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Bridging the Gap, Immersive Design— Using InfraWorks and Unity on the JMU Land Bridge

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Learning Objectives

- Learn how to optimize the complex tree geometry in InfraWorks
- Learn how to import data into Unity
- Learn how to apply collision and physics variables to prevent us from falling and walking through the model
- Learn how to compile a final build of the walk-through video game

Description

In this class, we'll use Unity to develop an immersive walk-through of a finalized InfraWorks model. In InfraWorks, we'll learn methods to optimize our complex tree geometry and export the final product meshes. In Unity, we'll import our data, apply collision and physic variables, formulate a first-person camera asset, and export a final build of the walk-through. The final build can be demonstrated and shared with stakeholders, encouraging them to explore the project on their own terms.

Speaker(s)

Chris DuBois is a Visualization Specialist with VHB, supporting VHB's 3D design workflows. His extensive computer skills include Civil 3D, Infraworks, Sketchup and the Adobe Creative Collection. He combines his artistic background with his 19 years of experience in roadway design and reconstruction, streetscape design, maintenance and protection of traffic, structural design, and transit and rail design. While working with the structural group, he was responsible for the modeling individual bridge components to develop a 4d constructability models in Newington, NH and Providence, RI. In working with project stakeholders, Chris enjoys using emerging technologies to further design understanding. His favorite was using a 15' diameter geodome to share an immersive walk through of the James Madison University Land Bridge.

Why Convert Infraworks Model to a Unity Video Game?

At times it becomes necessary to explore unique deliverables to allow the project stakeholders a better understanding of the project. For the JMU Land Bridge project, we created a Unity video game to facilitate an immersive experience in a 15' diameter geodome.

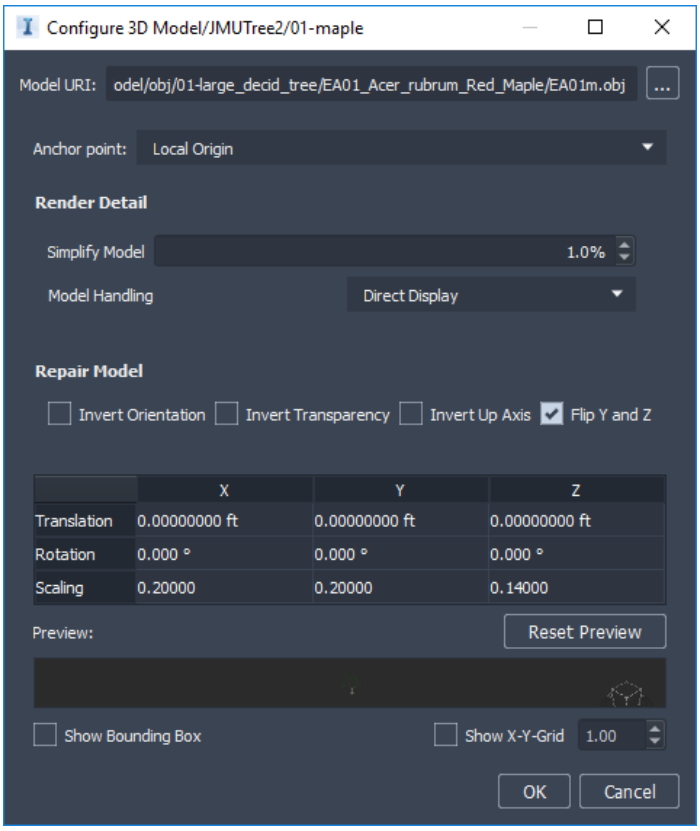
GEODOME RUNNING JMU UNITY PROJECT

Simplifying Complex Meshes

Simplifying complex meshes allow us to be able to import all of our data in Unity. Each custom tree we use can have 100,000 faces. It only takes a handful of these items to slow our files down.

Simplify our custom tree models procedure

- Open the 3d model tab in the style palette from Manage > Content > Style Pallet
- Double click the style catalog where the trees are stored
- Export the current style catalog, save as "3D Model_#catalogname#**Full**.styles.json
- Double click a model to open the "Configure 3d Model" dialogue box



CONFIGURE 3D MODEL DIALOGUE BOX

- Set the simplify model to 10% to start
- Set model handling to Direct Display
- Pull down on the bottom of the dialogue box to expand the preview area
- Adjust the simplify model percentage until you see desired results
- Ok to close
- Do this for each model that needs to be simplified
- Export the current style catalog, save as “3D Model_#catalogname#**Reduced**.styles.json

