



Integrating ArcGIS & 3D Modeling: Alternate Methods for 3D Mapping Using SketchUp

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Project Proposal

- **Pushing the boundaries of 2D mapping**
 - Looking to the future with 3D mapping, AR, and VR
- **Providing another tool for our students and visitors**
 - Impact of COVID and college visits
 - Navigating first day of classes
- **Benefits**
 - Design and construction in fields of architecture and construction
 - Investing



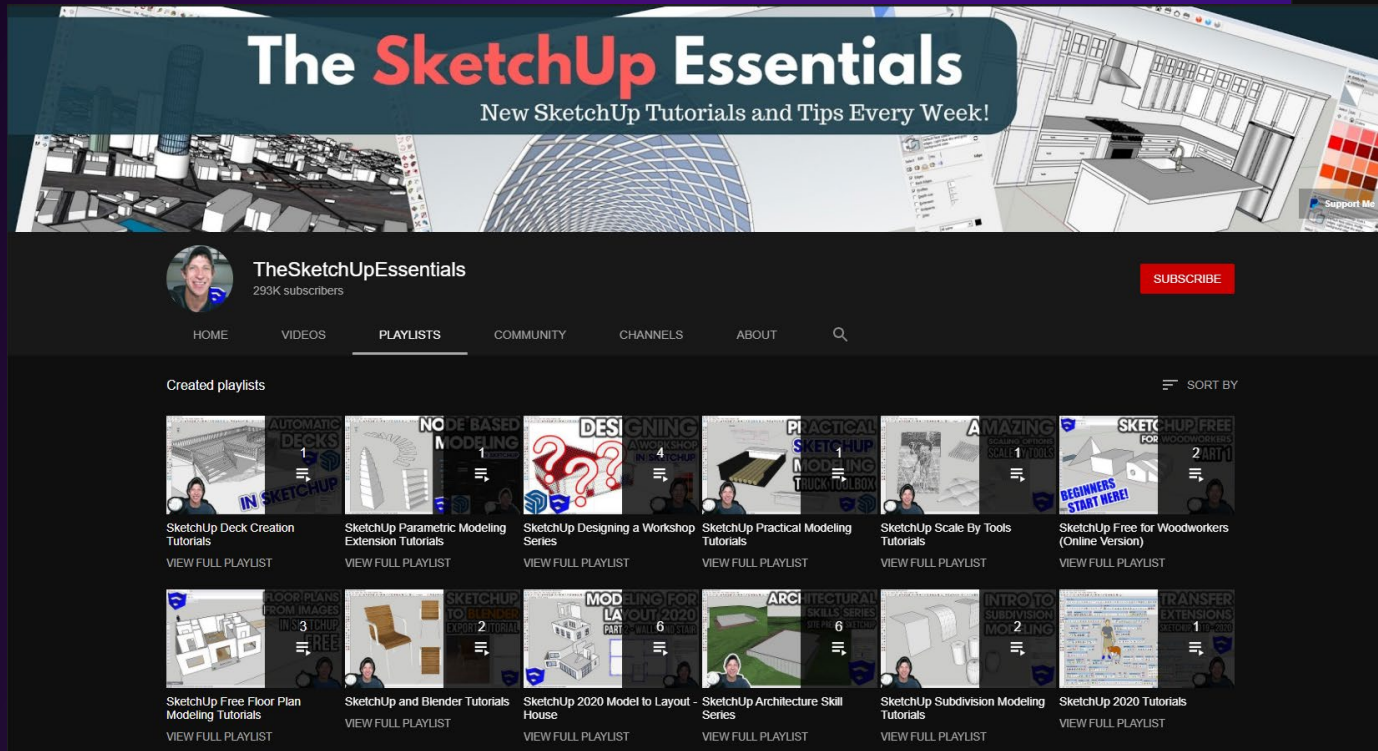
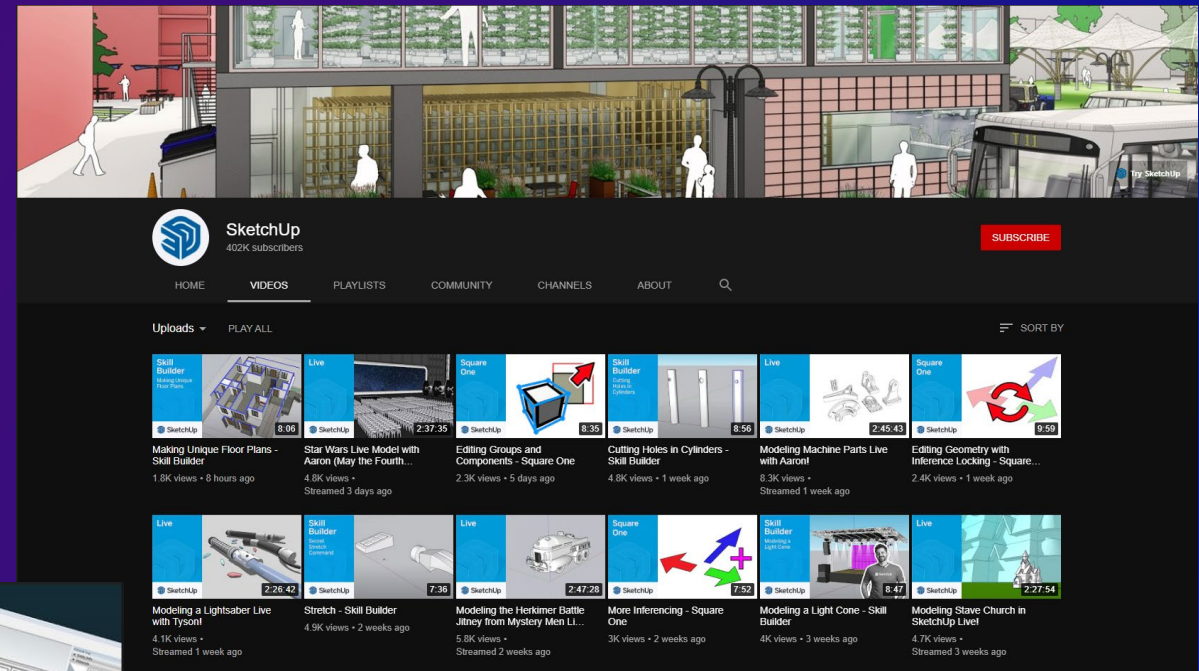


