Cross-Discipline Coordination: Civil 3D to Revit and Back Again

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About the speakers

Brianna Ladd

Brianna Ladd is a Technical Specialist with Applied Technology Group based in Minneapolis. Teaching and training are a huge passion for Brianna. With the ability to travel and train on site, welcome Reviteers to ATG’s Bloomington office, or interact with a Live 360 web training, every customer training is an exciting and unique opportunity. Brianna is a speaker at Midwest University and BILT NA. Additional consulting, Revit family creation, project management, customized tools demos, software troubleshooting, installations, template creation and more, are all part of a typical day! The importance of good team communication and collaboration are also a passion, hence the nature of this course.

About the speakers

Kyle Groves, EIT

As a member of the Civil and Infrastructure team at ATG, Kyle has spent the last two years supporting customers with specialized training, technical support, and consultation services. Prior to working at ATG, he worked on land development projects for solid waste, residential and commercial projects. Kyle received his B.S. in Geological Engineering from the University of Wisconsin-Madison. He is passionate about creative and sustainable solutions to the problems of today & tomorrow.

Course Description

Locating the Revit model in “real world” coordinates is the most important part of sharing files between the Civil and building disciplines. Once common coordinates have been established, sharing other design elements is relatively simple.

Building designers and site designers often live in different worlds. We differ in the way we think, the design problems we face, and how we traditionally approach and document our projects in Revit software versus Civil 3D software. What we do share is a client who expects us to collaborate effectively-—regardless of the software we use. In this class, we’ll explore challenges faced when collaborating between Revit and Civil 3D, with a focus on how each software deals with internal coordinate systems and creating surfaces and topographies. We’ll explore what both sides really need from the other data-wise, the critical steps needed during import/export of the models, and the internal workflows for Revit teams when the building location needs to shift after coordinates are shared. Although we’ll briefly touch on available add-ins and recent BIM 360 collaboration options, we’ll be spending most of our time discussing a manual method that is immediately usable in any version of Revit or Civil 3D.

Learning Objectives

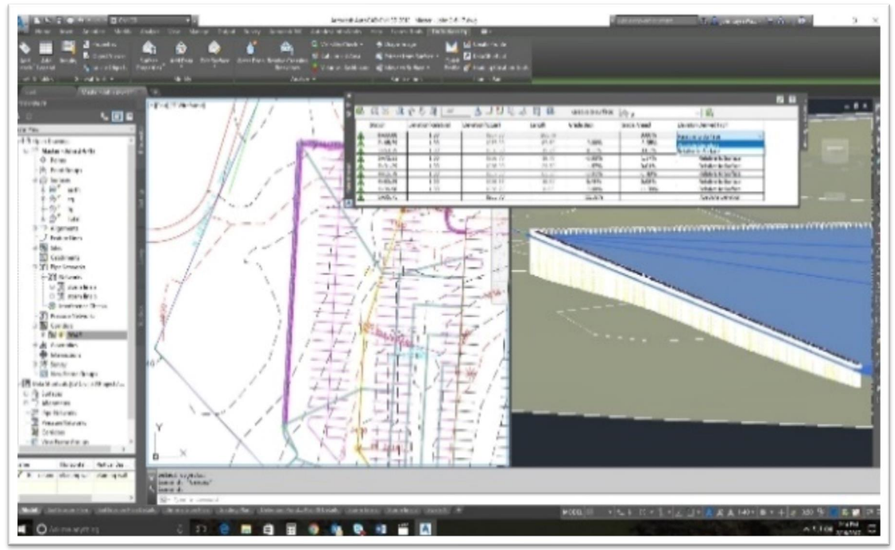
- Discover the innate differences between Revit and Civil 3D, and how to better discuss what you need from the other
- Define and share real-world coordinates between Civil 3D and Revit, and learn steps to take in Revit if the building must move
- Compare Revit and Civil 3D’s unique interpretations of TIN Surfaces, and what Revit needs for better surface creation
- Learn how to identify and apply automation tools unveiled in recent releases of Revit, Civil 3D, and BIM 360