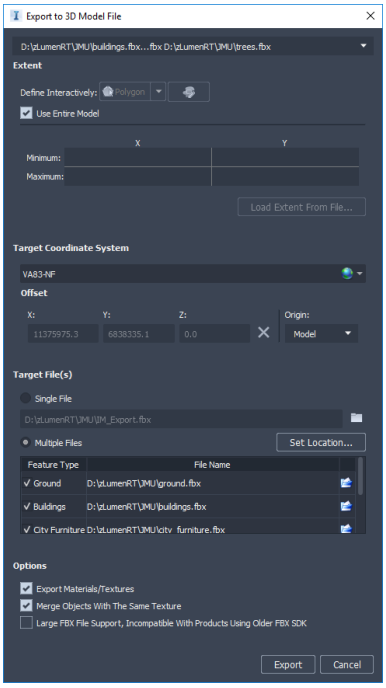
Exporting FBX Files

The files need to be exported to FBX so they can be read by other programs, including Unity

Export Procedure

- Open export 3d model from Present/Share > Share > Export 3d model
- If your model is small enough, you can check use entire model, or you can define interactively using a box or polygon
- You can ignore the target coordinate system
- Set origin to Model. This allows us to export multiple times and end up with the same origin point

- For target files(s), select multiple files
- Click Set Location and select a place to start the fbx files
- Options, check export materials and merge objects. Leave large FBX file support unchecked
- Export



EXPORT TO 3D MODEL FILE DIALOG BOX

Setting up a Unity Project

- When installing Unity, we included the pc, mac & linux standalone module
- Open the Unity Hub > Projects > New
- Select the 3d template, provide project name, and network storage location
- Press Create
- File > New Scene

Importing and Placing Assets (Including Infraworks FBX Files)

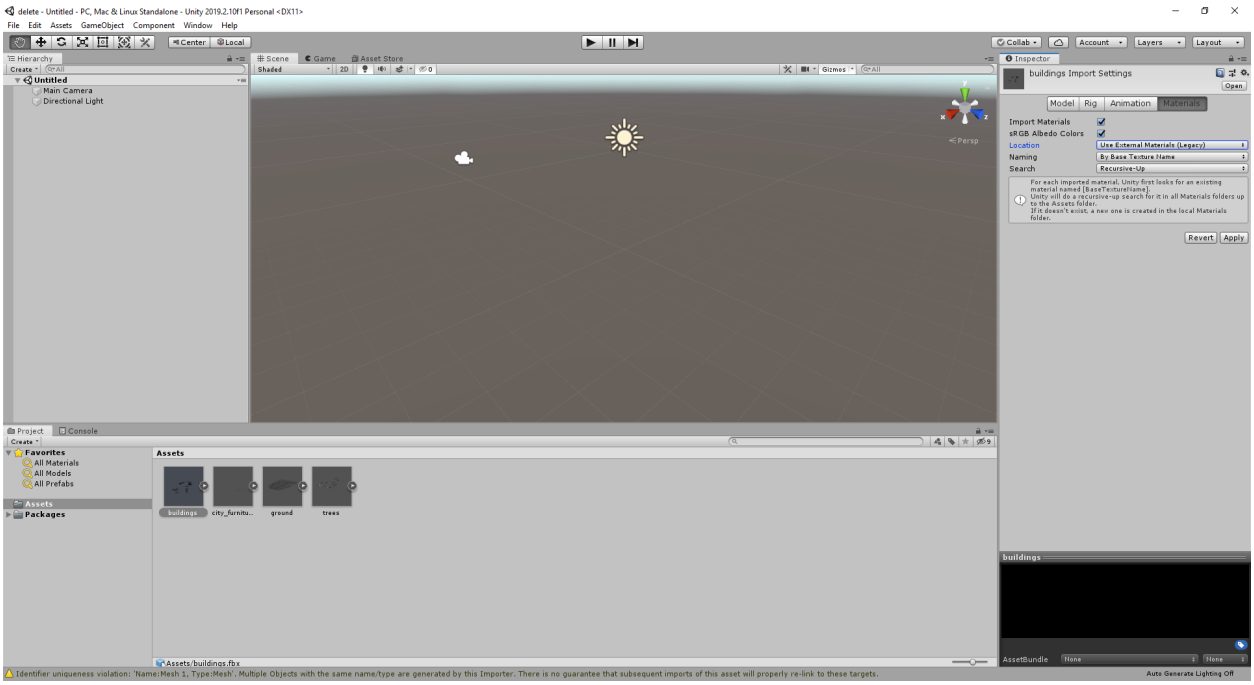
Create a New project and Scene

- In the project console, select the Assets directory
- Drag and Drop the Infraworks FBX files into the Assets directory
- Allow to load. This might be a good time to grab a coffee.