Original Workflow

Single-Structure Placement & Importing

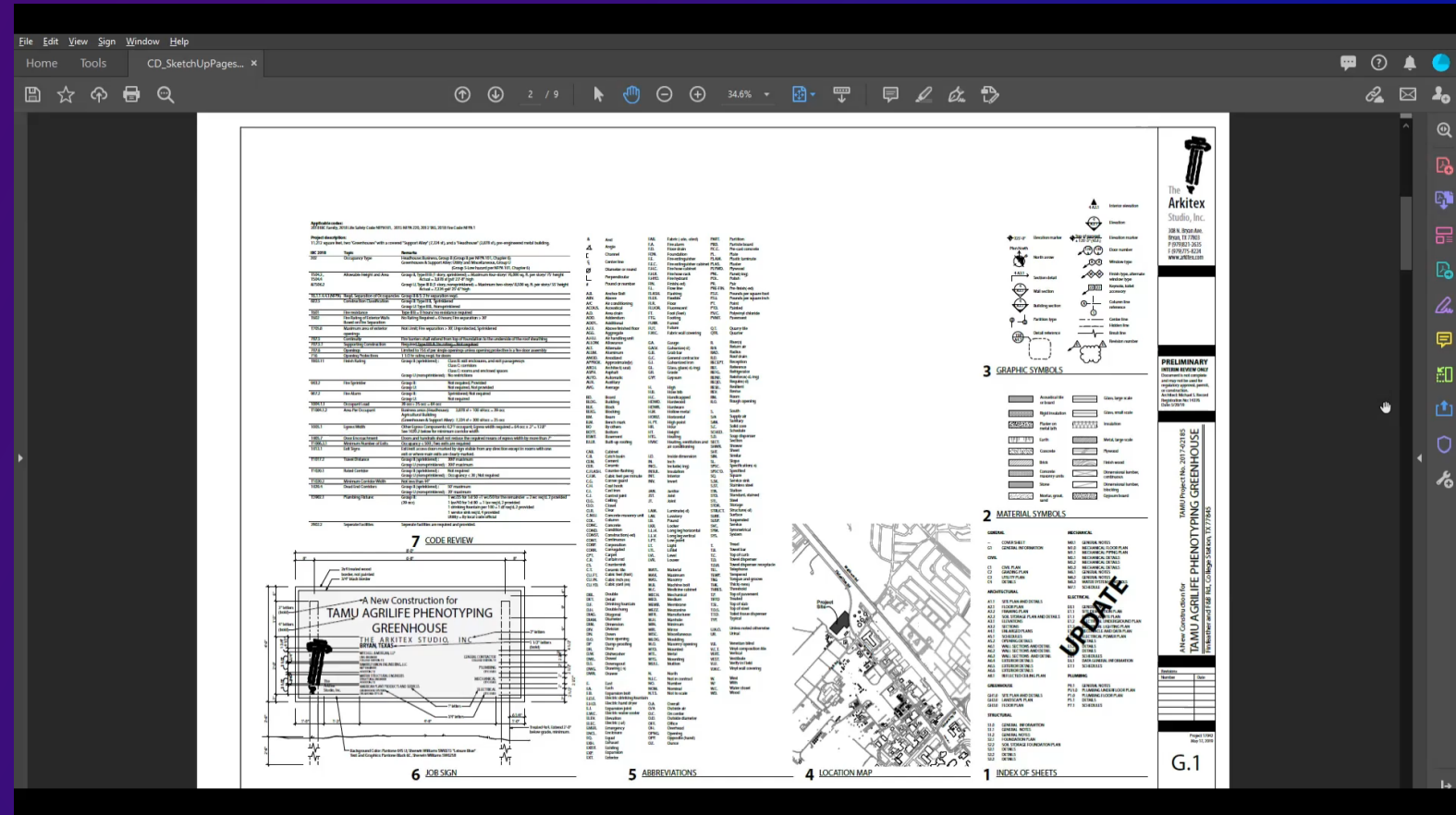
Where to Start

- Youtube channels
 - TheSketchUpEssentials & SketchUp
- General playing around



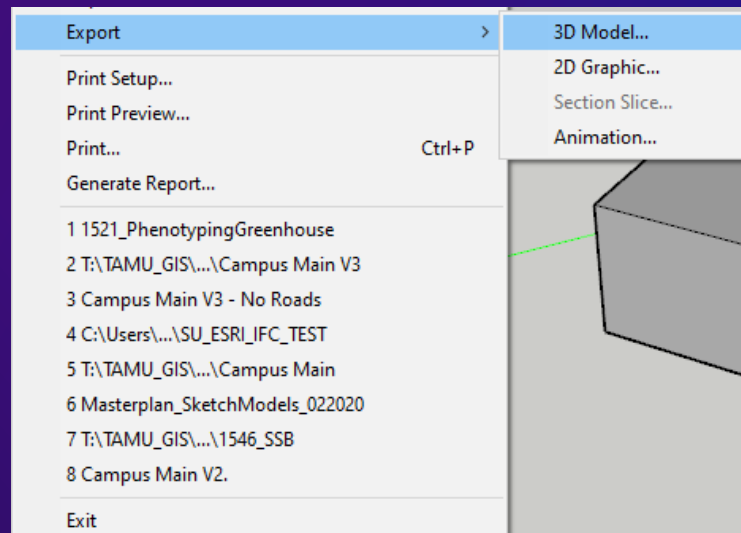
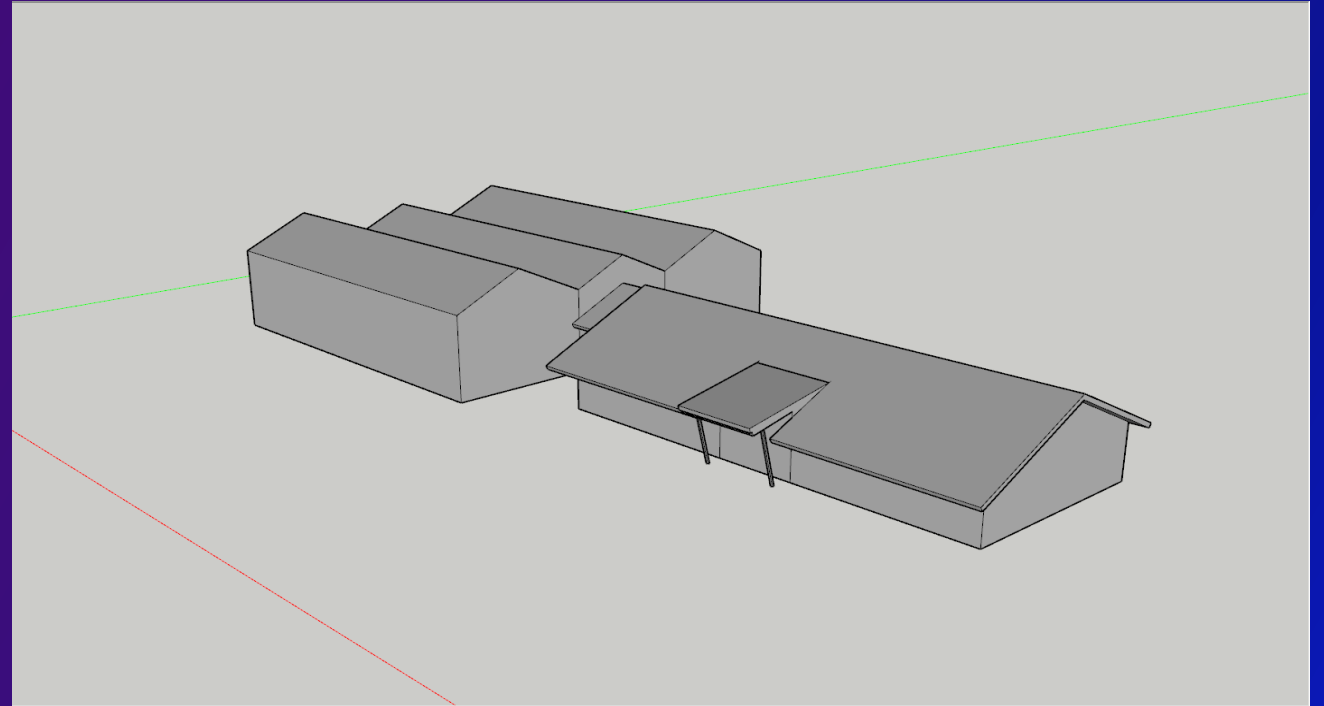
The Drawing Process

