AS500259

BIM360 workflows - a case of Noida International Airport

Kristine Slotina
Nordic – Office of Architecture

Q&A moderator
Bridget White
Nordic – Office of Architecture

Learning Objectives

- Learn about BIM 360 collaboration and coordination workflows in the design of a large international airport
- Learn how to set up a BIM 360 project for teams located across different offices and countries
- Discover optimized routines for BIM 360 Collaborate Pro, Navisworks integration and issue manager
- Learn about the challenges and potential improvements to the workflow

Description

In the summer of 2020, as the world struggled through the COVID-19 pandemic, Yamuna International Airport Private Limited (YIAPL) selected an international team to design Noida International Airport (NIA) in Delhi. The Delhi National Capital Region aims to serve 200 million passengers by the year 2060. The architectural team consists of Nordic, Grimshaw, Haptic, and STUP, and represents offices across the globe—Norway, India, the United Kingdom, and the United States. It became clear that the only way to work together, even without a pandemic, would be to use the most-advanced cloud services—BIM 360 software. Maximizing a combination of BIM 360 Docs, BIM 360 Design, and BIM 360 Collaboration software the team has designed the most-optimal workflows to suit the project. As the team members proceed with the four-phased architectural design from their home offices, this demo aims to present the routines we used, the collaboration processes we introduced and discovered, and the ways we brought together an international team to create sustainable world-class architecture.

Speaker(s)

Kristine Slotina is an Acting BIM Director / Techno - Anthropologist / Constructing Architect at Nordic — Office of Architecture. She is doing her PhD at the moment in NTNU: Norwegian University of Science and Technology, Department of Civil and Environmental Engineering. Drawing on Techno-Anthropological research perspectives, this PhD aims to explore the information exchange between various expert groups and identify the nature of the knowledge produced within online digital technologies and the effects VDC has on the architectural and engineering knowledge base. Kristine has multidisciplinary background. She is educated in Master of Science in Techno - Anthropology and Bachelor in Architectural Technology and Construction Management and worked as a Constructing Architect, BIM Coordinator/Manager and BIM Director in Nordic - Office of Architecture. Kristine is used to systematically work on the analysis of architectural projects, choice of materials and design. She specializes in new innovative solutions and persistent, sharp on-time performance. She works with general architectural design, incorporating a solid technical understanding and new effective methodologies in a use of BIM. Kristine has mastered programs like Autodesk Revit Architecture, Dynamo BIM and many other necessary ways to perform architectural work. Kristine has good project and design management skills. In 2018 and 2021 she managed Nordic's BIM Team as a BIM Director. As part of her free time Kristine enjoys teaching and performing improvised theatre, this has helped her to develop high communication, presentation and teaching skills.

Introduction to the project

Nordic – Office of Architecture

Nordic consists of dedicated individuals from a range of different countries. We are more than 240 people from 30 different nations based in Oslo, with offices in Copenhagen and Reykjavik. We are actively involved in projects in various countries across Europe, Africa, the Middle East and Asia.

Together, we are a community with a culture for beautiful and outstanding architecture, a culture that is powered by commitment.

We are very passionate about technology, so we try to integrate anything new that we come across. Starting from Gardemoen Airport in Oslo in 2009 was when we first decided to commit 100% on Revit. All of our future projects from then on were made with Autodesk Revit. We can proudly say that Autodesk has been home for our projects for more than 12 years.

This presentation looks at how Autodesk has enabled us to use new technologies throughout the early stages of the Noida International Airport project in Dehli.

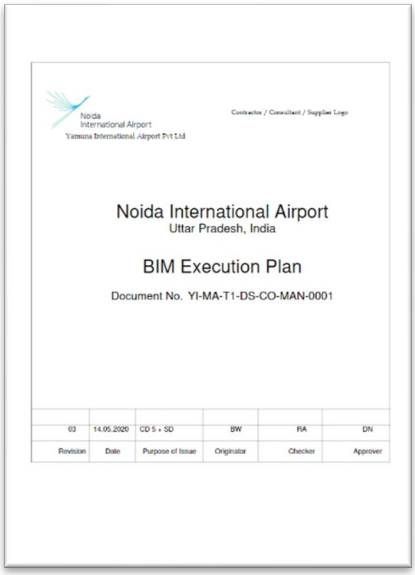
Noida International Airport

Architecture firms Nordic, Grimshaw, Haptic and STUP won the competition to design a carbon-neutral terminal for Noida International Airport in Dehli, India. Zurich Airport International decided to develop "India's greenest airport“ in Jewar, 25 miles / 40 km south of Delhi. This airport will have the capacity to serve 30 million passengers per year.

IMAGE COURTESY OF GRIMSHAW / NORDIC / HAPTIC

BIM in Noida International Airport (NIA)

Building information Modeling was an essential part of the Noida project.
The BIM ambitions in the project were to facilitate an efficient management of data and to assure the project from a design and performance perspective, allowing all parties to access the right information at the right time by using collaborative platforms like - Autodesk BIM Collaborate Pro, formerly known as BIM 360.
With defined data and information demands and a cohesive plan for each delivery, the team strives for integrated building information models and workflows that enable design, production and development through the 3D environment.
Collaboration is a fundamental aspect of building information modelling to succeed, therefore the team is working toward common goals, methodologies and information exchange routines.


Noida International Airport
Yamuna International Airport Pvt Ltd

Contractor / Consultant / Supplier Logo

Noida International Airport
Uttar Pradesh, India

BIM Execution Plan

Document No. YI-MA-T1-DS-CO-MAN-0001

03	14.05.2020	CD 5 + SD	BW	RA	DN
Revision	Date	Purpose of Issue	Originator	Checker	Approver

First we defined routines for how we would work together between all the disciplines and team members.

- BIM Execution plan
- Weekly BIM manager meetings
- BIM Deliverables
- LOD specifications
- Discipline BIM manuals
- Common BIM templates and Standards for Revit

Introduction to Autodesk BIM Collaborate Pro

NIA project used BIM Collaborate Pro because comparing to BIM Collaborate it also includes Revit Cloud Worksharing, Collaboration for Civil 3D, and Collaboration for Plant 3D (comparison in the table below). BIM collaborate enables project teams to align on the design intent and helps to manage design collaboration and coordination. It provides one source of truth.

The Autodesk® BIM Collaborate subscription includes: Design Collaboration, Model Coordination, Docs, Insight, Administration.

	Autodesk BIM Collaborate		Autodesk BIM Collaborate Pro (rebranded BIM 360 Design)	
	Launch	Future	Launch	Future
BIM 360 platform support	✓	✓	✓	✓
Autodesk Construction Cloud platform support	✓	✓	✓	✓
Insight*	✓	✓	✓	✓
ISO 19650 compliant	No	Released May 2021 for all projects	No	Released May 2021 for all projects
Europe Data Center support	BIM 360 projects only	Released May 2021 for all projects	BIM 360 projects only	Released May 2021 for all projects
Model Coordination	✓	✓	✓	✓
Design Collaboration	✓	✓	✓	✓
Collaborative Services (RCW, C4C3D, C4P3D**)	No	No	✓	✓
Bring Your Own Subscription	✓	✓	✓	✓
Branding changes in desktop products	No	✓	No	✓

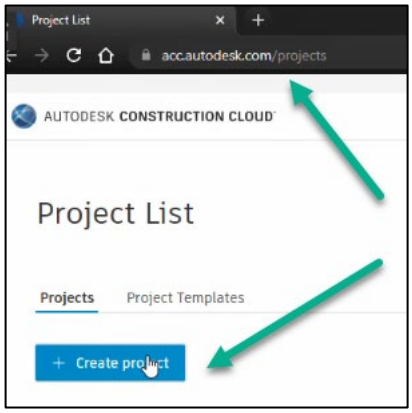
IMAGE COURTESY OF AUTODESK

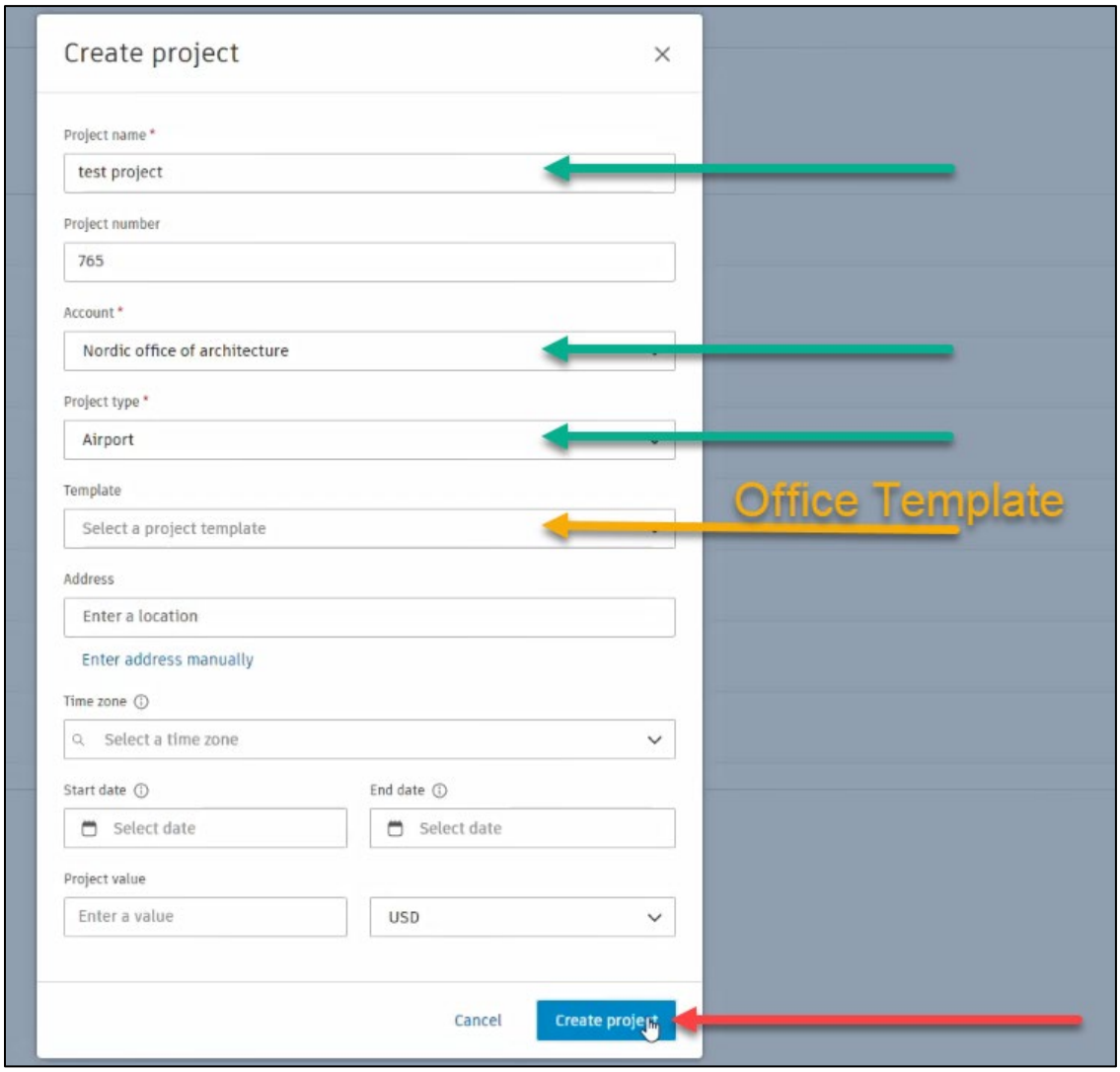
Set up of a BIM Collaborate Pro (BIM 360) project for teams located across different offices and countries

How to create project

To create a new project in BIM Collaborate Pro, go to https://acc.autodesk.com and click on “Create project”.
Fill in the information required.
More information can be adjusted in a later stage.
Use an Office Template if that has been established.

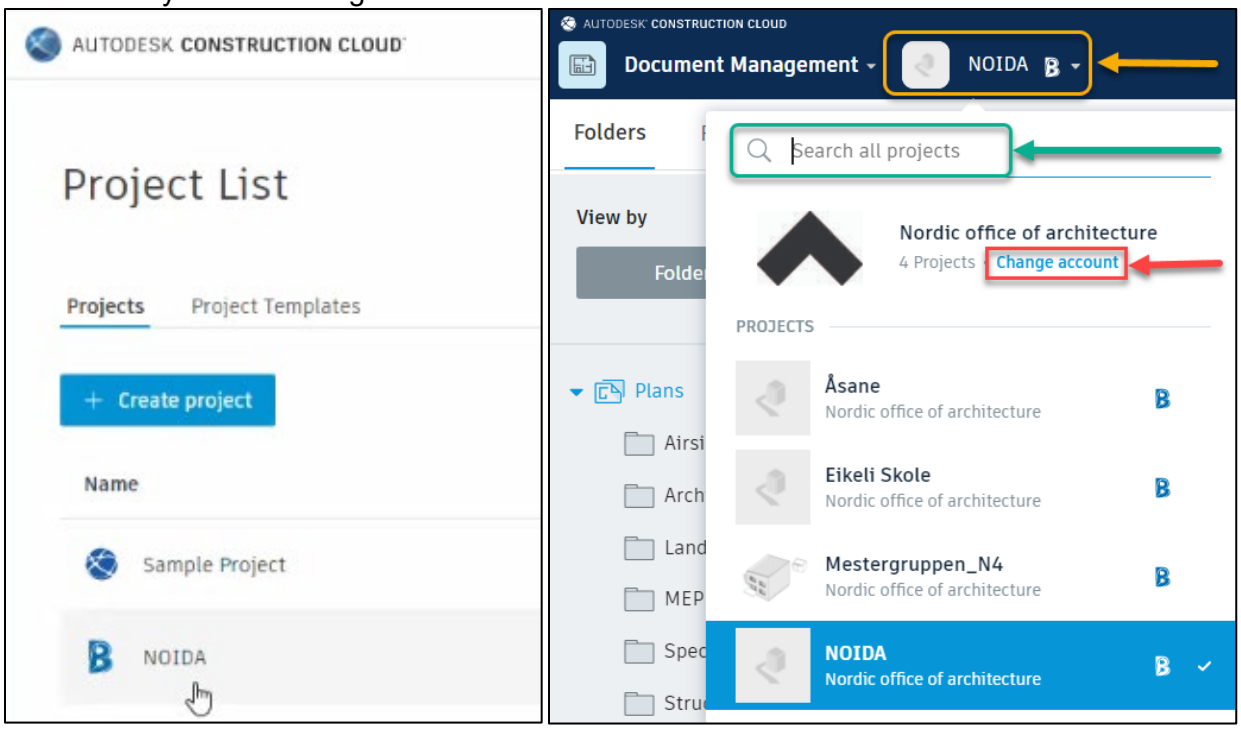
- Choosing the right time zone is very important when working across the globe and using BIM Collaborate Pro functionalities like “Scheduled Publish”