Class Overview

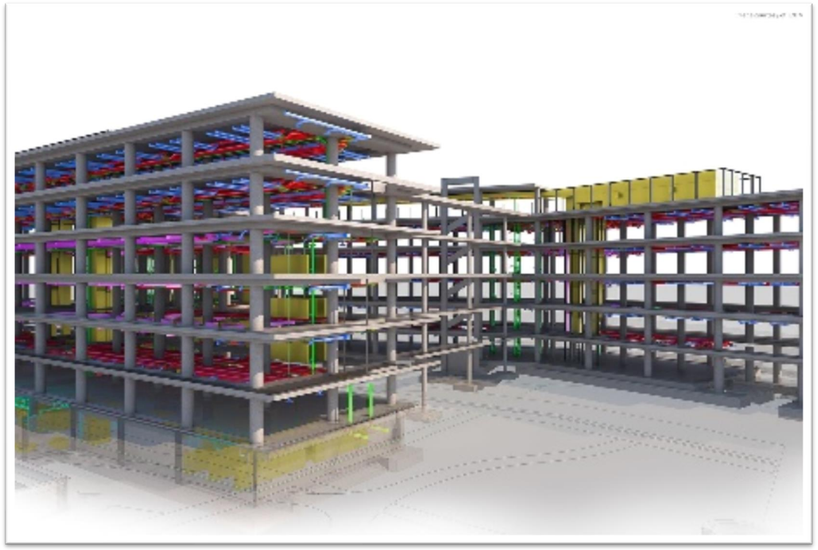
- Software and Discipline overview and comparison
- Manual Workflow for Site Topography and Shared Coordinates
  - Pros: Works in all versions, no additional downloads required
  - Cons: Manual workflow
- Workflow to Shift all Revit models if Architecture Model moves
- Automated Workflows for Shared Coordinates and Site Topography
  - Pros: Faster, Topography largely dynamic for updates
  - Cons: Difficult to troubleshoot if incorrect, requires additional downloads and Subscriptions ($$$)
- Takeaways

Civil 3D vs. Revit

- Civil Engineering Design Software
- AutoCAD Program +3D
- Some parametric modeling, mostly lines
- Always Real World Coordinates



- Building Information Modeling (BIM) Software
- Definitely **NOT** AutoCAD
- Parametric modeling
- Internal Project Coordinate System



What Civil needs vs. What Architects Need

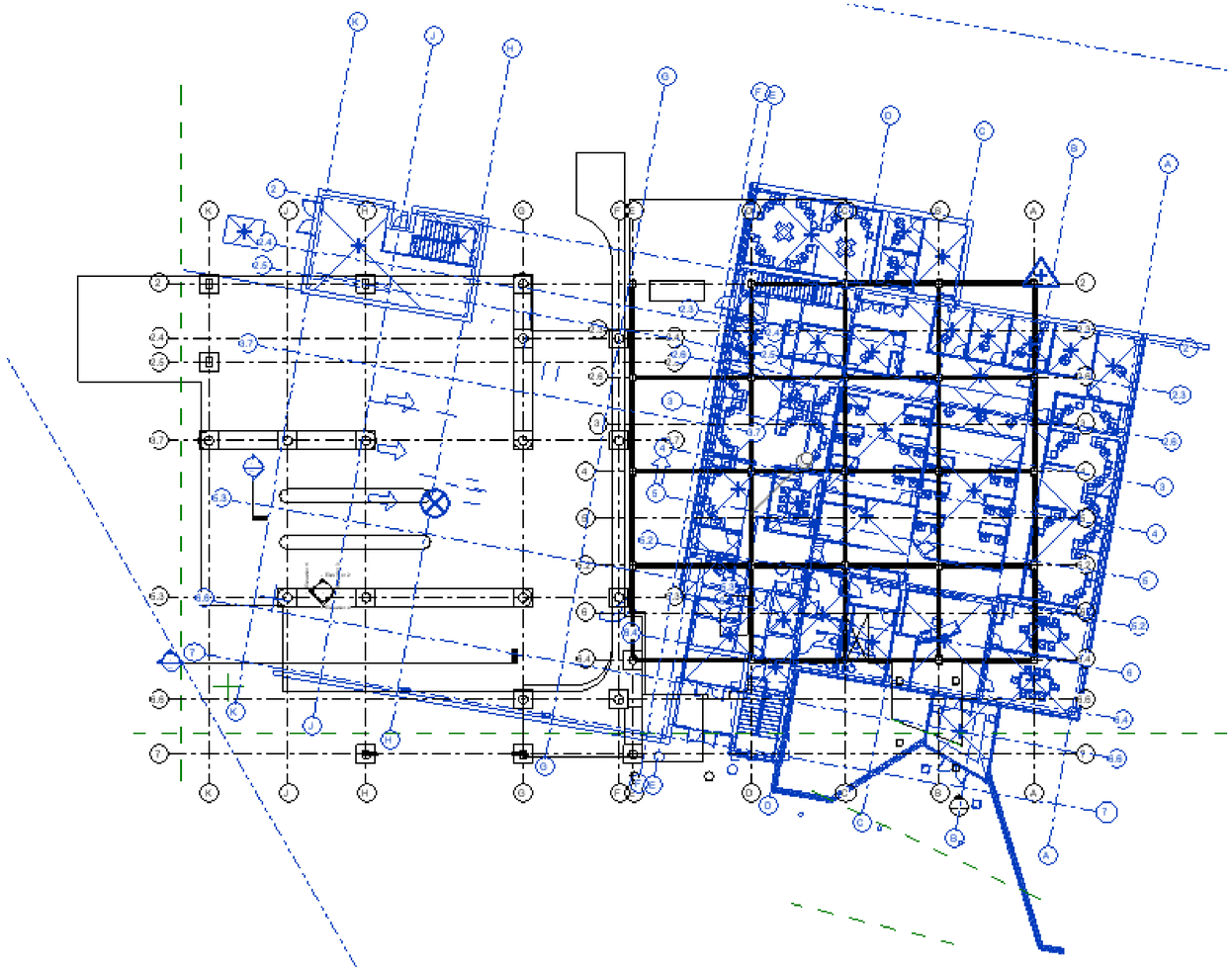
- Clean Architectural building footprint
- Import updated Architectural file without manually positioning each time
- 3D building accuracy for coordination of entrances, ADA, etc.

