



UNREAL  
ENGINE

## HOUR 4

Static Mesh Editor:  
Working with Static Mesh Assets and Actors

# INTRODUCTION

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In this lecture, you will become familiar with importing 3D models, using the Static Mesh Editor, editing collision hulls, and working with Static Mesh assets and Actors.



# LECTURE GOALS AND OUTCOMES

## Goals

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The goals of this lecture are to

- Become familiar with the Static Mesh Editor
- Learn how to import 3D model files
- Learn to assign Materials and collision hulls to Static Mesh assets
- Learn how to place Static Mesh Actors in a Level
- Learn how to change mesh and Material references on Static Mesh Actors
- Learn to set collision responses on Static Mesh Actors

## Outcomes

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By the end of this lecture you will be able to

- Work with the Static Mesh Editor
- Import 3D model files
- Assign Materials and collision hulls to Static Mesh assets
- Place Static Mesh Actors in a Level
- Change mesh and Material references on Static Mesh Actors
- Set collision responses on Static Mesh Actors



# STATIC MESH

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Static Meshes are some of the most common art assets and Actor types you will work with in UE4.

Static Meshes are 3D models imported from applications such as 3ds Max or Maya. They are primarily used for set dressing and world building.

Just about every Level you make will use Static Meshes.





## Static Mesh

### Asset

- A Static Mesh *asset* is imported and stored in the Content Browser.
- An asset stores initial collision settings.
- An asset stores the initial Material assignment for the mesh.
- An asset stores LOD assignments.

### Actor

- A Static Mesh *Actor* is a placed instance of a Static Mesh asset in a Level.
- There can be many instances of a single asset.
- Each Actor instance's properties can be modified individually.



# STATIC MESH

Static Meshes contain the following:

- The pivot point (local axis)
- Vertices, edges, and polygons that define the visual look of a model
- Levels of detail (LODs)
- Collision hulls
- Sockets
- UV layouts used for projecting Textures and lightmaps
- Vertex color assignment

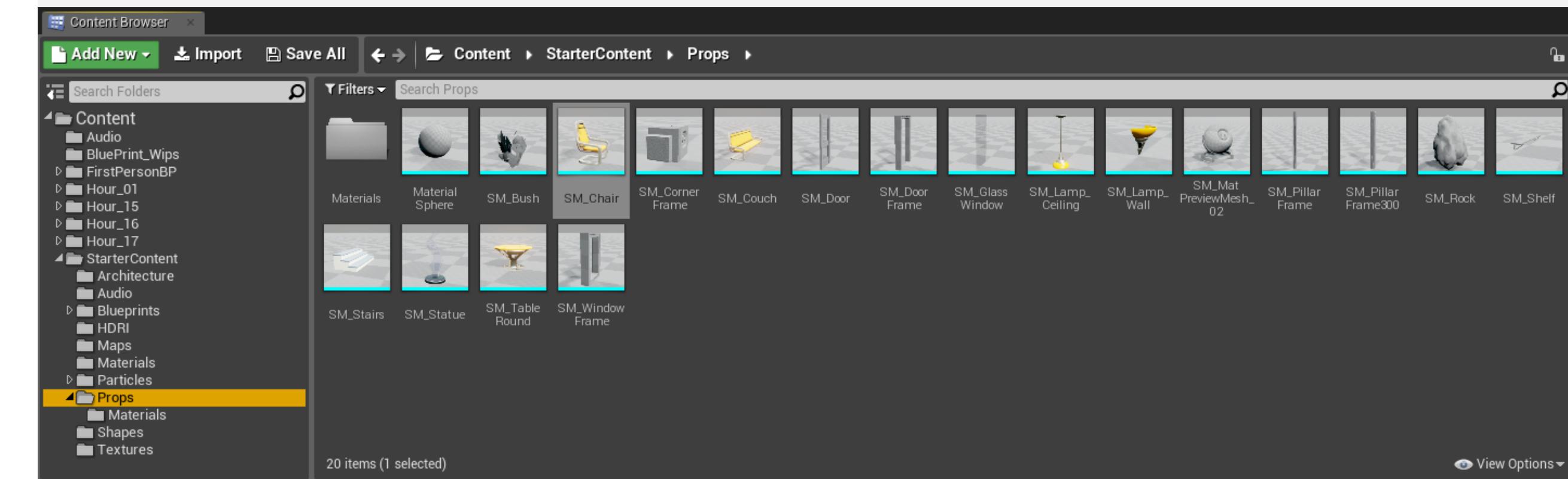
The screenshot shows the Unreal Engine Editor's interface for managing static meshes. In the center, a 3D model of a chair is displayed, surrounded by a wireframe bounding box. The top bar features standard tools: 'UV Channel 0', 'Reset Camera', and 'Auto LOD'. The main workspace is dominated by the 'Details' panel on the right, which provides detailed configuration for the selected mesh, 'M\_Chair'. This panel includes sections for 'LOD0' (Element 0, with 'Highlight' checked) and 'Build Settings' (with various checkboxes and dropdowns for optimization and build parameters). Below the Details panel are other toolbars for 'Socket Manager' and 'Convex Decomposition', each with its own set of controls.



# IMPORTING STATIC MESHES

Two file types are commonly used for importing 3D models into the Editor:

- .obj
- .fbx

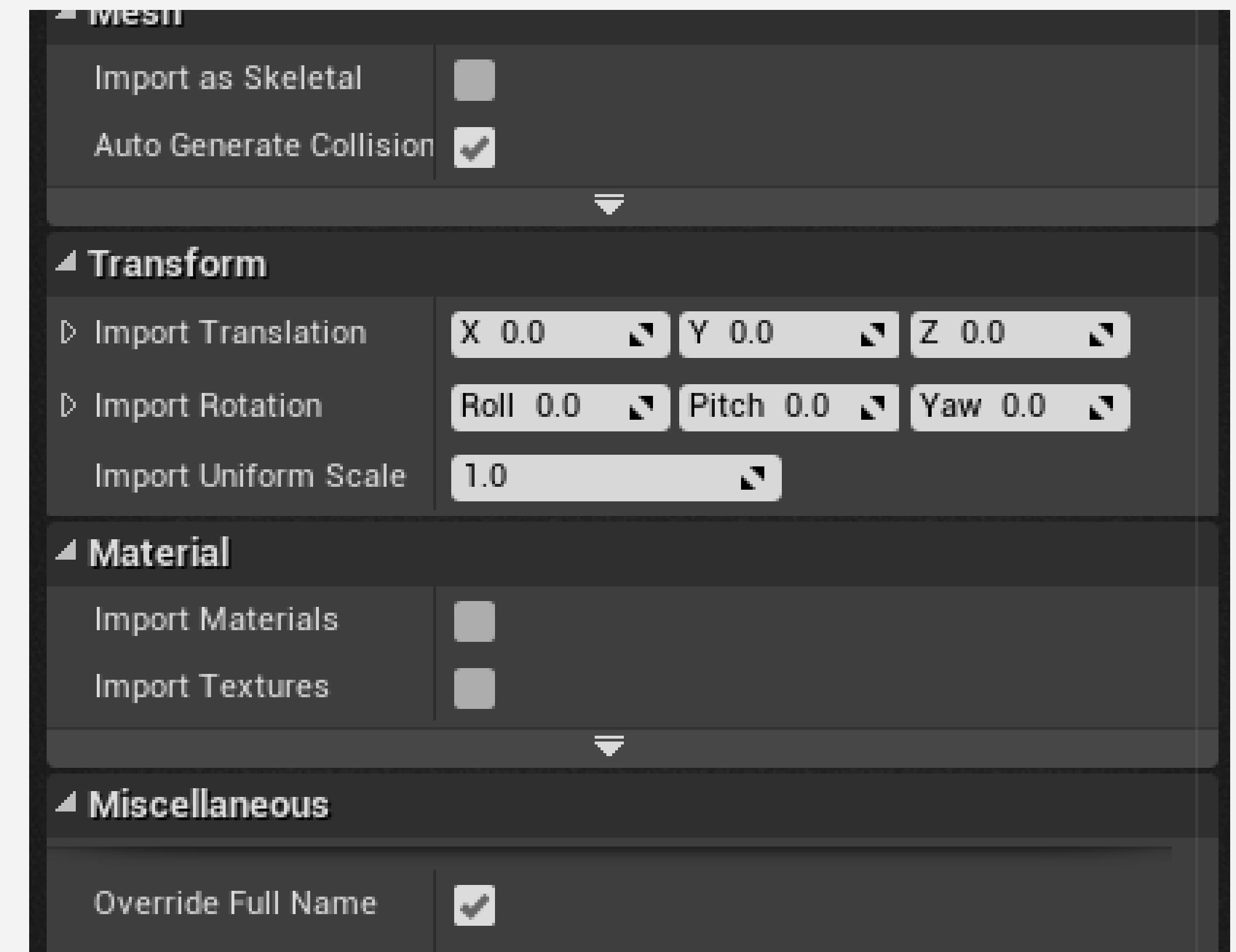




# IMPORTING STATIC MESHES

When you import either file type, you open up an FBX Import Options window.