- Learning to read Architectural plans
 - Fumbled through
 - Found help from others
- Necessary documents
 - Site plan
 - Elevations (N, S, E, W)
 - Floor plans (If drawing multiple floors)



Working in SketchUp

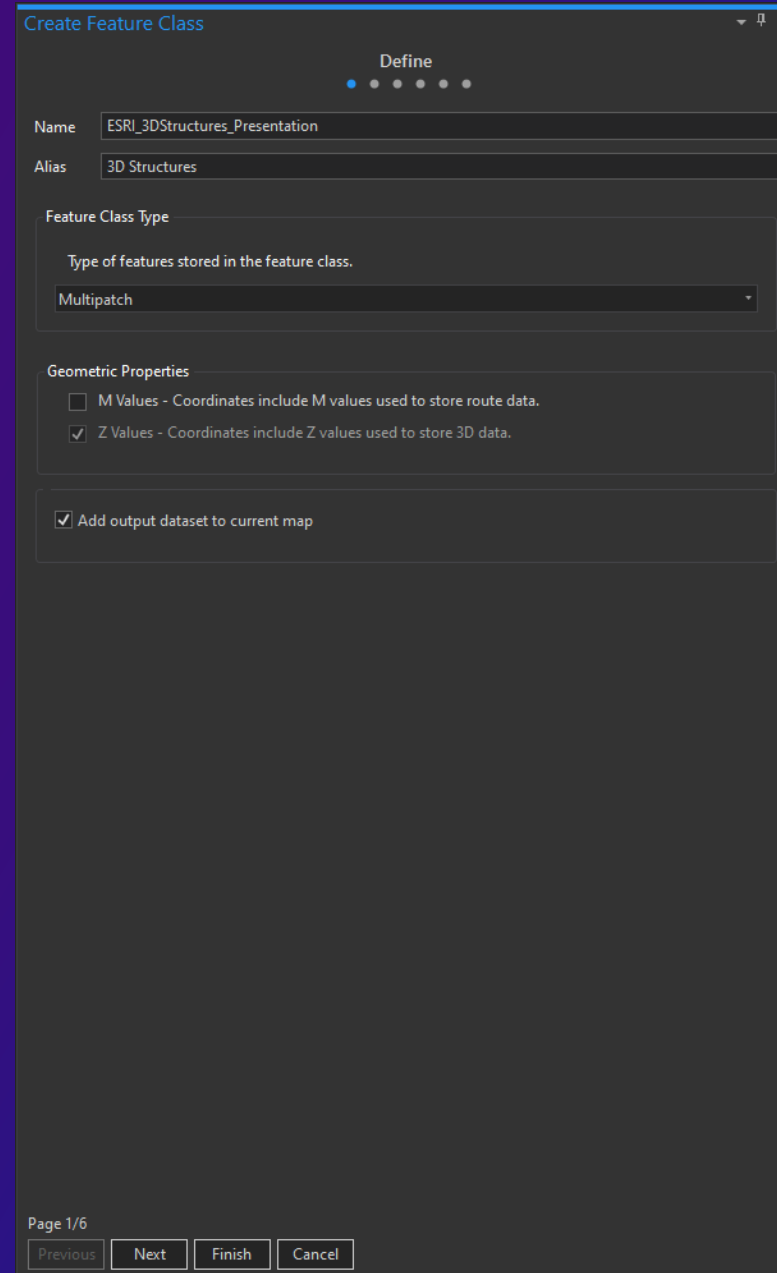
- Using site plans, floor plans, and elevations to keep the drawing as close to 1:1 scale
- Exporting the completed building as a COLLADA file (.DAE)



Save as type: COLLADA File (*.dae)