Change Material Locations

- From the project console, select the first fbx in the Assets directory

- In the Inspector console, select the Materials Tab, change location to: Use External Materials (Legacy) > select apply
- Repeat for each FBX file



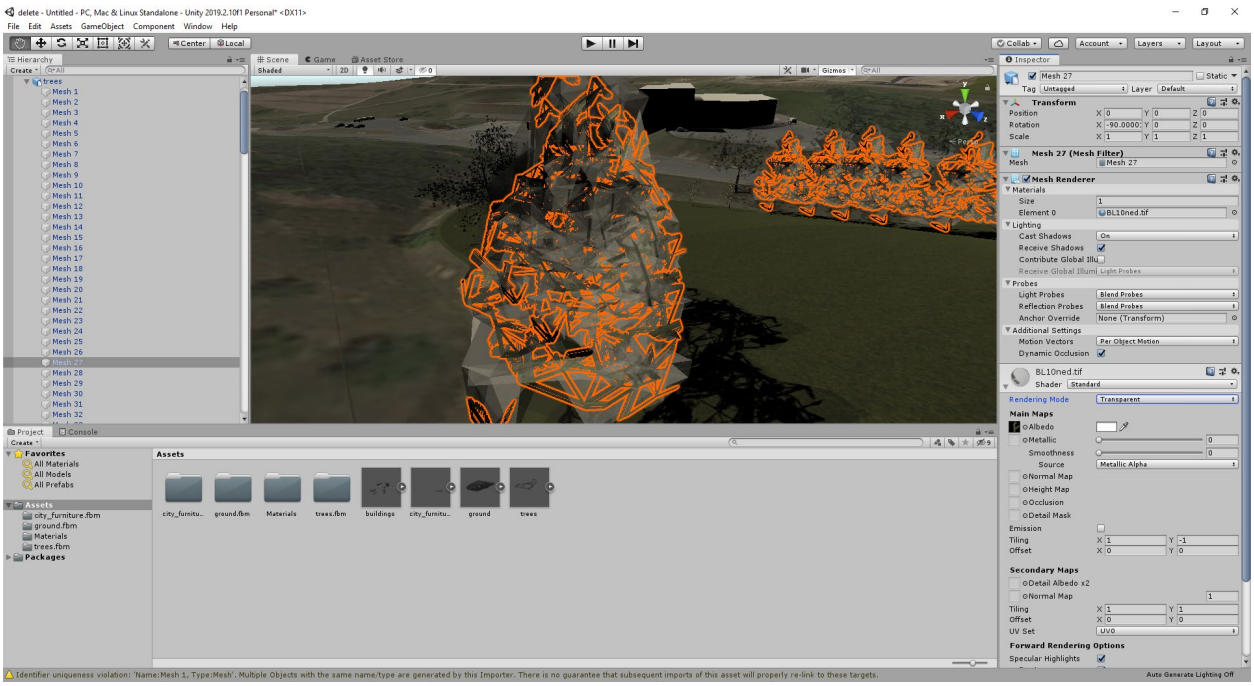
UNITY PROJECT WINDOW WITH THE PROJECT CONSOLE ON THE BOTTOM AND INSPECTOR CONSOLE ON THE RIGHT

Place FBX files into scene

- Drag and drop the first FBX file to the scene
- In the Inspector console, set the position to 0,0,0
- Zoom out of the scene until you can see your model
- Repeat for each additional FBX file

Trouble Shooting Alpha Channels on Trees

- Not all Alpha Channels will configure properly
- To resolve, click on an improper tree until it is outlined in orange
- In the inspector console, click the arrow in the material box to expand the selection
- Change rendering mode from transparent to fade
- Repeat for each mesh with a similar issue



TREE MESH HIGHLIGHTED IN ORANGE WITH THE EXPANDED MATERIAL BOX

Downloading Standard Assets

We will need to download the standard assets from the Unity Store

Downloading Assets

- Window > Asset Store
- Search “Standard Assets”
- Download and Import All

Apply First Person Controller

- In the workspace window, select #Scene
- Delete “Main Camera” from the hierarchy console
- Under Assets > Standard Assets > Characters > FirstPersonCharacter > Prefabs
- Drag and drop FPSController.prefab into the scene

Move and Rotate Camera to Set Start Position

- Using the move gizmos, position the camera over your start location
- Use the transform section, in the inspector console, to fine tune movements and rotate.
- You can press the play button to the top of the page to test, but you will fall through the terrain. Press esc to get your mouse back and press the play button to stop the preview.

Adding Mesh Colliders

A mesh collider takes a mesh asset and builds a collider from that mesh, preventing the first-person camera from passing through it. We are going to apply this to our ground, tunnel, and fences.

Applying the Collider

- In the hierarchy console, select the arrow to the left of the fbx asset you want to apply the collider to. Let's select ground
- Using the shift key, select all the meshes in the ground asset
- Component > Physics > Mesh Collider
- Press the Play button. You should not fall though the ground this time.
- Press esc to get your mouse back and press the play button to stop the preview.