Auto-generating collision hulls and lightmap UVs on import can speed things up, but you can also edit and modify collision hulls and lightmap UVs in the Static Mesh Editor.

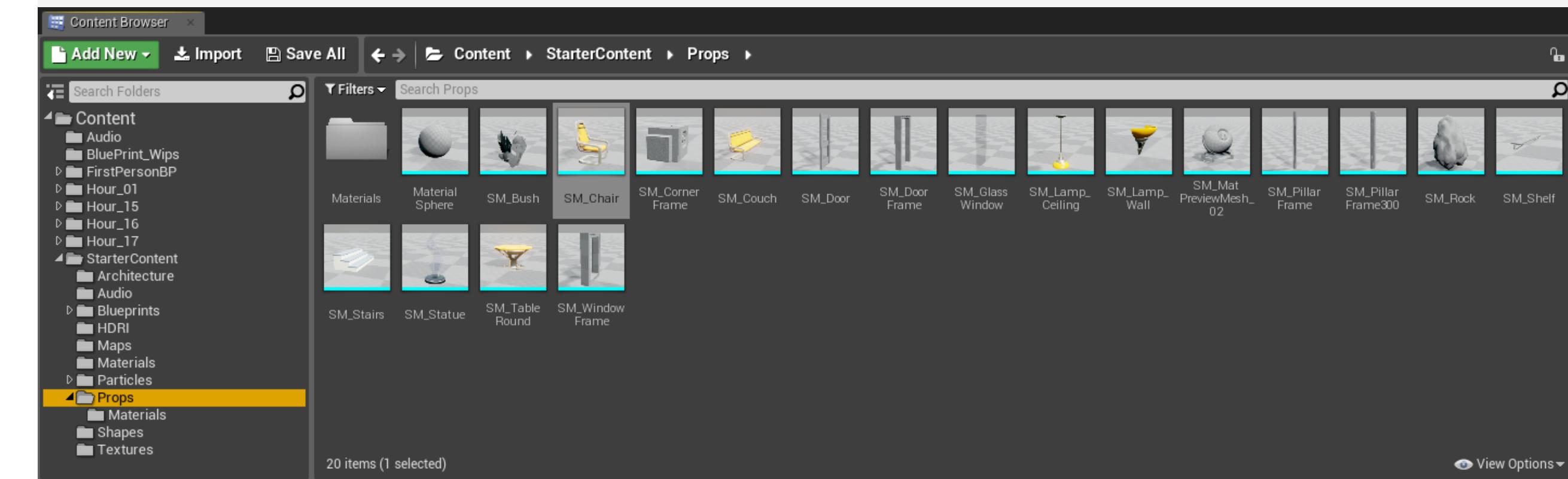


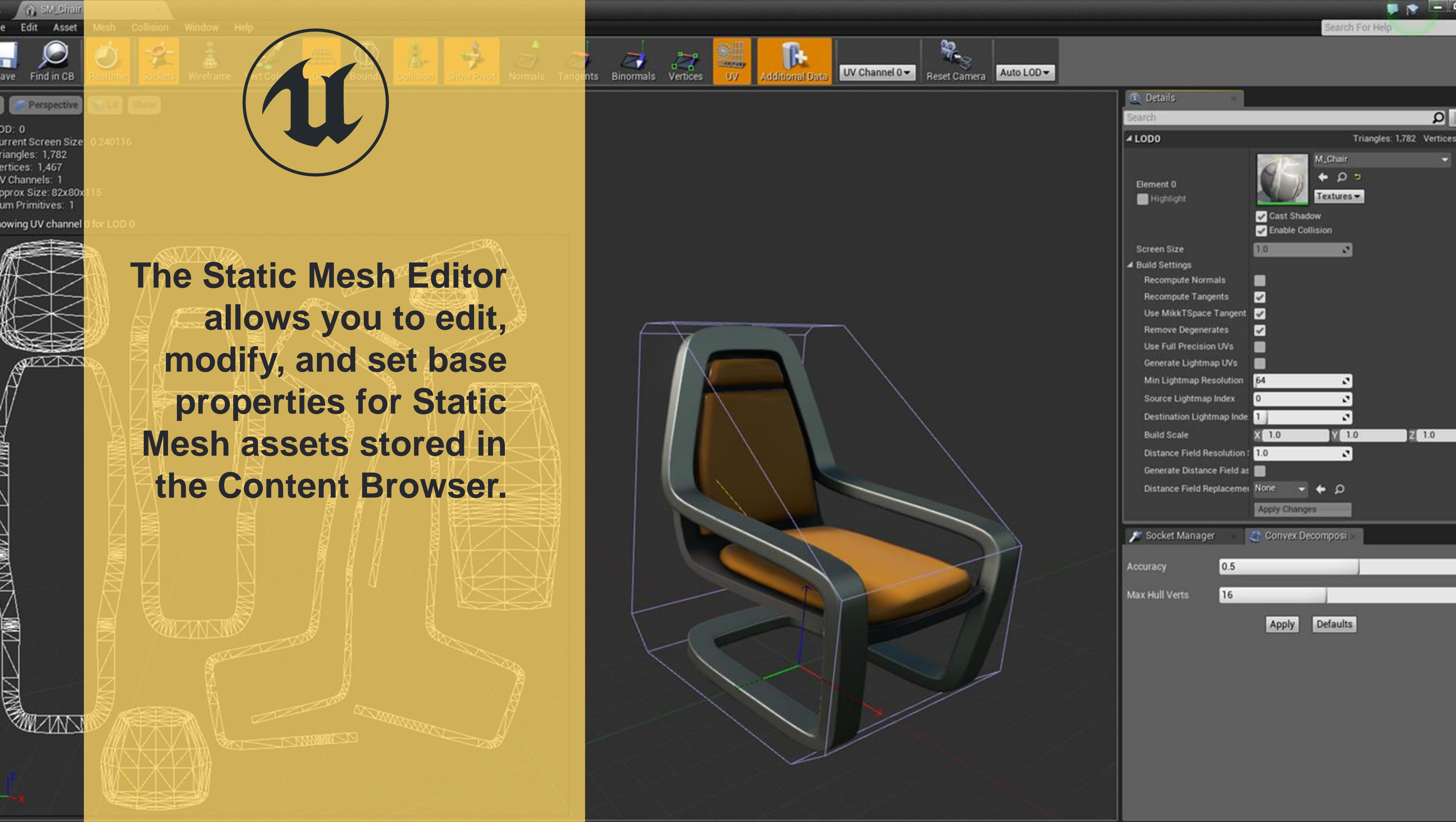


# OPENING THE STATIC MESH EDITOR

To view a Static Mesh in the Static Mesh Editor, double-click the Static Mesh asset in the Content Browser. The Static Mesh Editor will open in a new window.

Each Static Mesh asset you double-click opens its own Static Mesh Editor window.





The Static Mesh Editor allows you to edit, modify, and set base properties for Static Mesh assets stored in the Content Browser.