Working in ArcGIS Pro

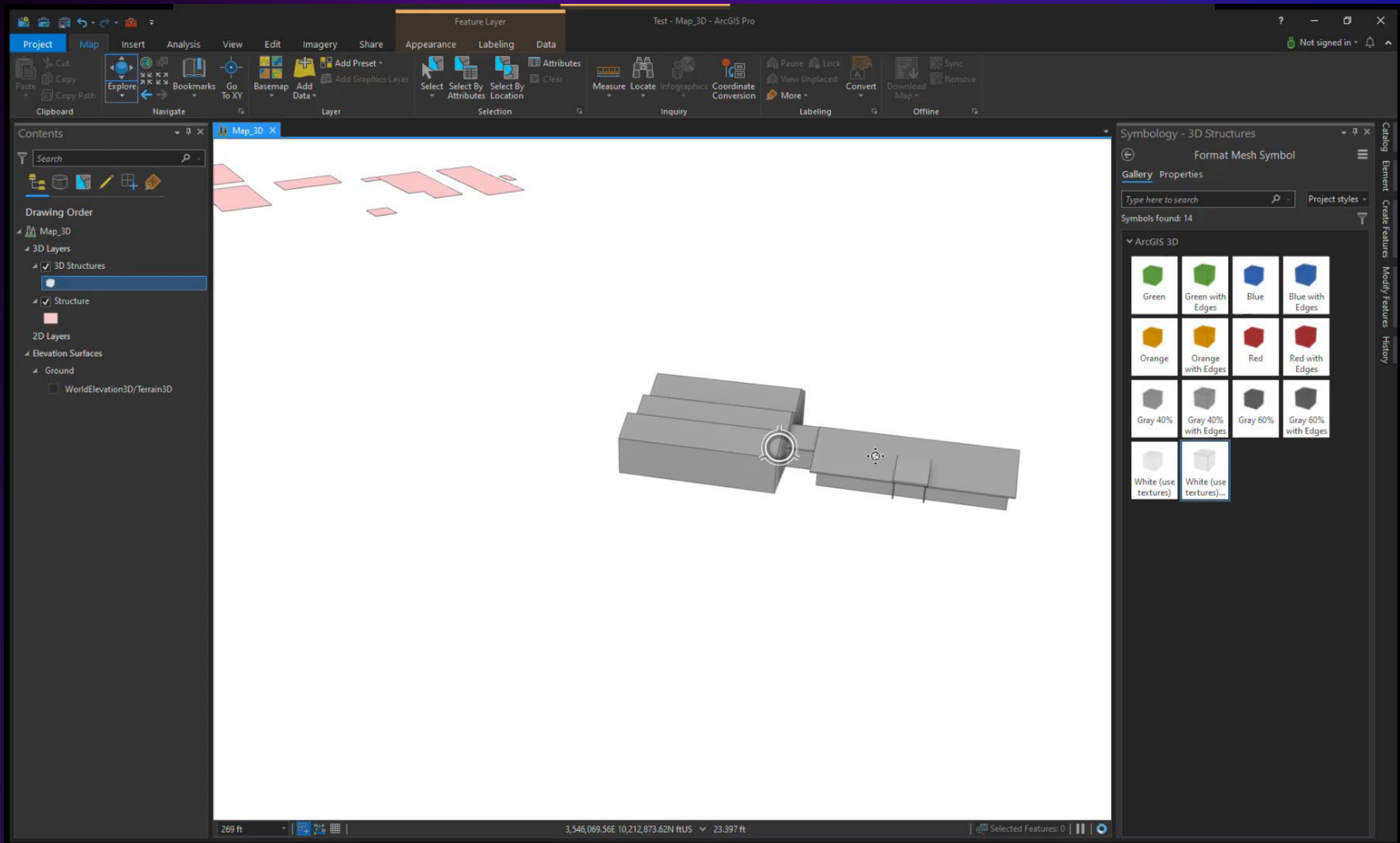
- **Local Scene**
 - Foundation for the 3D platform
- **Geodatabase**
 - Housing for your 3D structures
- **Feature Class**
 - Specifically, a Multipatch



The screenshot shows the 'Create Feature Class' dialog box in ArcGIS Pro, specifically the 'Define' step. The dialog has a title bar with 'Create Feature Class' and standard window controls. Below the title bar is a progress indicator with five dots, the second of which is filled, indicating the current step. The main area contains the following fields and options:

- Name:** A text field containing 'ESRI_3DStructures_Presentation'.
- Alias:** A text field containing '3D Structures'.
- Feature Class Type:** A section with a label 'Type of features stored in the feature class.' and a dropdown menu currently set to 'Multipatch'.
- Geometric Properties:** A section with two checkboxes:
 - ☐ M Values - Coordinates include M values used to store route data.
 - ☒ Z Values - Coordinates include Z values used to store 3D data.
- Output:** A checkbox labeled 'Add output dataset to current map' which is checked.

At the bottom of the dialog, there is a page indicator 'Page 1/6' and four buttons: 'Previous', 'Next', 'Finish', and 'Cancel'.