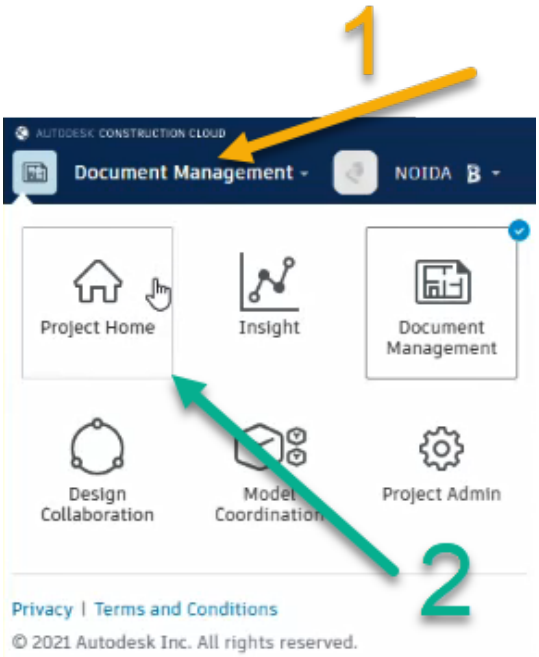


Project home

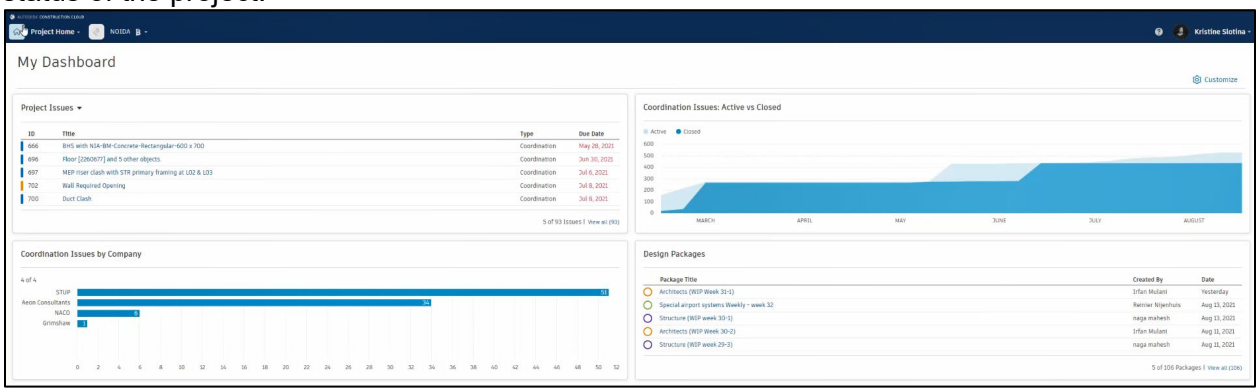
To get to the project, you click on the name in https://acc.autodesk.com or go to https://docs.b360.autodesk.com/ and click on project name to find other projects or to change the account you are viewing.



Click on document management to be able to go to “Project Home”



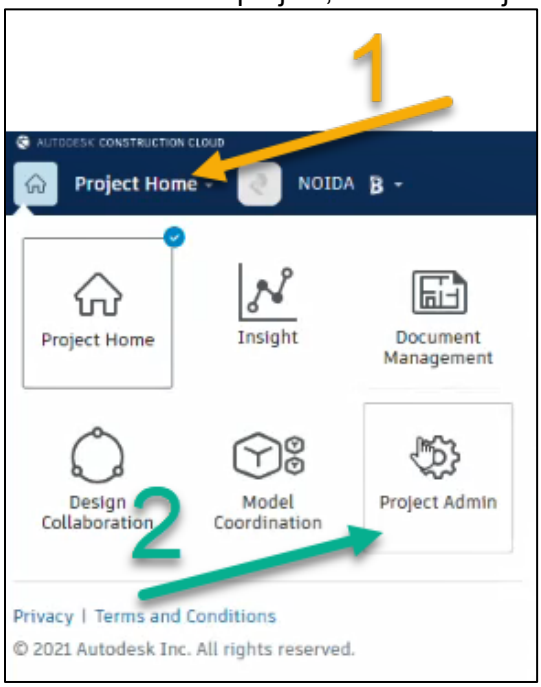
There you will be able to see the latest statistics of the project, like “Coordination Issues: Active vs Closed” and “Design Packages”. Project home gives a good overview of what is the current status of the project.



- Similar information can be found under Insights tab. The difference being that the insights tab also provides the possibility to export reports.
- It is good practice to Customize the Dashboards to show exactly what you would prefer in your Project home and Insights tab.

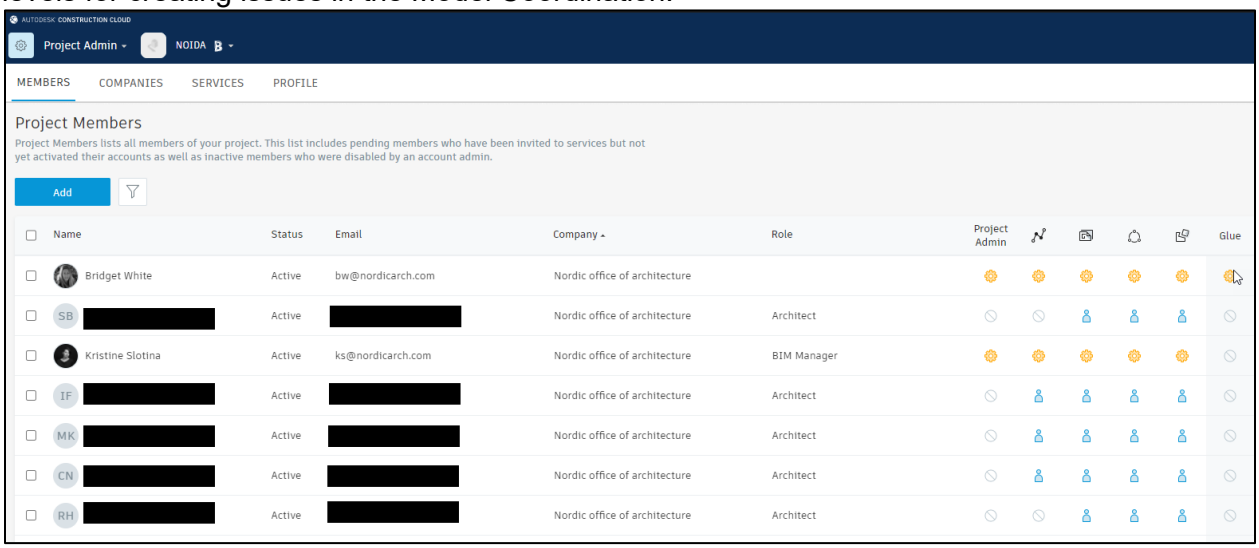
Project Admin

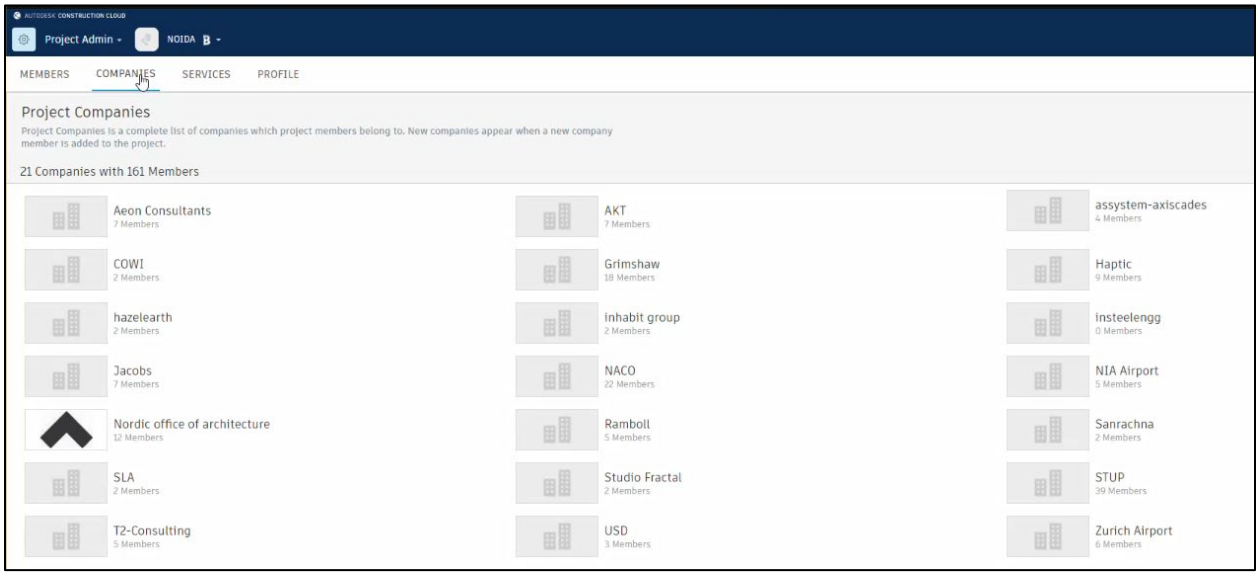
To administer the project, click on “Project Admin” under the tabs.

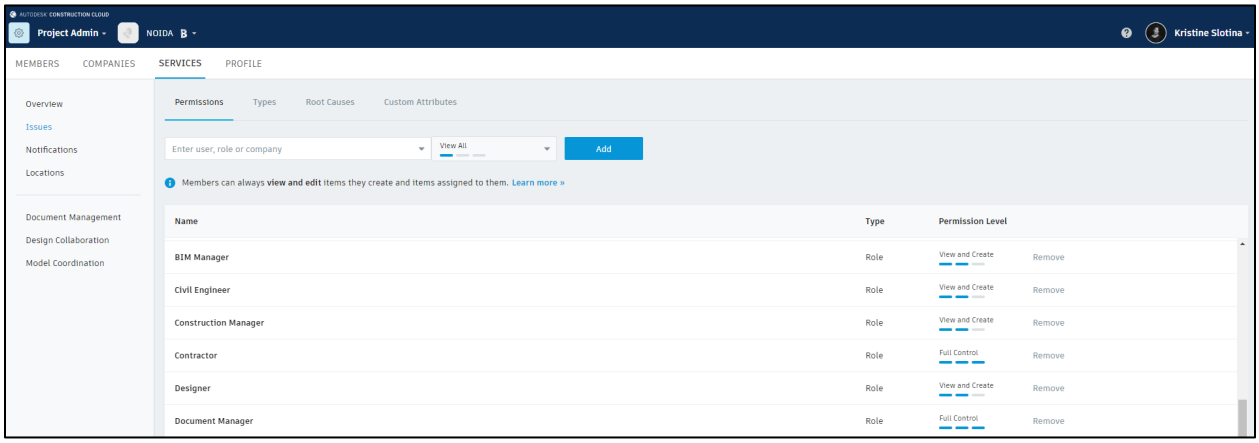


There you will have an overview of all the Project members under “Project members” tab. You can sort them by Name, Status, Company or Role.

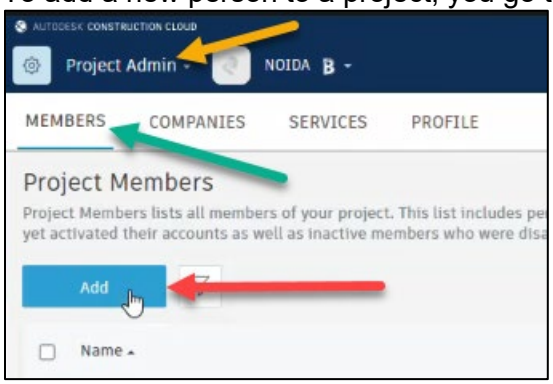
Under “Services” tab you will be able to manage the different teams and adjust the permission levels for creating issues in the Model Coordination.



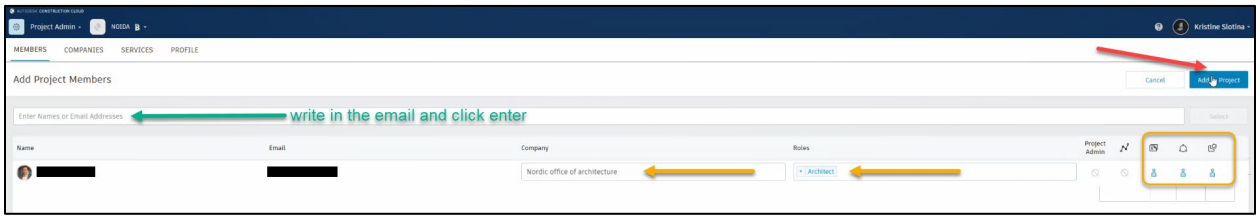




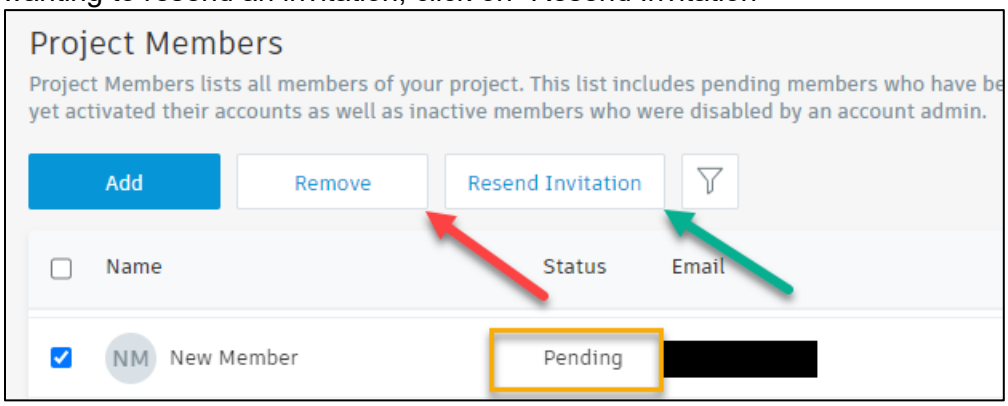
To add a new person to a project, you go to “Project admin”, “Members” and click “Add”.



