CES323424-L: A Walk in the Park

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About the speaker

Richard Hutchinson

After working in the Offshore industry for a number of years, I began teaching at Texas A&M in 2001. I currently am teaching in the Dwight Look College of Civil and Environmental Engineering at Texas A&M.

My background is in Autodesk Inventor, Fusion, Revit (Structures), AutoCAD and Civil 3D.
Description:

This hands-on lab uses BIM 360 software to help drive a collaborative project involving the redesign of a park facility. The class will use Civil 3D, InfraWorks, and Revit to create a conceptual visualization of the design. The class will learn to create a new model using existing geographic information system (GIS) data. The class will then work from the conceptual design stage to a more detailed design, finally tying the design back into a finalized visualization of the project area. The class will be moving between InfraWorks, Civil 3D, and Revit as they explore various design aspects used in the design process. The class will then be asked to move various aspects of the design from InfraWorks to Civil 3D, and then from Civil 3D and Revit to InfraWorks.
Our Goal

Our Goal is to use tools like Autodesk Data Connection and the Geo-reference tool to more seamlessly communicate between products like Revit, AutoCAD Civil 3D, and Infraworks.
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Learning Objectives

• Identify some of the benefits of Using BIM 360 Desktop connector.
• Use BIM 360 Desktop Creator to create shared files for design collaboration.
• Create a common coordinate system between Civil 3D and Revit using a shared reference point.
• Publish a reference surface in Civil 3D for use in Infraworks and Revit with the help of Desktop Creator.
• Create collaborative 3d models in Revit for use in Infraworks and Civil 3D.
• Create a conceptualized design in Infraworks using assets from Civil 3D and Revit.
How we are going to do it

• Highlight some of the environment available to us for collaboration
• Highlight some of the tools available to us to assist in collaboration.
• Use some of the tools to help get our products “talking to each other”
• Create assets in the products to use in a conceptual visualization in Infraworks

So, We may have to Strap in and get ready for a whirlwind of a ride
Highlight some of the environment available to us for collaboration BIM 360… With A qualifier

• We are going to use BIM 360 as a central repository for our files as we collaborate on our project.
  o But this is not collaboration like what you can do in BIM 360 Design

• This workflow can certainly be used in a BIM 360 design environment, but I would consider it more of a Tier 1 level of collaboration as compared to the Tier 2 BIM 360 design environment

So, Let’s call it… mostly collaborating 😊
Our BIM 360 environment
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THE MAIN PROJECT

- All Teams are Part of this Project

PROJECT FILES

DESIGN STORAGE LOCATION
- Main design folder
- Holds all the Team folders for this design

TEAM FOLDER

5 MEMBERS
- Each Team has their own team folder
- The default Permission is Read and Download ability
- Also contains a shared folder with Read – Write and download ability for all members

INDIVIDUAL FOLDER

SPECIFIC TO INDIVIDUAL MEMBERS
- Owner has Read Write and Download ability
Highlighting some of the tools available to us to assist in collaboration.

In addition to Civil 3D, Infraworks and Revit we are going to need two extra items to really utilize BIM 360 and some of the collaborative tools available to us.

**BIM 360 Desktop Connector**

**Civil 3D and Revit, Shared Reference Point Extension**
We are going to open an Infraworks file to output an .IMX file to be used in a Civil 3D design.

We will save the file to the shared folder in our Team directory in BIM 360.

We will then open a Civil 3D drawing directly from BIM 360 from our individual folder.

Finally, we will use one of our team member’s .IMX file to link the initial roadwork concept from Infraworks to our Civil 3D design.
Demo

Export IMX

Define Interactivity: Polygon

Target Coordinate System

Target File(s)

Export

Cancel
Start Infraworks:

1. Open CES323424-L Sadie Thomas Park-Team XXX
2. Switch to The New_Road Proposal
3. Go to the Settings and Utilities (2020) or F8 (2020.1) to export as an .imx
   - Select the Polygon and draw around your design area
   - Click on the File button and navigate to the CES323424-L A Walk in the Park” project
     - Select your Share Folder from your Team Directory in BIM 360
     - Save as “IM_Export_Your Computer number”
Demo
CES323424-L Exercise 02

1. Start Civil 3D

2. Open the file “CES323424-L Sadie Thomas Park Design - Start.dwg” from your individual BIM 360 folder
   - Open the file

3. Go to the Infraworks tab on the ribbon space.
   - Select Open Model

4. Navigate to your BIM 360 folder and select one of your teammate’s .IMX file
   - If you can’t find it, you can go to the Parachute folder to access it

5. Click on Refine Selection set
   - Deselect everything but Waco Street.
   - Click OK

6. Click Open Model
Shared Reference Point

- Shared Reference Point will create a commonality, through the point, between the real world coordinate system in Civil 3D and the Revit coordinate system.
  - We’ll talk more about that in a second.