- Civil files that generate visually accurate topographies in Revit*
- Civil file properly oriented in real world coordinates
- Deliberately named layers in Civil 3D
- Labeled NEZ point in Civil 3D file

Manual Workflow for Topography & Shared Coordinates

- Civil 3D
  - Define Surface, turn on Triangles (TIN Lines) to easily identifiable layer
  - Define COGO Point in “real world” coordinates w/ PNEZD information
  - Export to DWG
  - OPTIONAL: Create extra COGO points for better breaklines in Revit
- Revit
  - Link the exported Civil *.DWG
  - Create the Toposurface from an Import
  - Position the Revit Survey Point correctly
  - Project Location = Acquire Coordinates
  - Export to *.DWG to give back to Civil

Workflow for Moving Building(s) in Revit



Workflow for Moving Building(s) in Revit

- Architect initially shares Revit file with no coordinates
  - Work proceeds with all disciplines, files linked Origin to Origin
    - Local Models updated via Manage Links > Load From “…”
    - BIM 360 models either update at Save-to Central points OR “controlled sharing” publish points
- Architect coordinates with Civil to locate in “real world” coordinates
- Building design team
  - Acquire Coordinates method to pull from Architect’s model
  - Change Properties Palette > Site Location to “Do not share site of selected instance”

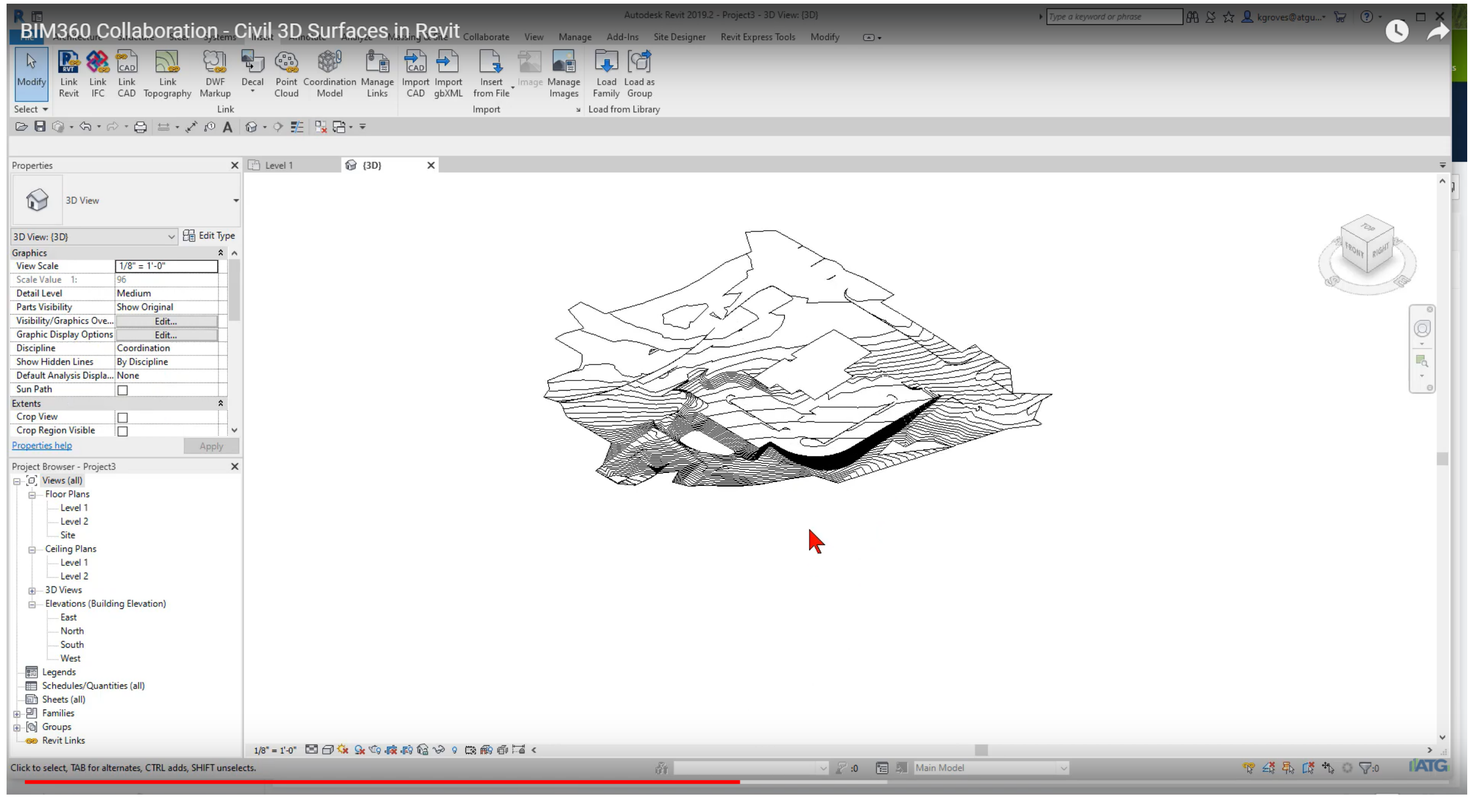
Add-in Workflow for Shared Coordinates

- Software requirements
  - Revit / C3D 2015 or later
  - Shared Reference Point Extension
- Civil 3D
  - Mark 2 points for “instructions” and easy snaps (same elevation)
  - Run the “Shared Reference Point” tool
  - Save the XML file, provide to Architect
- Revit
  - Add-ins Tab > Import Shared Coordinates form XML file
  - Follow Civil instructions and Revit prompts
  - Manage Tab > Location > Weather and Site > Site > “Make Current”