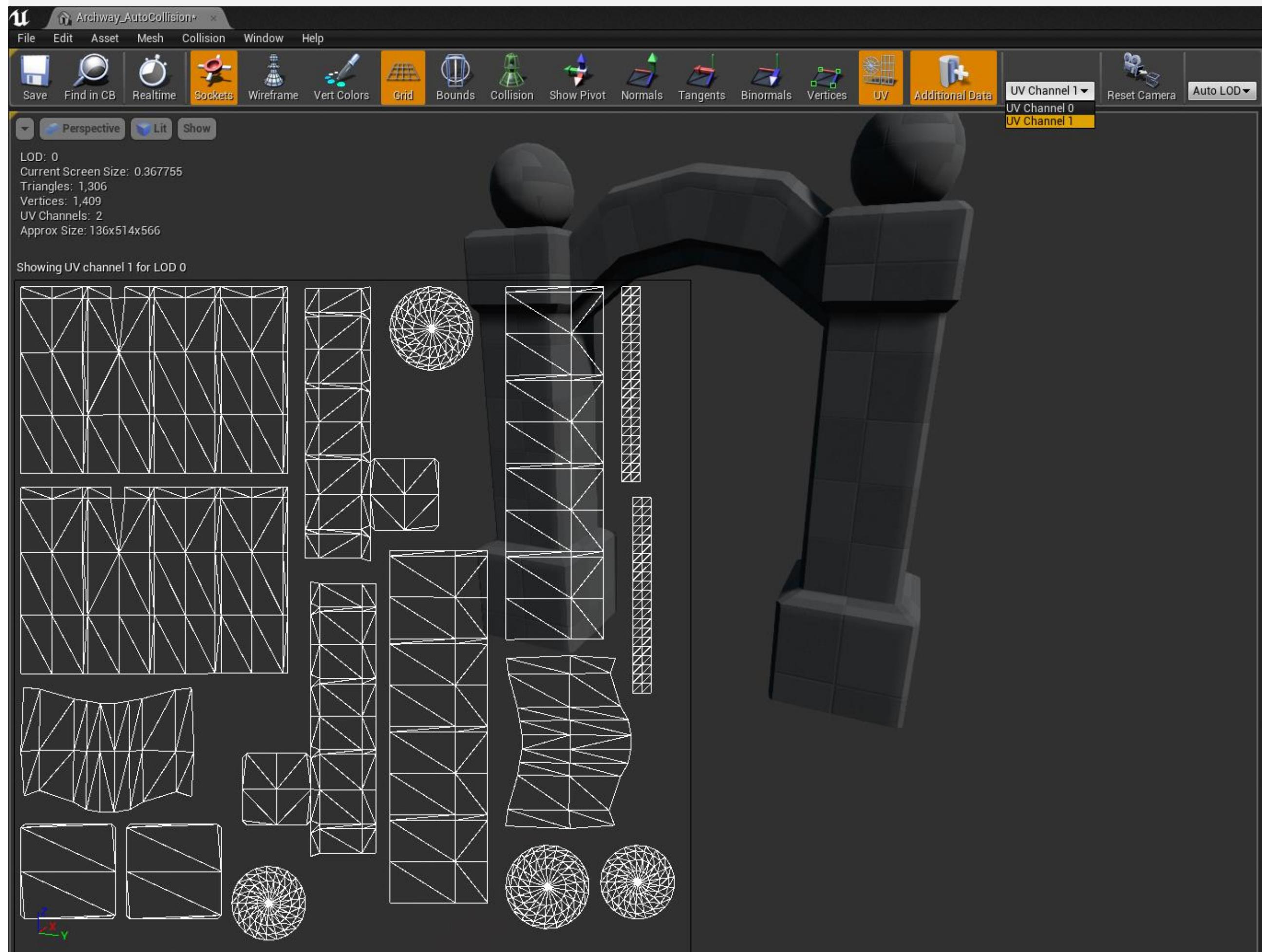
## VIEWING UV LAYOUTS

Before a Material can be properly displayed on the surface of a model, it needs a UV map layout, also known as a UV channel.

If a model has been created properly in a 3D modeling application, it should already have at least one UV channel set up.

Static Meshes can have multiple UV channels.

Typically there is at least one UV channel for a Material (UV Channel 0) and one for the lightmap data (UV Channel 1).



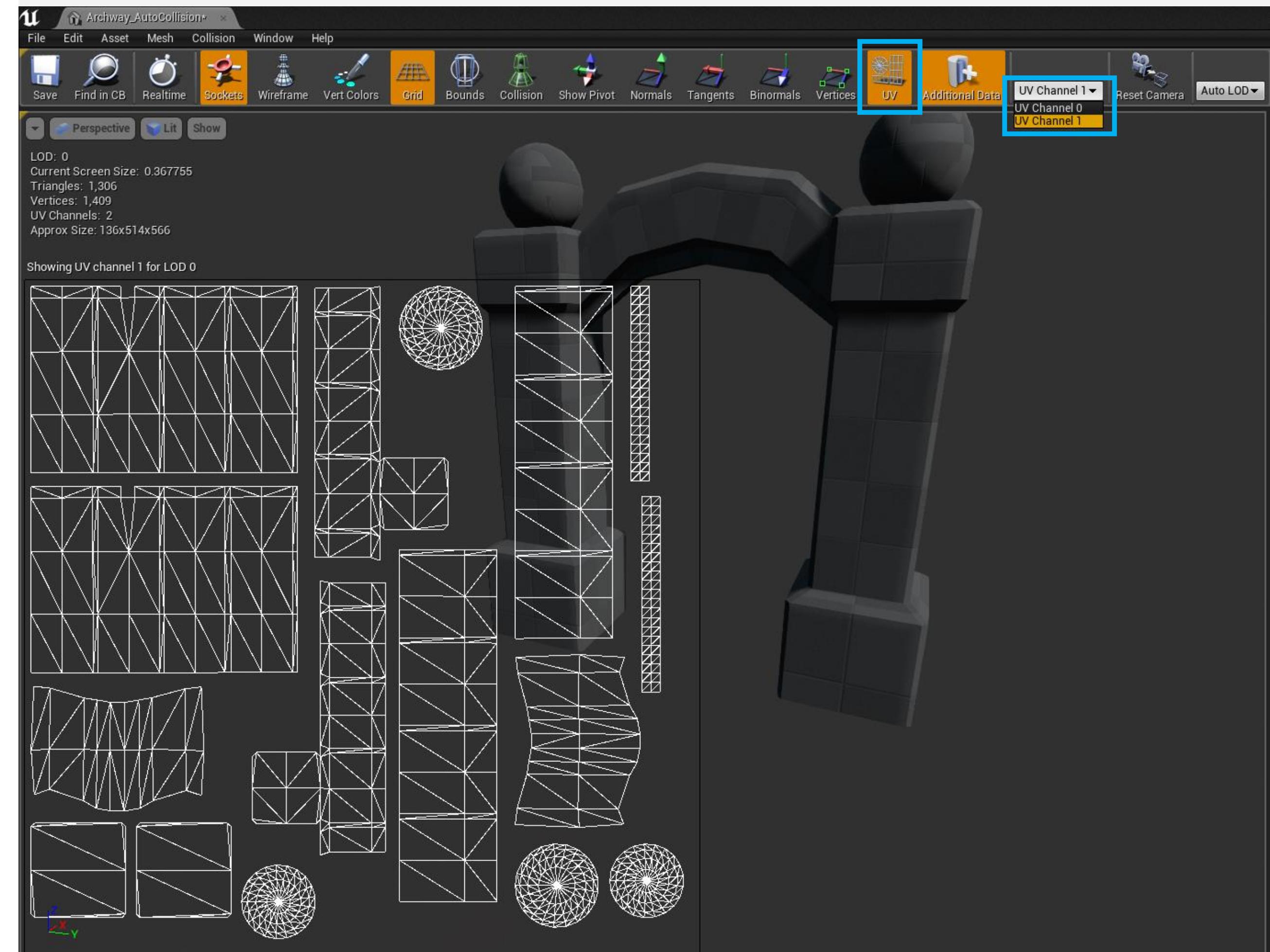


## VIEWING UV LAYOUTS

To view the UV channels for a Static Mesh, click the UV button on the toolbar to toggle it on and off.

The current UV channel is displayed in the Viewport window.

You can change which UV channel is displayed by selecting a channel from the drop-down on the toolbar.





# Lightmap UV Channel

The lightmap UV channel is used for storing light and shadow information on the surface of a mesh.

The Editor auto-generates a UV channel for lightmaps during import, but you can also create one after import by using the Static Mesh Editor's Details panel options.

The default lightmap UV channel is 1, which is the second UV channel because the UV channel index starts at 0.

Although you can technically use any UV channel you want for lightmaps, when starting out it is best to use the default settings.

