document.



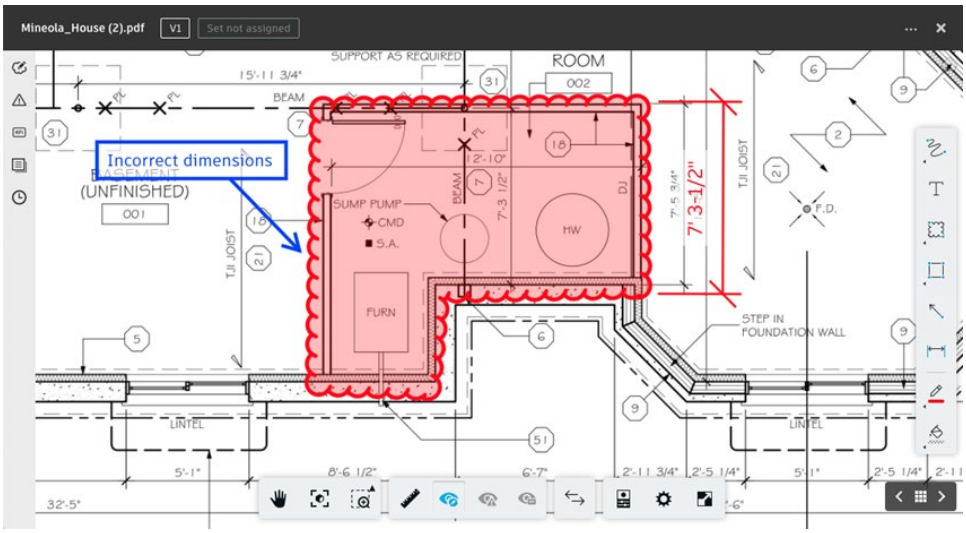


Defining Diversified Team Review Workflows

Having a well-defined process is just as important as executing the process during Review sessions. Understanding how to assign your team to roles within these workflows will support successful integration of digital-review processes for your project.

Creating Markups

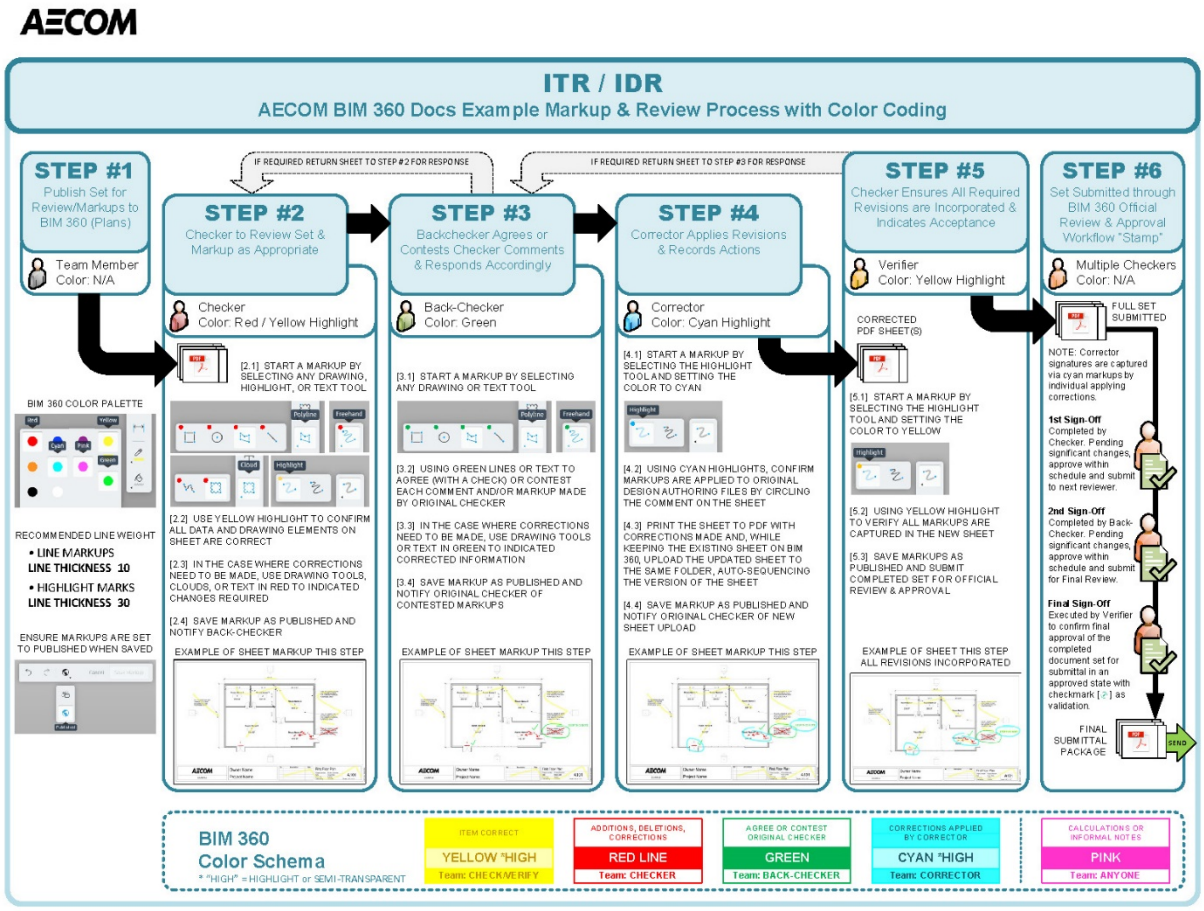
Graphical descriptions, or “Markups”, can be made to a 2D document or 3D model through the Plans folder of the Document Management module. After selecting a document, click the Markups Icon  . Markup functionality provides a variety of tools, styling, and editing capabilities which are tracked by user.