New Workflow

Multi-Structure Placement & Importing, BIM Files, and Shapefiles

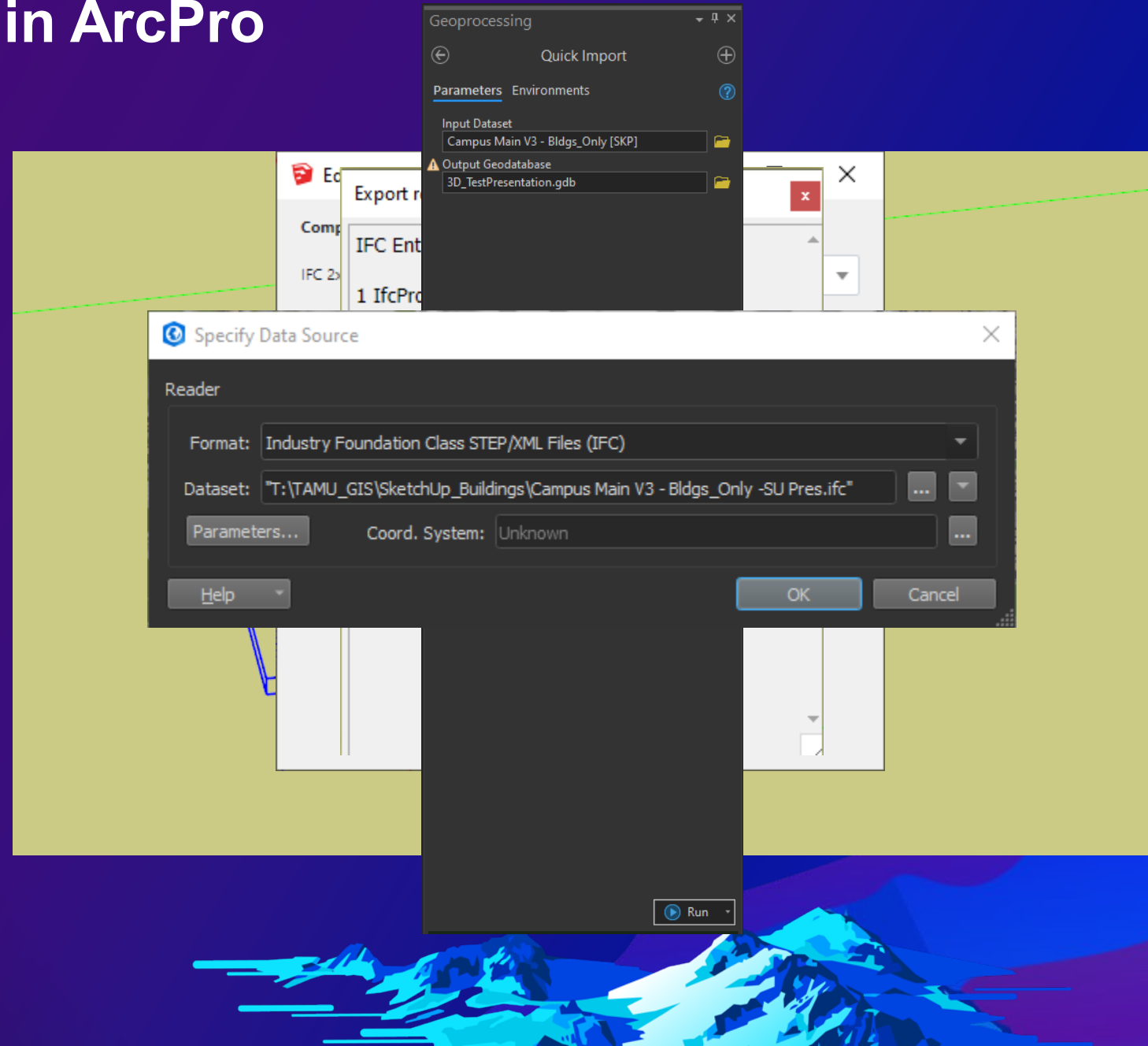
Shapefiles and SketchUp

- **Importing shapefiles into SketchUp**
 - Building a University over its' 2D equivalent
- **Importing BIM models into SketchUp**
 - Easier than drawing by hand, but needs to be cleaned up



Multi-structure Placement in ArcPro

- Using an IFC manager to import
 - Maintains each unique model upon exporting
 - ArcGIS Pro recognizes each building's unique ID
- Still have to scale and place the buildings like previous workflow