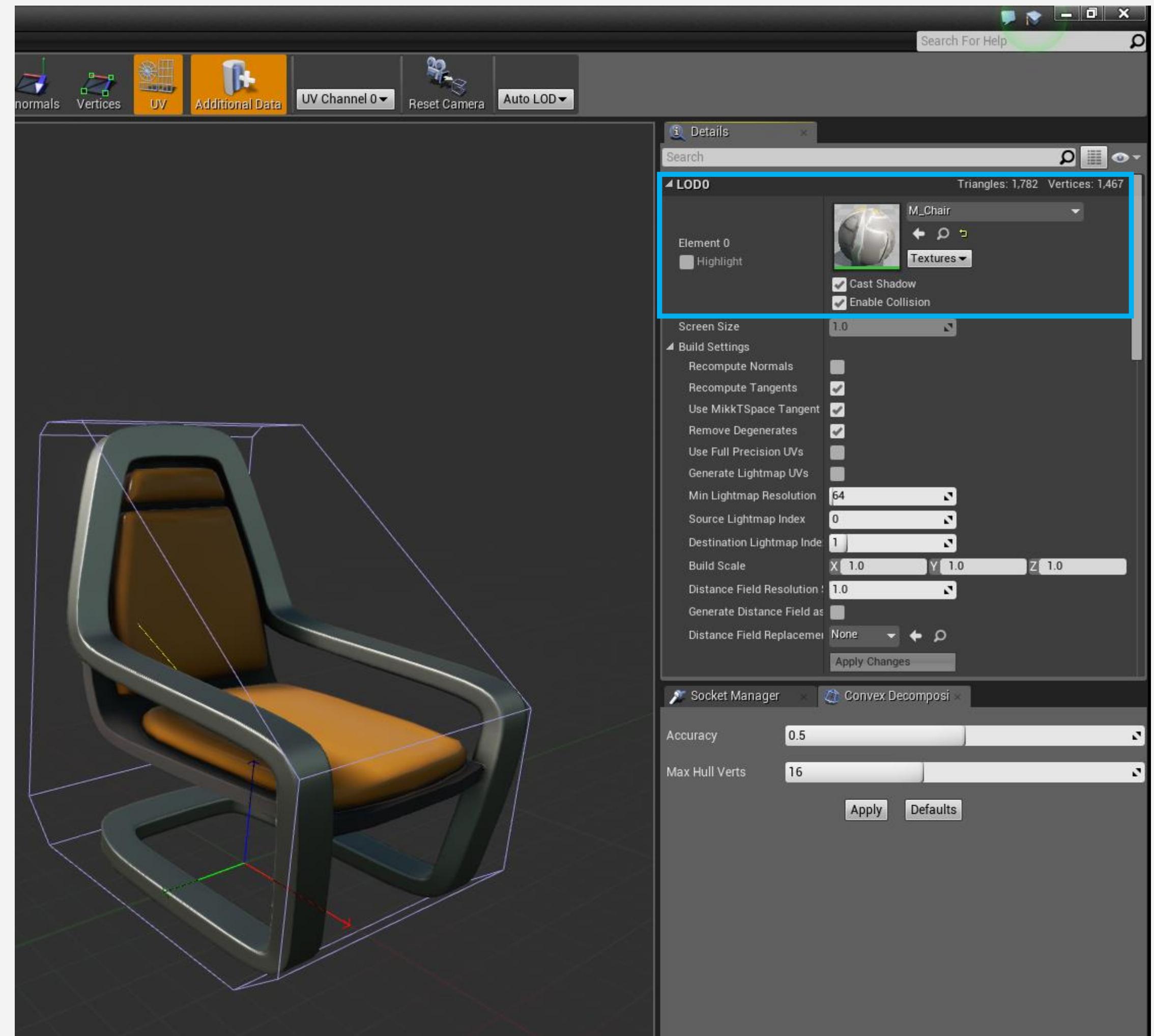


# ASSIGNING A MATERIAL TO A STATIC MESH ASSET

Because a Static Mesh asset is a base asset, it is a good idea to prep the asset for continual use.

Assign a default Material so that every time the asset is placed in a Level as a Static Mesh Actor, it already has a Material.

Every time you place an instance of the mesh in the Level, you can assign a new Material to that instance if you need to.



# COLLISION HULLS

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A collision hull is a simple primitive shape that surrounds a mesh and is used to identify collision events.

A collision event occurs when two Actor collision hulls hit, touch, or overlap with each other.

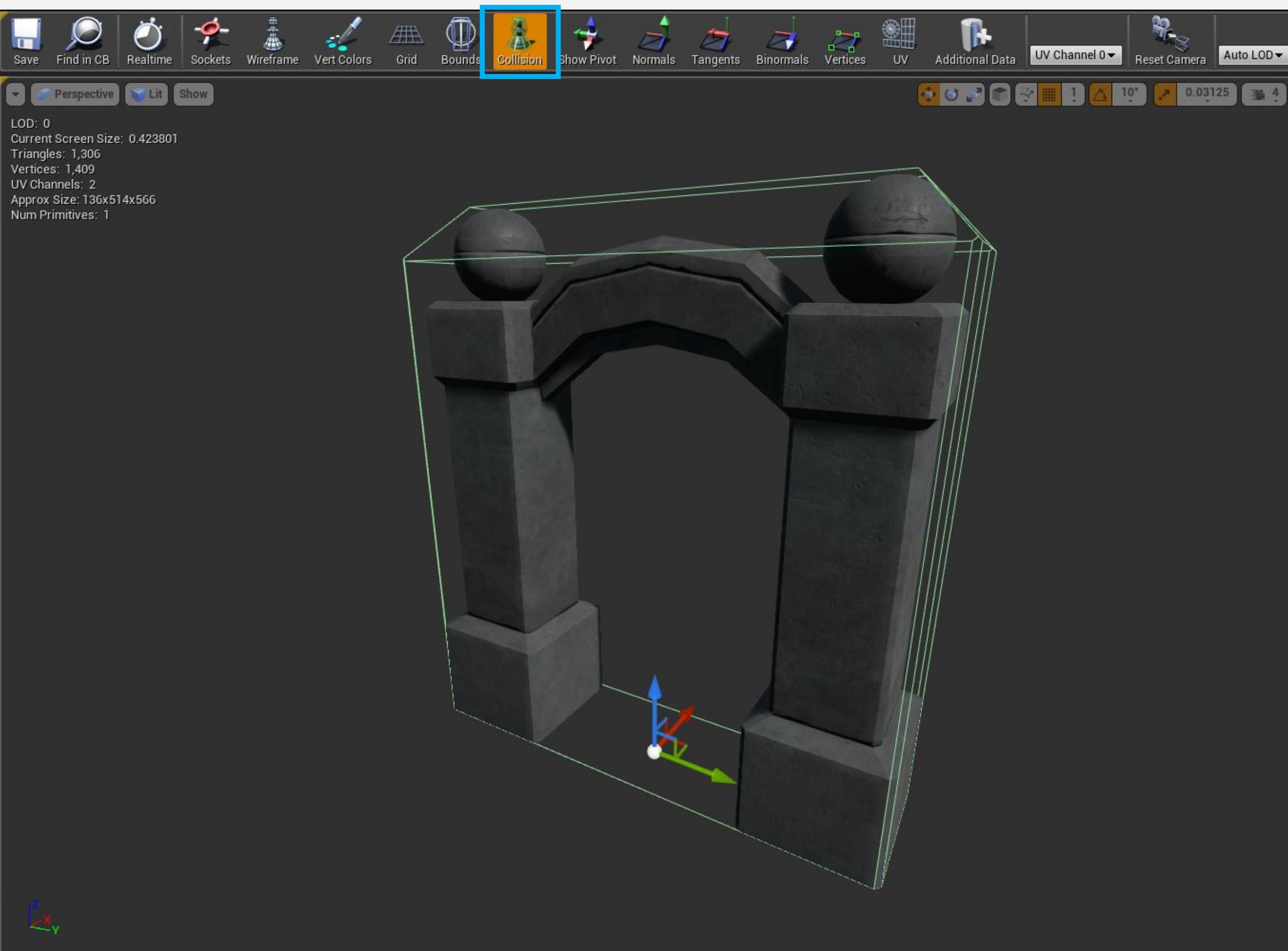
When you import a 3D model, the Editor auto-generates a simple collision hull.





## VIEWING COLLISION HULLS

You can view a collision hull in the Static Mesh Editor by clicking the Collision icon on the Static Mesh Editor toolbar.



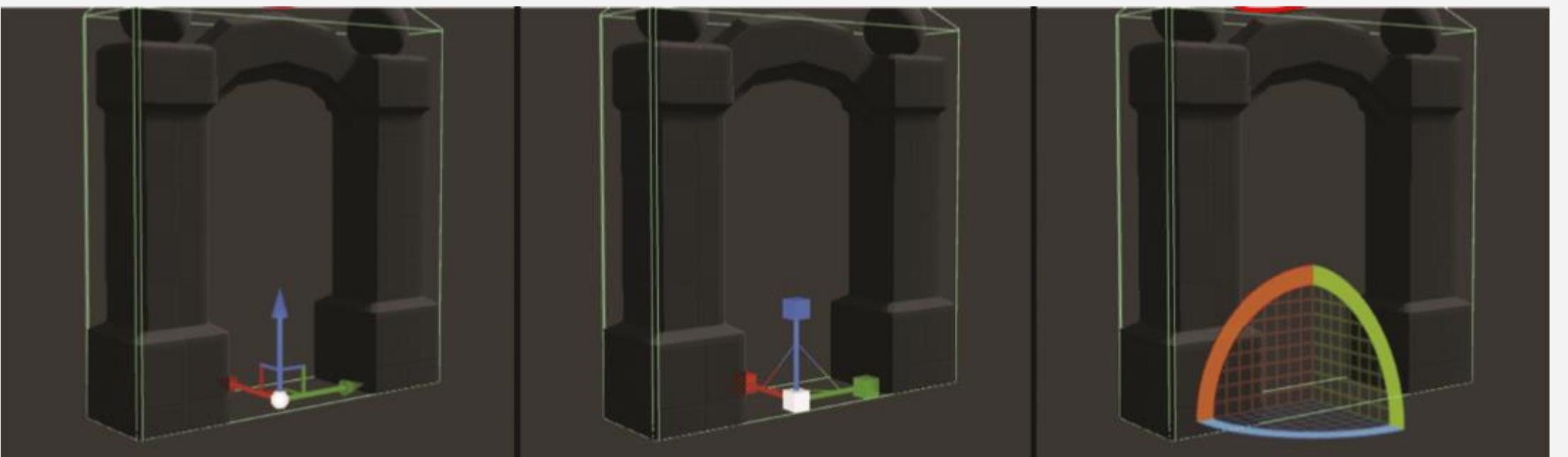


## EDITING COLLISION HULLS

You can interact with the collision hull by clicking any of its wireframe edges.