Next write in person`s email, Company and Role. The access will adjust automatically to the company’s permission level.

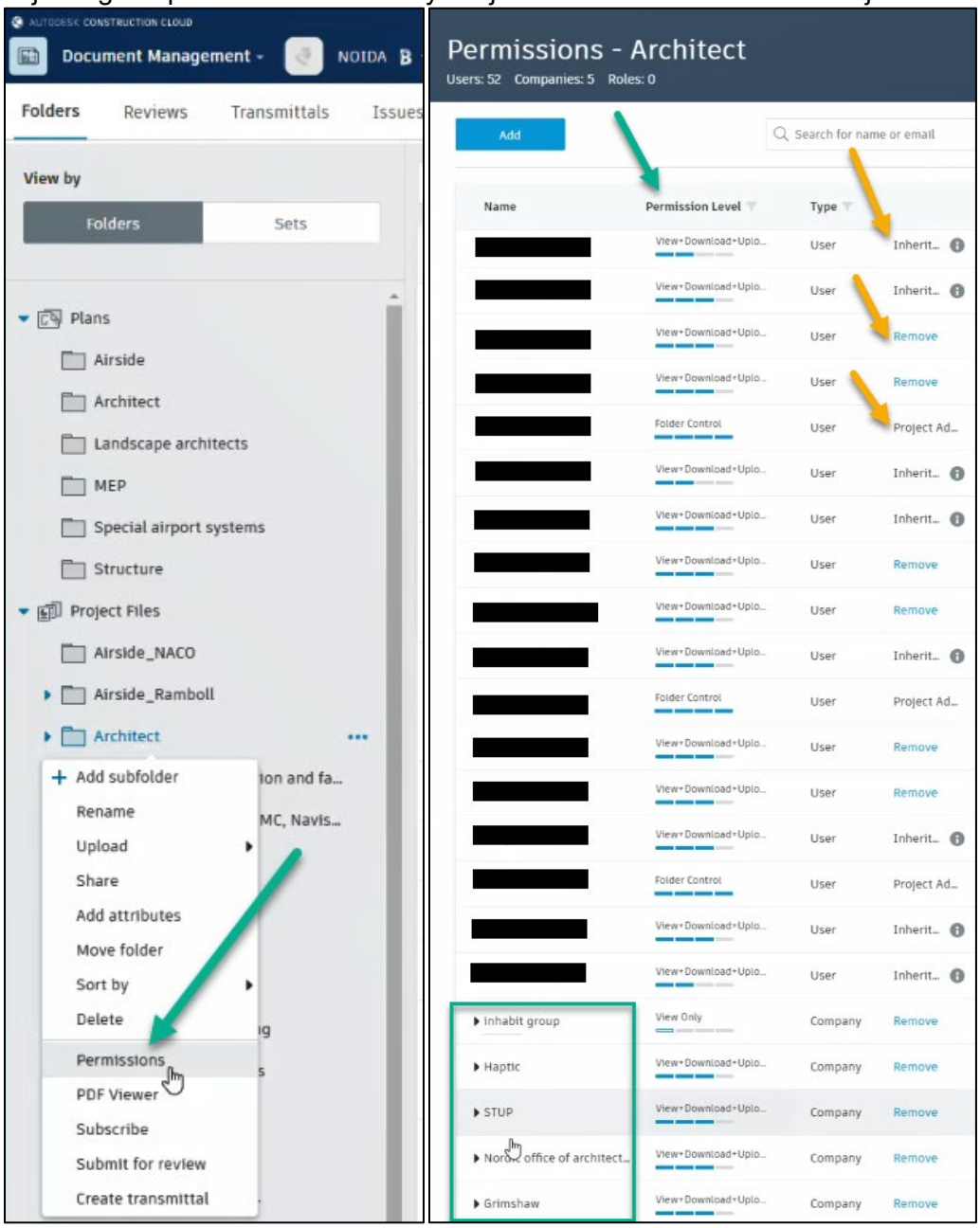


To remove a person who is no longer working in a project, you click on “remove” or in case of wanting to resend an invitation, click on “Resend Invitation”



Document Management

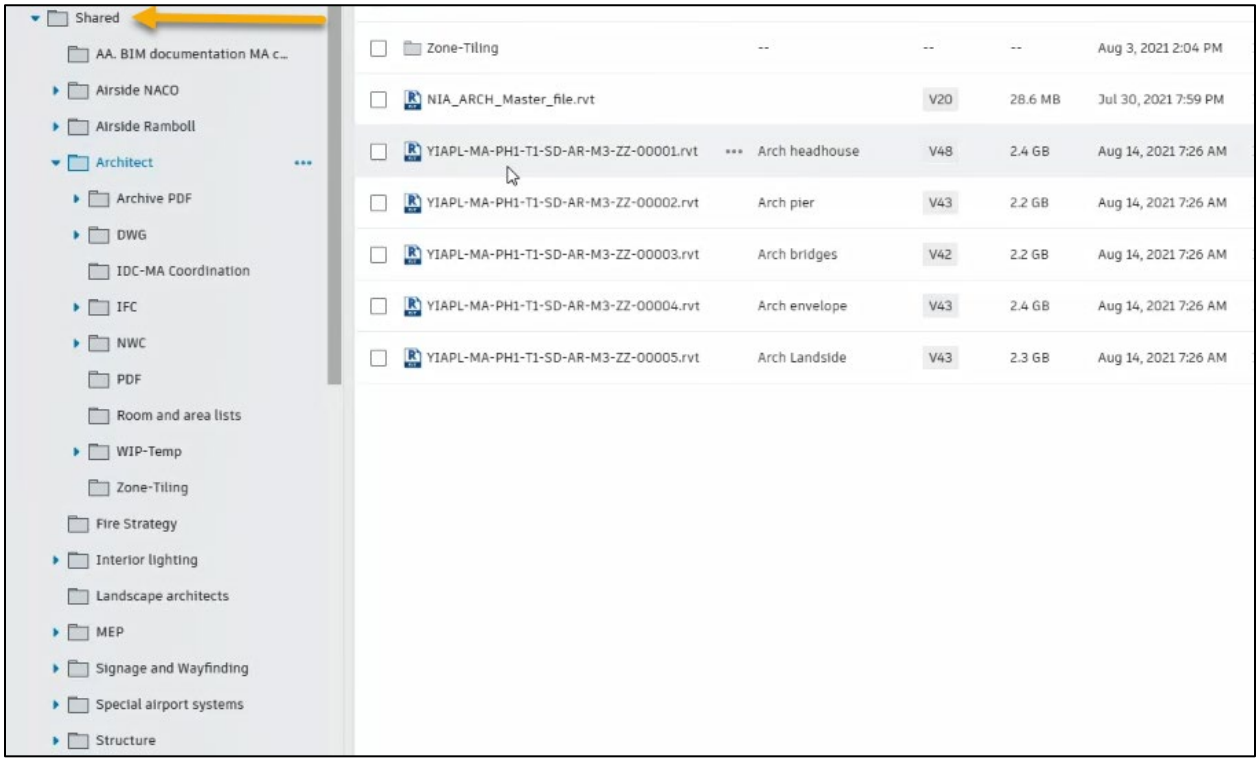
Under document management tab we set up a folder structure that best suited this project. Split up by the disciplines and companies, it was easy to adjust the permission levels as required. Each folder`s permissions can be adjusted by right clicking on the folder and reviewing and adjusting the permission level. Only Project administrators can do this job.



- Subfolders by default «inherit» the permission levels of the parental folder, but its possible to adjust manually too.
- It`s possible to give permissions to the whole company instead of adding each individual person.

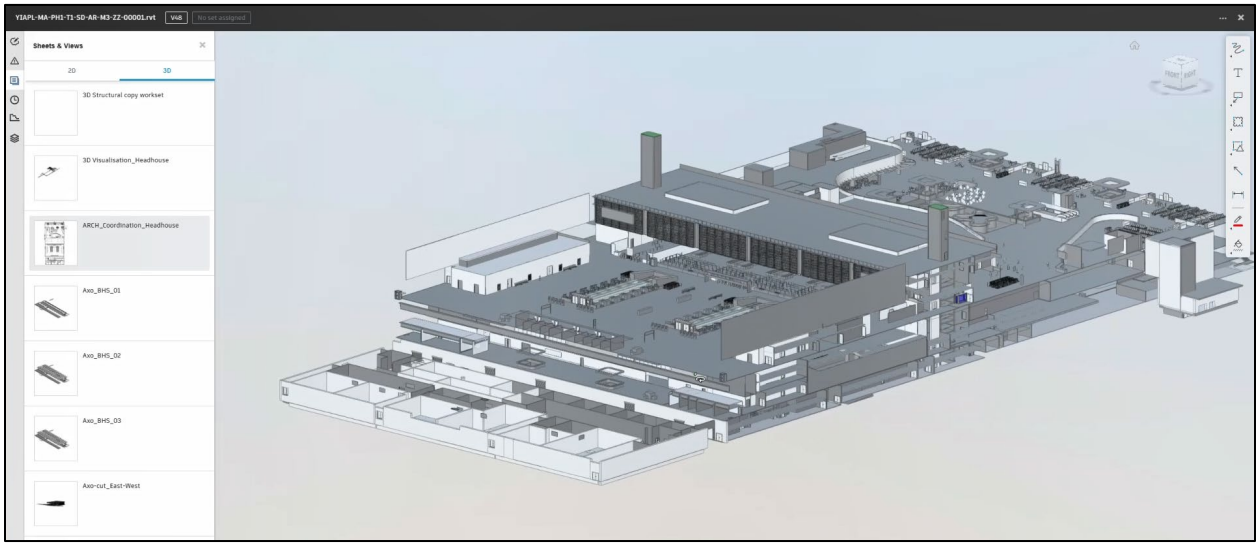
Shared folder

Shared folder was the folder that we shared with our employer and that was updated every week with the “Share” function.

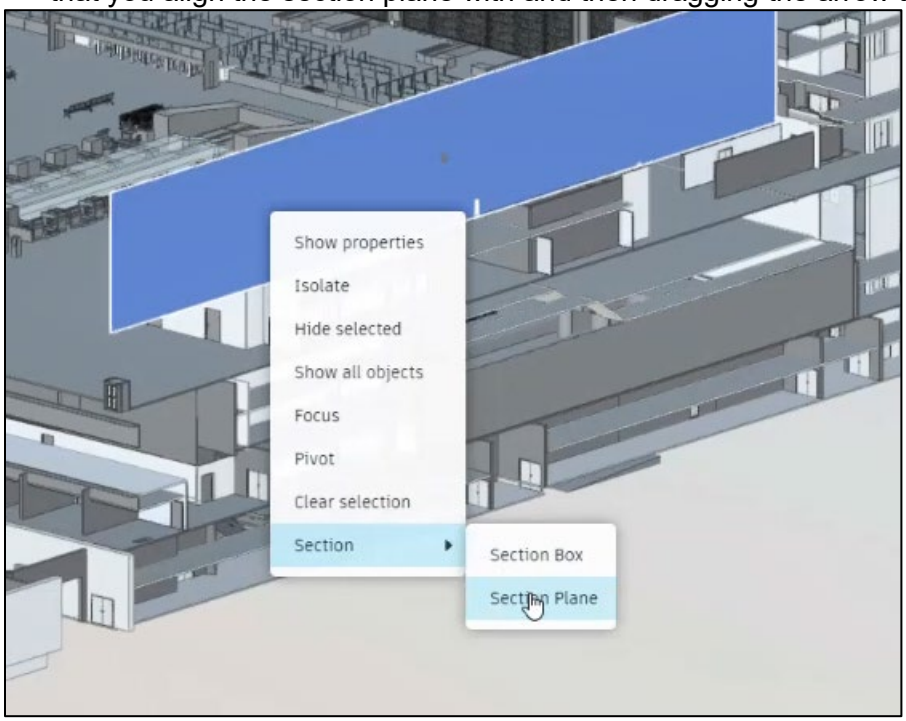


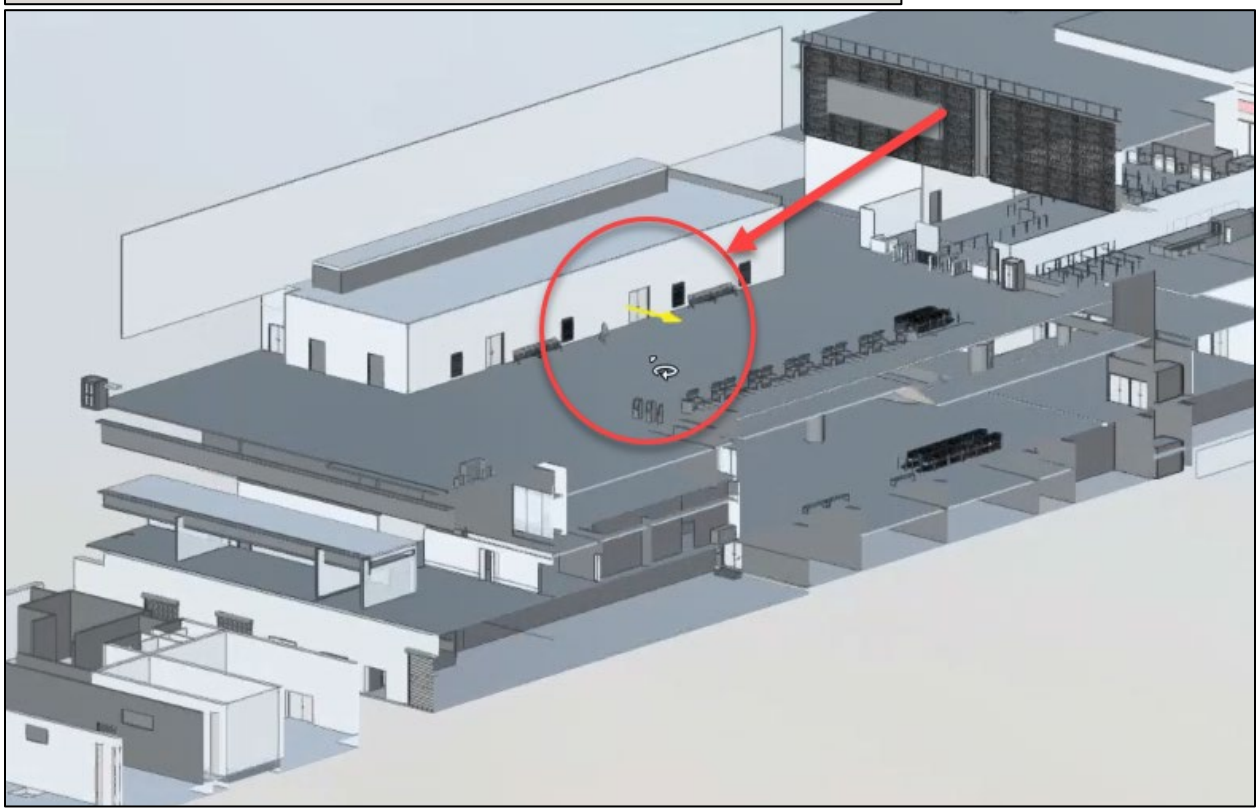
By clicking on the Revit files, it`s possible for the employer to review the models directly in BIM Collaborate Pro.