BIM360 Workflow for Site Topography

- Software requirements
  - BIM360 Design (and licenses)
- Civil 3D
  - Create Surface
  - Collaborate tab > Publish Surface > (save to BIM360 Project)
  - Re-publish as necessary
- Revit
  - Insert Tab > Link Topography > (load Civil Surface)
  - Adjust “breakline” settings on Massing and Site > Model Site expansion > Increment.
  - To update:
    - Manage Links > Reload From > (updated Civil Surface file).
    - Pads, subregions, materials, etc. will adjust automatically

BIM360 Workflow for Site Topography



A Civil 3D Surface can be published to a BIM360 Project. Once Linked into the Revit file, the Civil 3D Surface can be overwritten and reloaded to automatically adjust elevations of the Revit Toposurface.

https://youtu.be/J3kmxVUnrmo

Takeaways- BIM Plan

- Civil 3D
  - Label N,E,Z of Coordination Point
  - Surface Style > Triangles ON, dedicated layer
- Surfaces
  - Conceptual vs. “Visualization” quality
  - Extra hour or two for COGO Points (manual workflow, site dependent)
- Revit collaborating files
  - Only “Acquire Coordinates”
  - Site Location Changes
    - In Revit Arch. file, change the Site Link, not the building
    - Architect needs to communicate changes to site location before other disciplines update the Link(s)

Takeaways - Methodology

- Collaboration should be easy, but differences exist between disciplines and the software they use.
- Anyone can use the manual workflows!
  - ✓ They provide the surest way of verifying that the result is correct.
  - ❖ They take the most time.
- The Shared Reference Point tool…
  - ✓ Is free and simple.
  - ❖ Requires download.
- Using BIM360 to share Surfaces…
  - ✓ Is highly dynamic.
  - ❖ Requires extra subscriptions and licensing.

Thank you!

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