You can move, scale, and rotate the hull by pressing the spacebar to cycle through transform gizmos.

You can remove a selected collision hull by pressing the Delete key.

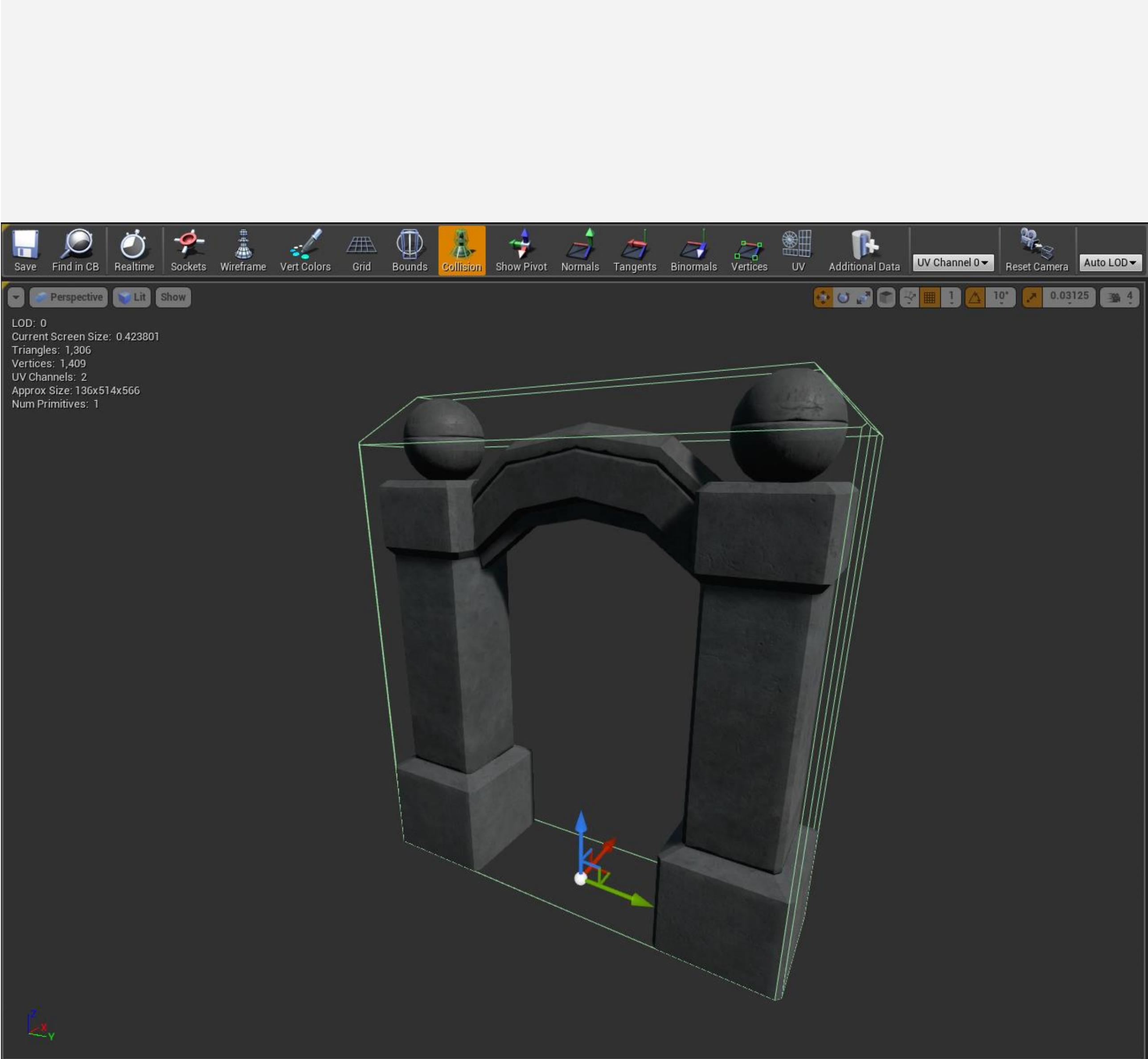




## EDITING COLLISION HULLS

Auto-generating collision hulls during import can save you time, but depending on the shape of the mesh asset, auto-generation may not always be the best solution.

In the image on the right, you can see the auto-generated collision that surrounds the entire Archway mesh. This collision hull will block Actors from passing through the mesh, but it will also stop Actors from walking under the Archway. In this case, the collision hull needs to be modified.

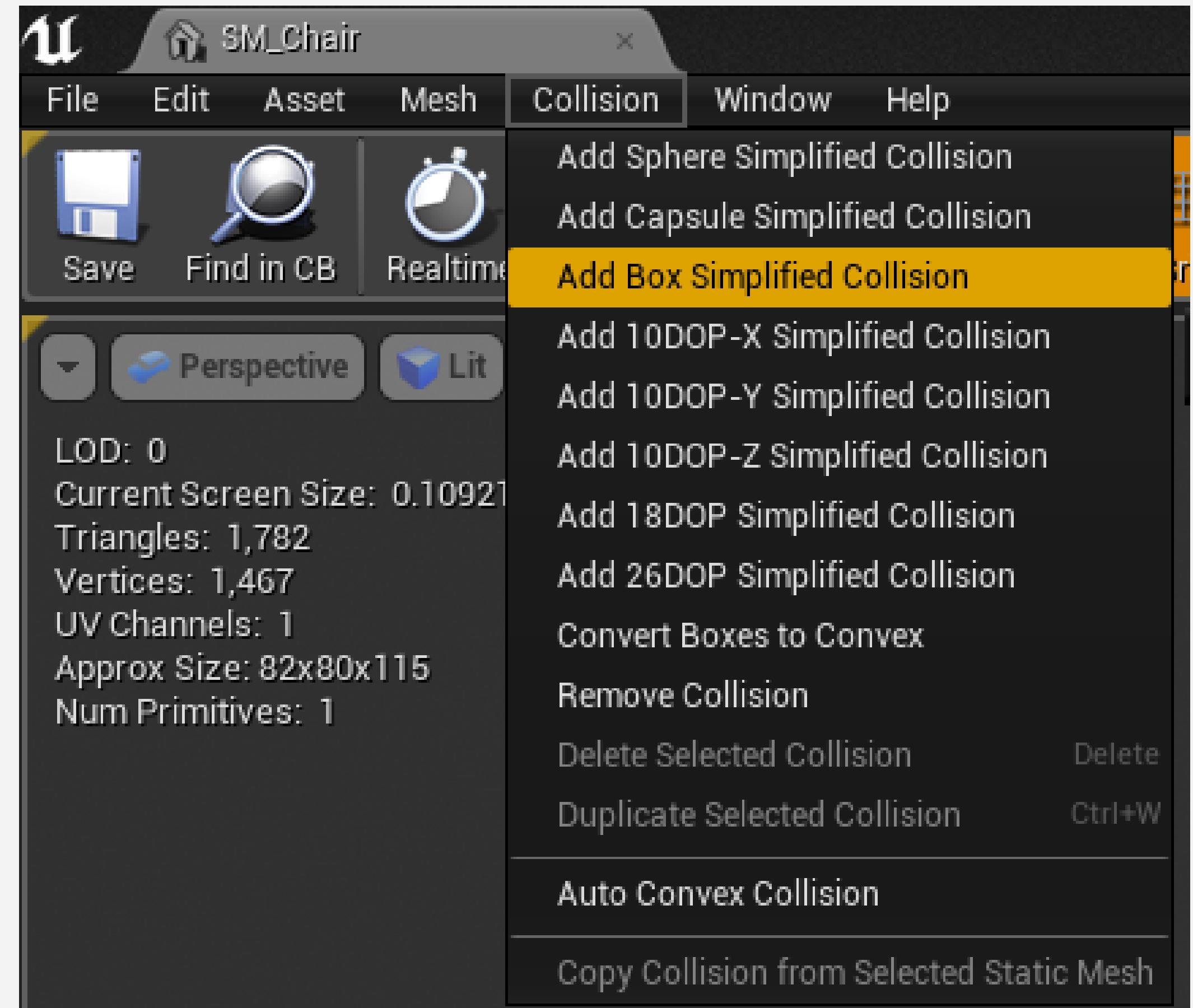




# EDITING COLLISION HULLS: SIMPLIFIED COLLISION

You can add multiple collision hulls to one Static Mesh.

