CES500086

# Elevating Multidisciplinary Transportation Projects Through BIM 360

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## Learning Objectives

- Learn how to successfully host a multidisciplinary project on BIM 360
- Learn about improving collaboration across multiple Autodesk products such as Civil 3D, Revit, and Navisworks
- Learn about best practices to optimize BIM 360 performance and maximize user experience
- Learn about workflows for hosting Civil 3D, Revit, and LIDAR data on BIM 360

## Description

Transportation engineers work every day to keep cities and people connected. But how do we keep transportation engineers connected so they can help successfully deliver projects? This class will focus on providing a workflow for hosting multidisciplinary transportation projects in BIM 360 software. We will start with project setup, including cleaning inherited files, folder structure, and drawing and model creation. We'll discuss the steps teams need to take to collaborate through effective data shortcut management, markups, issues, and model coordination. We'll examine collaboration techniques between roadway, utility, and structural designers working in Civil 3D software and architects working in Revit software. In addition, we will show how LIDAR data can be used using Navisworks software to complete the 3D model. Finally, we'll summarize best practice tips and tricks that can aid design teams in the efficient management of projects. We'll use examples from a successful BIM 360 transportation project located in Toronto.

## Speakers

Courtney Hawkins, EIT

- Transportation EIT with 3 years of industry experience
- Currently working in the Municipal Transportation department at AECOM
- Frequent user of Civil 3D and BIM 360

Stephen McDonald, CET

- Civil Engineer with 13 years of industry experience
- Combines software expertise and collaboration methods to help design teams deliver projects
- Current focus includes adoption of BIM 360 as the common data environment for digital files on large scale infrastructure projects

Sean Hulbert, PE

- Civil Engineer with 30 years of industry experience
- Combines IT and software expertise with a background in CAD and BIM training
- Current focus includes the rollout of BIM 360 Design for Civil 3D

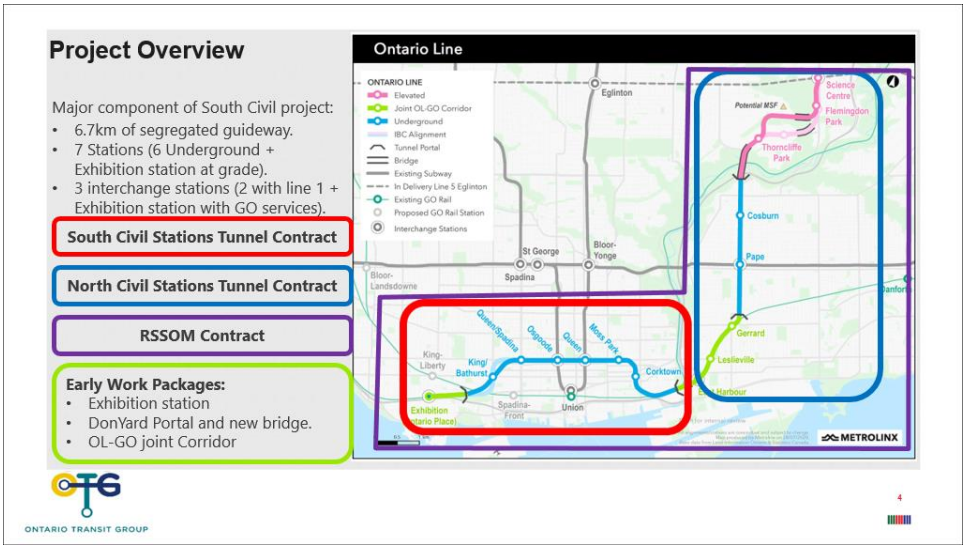
## Class Overview

This class will look at an overview of hosting a project on BIM 360 which is a web-based cloud server that can be used to store project documents and collaborate with team members. In this class we will review the following:

- Project Setup
- Document Management
  - Folder Structure
  - Cleaning Files
- Civil 3D Project on BIM 360
- Drawing Creation
  - Models
  - Pipe Networks
  - Data Shortcuts
- Collaboration Tools
  - Markups
  - Issues
  - Client Feedback
  - Version Control
- Model Coordination
- Next Steps and Reference Material