TIP: Be sure to publish Markups so that they are visible to the team.

Document Review Workflows

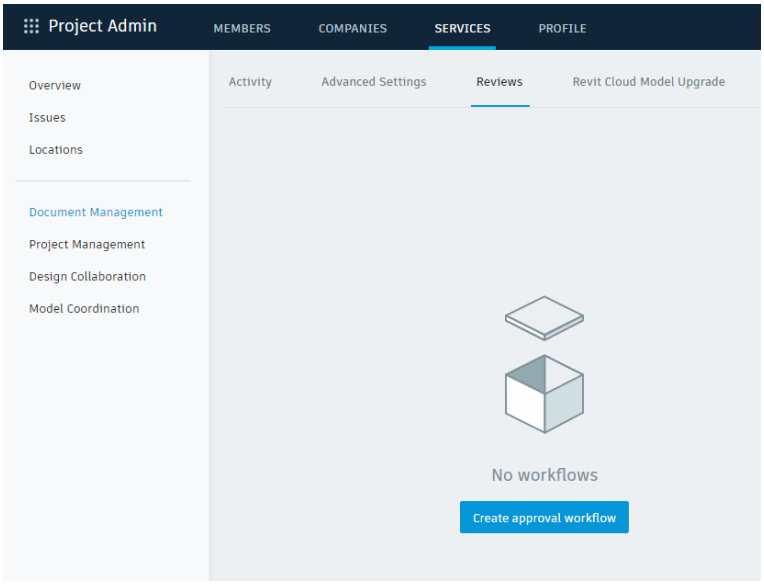
One of the most repeated processes in design delivery is Markups and Reviews prior to each milestone and intermediate review in a scheduled cadence. The following flowchart illustrates Markup definitions and how team members roles in the process are similar to conventional methods, applied within the BIM 360 Design platform.