- To add a collision hull, click Collision on the menu bar and select Add *collision you want to add*. Do this as many times as you like.
- If you need to remove a single collision hull, just select it in the Viewport and press Delete.
- If you want to remove all of the collision hulls from the Viewport, select Collision > Remove Collision.

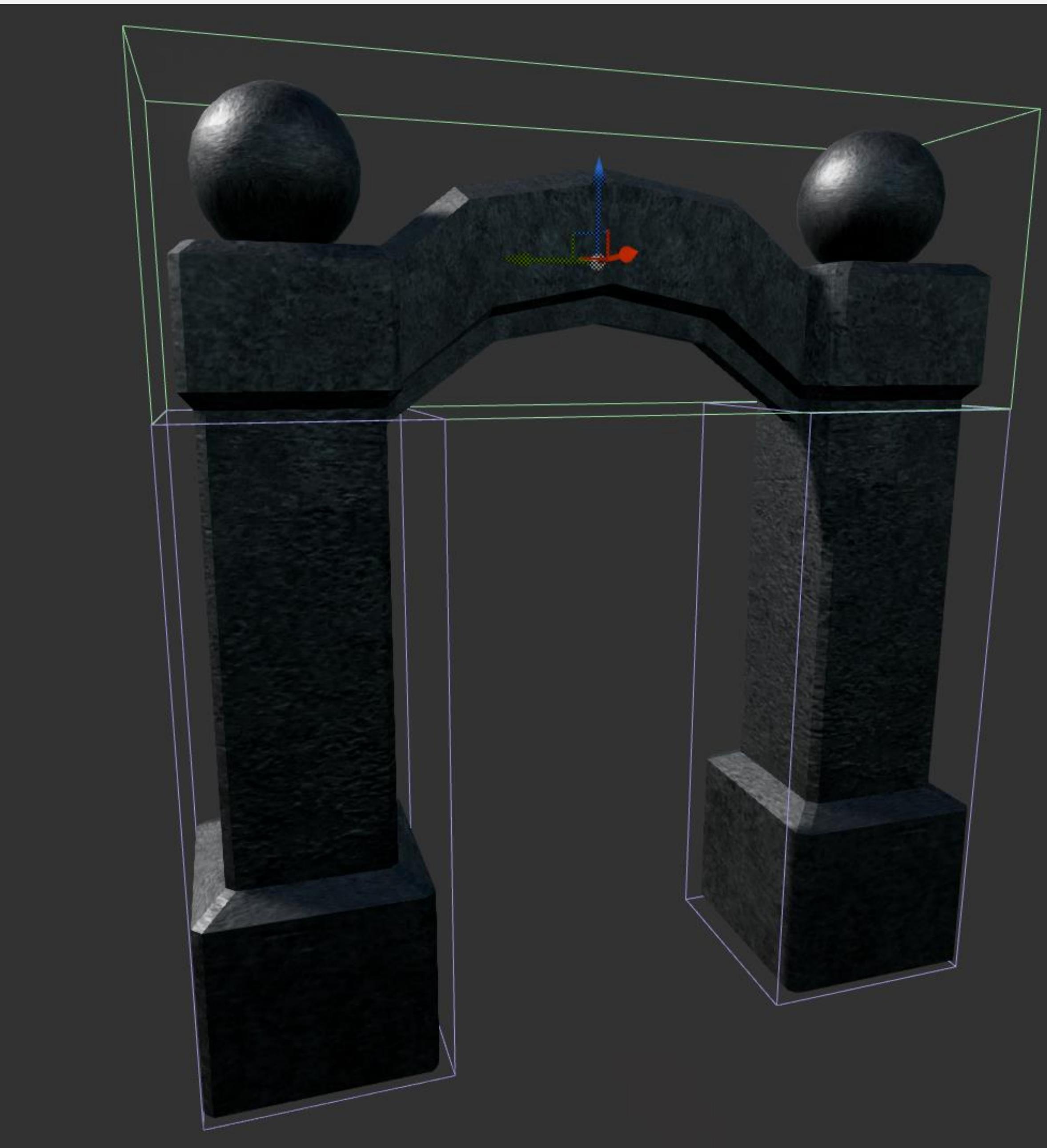




## EDITING COLLISION HULLS: SIMPLIFIED COLLISION

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The image on the right shows multiple Box Simplified collision hulls assigned to a single mesh.



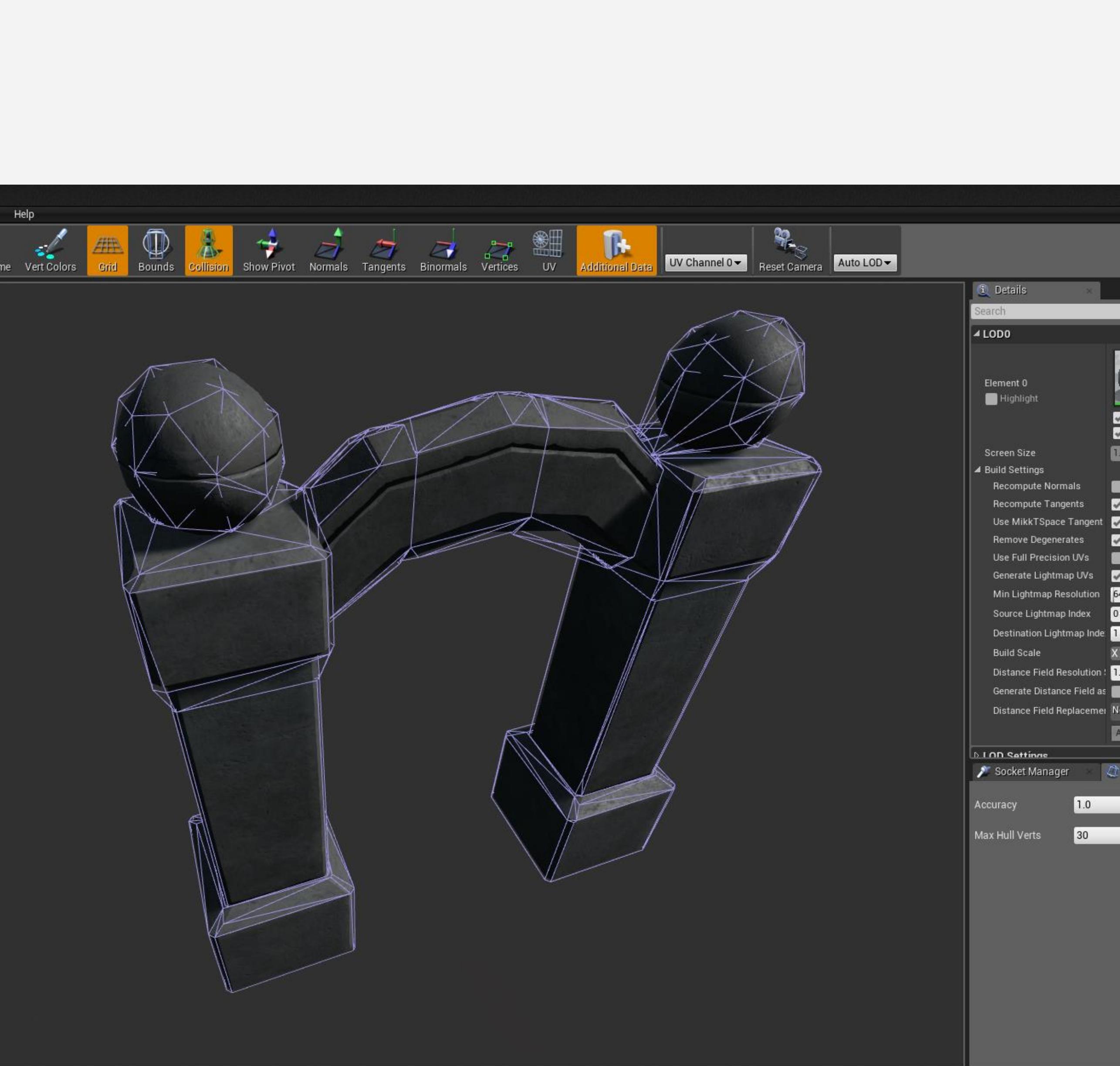


# CONVEX DECOMPOSITION

The Static Mesh Editor also has a panel called Convex Decomposition that allows you to auto-generate collision hulls for more complicated models.

Altering the complexity of a Static Mesh and the convex decomposition settings will give you varying results.

To open the Convex Decomposition panel, select Collision > Auto Convex Collision.





## PER-POLY COLLISION

You can also set Static Mesh assets to per-poly collision, which is the most accurate collision you can have. It is also the most computationally intensive, so you should use it only for specific situations when you need precision.

- To set Static Mesh assets to per-poly collision, go to the Static Mesh Settings section of the Details panel and set Collision Complexity to Use Complex Collision as Simple.
- This will tell the Editor to use Complex Collision (per-poly) instead of Simple Primitive Convex Primitive.