ProjectMapInsertAnalysisViewEditImageryShareViewAppearanceLabelingData

CutCopyPasteCopy PathClipboard

SaveDiscardStatusError InspectorManage Edits

No TopologySnappingCreateModifyDeleteFeatures

AttributesClearSelectionTools

MoveRotateScaleEdit VerticesReplace MultipatchDuplicate Vertical

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3d_test_layer

2D Layers

Structure

AggieMap

Structure Abbreviation

Default

Road Centerline Name

Default

Garage

Railroad

Transportation

Parking Line

Parking Lots

Private Parking Lot

Street Line

Streets

Brazos County Road Centerline

FSC

OVERPASS

STREET

UNDERPASS

Sidewalk

Airport Runway

SceneLayoutLayout1

1,919 m96°20'48"W 30°36'8"N4.025 m

Selected Features: 64

3d_test_layer

Field: AddCalculateSelection: Select By AttributesZoom ToSwitchClearDeleteCopy

FID	Shape	GlobalId	Name	Descriptio	ObjectType	Tag	Compositio	ifc_unique	ifc_type_o	ifc_parent	ifc_pare_1
3	MultiPatch M	3Zt3Uznwr1KB2f1nUh...	Group#43					3Zt3Uznwr1KB2f1nUh...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
4	MultiPatch M	3ckis0pcb1G82eq3eEP...	Group#46					3ckis0pcb1G82eq3eEP...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
5	MultiPatch M	3ZZ7W1U891fP22MP6...	Group#22					3ZZ7W1U891fP22MP6...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
6	MultiPatch M	3fo6Kdl6T1mh21GXVer...	Group#19					3fo6Kdl6T1mh21GXVer...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
7	MultiPatch M	3g16IR2651TP2655ukN...	Group#18					3g16IR2651TP2655ukN...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
8	MultiPatch M	3gFB7hjOf1xR222tuKS...	Test 001					3gFB7hjOf1xR222tuKS...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
9	MultiPatch M	3dosxyNt51Jv2FuqHL...	Group#27					3dosxyNt51Jv2FuqHL...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
10	MultiPatch M	3ZMdWuWbP1xO2lz2...	Group#21					3ZMdWuWbP1xO2lz2...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
11	MultiPatch M	3XNldO6ff1l82topU4dlIC	0465 - Butler Hall					3XNldO6ff1l82topU4dlIC	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
12	MultiPatch M	3eqWdOoSH1Og2TG4...	0467_BS8E#1					3eqWdOoSH1Og2TG4...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
13	MultiPatch M	3cbTcm2ZH1af2XBRBR...	Group#24					3cbTcm2ZH1af2XBRBR...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
14	MultiPatch M	3ZYC1NqN11I92afSx7J...	Group#26					3ZYC1NqN11I92afSx7J...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
15	MultiPatch M	3c5Go3naf1Eg2k8TxBD...	1607_ALLN					3c5Go3naf1Eg2k8TxBD...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
16	MultiPatch M	3Yel5cq9X1sg2gVs04...	Group#31					3Yel5cq9X1sg2gVs04...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...
17	MultiPatch M	3aUwVSCq113v232fPZ...	Group#32					3aUwVSCq113v232fPZ...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...	3VsQltL6f3oP_V7DniO...