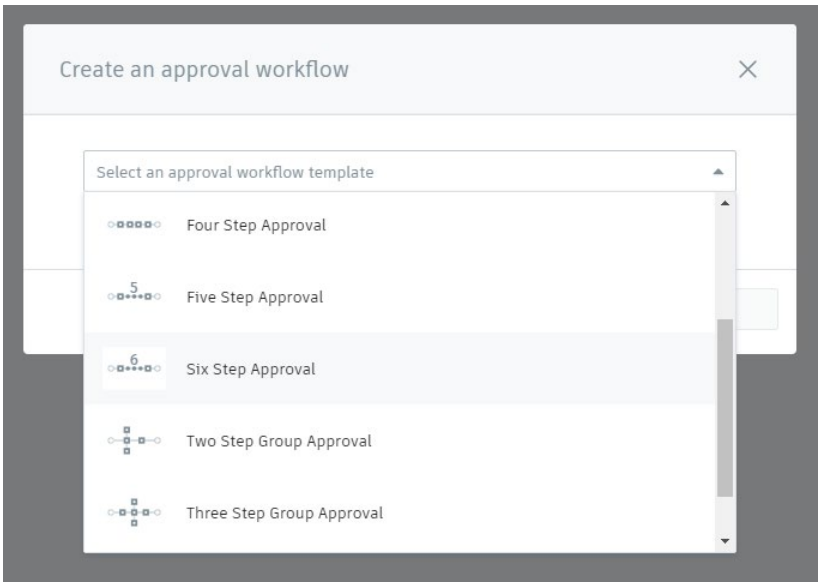
AECOM EXAMPLE MARKUP REVIEW PROCESS

Selecting a Review Workflow

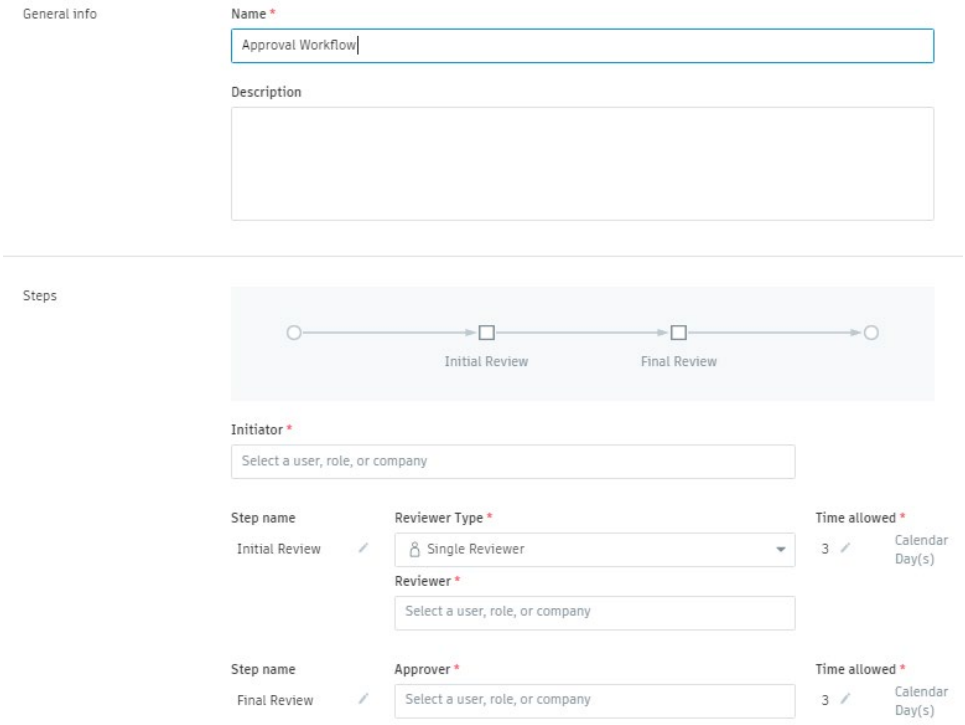
In the Project Admin module under the [Services] tab, click on the [Create Approval Workflow] button.



BIM 360 Design provides a variety of workflows – including linear or group – to meet team needs.



Select an approval workflow from the drop-down menu and assign Roles.