The screenshot shows the Unreal Engine Details panel for a static mesh asset. The 'Collision Complexity' dropdown menu is open, displaying three options: 'Default', 'Use Simple Collision As Complex', and 'Use Complex Collision As Simple'. The 'Use Complex Collision As Simple' option is highlighted with a yellow background, indicating it is selected. Other settings visible include 'Cast Shadow' (checked), 'Enable Collision' (checked), 'Screen Size' (set to 1.0), and 'Light Map Resolution' (set to 1).

# WORKING WITH STATIC MESH ACTORS

# **STATIC MESH ACTORS**

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Static Mesh Actors are placed instances of a Static Mesh asset in a Level.

Each placed Static Mesh Actor has its own properties that can be modified independently of the referenced Static Mesh asset.



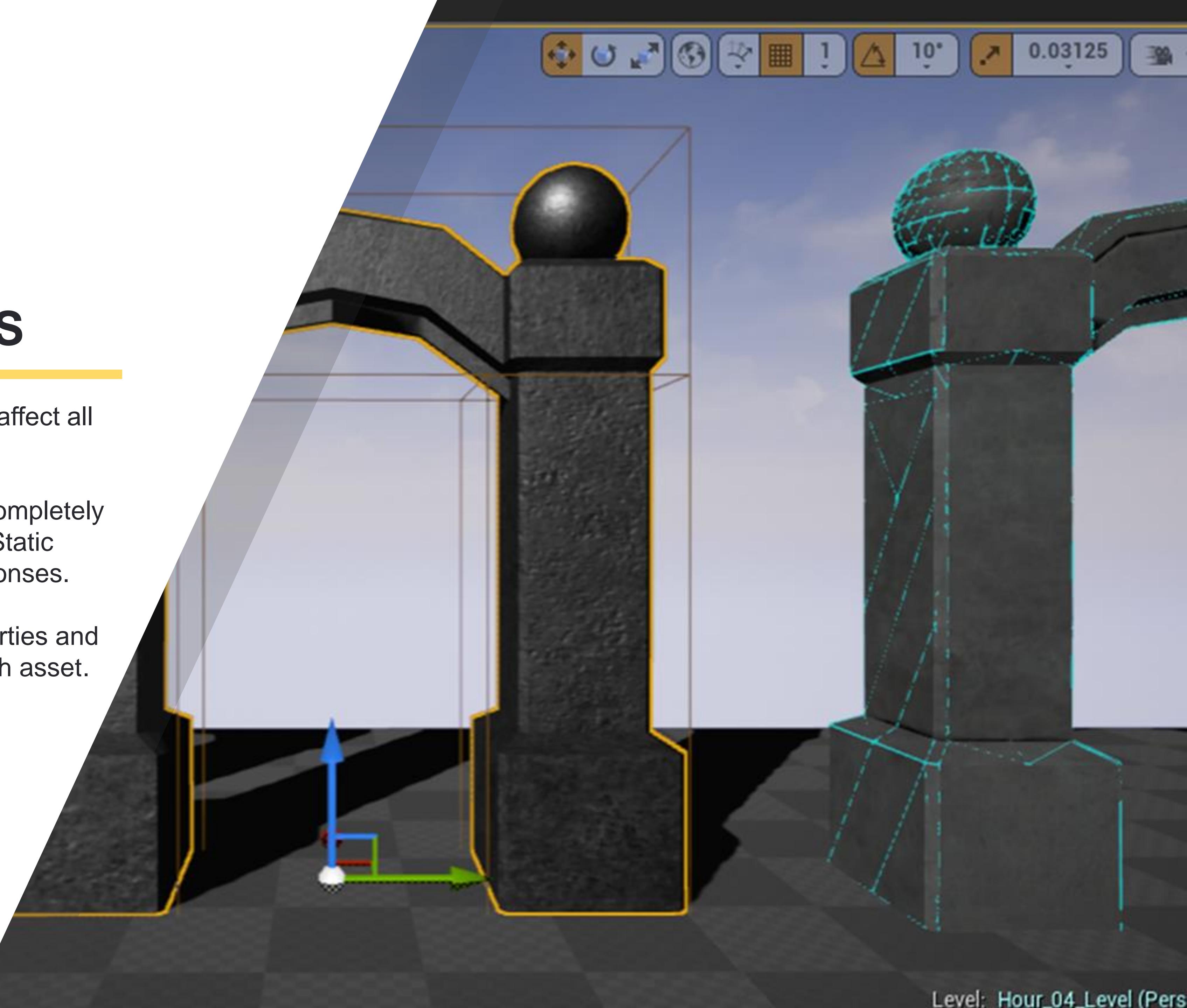


## EDITING STATIC MESHES

Changing a Static Mesh asset's properties can affect all of the Static Mesh Actors that reference it.

For example, if you remove the collision hulls completely from a mesh asset, all the Actors that use that Static Mesh will not be able to generate collision responses.

However, changing a Static Mesh Actor's properties and settings has no effect on the original Static Mesh asset.





## PLACING STATIC MESHES

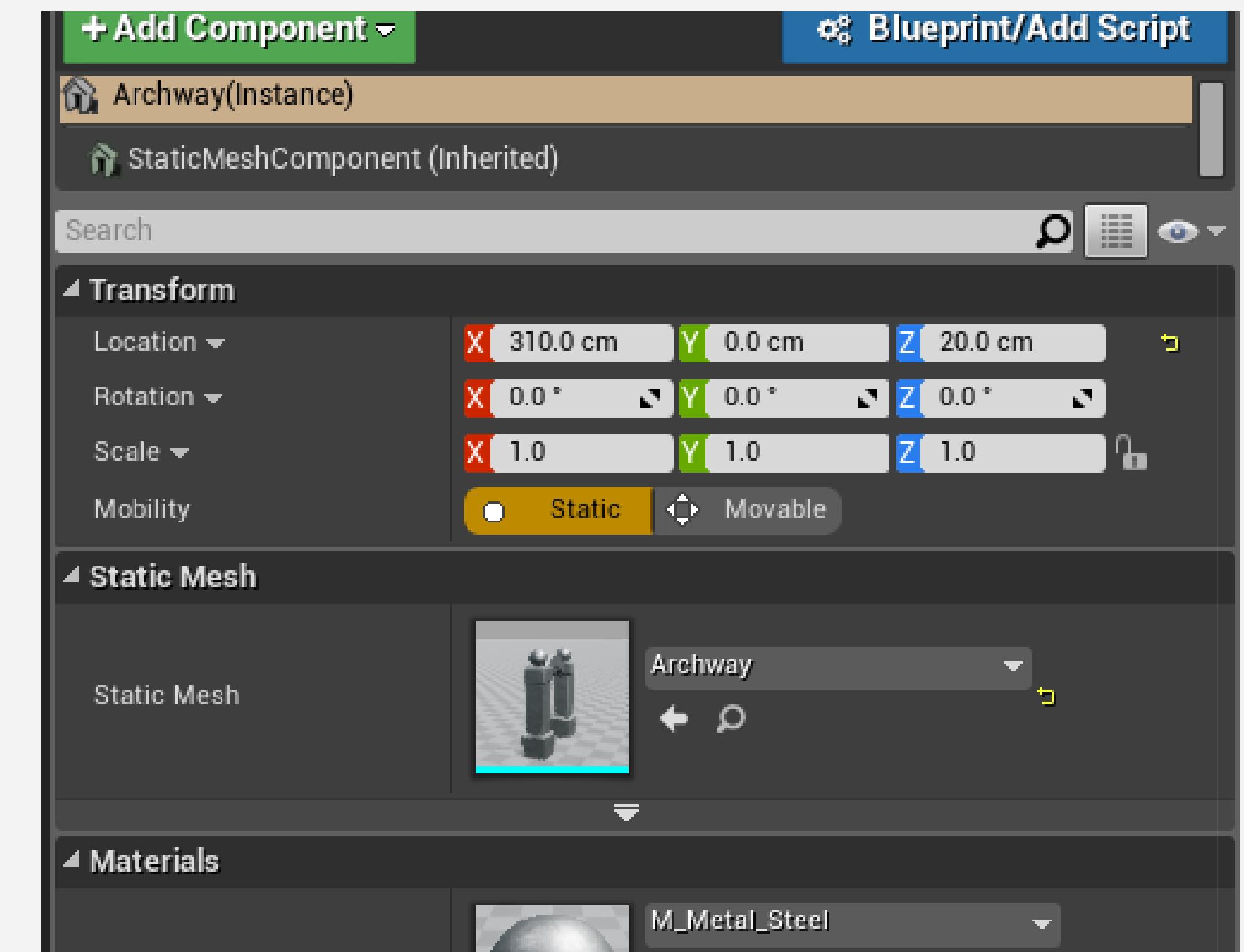
To place a Static Mesh into a Level, locate one in the Content Browser and simply drag and drop the asset from the Content Browser to the current Level in the Level Editor Viewport.