Locate individual Meshes

- In my city_furniture asset, I want to select the fence and tunnel, but leave everything else
- Select "mesh 1" and use the arrow keys to move up and down until the mesh you want is highlighted.
- Component > Physics > Mesh Collider

Add Mesh Collider to Buildings

- In the hierarchy console, select buildings
- Using the shift key, select all the meshes in the ground asset
- Component > Physics > Mesh Collider

Adjust Lighting

We are going to simulate the sun using the built in Direction Light already in our Hierarchy

Adjust Directional Light

- Select Directional Light in the Hierarchy console
- Using the move gizmos, position the light to your approximate sun location
- Adjust intensity in the Inspector Console, as necessary

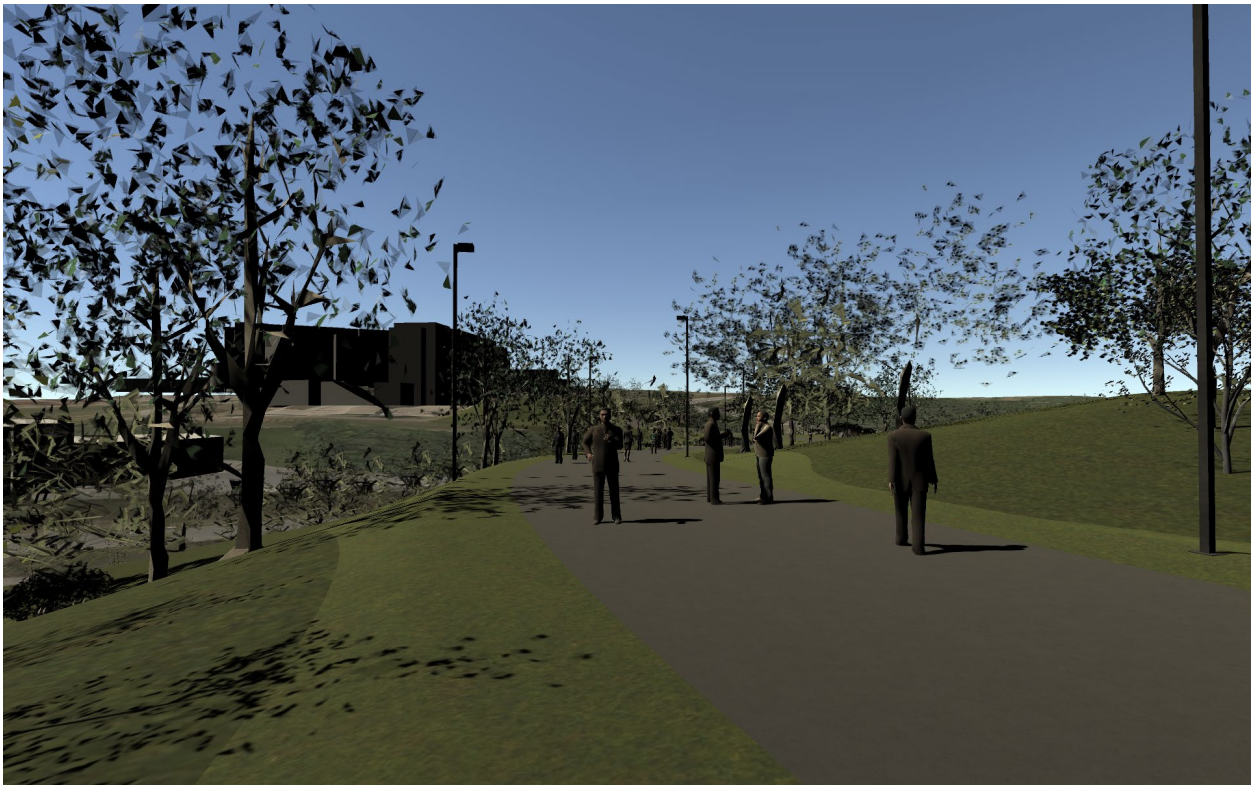
Turn Off Receive Shadows When Necessary

- You may want to turn off shadows for some meshes
- Click on your mesh until the area you want to edit is highlighted
- In the inspector console, under lighting section, uncheck receive shadows
- Repeat as necessary for different meshes

Create a final Game Build

Now we will build the final “game” for use in windows. If you haven’t saved recently, now is a good time to save your file.

- File > Build Settings
- Select PC, Mac & Linux Stand alone
- Target Platform = Windows
- Architecture = x86_64
- Press build and provide build directory
- Find the network location where you saved the file and double click the exe file
- We did not build an GUI exit button, but you can use alt+f4 to exit



FINAL BUILD OF INFRAWORKS MODEL IN UNITY