- You will need to download the shared reference point for Civil and Revit through the Extensions updates on the Autodesk Desktop app
Revit to Civil 3D to Revit

- The process to use the shared reference point starts with attaching or inserting a drawing file created by Revit into our Civil 3D file.
- We can use the align command to align the footprint to our site.
  - Remember, we want to set the elevation as well.
- The shared reference point in Civil 3D is found in the Toolbox panel in the Toolspace.
  - Under Subscription Extension Manager
  - Execute the point
Quasi-What?

- You will be asked to pick a point then click a point representing “Quasi-North”
- The second point is just to help you properly identify the buildings orientation on the Z-axis when you place the reference point in Revit
- Click on just another point we will be able to easily find when we come back into Revit
CES323424-L Exercise 03

• Open Civil 3D

1. Go to your previously opened file
   o “CES323424-L Sadie Thomas Park Design - Start.dwg”

2. Attach the Floor Plan Drawings from the Parachute Folder in your directory
   o Place close to your site

3. Use the ALIGN command to align it as shown
   o Remember to check the elevation of the floorplan after you align

4. Go to the Toolbox tab in the Toolspace
   o Right Click and Execute the Export Shared Reference Point command

5. Select the center point of circle 1 you used earlier when you aligned the part.
   o For Quasi-North, select the circle 2.
   o **Set the units to Feet**

6. Save to the BIM 360 shared team folder as
   o “Shared Ref Point_Your computer number”
Aligning our Revit model to our Site

- To access our information from Civil 3D we are going to have to do two steps
- Align Revit’s shared reference point to our model
- Designate that reference point as our site location
- We will find these steps on two panels
  - Add-Ins
    - Shared Reference Point
  - Manage
    - Location for our model
Importing the Shared Reference Point and setting the location

- When we click on the Add-ins tab and select Import Shared coordinates command we only have two real options
  - Pick the Location of the reference point
  - Pick the location of the Quasi-North point
- So, Remember what we picked for Quasi-North.
  - It isn’t so important what point we pick, just that we can pick it again in Revit.
- To tell the model we are going to use our coordinates to define the site, we need to go to the Manage tab and click on the Location command
  - Click over to the Site tab and select your Shared Reference Point
    - Click make current and the OK
1. Open the model “Sadie Thomas Rec Center.rvt” downloaded from your BIM 360 folder.
2. Open the Level 1 view.
3. Go to the add-Ins tab on the ribbon and select **Import Shared coordinates**.
4. In Level 1, click on the two points as shown.
   - Select the Shared reference point from your shared folder.
   - Say Yes.
5. Go to the Manage tab on the ribbon and select **Location**.
   - Click on the Site tab.
   - Select our reference point.
   - Click on Make current.
6. In the View properties, Change the Orientation.
   - From Project North to True North.
Create assets in the products to use in a conceptual visualization in Infraworks
Using Assets between Revit, Civil 3D, and Infraworks

• Up to this point we have been taken on two tasks;
  o Setting up BIM 360 and our software so that we have the capability to collaborate
  o Setting up our files in our software so that they are “Speaking “ the same language as far as coordinates go
• These tasks were to get us to this point; actually exchanging assets between our products.

• Here is our game plan…
  o Revit:
    ▪ Create a .FBX
    ▪ Create a Navisworks .NWC file*
  o Civil 3D
    ▪ Create .SHP files in Civil 3D
    ▪ Create .SDF files in Civil 3D
    ▪ Publish Surface
  o Infraworks
    ▪ Create a New proposal showing your collaborated designs
Creating Shapefiles in Civil 3D

• Shape files (.shp) and .SDF files are a way we can bring in Coverage Areas into Infraworks

• We Create the shapefiles using the MAPEXPORT command in Civil 3D

• It is best practice to export any coverage areas that will be stacked or layered over another separately
Creating a Civil 3D Published Surface

- One of the most efficient ways to bSurfacering in a Civil 3D grade surface into Infraworks is using the Publish to.
  - This will allow us to use BIM 360 as a resource for programs like Revit and Infraworks.
- This can be found under the **Collaborate** Tab in Civil 3D
- The advantage of this file is that you can specify what surface you want to add to the file.
- Once the file is created it can be dropped into your Infraworks model
  - As long as the coordinate systems can recognize each other, then it will add it to your model
  - Make sure you close and refresh to get it to show up.
Revit

1. Continue with your Existing Revit File or open “SadieThomasRecCenter-SharedReferencePoint-EasyButton.rvt” from the Parachute folder

2. Switch to a 3D View.

3. Go to the File Tab and Click on the Export command
   - Export to .FBX
   - Save to the Shared Folder as “Sadie Thomas Rec Center – Your Computer Number”

Civil 3D

1. Open “CES323424-L Sadie Thomas Park Design - Surface-Easy Button.dwg” from Your BIM 360 folder

2. Turn on the following layers
   - 0-Ground Cover
   - 0-Blacktop
   - 0-Parking Lot Flange Edge

3. Type in **MAPEXPORT**
   - Save as a .SHP file
   - select the Ground Cover Polyline
   - Name the file “Ground Cover – Your Computer Number”