- Rotate them around

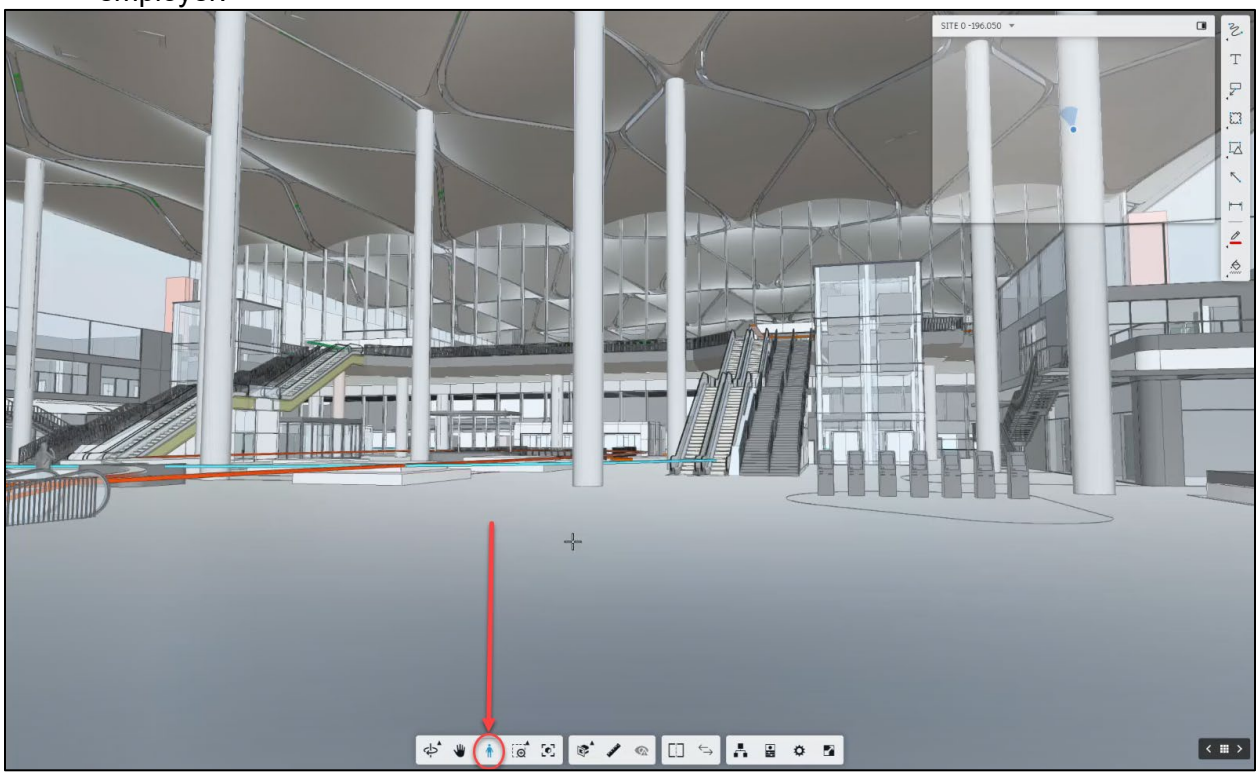


- Section through. We mostly preferred using Section Plane. First selecting the element that you align the section plane with and then dragging the arrow to where we need that.

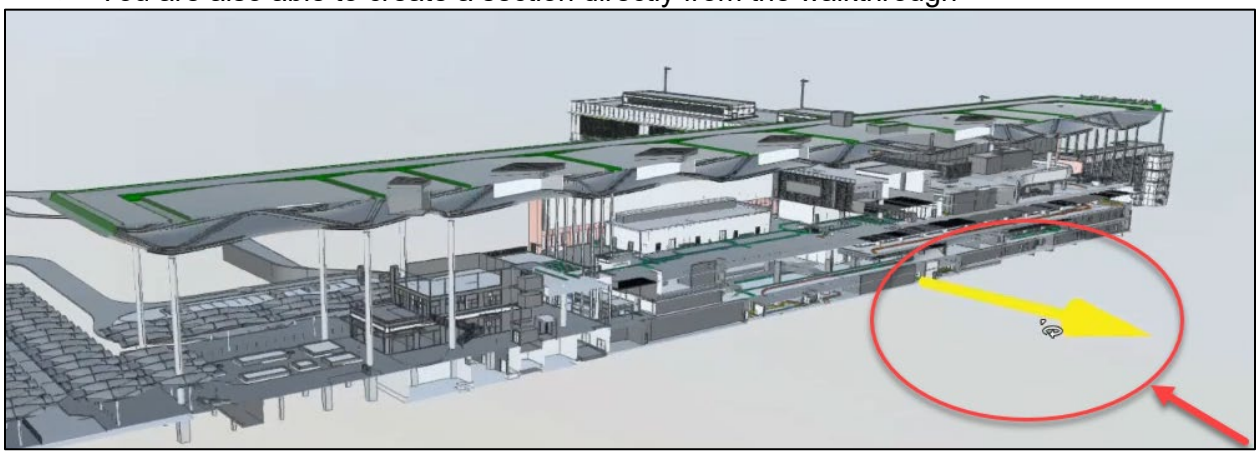




- All the views accessible here are the ones that have been published and shared weekly
- It`s also easy to walk through the building in the BIM360 environment. By clicking on a little human figure underneath. We used this extensively in our meetings with the employer.



- You are also able to create a section directly from the walkthrough



For us it was very useful to use Autodesk Help site to get a good overview and search what we were uncertain about. https://help.autodesk.com/view/COLLAB/ENU/ https://knowledge.autodesk.com/support/bim-collaborate-products is a useful site to get a quick overview of different knowledge sources for BIM Collaborate Pro.

BIM Collaborate Pro (BIM 360) collaboration and coordination workflows in the design of a large international airport

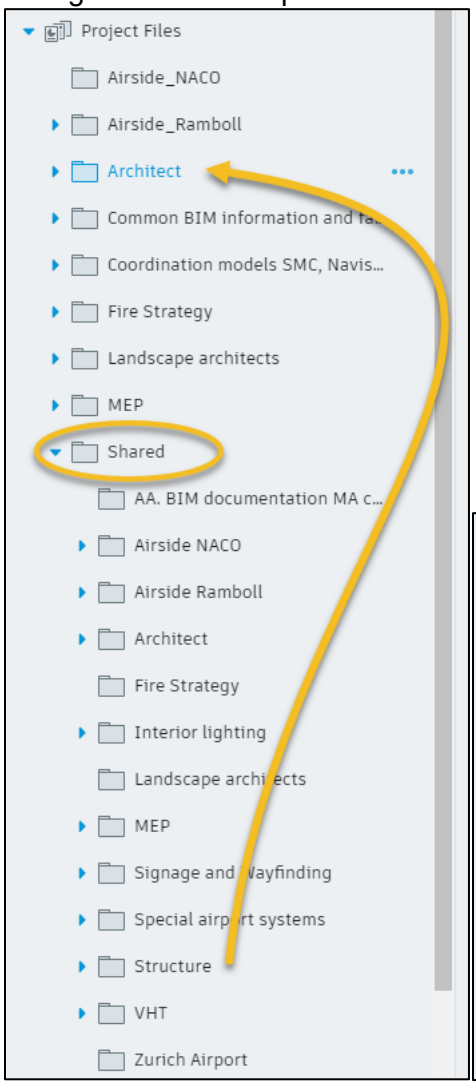
File sharing

File sharing methods

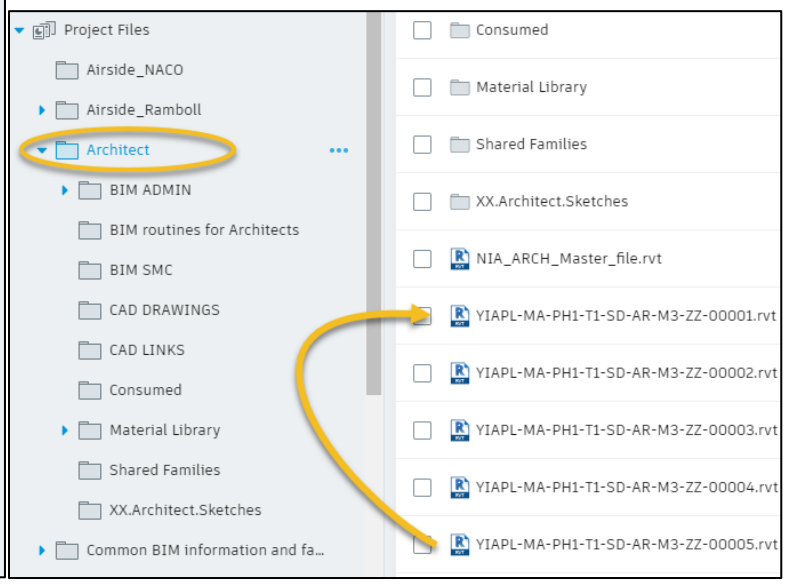
There are three types of sharing that are available in BIM Collaborate Pro and as a base rule, we try to agree on the same system between the whole team. Autodesk also calls it trust levels.

1. Controlled Sharing - Consume Models from Packages (low trust)
2. Controlled Sharing - Link from the Shared folder (medium trust)
3. Live Linking (high trust)

We used “Linking from Shared folder” for linking other discipline models and “Live Linking” for linking the same discipline models.



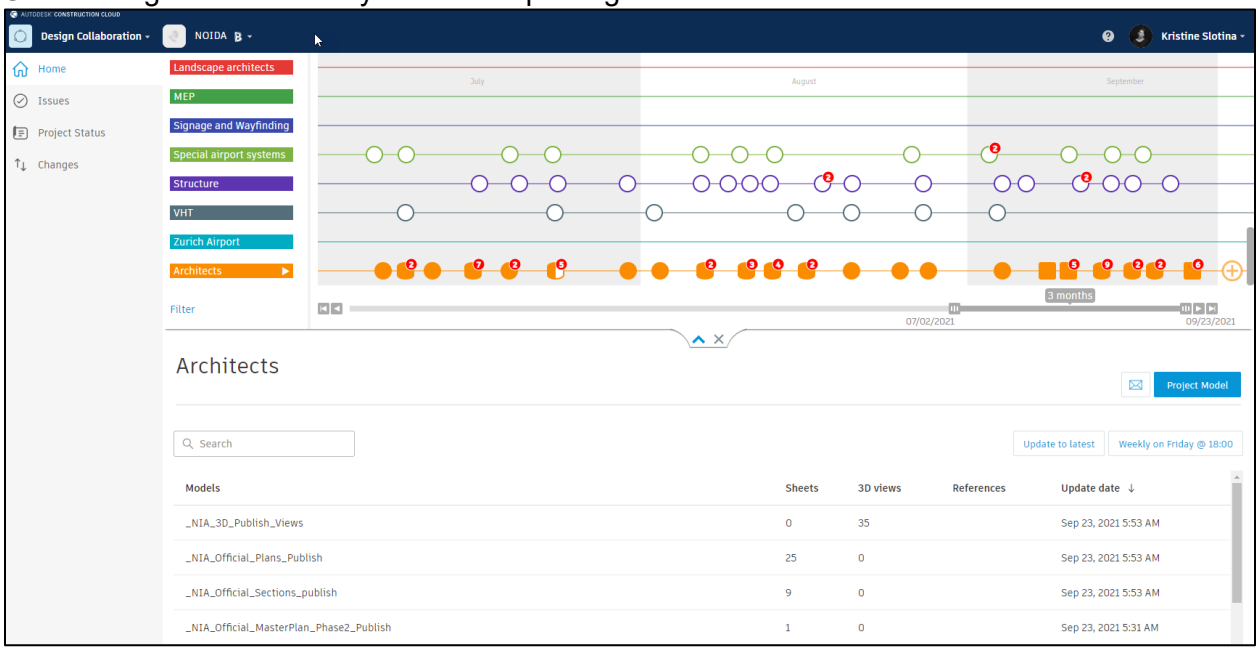
“LINKING FROM SHARED FOLDER”



“LIVE LINKING”

Design collaboration

Under design collaboration you can see packages that were shared and consumed.



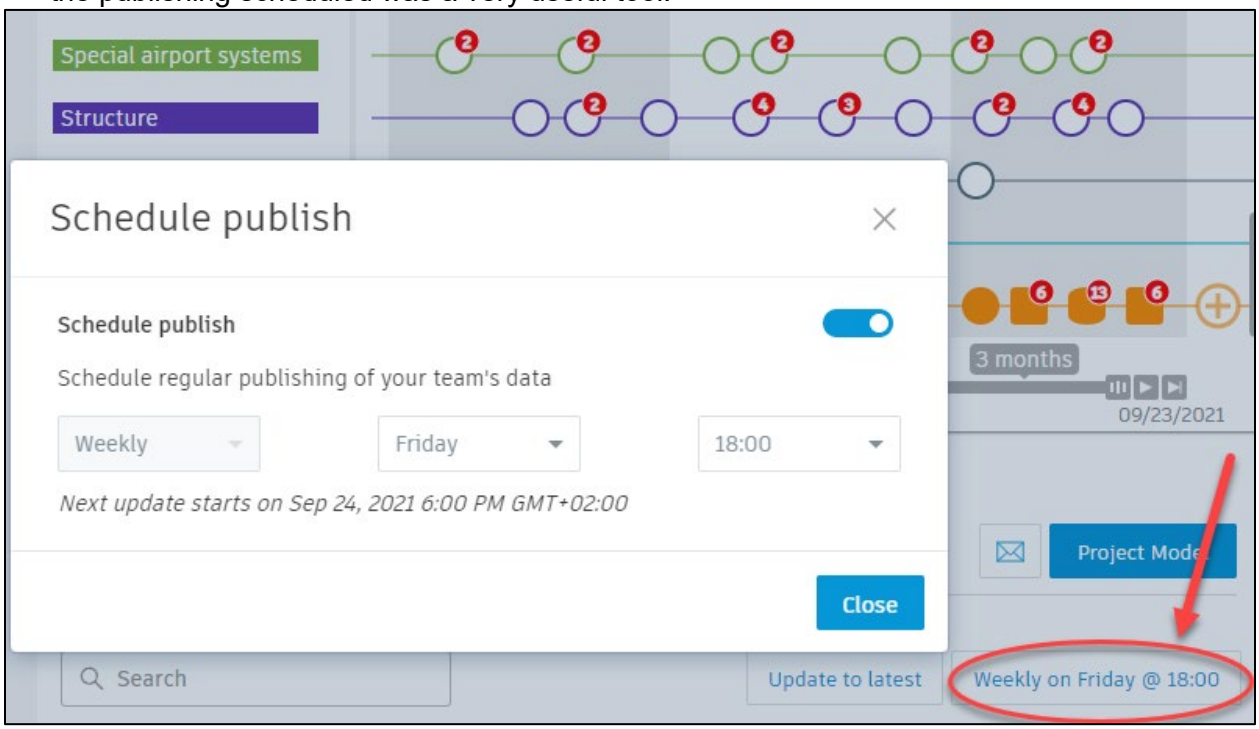
Different dots mean different things in BIM collaborate Pro and you can read more about it here. (https://knowledge.autodesk.com/)

Packages and standalone models are displayed on the timeline with varying symbols that indicate their status.