## Project Overview

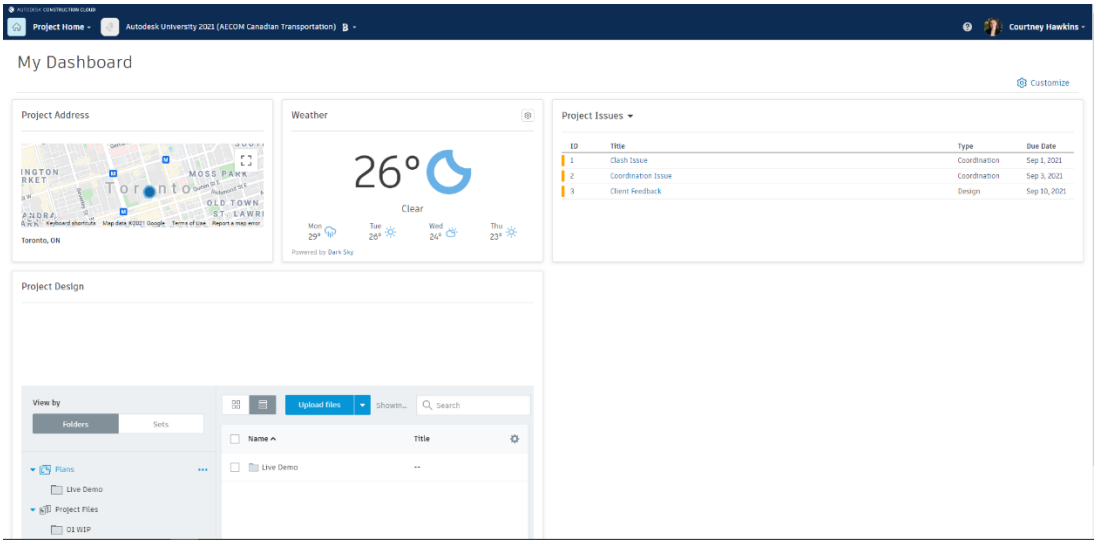
This section is included to give a quick overview of the most recent project that AECOM (Toronto) hosted on BIM 360 which is the Ontario Line South project. This contract included the civil and tunnel design of 6.7km of subway running under downtown Toronto. This included 7 stations, 6 underground and 1 at grade. As well as 3 interchange stations to connect transit riders to existing subway and train services. This gives a good understanding of the complexity of the project and the need for an effective workflow.




Project Overview: Ontario Line South

## Project Setup

Getting started with the workflow the first step would be project setup which is easy in BIM 360. The initial setup would be completed by the account manager. From there the account manager can assign project administrators, these individuals would manage the specific project on BIM 360 and would send out invitation to all project staff to join the project site. Once the team accepts the invitation they will be asked to sign into Autodesk and will directed to the Project Home page. The project homepage can be customized to show useful project information.




Project Setup: Project Home Page

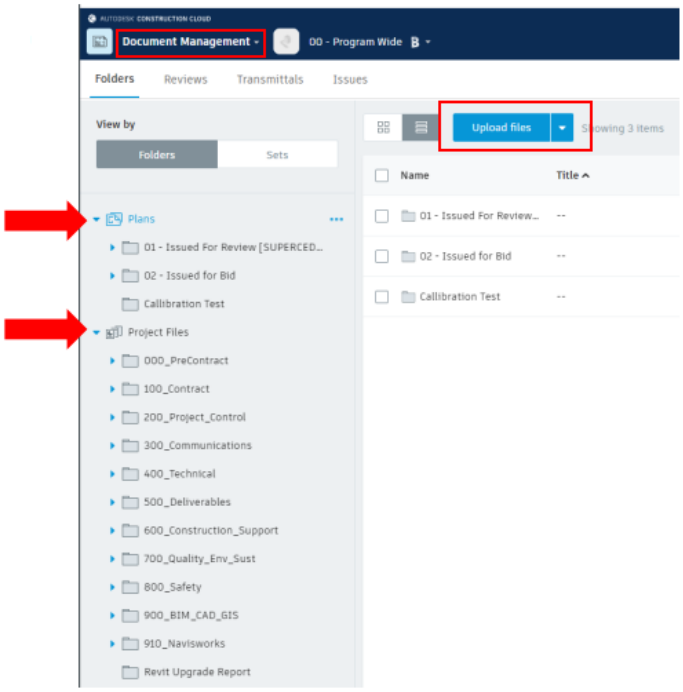
## Document Management

BIM 360 offers a wide range of services but for the Ontario Line South project only BIM 360 docs was used. This meant users had two options from the project homepage, to can navigate to document management or model coordination.

Document management is where all project files will be stored. That includes contracts, background information, CAD models and references, Revit files, PDF's and Excel spreadsheets. BIM 360 allows you to edit Excel and Word documents on the website through a web version of excel and word. You can upload project files be either using the upload button or simply dragging files into the webpage window.