64 of 377 selected

Filters100%

Web Display

ArcGIS Online/ ArcGIS Enterprise Portal

Uploading to Portal

Share As Web Scene

Scene

Scene Content

Home Gallery Map Scene Groups Content Organization

dramos518

Content

My Content My Favorites My Groups My Organization Living Atlas

+ Add Item Create

Filter folders

All My Content

dramos518

Item Type

Maps

Layers

Scenes

Apps

Tools

Files

> Date Modified

> Date Created













> Shared

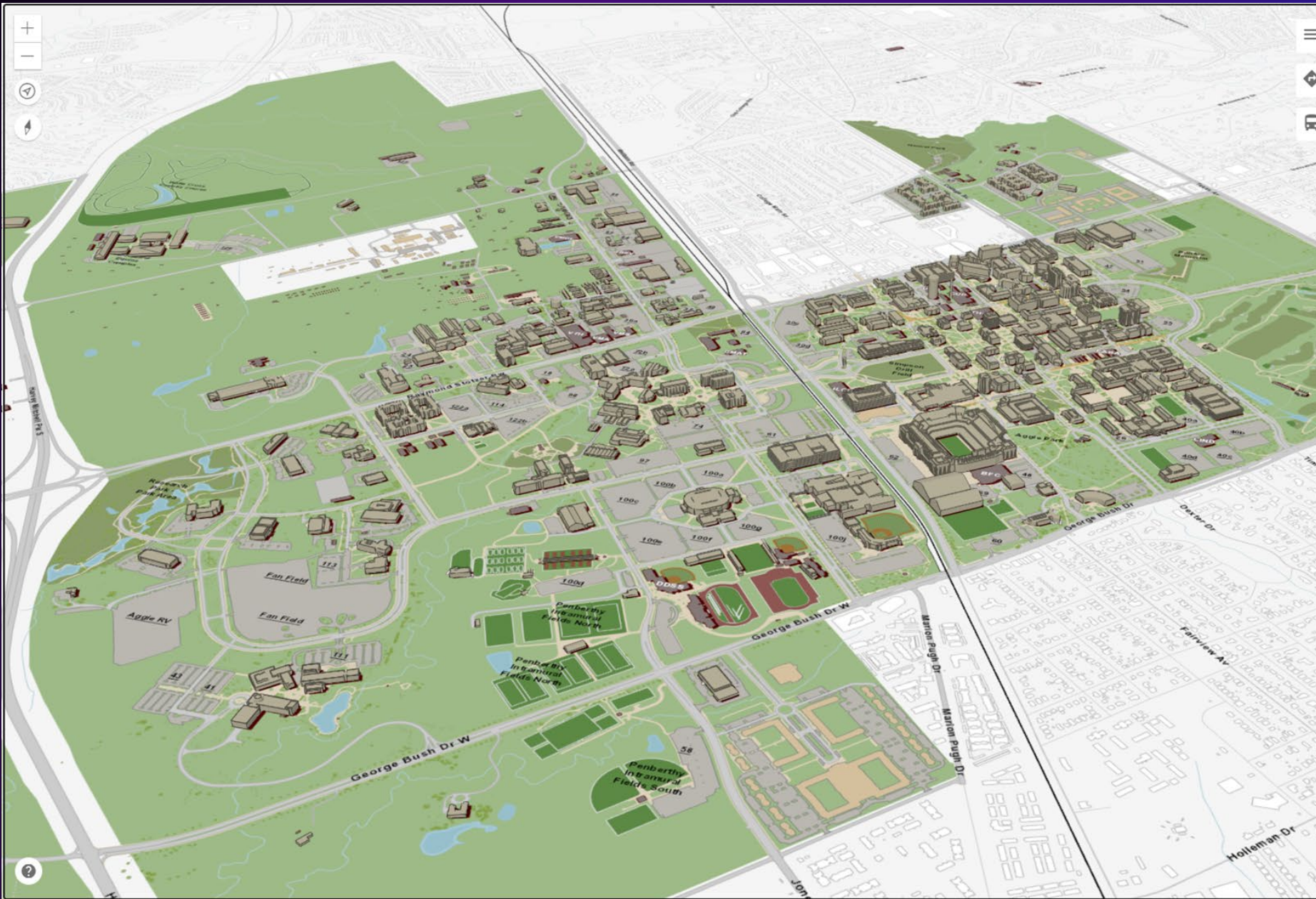
> Status

Search dramos518

1 - 4 of 4 in dramos518

Sort by: Date Modified

<input type="checkbox"/>	Title		Modified
<input type="checkbox"/>	 3D Presentation Test 1	Web Scene	  ... Nov 12, 2020
<input type="checkbox"/>	 3D Presentation Test 1_WSL1	Scene Layer (hosted)	  ... Nov 12, 2020
<input type="checkbox"/>	 3D Presentation Test 1_WSL1	Feature Layer (hosted)	  ... Nov 12, 2020
<input type="checkbox"/>	 3D Presentation Test 1_WSL1	Service Definition	  ... Nov 12, 2020



TEXAS A&M UNIVERSITY
Aggie Map

Find Building or Parking

Layers

- ☒ Test 3D Buildings
- ☐ Construction Zone
- ☐ Points of Interest
- ☐ Restrooms
- ☐ Lactation Rooms
- ☐ Visitor Parking
- ☐ Accessible Entrances
- ☐ Emergency Phones
- ☐ Physical Distance Study Area

Legend

- University Building
- Non-University Building
- Off Campus Building
- Garage Parking
- Restricted 6am to 6pm
- Paved Surface
- Sidewalk
- Railroad

Applications

The background is a vibrant, abstract composition. The left side is dominated by a solid deep purple field. On the right, there are dynamic, wavy shapes in shades of pink, magenta, and orange, creating a sense of movement. In the bottom right corner, a stylized, high-contrast illustration of a mountain range is visible, rendered in warm tones of orange and yellow. A thin, bright yellow curved line arcs across the right side of the image, adding to the abstract feel.

- **Architecture and Construction**

- Design purpose, Environmental Implications, and client tours

- **Virtual Campus Tours**

- Visiting campus as a prospective student or looking to see what campus is like, 3D models provide a way to visualize yourself at Texas A&M University

- **Financial**

- Being able to “walk” a building, seeing how it stands out among the surrounding city scape, 3D models can be a useful tool for convincing clients to invest in your company





Development Site for Aggimaps

3D Playground