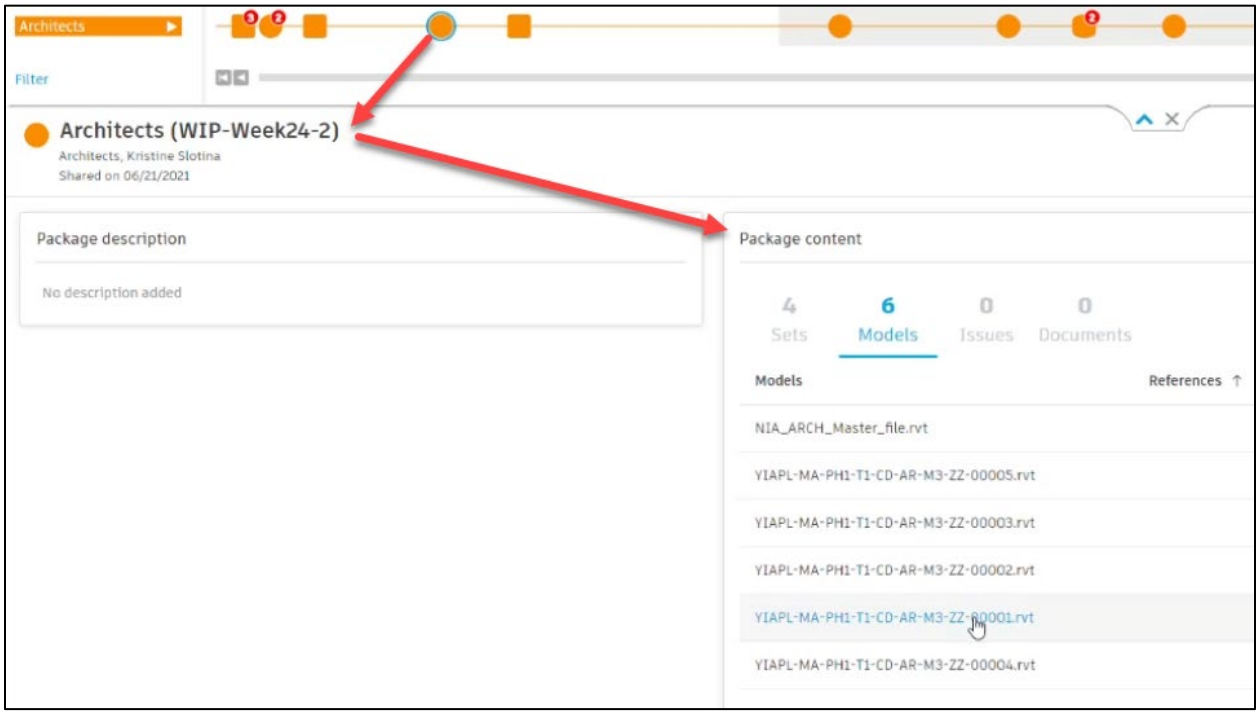
Node Type	Description
	An empty circle on another team's line represents a package that has been shared, but not consumed by your team.
Shared	A filled circle on another team's line represents a package that your team has consumed.
BNIM	A filled circle on your team's line represents a package you have shared.
	A dotted-line circle on your team's line represents the start of a new package that you haven't shared yet.
3	A numbered badge with a circle represents a cluster of packages. The two-tone color means some have been consumed, some have not. Click or zoom to expand the cluster.
2	A numbered badge with an empty circle represents multiple packages that haven't been consumed. Click or zoom to expand.
4	A numbered badge with a filled circle represents multiple packages that have been consumed. Click or zoom to expand.
	A square represents a model uploaded to the team folder in the Files tool (in Docs or Build).
2	A numbered badge with a square represents a cluster of models. Click or zoom to expand.
8	A numbered badge with a hybrid square and circle shape represents a cluster of models and packages. Click or zoom to expand.
8	A numbered badge with a hybrid square and circle shape represents a cluster of models and packages. The two-tone color means some have been consumed, some have not. Click or zoom to expand the cluster.
	The plus node allows you to create a new package to share your team's work.

IMAGE COURTESY OF AUTODESK

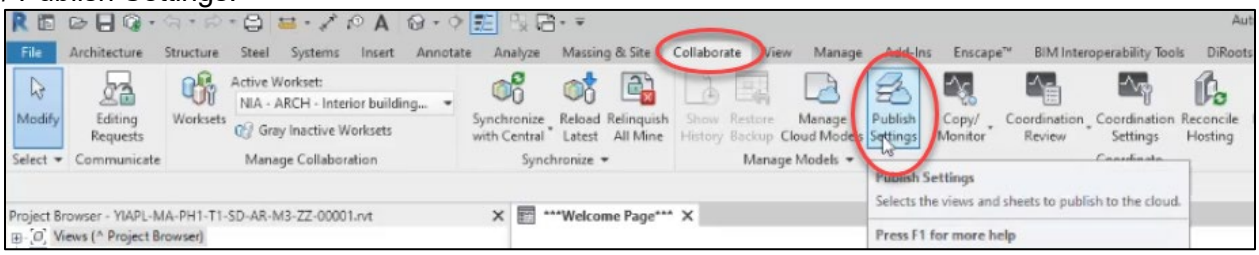
- You`re able to schedule and automatic “publish” in BIM Collaborate Pro. That takes the latest Revit models and publishes them. You still need to review them and click on share. But from our experience ”Publish” function is the one that takes time, so having the publishing scheduled was a very useful tool.



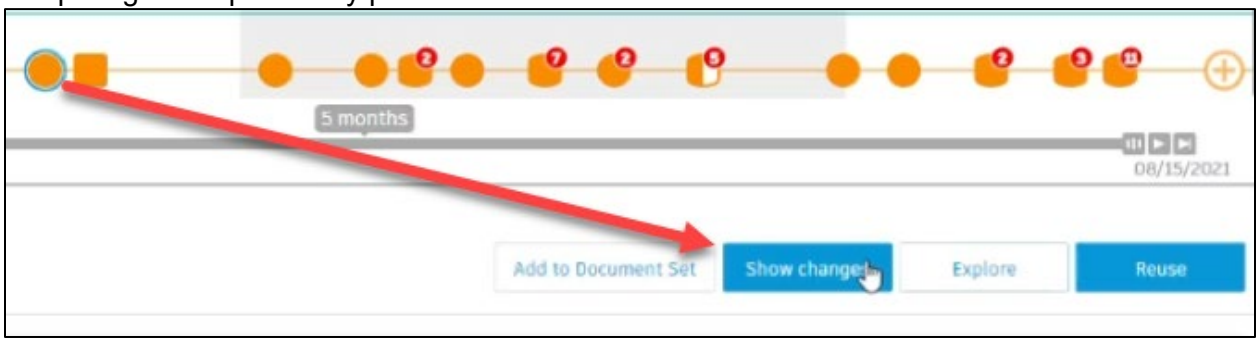
You are able to click on the each dots and review the models at that exact timeline.



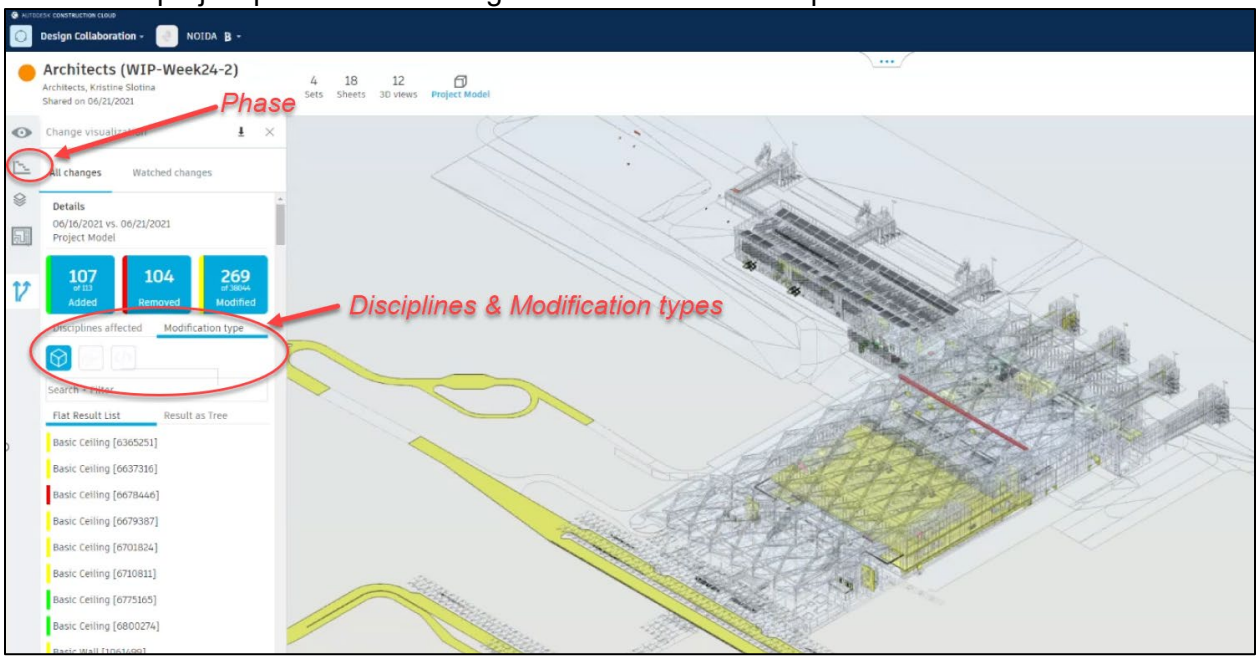
In each set you are able to see all the information that you have published with this set. Both 3D models and 2D sheets.
In order to adjust the “Publish Settings”, you go into Revit environment and click on Collaborate / Publish Settings.



In addition to seeing the published views, you are able to show changes of the model, comparing to the previously published model.

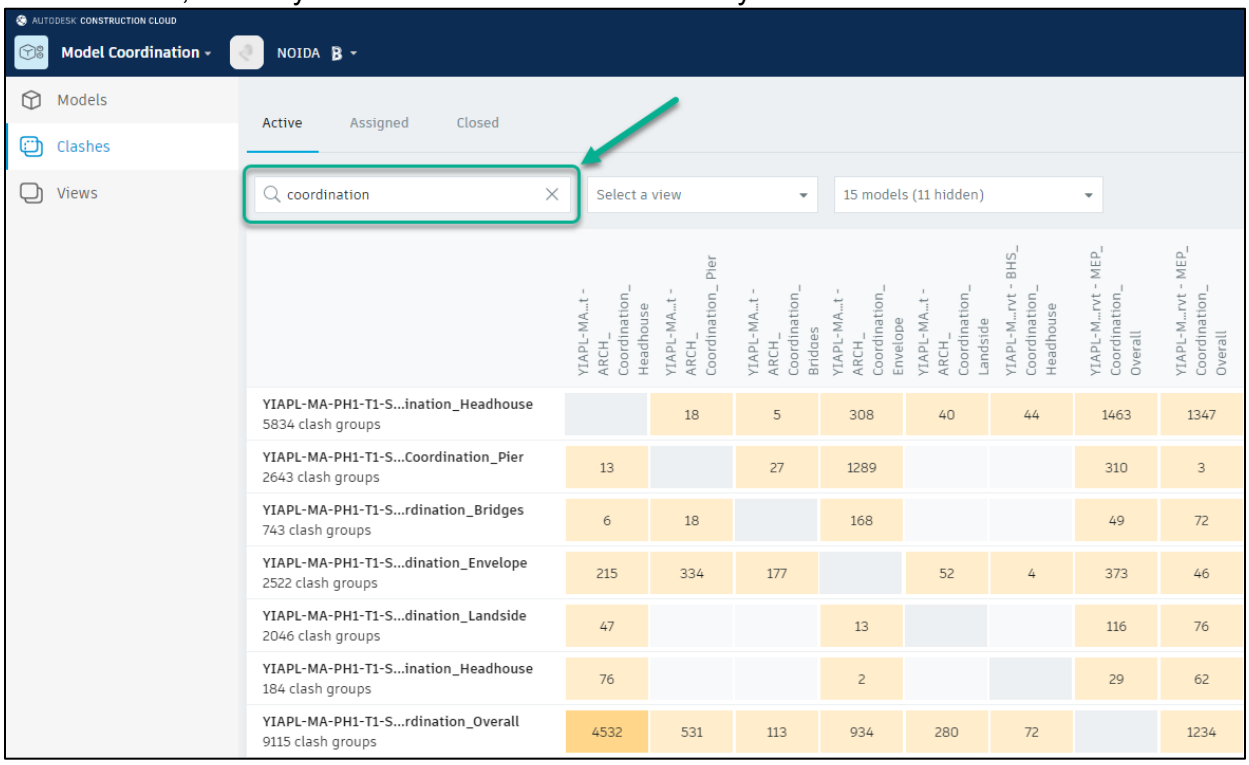


When opening the “Changes” view, you can adjust the Phase, Discipline and Modification type you are interested to see. For example in the early stages, we only wanted to review Phase 1, Architectural changes and geometry modifications.
Later in the project parametrical changes would have mode importance.