Here at AECOM we have a standard folder structure that we start with but then it can be customized on BIM 360 to suit the project needs. BIM 360 automatically provides a plans section and a project file section. The plans section is the area where project documents that are ready for Quality control review are stored. And the second section is call Project files, this is where all project documents and work in progress reports, cad and Revit files are saved. Folder permissions for each folder and each user ranging from view only permission to full folder control can also be set up.

All files on BIM 360 are version controlled. This allows you to save and track the entire history of your design. You can view and restore old versions which can be a great tool for designers.




Document Management: Plans vs. Project Files

## Civil 3D Projects on BIM 360

Civil 3D designers can store files on BIM 360 such as CAD files, data shortcuts and references.

File maintenance is very important on BIM 360 and it is recommended to remove all broken references, regularity purge and audit files and clean inherited files.

A few tip and tricks to host Civil 3D files on BIM 360 includes keeping software up to date, regularly checking local hard drive space and locating any problems by using reference explorer and health checker.

## Drawing Creation

Next is drawing creation. We have found that it is very important to set up standards for drawing creation at the beginning of the project and make sure that all designers are following the standards. That includes a naming convention. Since BIM 360 is version controlled it is important to keep the drawing names the same throughout the project. CAD model files should be created from a dwt file. The template can be set up to include shared coordinate system, standard fonts and styles as well as standard settings.

In terms of sheet files, it is important to set up a standardized title block for the entire project. If this is done, then you can use the OCR reader in BIM 360. This means when a PDF drawing is uploaded to the plans folder the reader will be able to automatically populate the drawing attributes such as name and description. Another tip is in page setup to turn on the Display Plot

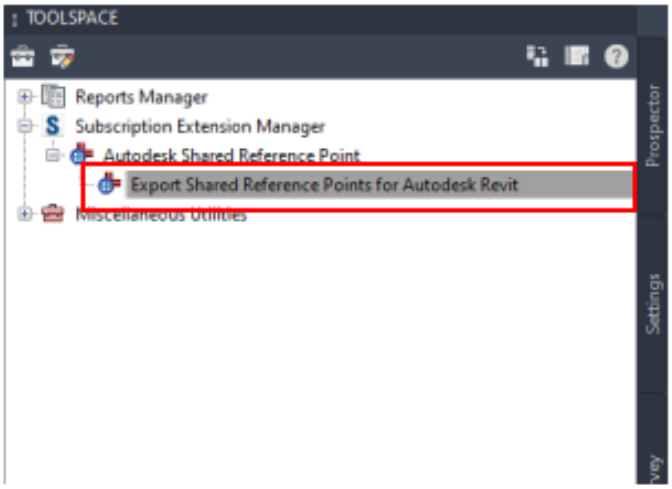
Style setting. This allows the cad sheet file to be viewed directly on BIM 360 without having CAD installed. This is a big timer saver and means that drawings could be reviewed without the need to plot drawings to PDF.

Finally, when designers created 3D models they were asked to create data shortcuts. These data shortcuts were all saved in one folder on BIM 360 and available for all disciplines to reference into their models. Designers were also asked to share all 3D models in the model coordination space. This was done by creating container files which are essentially files with data shortcuts instead of using the actual model file. This reduced the size of files and increased the speed of the 3D models.

## Coordination with Revit

For large transportation project Revit and Civil 3D coordination may be required. For the Ontario Line South Project there was architectural, structural, mechanical, electrical and ventilation designing in Revit. With a project team this big it is important that models are properly coordinated. This was achieved by setting up shared coordinates for all the disciplines. Then on a weekly or bi-weekly basis depending on project needs, the Revit teams would produce an export of their files in dwg format. This is an easy process once the civil and Revit teams had coordinated and setup saved views in Revit. The Revit teams were also asked to keep the name of these exports consistent for the duration of the project. These saved views would then be exported to dwg and shared with the civil 3D team to a specific folder on BIM 360. For the Ontario Line South project these Revit exports were being used by our track, roads, landscape, utilities, drainage teams.

The civil team was able to use the ‘Check Reference Status’ tool to confirm that they were always working with the most recent version of references. Another great tip is that you can subscribe to folders on BIM 360, this means every time someone uploads a new file you get a notification. This is a great tool to notify users when another discipline had made a change. Then on the flip side, the Civil 3D team would save DWG models in shared coordinates and share the files directly with the Revit team and they were able to reference the files into their models.




Coordination with Revit

## Collaboration Tools

Collaboration tools on BIM 360 was a key feature that helped the AECOM team stay coordinated. The collaboration tools used on this project included markups, issues and version control.