4. You can do the same to the parking islands, but save it as a .shp instead
Civil 3D

1. Open “CES323424-L Sadie Thomas Park Design - Surface-Easy Button.dwg” from Your BIM 360 folder
2. Click on the **Collaborate** tab on the ribbon.
   - Select Publish Surface
3. De-Select everything but the **Corridor - Parking Surface**
4. Place in your Team BIM 360 shared folder
   - “Parking Surface – Your Computer Number”
Applying the assets in Infraworks

• Now that we have Created the Assets lets apply them to a concept design.
• The first thing we want to do is add in our published surface
  o This will be a .dwg file
  o It will actually contain a couple things we want because we made it using a corridor.
    ▪ The corridor surface
    ▪ The coverage area of the corridor surface
• The second thing is to put in the .SDF and .SHP files as coverage areas
  o These need to be ordered in a way that the lowest coverage is inserted first and the upper coverage is inserted last
  o We'll discuss that in a bit.
• The third thing is to insert the .FBX file we created from our Revit file
  o The hardest part of this is to get it to position right on our file
  o We will use the coordinates from the project point in Revit to accurately place the model
CES323424-L Exercise 07

- Open Infraworks
  - Open the CES323424-L Sadie Thomas Park Team XXX model
- Create a new proposal
  - Name it *Sadie_Concept_Your Computer number*
- Go to the Manage Tab and select *Data Sources*
- Open the *Add File Data Source* Command
  - Select *Autodesk Civil 3D Drawing*
  - Navigate to your Published Surface in BIM 360 and select it
  - Select *Corridor -Parking Lot Surface*
  - Select the *CORRIDOR COVERAGE*
  - Click *OK*
- Click the Refresh command
- Now go over to the Surface Layers command
  - Drag the corridor-Parking lot surface into the **Terrain Surfaces**
  - Turn On and hit *OK*
Inserting Civil 3D Projects to Infraworks: Coverage areas

• To make our surface look correct in Infraworks, we need to use Coverage areas to define the parking lot from the curb or the earthwork grading.

• There are a few rules we need to follow if we want them to work right.
  o If you want an area coverage, you need to make sure you have a closed polygon in civil 3D.
  o If you want to transfer lines in a coverage area, you need to use buffer in Infraworks to show up.
  o Coverage areas stack on top of each other,
    ▪ so make sure they are layered with the largest coverage area inserted first and then proceed down from there with the smallest area last.
    ▪ You can adjust later by using the layers command in Infraworks and moving coverage areas up and down.
Drop in the Shape files you just created into the Infraworks model

- Drop them in in this order
  - Sadie Thomas Ground Cover.SDF Coverage Area Field 1
  - Sadie Thomas Blacktop.SDF Coverage Area Dark Gray Asphalt
  - Sadie Thomas Rec Center Walkway.SDF Coverage Area Surface Concrete Light
  - Islands.SHP Coverage Area Grass 2
  - Sadie Thomas Parking Stripes Coverage Area White

- Configure them as shown.
- Close and Refresh
- Select the Parking Spaces
  - Go to the buffer and set it to .25
Brining in the Revit assets

- We can drop in the .fbx file the same way we did the other files, with one exception.
- We need to set the coordinates of the building.
- As of yet, the shared coordinates do not seem to translate from Revit to Infraworks.
- We can, however, find the coordinates from the Revit model itself.
  - This can be done by turning on the **Project Base Point** visibility and then selecting it.
- We can then input the information into the coordinates of the model when it is dropped in.
CES323424-L Exercise 09

- Drop the Sadie Thomas Rec Center FBX file into Infraworks
- Set the Type to *City Furniture*
- The coordinates Should be
  - TX83-CF
  - Local Origin
  - X: 3545654.813
  - Y: 10235229.852
  - Z: 316.5
- The Rotation should be:
  - Z: 260.1
- Close and Refresh
Conclusion

• While this is only touched a small bit of the capabilities of harnessing the potential of BIM 360 and its ability to maximize the potential of Autodesk products to more seamlessly collaborate in the design process.

• While this was a whirlwind of work, you should be now able to…
  o Identify some of the benefits of Using BIM 360 Desktop connector.
  o Use BIM 360 Desktop Creator to create shared files for design collaboration.
  o Create a common coordinate system between Civil 3D and Revit using a shared reference point.
  o Publish a reference surface in Civil 3D for use in Infraworks and Revit with the help of Desktop Creator.
  o Create collaborative 3d models in Revit for use in Infraworks and Civil 3D.
  o Create a conceptualized design in Infraworks using assets from Civil 3D and Revit.
If you are anything like me, these labs seem to fill me up with questions. We will try to answer as much as we can today. If you still have questions, please feel free to email me at.

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Thanks and Gig’em