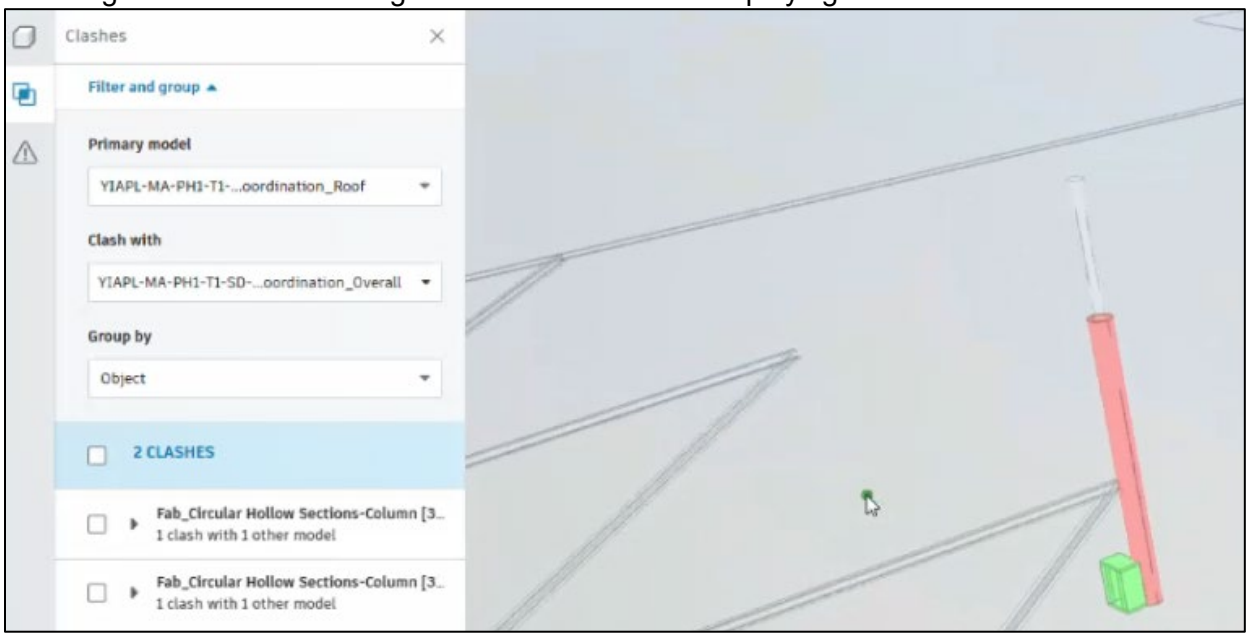
Model Coordination

Under Model Coordination / Clashes one can see the Automatic Clash detection results that BIM360 has produced. It takes all the 3D views in the shared models and clashes them together. To limit the 3D views taken into consideration, we have added a keyword to the views “coordination”, that way we can review views that are only relevant for coordination.



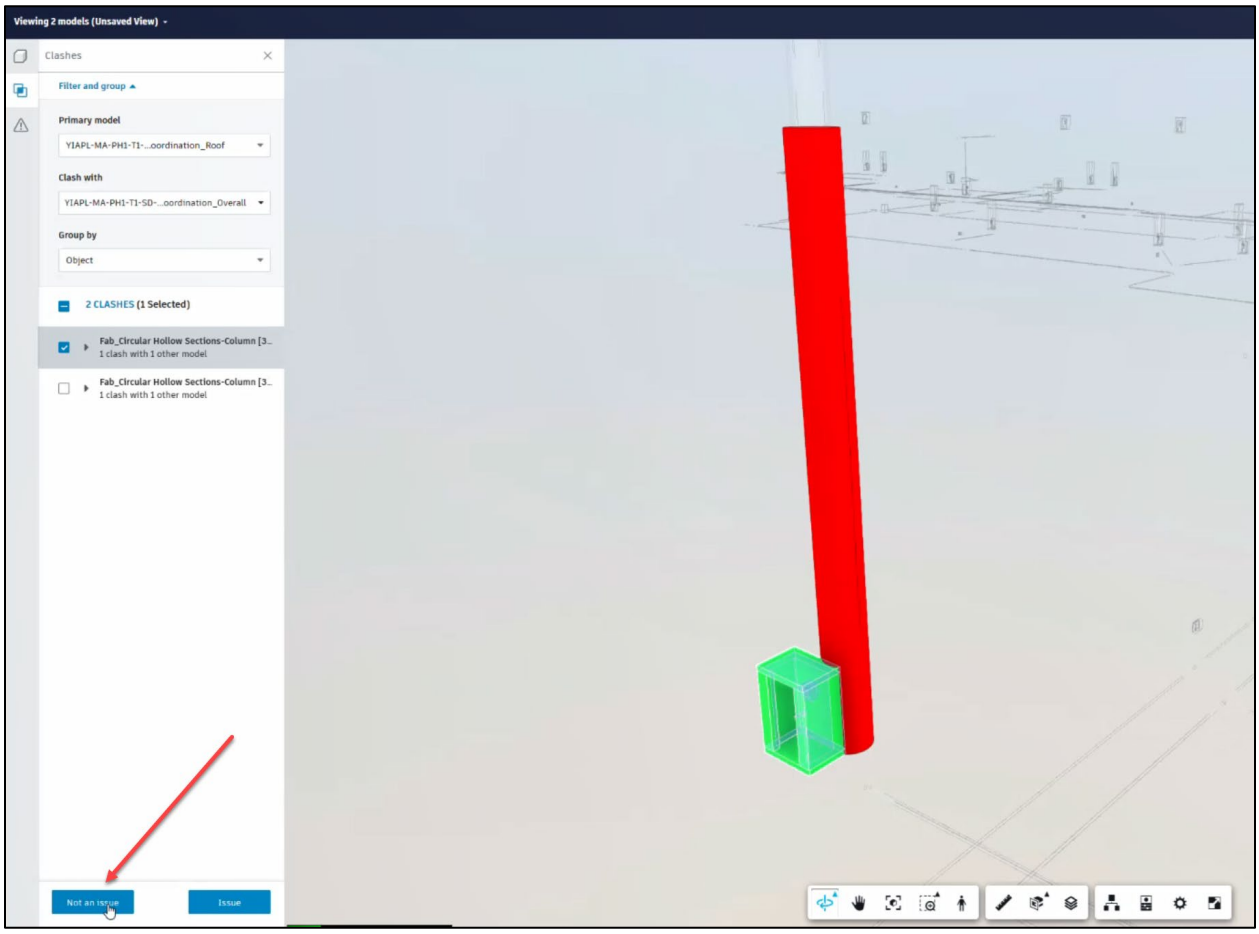
	YIAPL-MA...t - ARCH_ Coordination_ Headhouse	YIAPL-MA...t - ARCH_ Coordination_ Pier	YIAPL-MA...t - ARCH_ Coordination_ Bridges	YIAPL-MA...t - ARCH_ Coordination_ Envelope	YIAPL-MA...t - ARCH_ Coordination_ Landside	YIAPL-M...rvt - BHS_ Coordination_ Headhouse	YIAPL-M...rvt - MEP_ Coordination_ Overall	YIAPL-M...rvt - MEP_ Coordination_ Overall
YIAPL-MA-PH1-T1-S...ination_Headhouse 5834 clash groups		18	5	308	40	44	1463	1347
YIAPL-MA-PH1-T1-S...Coordination_Pier 2643 clash groups	13		27	1289			310	3
YIAPL-MA-PH1-T1-S...rdination_Bridges 743 clash groups	6	18		168			49	72
YIAPL-MA-PH1-T1-S...dination_Envelope 2522 clash groups	215	334	177		52	4	373	46
YIAPL-MA-PH1-T1-S...dination_Landside 2046 clash groups	47			13			116	76
YIAPL-MA-PH1-T1-S...ination_Headhouse 184 clash groups	76			2			29	62
YIAPL-MA-PH1-T1-S...rdination_Overall 9115 clash groups	4532	531	113	934	280	72		1234

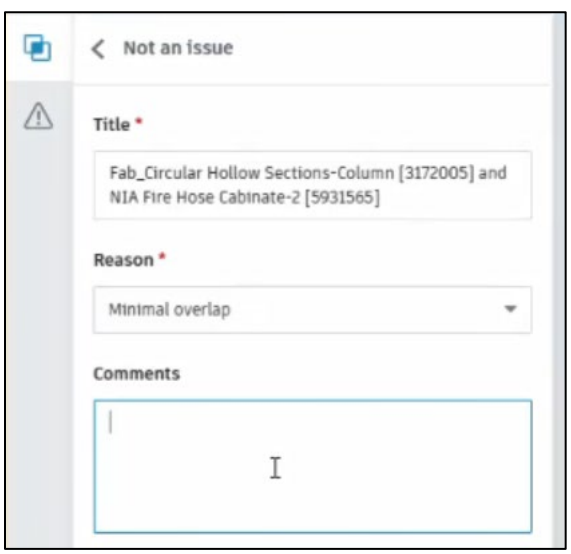
What is nice about this Matrix is that you can directly from here click on any of the numbers and be brought to the view clashing those two models and displaying those clashes.



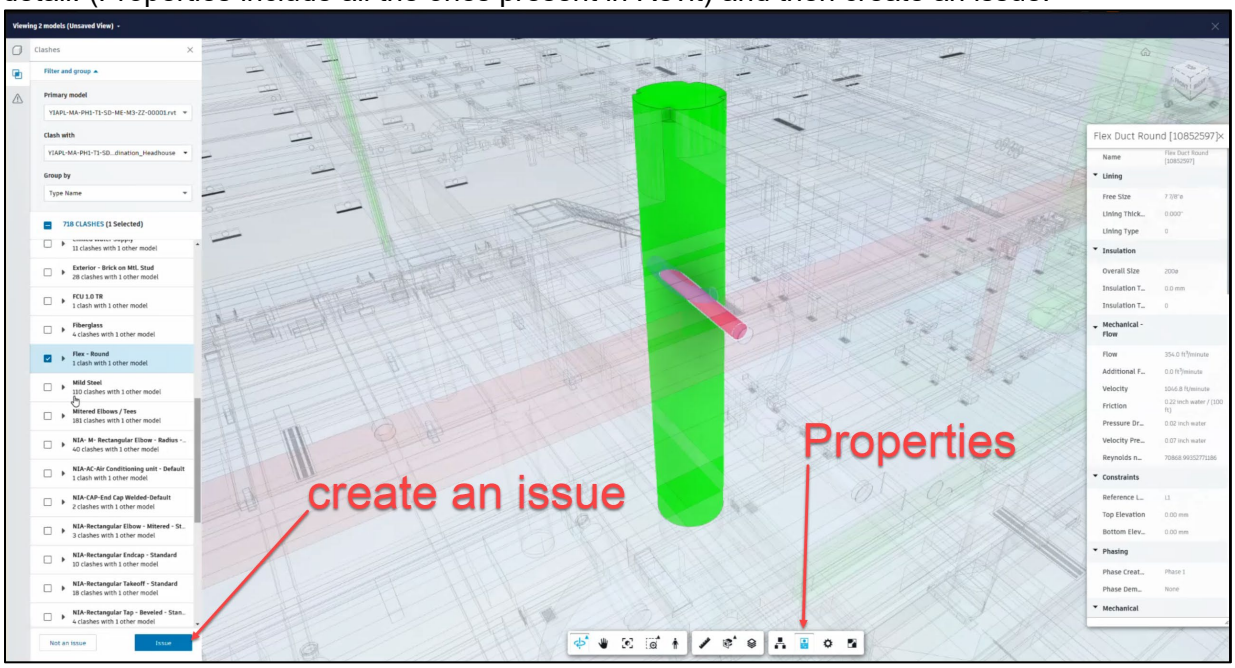
Reviewing the clashes

Some of the clashes might be minor, that will be adjusted in the next phase, therefore its also possible to review them and mark it as “Not an issue”