Clash Detection and Issue Resolution Workflows

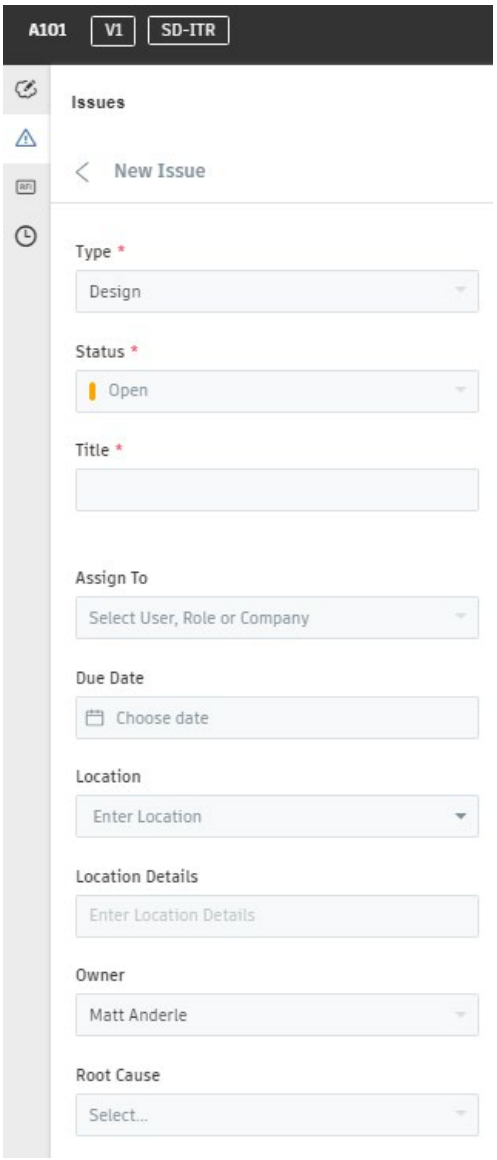
Using the Model Coordination module and establishing Coordination Spaces provides the team opportunities to leverage the BIM 360 Design Issues tracking and reporting tools to resolve design challenges and prevent interferences from reaching construction. This module can be used for milestone reviews or leveraged by the team organically to review on-demand any design Issues and resolutions executed by disciplines throughout the process. Models contained within the Coordination Spaces (as defined in Project Admin Services as a specific Plans folder) will automatically federate and generate clash reports, updating as new models are posted. Issues can be generated from individual clashes or clash groupings to better focus on specific design challenges.

Issues

Issues related to 2D documents and 3D models can be created and managed at the document or project level. Within the Project Admin module, project administrators can create Issues types and sub-types, create custom attributes, and control Issue permissions.