- <https://dev.aggiemap.tamu.edu/3d/dom/map/d>
- **To navigate on a computer: Pan with the left mouse button, rotate with the right mouse button**
- **To navigate on a phone: Use one finger to pan, use two fingers in an upward or downward motion to change the tilt angle, and use two fingers moving in a twisting motion to rotate.**
- **Comments and Suggestions: email me d.ramos@tamu.edu**



Acknowledgements

The background of the slide is a vibrant, abstract composition. It features large, flowing, organic shapes in shades of purple, magenta, and pink. In the bottom right corner, there is a stylized, high-contrast silhouette of a mountain range in white and orange. A thin, bright yellow arc curves across the right side of the image, adding a dynamic element to the design.

- **Chris Dizon** and his team at SketchUp. They provided invaluable knowledge and guidance in learning how to better utilize the tools within SketchUp, including the IFC Manager and CleanUp Extension.
- **Dr. Dan Goldberg** and **Edgar Hernandez** at Texas A&M University. They provided the web development and maintenance of Aggimemap.
- **Chris Matus** at Texas A&M University. A fantastic mentor, providing design suggestions and continuous encouragement to share my work.
- **Nathan Brown** at Texas A&M University. His IT expertise solved several problems I encountered.



References

The background of the slide is a vibrant, abstract composition. It features a deep purple base color. In the top-left corner, there are layered, wavy shapes in shades of pink, magenta, and orange. A thin, bright yellow arc curves from the right side towards the center. On the right side, there are more complex, layered shapes in pink and orange, some with darker, almost black, internal details that suggest a topographical or geological map. The overall effect is modern and artistic.

IFC Manager

- <https://github.com/BIM-Tools/SketchUp-IFC-Manager/releases>

How to use the IFC Manager video *In Dutch*

- <https://vimeo.com/256742066>

SketchUp to ArcGIS

- <https://www.esri.com/arcgis-blog/products/product/design-planning/visualizing-sketchup-models-in-arcgis-urban/>

BIM-GIS Integration with IFC

- <https://www.esri.com/arcgis-blog/products/product/3d-gis/bim-gis-integration-with-ifc/>

Spirix Shapefile Importer

- <https://sites.google.com/site/spirixcode/home?authuser=0>



Questions and Comments

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