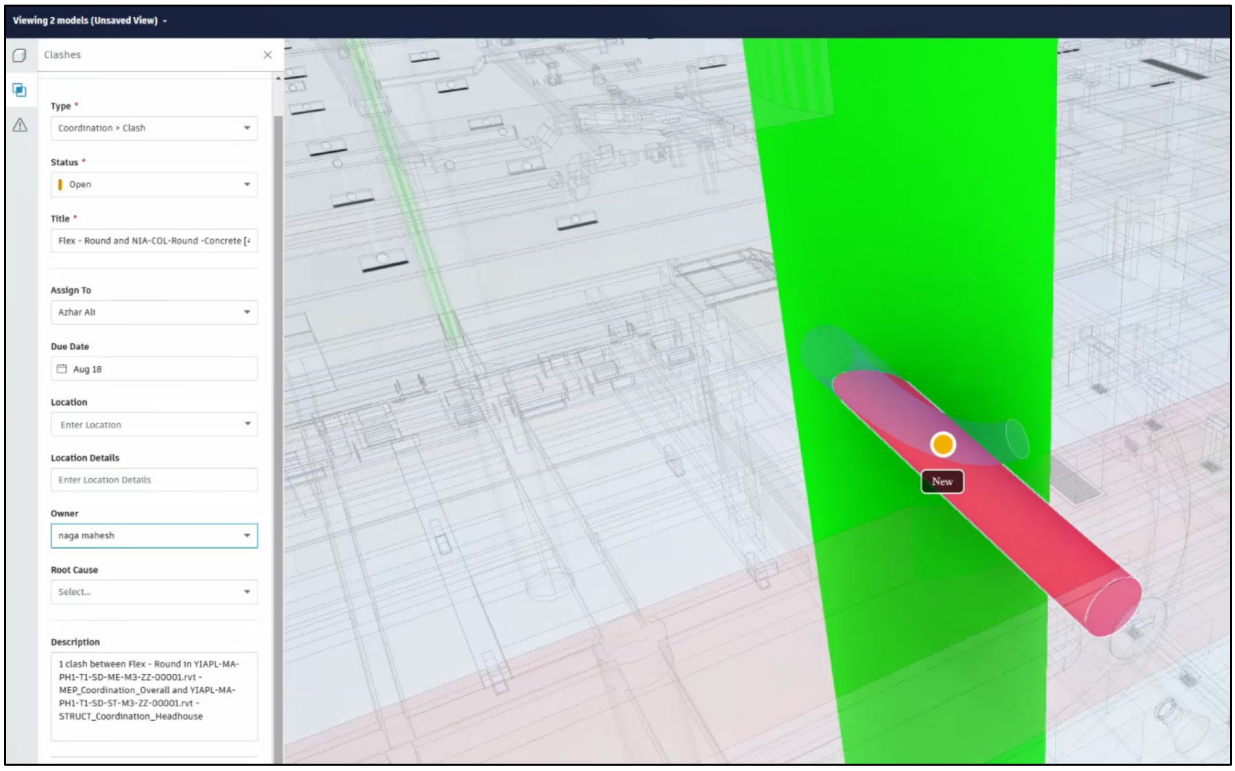




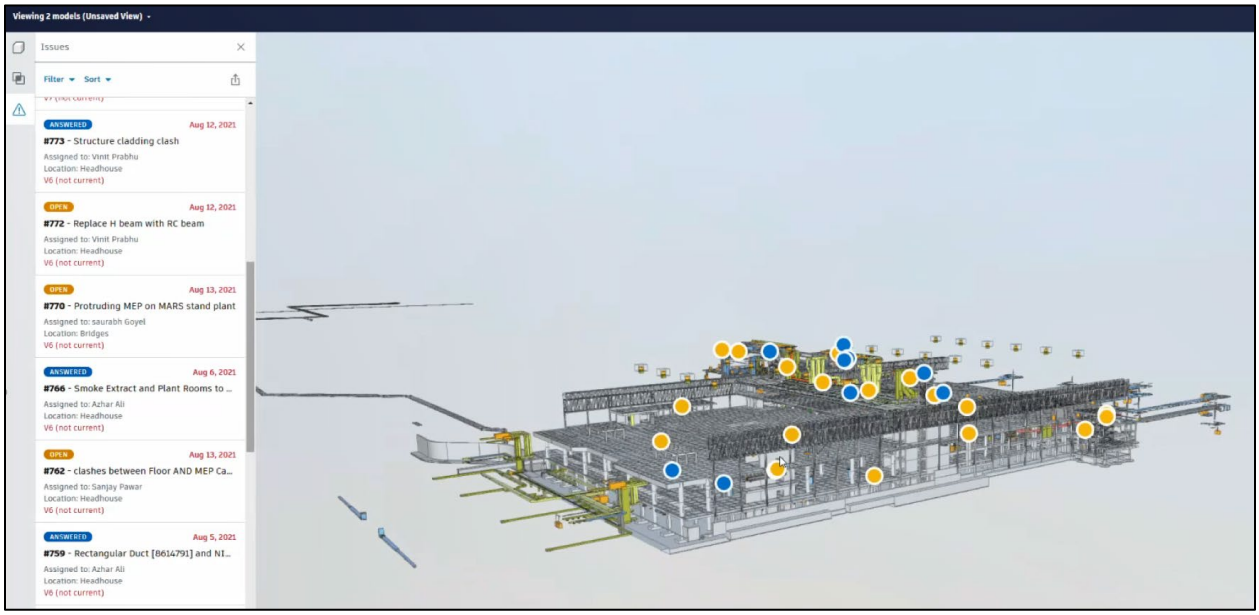
If one finds a clash that is relevant, you can in addition, click on Properties and review it in detail. (Properties include all the ones present in Revit) and then create an issue.



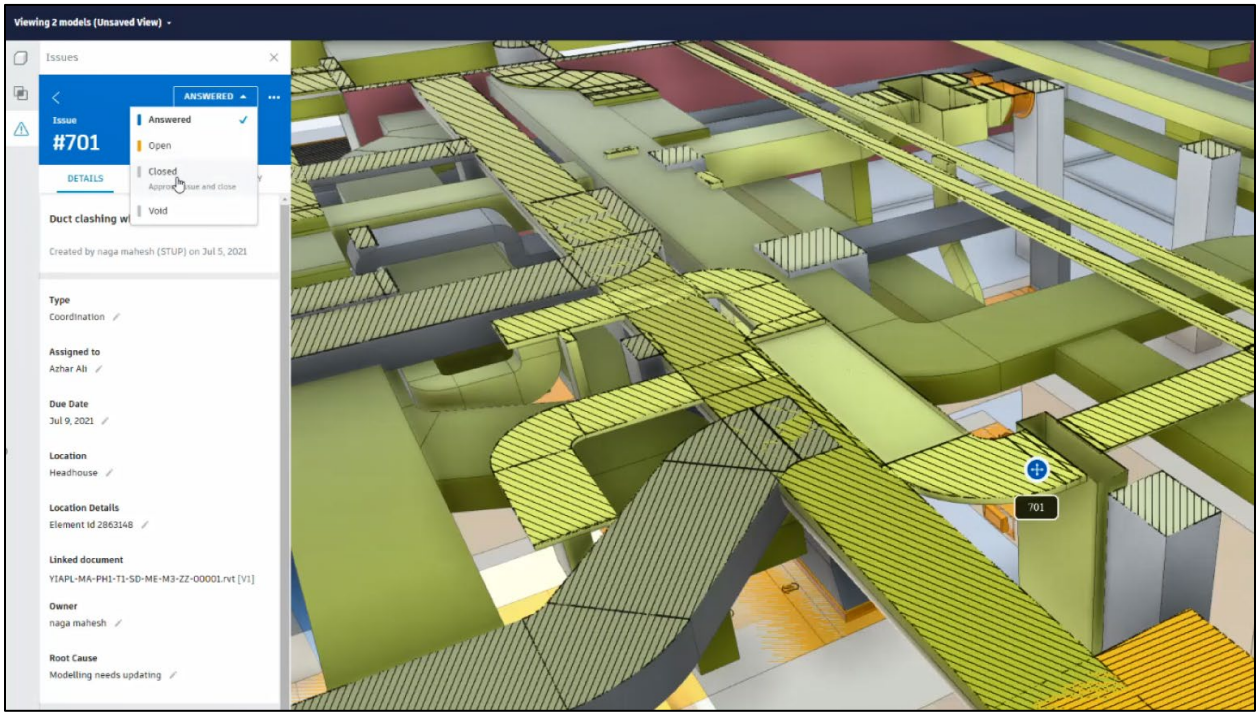
To place the issue in space, you need to click on the model space where issue is located first and then you can fill in the necessary information. Once the issue is created it is removed from clash matric and moved to the issue tab.



To review the issues already created and / or open, you can click to the issues tab on the left side.

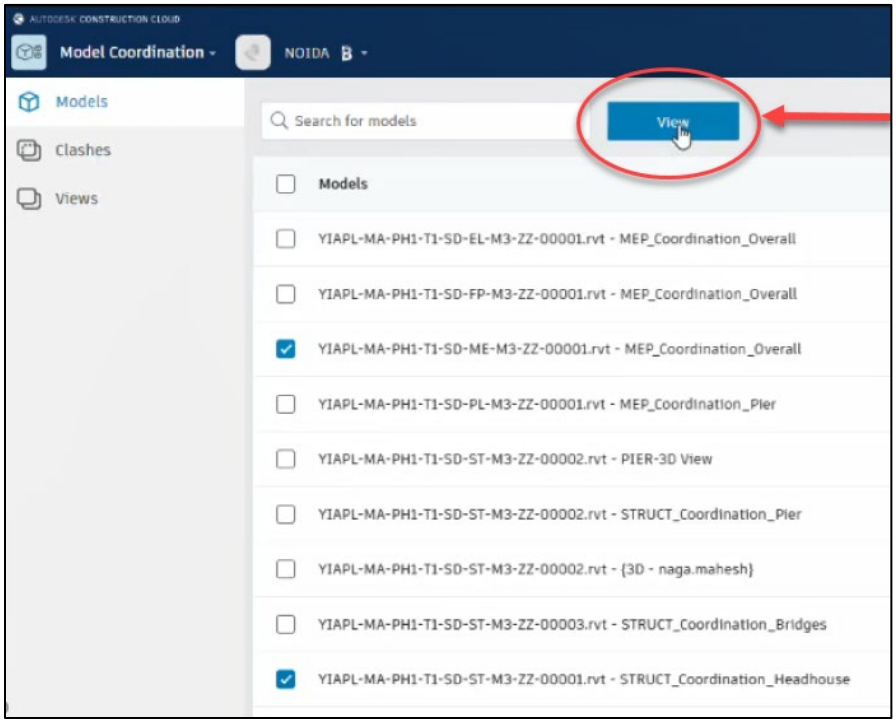


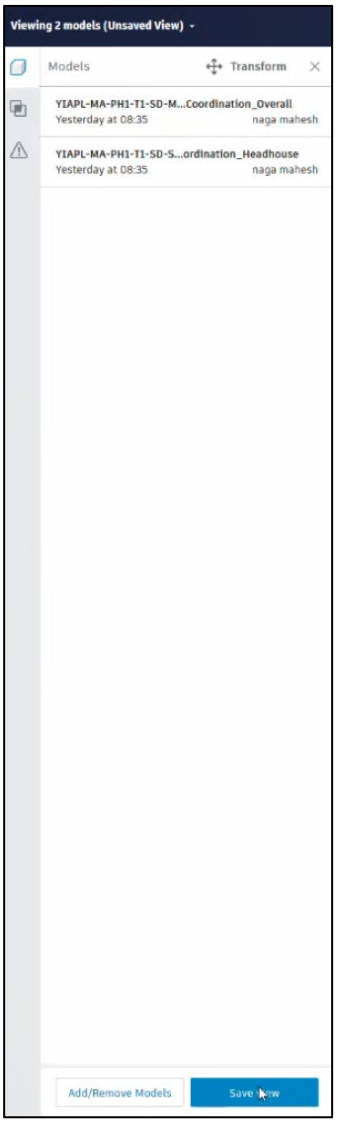
By clicking on the dots (yellow – for open issues, blue - for answered issues), you can see the comments and close the issues that are solved.



In addition to the “Models” and “Clashes tab”, one can also see “Views” tab, where its possible to make and save views.

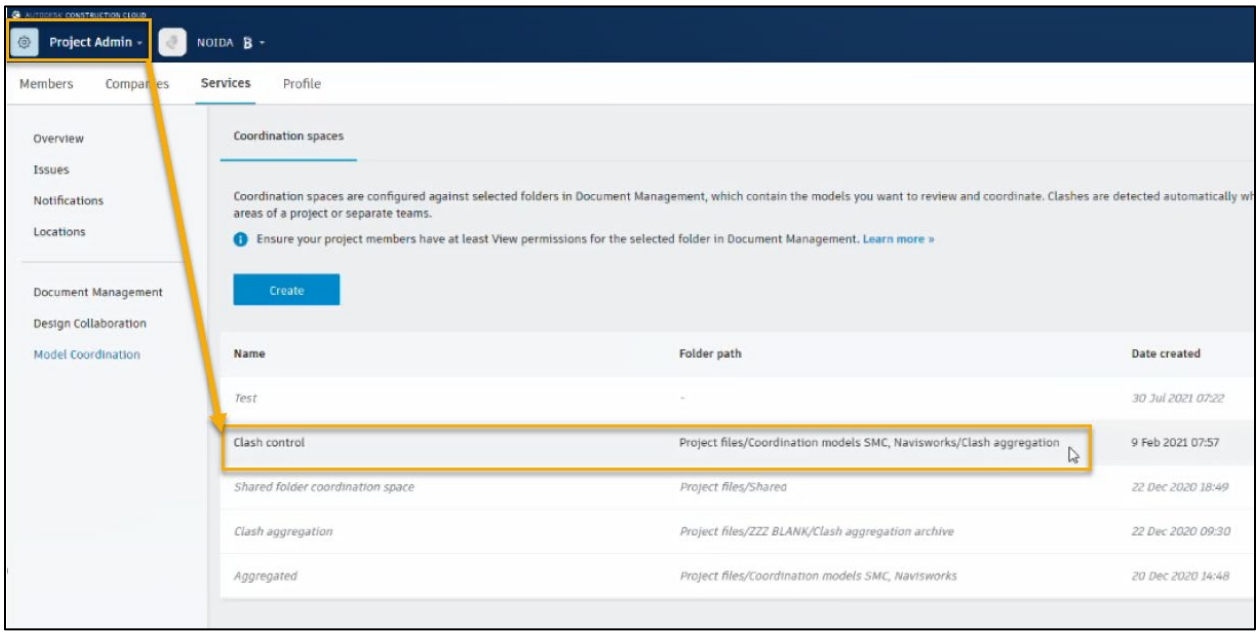
The easiest way to create views is to go to “Models” tab, select models you are interested and click “View”.



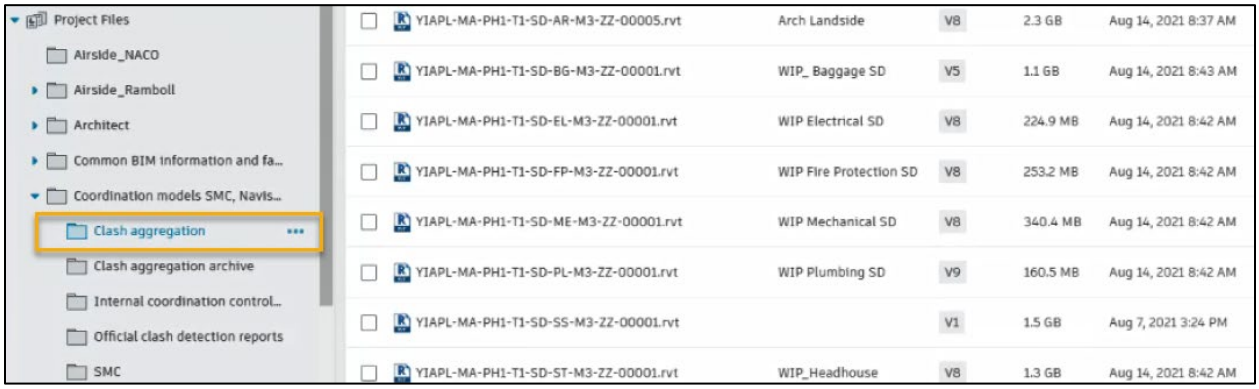


Coordination space

We chose to adjust the coordination space location, because BIM Collaborate Pro was not finding the clashes when there were not only Revit files, but also NWC, IFC and PDF files in our Shared folders. In addition to this issue, we also wanted to control when the clash detection is happening. Therefore, whenever the BIM Manager would copy the files over to the Coordination space, BIM360 would start running clash detection automatically.