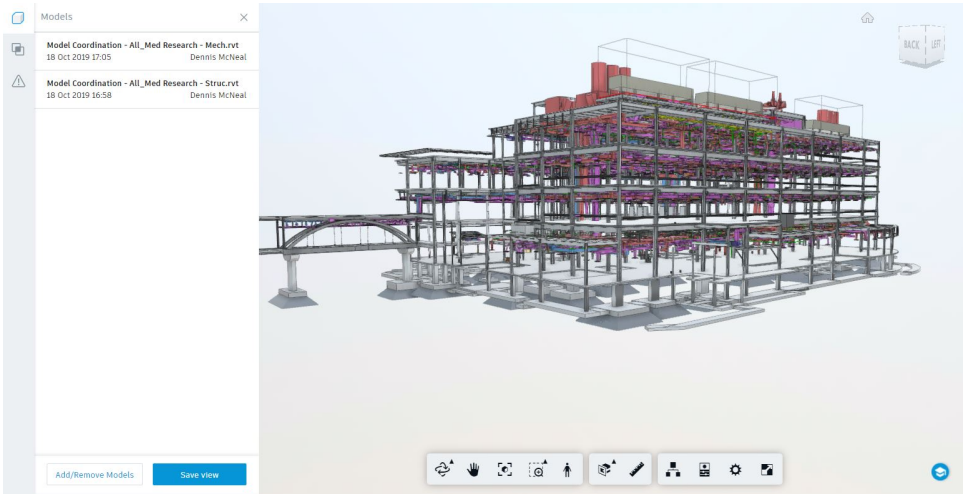
2D Issues Tracking

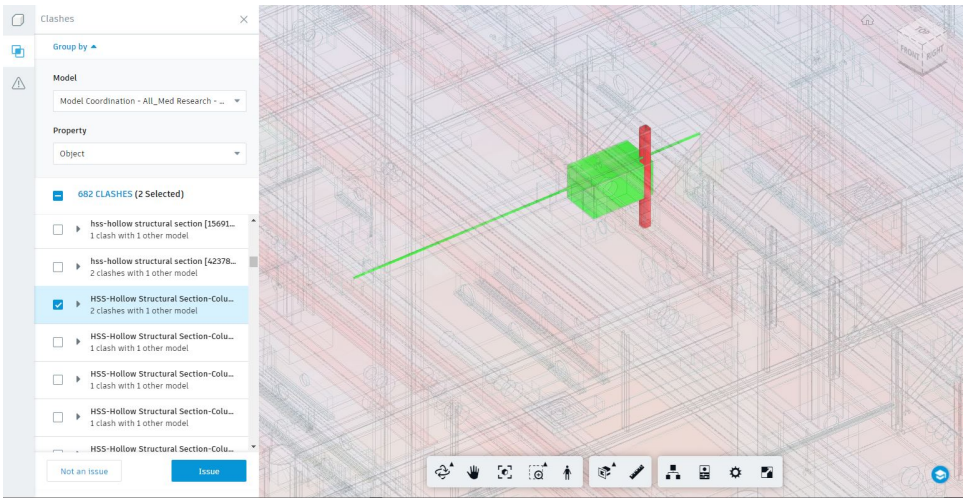
Document Issues are created through the Plans folder of the Document Management module. After selecting a document, click the Issues icon ⚠, click the [Create Issue] button, place a pin on the sheet to define the issue position, input the required information, and click the [Create] button.

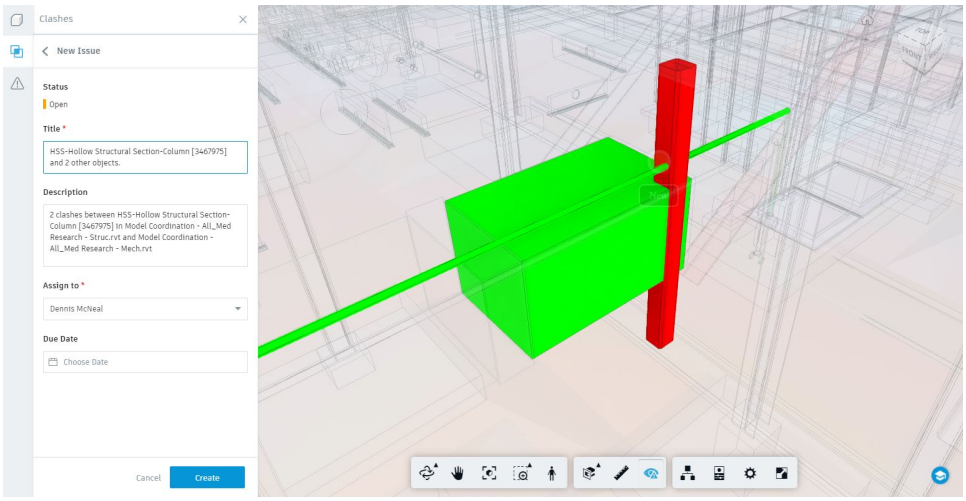


3D Issues Tracking

Model clash issues are generated from the list of element interreferences contained with Coordinate Spaces and are tracked similarly to 2D issues. Choosing which model is Primary and grouping Properties will change the organization and priority of model as the Issue is assigned. Selecting the Clash icon in the left panel will display the models active in a color-coded comparison. When selecting a clash, the objects involved will highlight while ghosting the other content around them. When a clash, or multiple clashes are selected, they may be used to generate an Issue. Select a position on the primary model element and complete the Issue details, then select [Create].







TIP: Critical elements intended for clashing are defined by what is visible in the published 3D view associated with the models loaded into the Coordination Space. Filter this content to remove unnecessary, erroneous clashes from oversaturating the clash results.

Overcoming Challenges

Teams are often reluctant to change well-established workflows that accomplish necessary tasks throughout the project life-cycle. Identifying the value of leveraging a platform like BIM 360 Design will help determine the roadmap for migrating a team through digital transformation into a 100% digital-review workflow.

Champions of this process should evaluate the project team, availability for training, schedule, and opportunity for success in implementing new tools and workflows.

Key Identifiers for Change

- Distributed project teams, either internal to an organization or external team members
- Project scope and complexity
- Immediacy of information being exchanging outside the review process
- Client requirements

Often a pilot project or proof of concept to provide return-on-investment metrics for your company will serve as a good indicator of future potential in cloud collaboration Markups, Issues, and Reviews processes.