Markups allow team members to provide comments directly into PDFs or CAD files saved on BIM 360. This is the tool used for internal QA/QC to allow project managers and designers to review drawings.

Issues can also be created and assigned directly to a user or company. Issues can be tracked to closure and saves an activity log of all discussions on the topic.

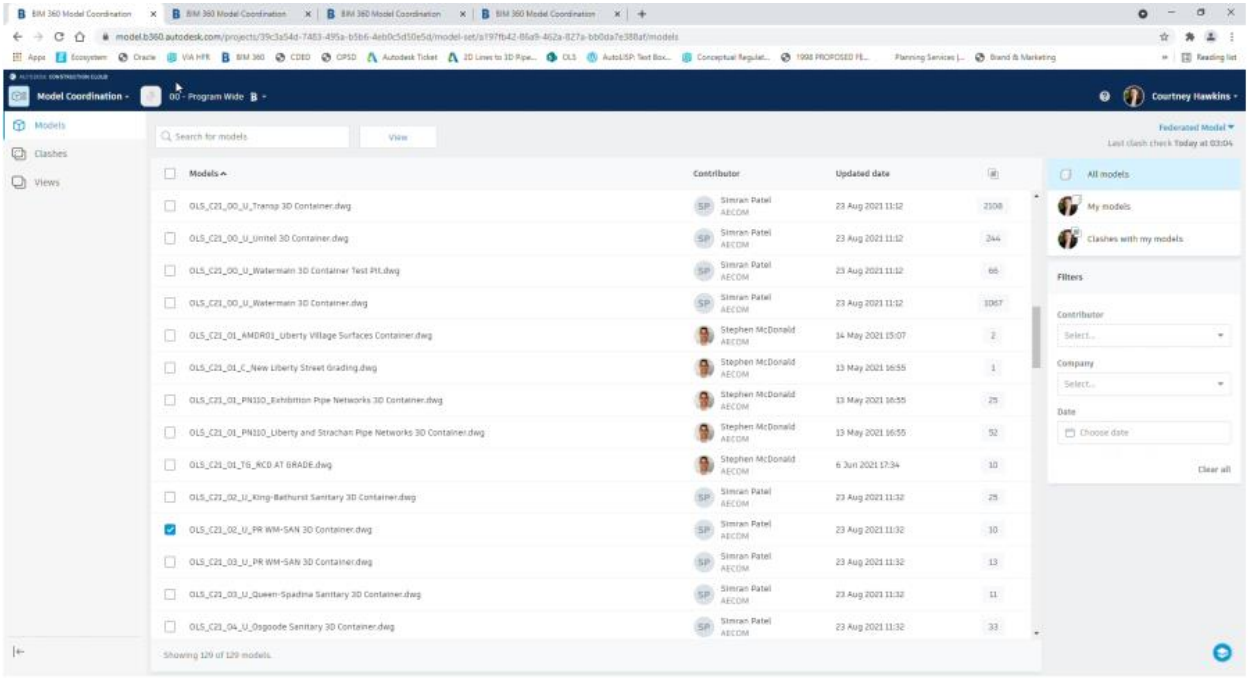
Another great feature is the version control on all BIM 360 documents. When viewing a PDF users can use the compare tool to view the progress of the design drawing. This tool will highlight all changes that have occurred between specific versions of the document.

## Model Coordination

Model coordination on BIM 360 is where users can view 3D models. 3D model files such a surfaces, utilities pipe networks, Revit models can be published to model coordination and then can all be viewed in one place.

On BIM 360, under model coordination you can see a list of models that have been published. You can view them individually, this is just a 3D pipe network.

The other thing you can do is view multiple models at once by selecting a list of models. The other option is to navigate to the ‘Views’ tab where all saved project views are saved. Within model coordination there are multiple tool options such as properties and a measure tool. Users also have the option to create issues directly into the 3D model. Users can also view model clashes and view a summary of all clashes back at the main model coordination page.




Model Coordination

## Reference Material and Next Steps

Below are some tips to successfully implement BIM 360 into future projects.

- Ensure all software is up to date. That includes AutoCAD, Civil 3D and desktop connector.
- Prepare date by checking for drawing errors, removing unused data/references, locating redundant objects and repairing drawings. Drawings can be repaired by using the Autodesk Batch Save Utility.
- Uploading files can be done through Project Migration tool.
- Autodesk Reference Explorer can be used for troubleshooting. Users can find a backup of all working files in the %temp% folder.

Reference Material:

- Collaboration for Civil 3D
- Migrating an Existing Project to Autodesk Docs for Collaboration for Civil 3D

Autodesk Support:

- Support Tickets