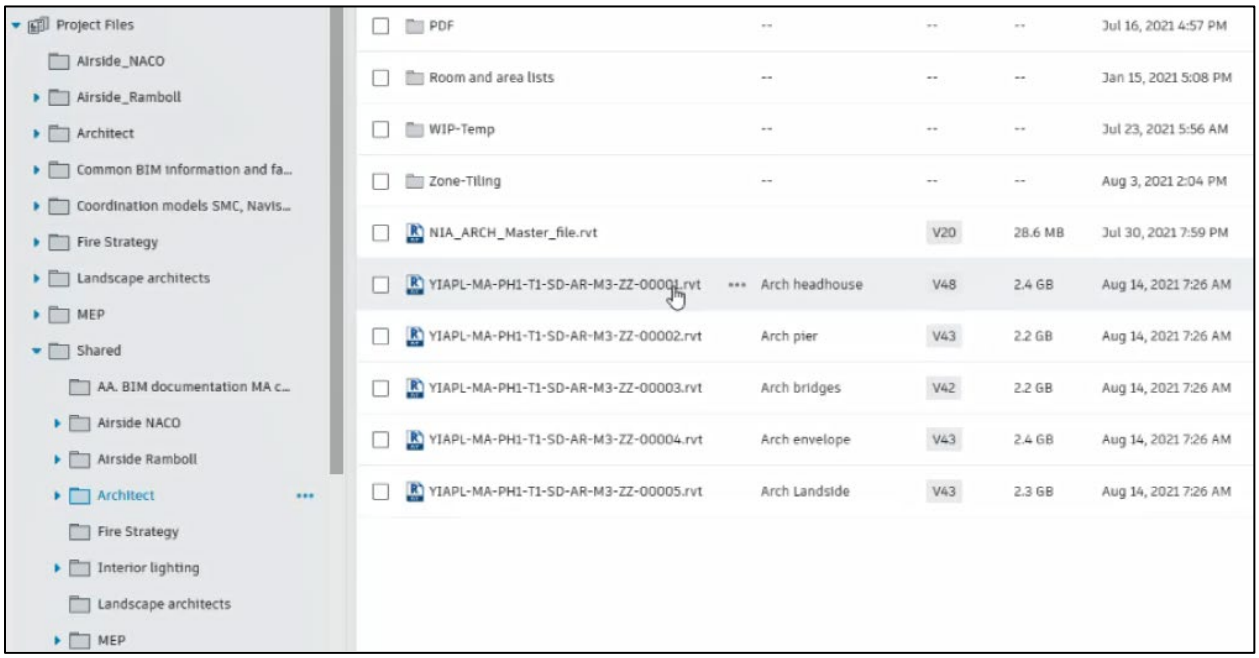


All of our Revit models that were meant for clash detection were copied over to this folder.

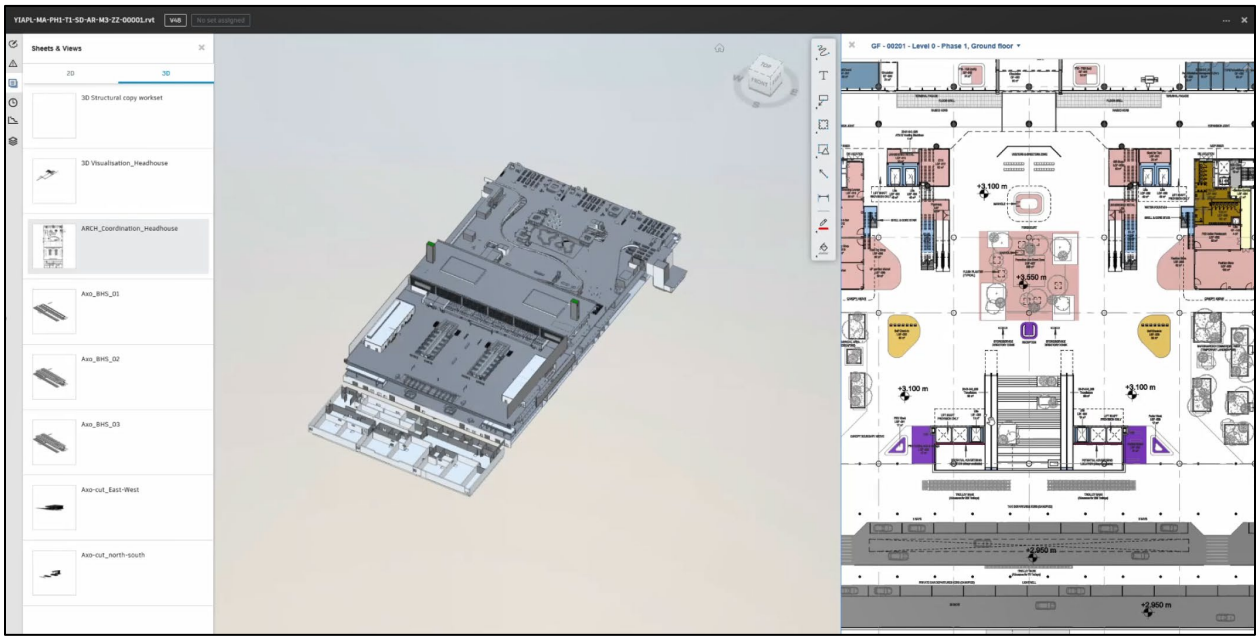


Communication with the employer

All the official files shared with the employer were uploaded in delivery folders created in both Employers Microsoft Sharepoint folder, but also in BIM Collaborate Pro. In addition to this our employer – YIAPL (Yamuna International Airport Private Limited) had full access to the shared folder and was able to download work in progress files any time they wished to. This created transparency in the collaboration and improved communication.



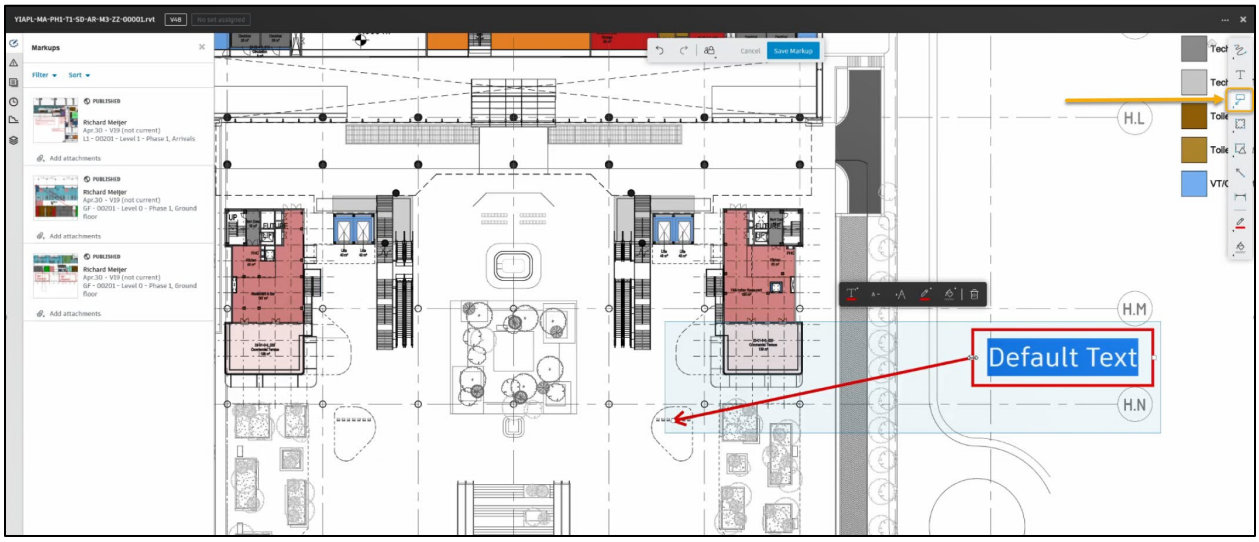
Using BIM Collaborate helped YIAPL to open the models and drawings directly in the BIM360 homepage without needing to know how to navigate Revit.



Markups and internal communication

As part of the design development and Quality assurance review, the team used Markups function in BIM Collaborate Pro to communicate further design development.

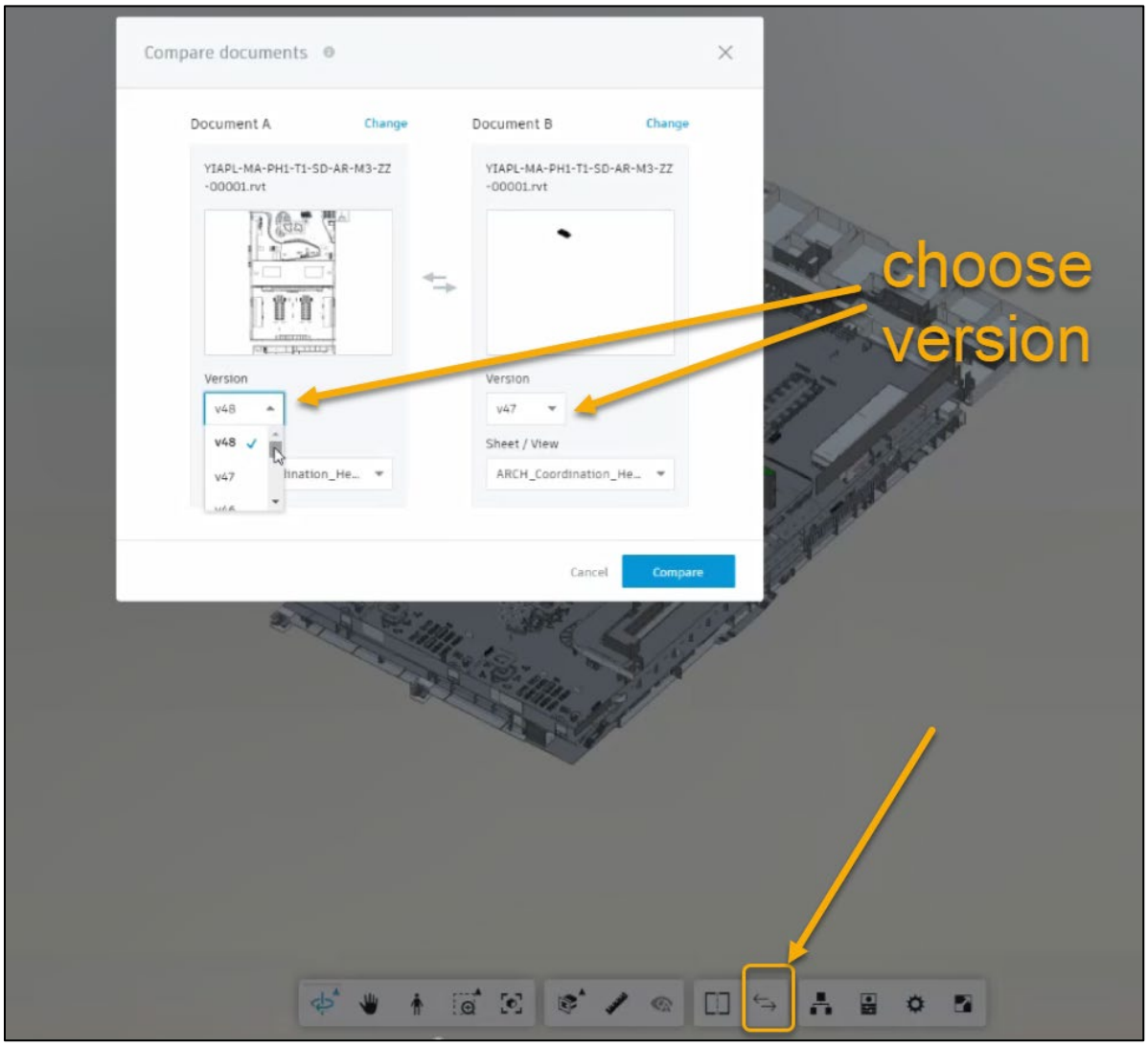
In order to create a markup, click on a 2D drawing and click on the sign shown in the picture to create a markup.

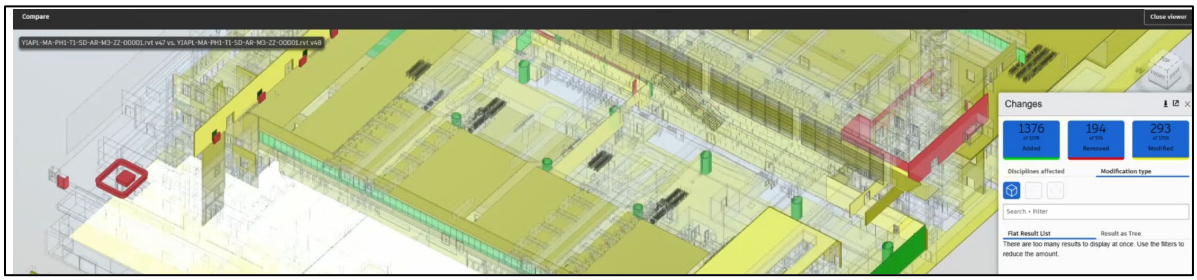


As a default it will be a private markup unless you change that to be a public one.

When looking at the files in the “Document Management” tab, it is easy to control the display of the changes between different versions published. In the previously presented “Model Collaboration” tab you are able to pick a version and compare it with the previous version. Here in “Document Management” tab, you can compare any version with any, even jumping several.

Click on the two arrows on the bottom of the screen and explore different view functionalities (similarly as in the other tab).





BIM Collaborate Pro and Navisworks integration

In the early stages of the project we used Navisworks and BIM Collaborate Pro integration in a simple way to find clashes in Navisworks and convert that to BIM Collaborate Pro.

Our goal was to integrate this seamlessly with Navisworks and Revit plugins. This is still work in progress but promising examples of this have been found already.
(Example: https://youtu.be/K2oWmzTrWUI)

At the moment our integration process unfortunately has not succeeded. Although because of the chellenges, we have realized by getting more people using BIM Collaborate Pro and engaging them in this platform, the communication flows much better than by using several platforms.

Challenges and potential improvements to the workflow

What could we do to improve workflow?

BIM360 template

Use the BIM360 templates for future projects

Clash Detection

Use the “Shared” folder as a clash detection folder

Communication

Use BIM360 more extensively for communication

Early Standards

Establish the standards before starting the project design

Takeaways

Design collaboration and BIM Model coordination across the globe

An international team with expertise from various working practices and cultures

BIM360
as one source of truth!

The Team

Noida International Airport

nordic OFFICE OF ARCHITECTURE

GRIMSHAW

NACO a company of Royal HaskoningDHV

STUP

COWI

STUDIO FRACTAL

SLA

Inhabit

aeon Integrated Building Design Consultants LLP

akt II