Once you drag a Static Mesh into a Level, you create a Static Mesh Actor that references the original mesh asset.

If you select a placed Static Mesh Actor in a Level, you see the transform gizmo appear at the Actor's pivot point.

You can see in the Level Editor Details panel that the Actor has transform properties that store its position, rotation, and scale in the world along with Mobility settings.

While a Static Mesh Actor references the original Static Mesh asset, once it is placed you can change the Static Mesh and the Material reference.





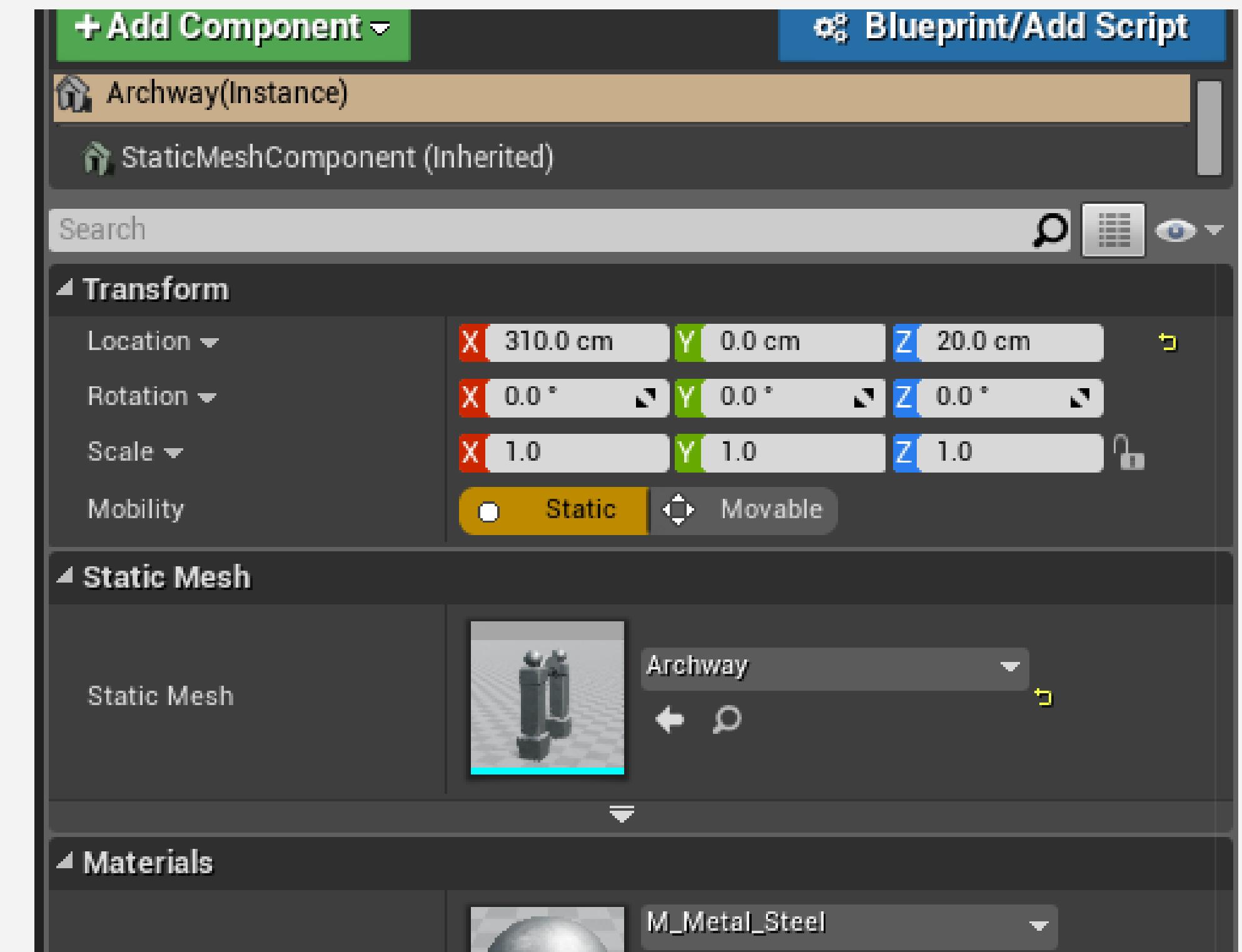
# MOBILITY SETTINGS

A Static Mesh Actor has two possible mobility states:  
**Static** and **Movable**.

Changing the mobility state of an Actor ultimately affects how the engine calculates light and shadow information for the Actor.

- **Static** tells the engine that lighting needs to be precalculated.
- **Movable** tells the engine to calculate lighting during runtime.

If you want to animate a Static Mesh Actor or have it simulate physics, you need to set Mobility to Movable.



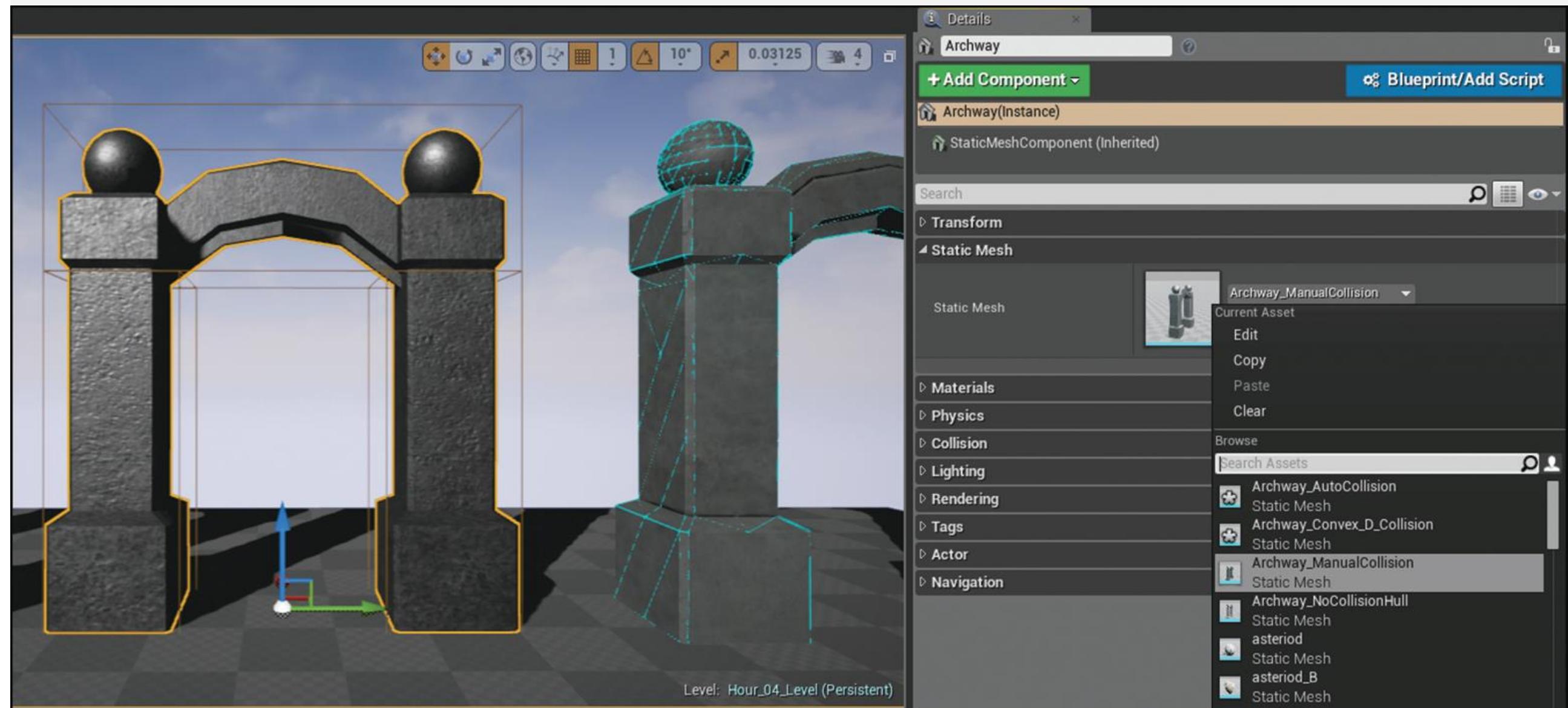


# CHANGING THE MESH REFERENCE FOR A STATIC MESH ACTOR

A Static Mesh Actor references the initial Static Mesh asset used when the Actor was placed in the Level.

The mesh reference can easily be changed in a couple of ways:

- Drag a new mesh asset from the Content Browser to the Static Mesh reference thumbnail in the Level Details panel of the selected Static Mesh Actor.
- Click on the drop-down arrow next to the currently assigned mesh and select a new mesh.



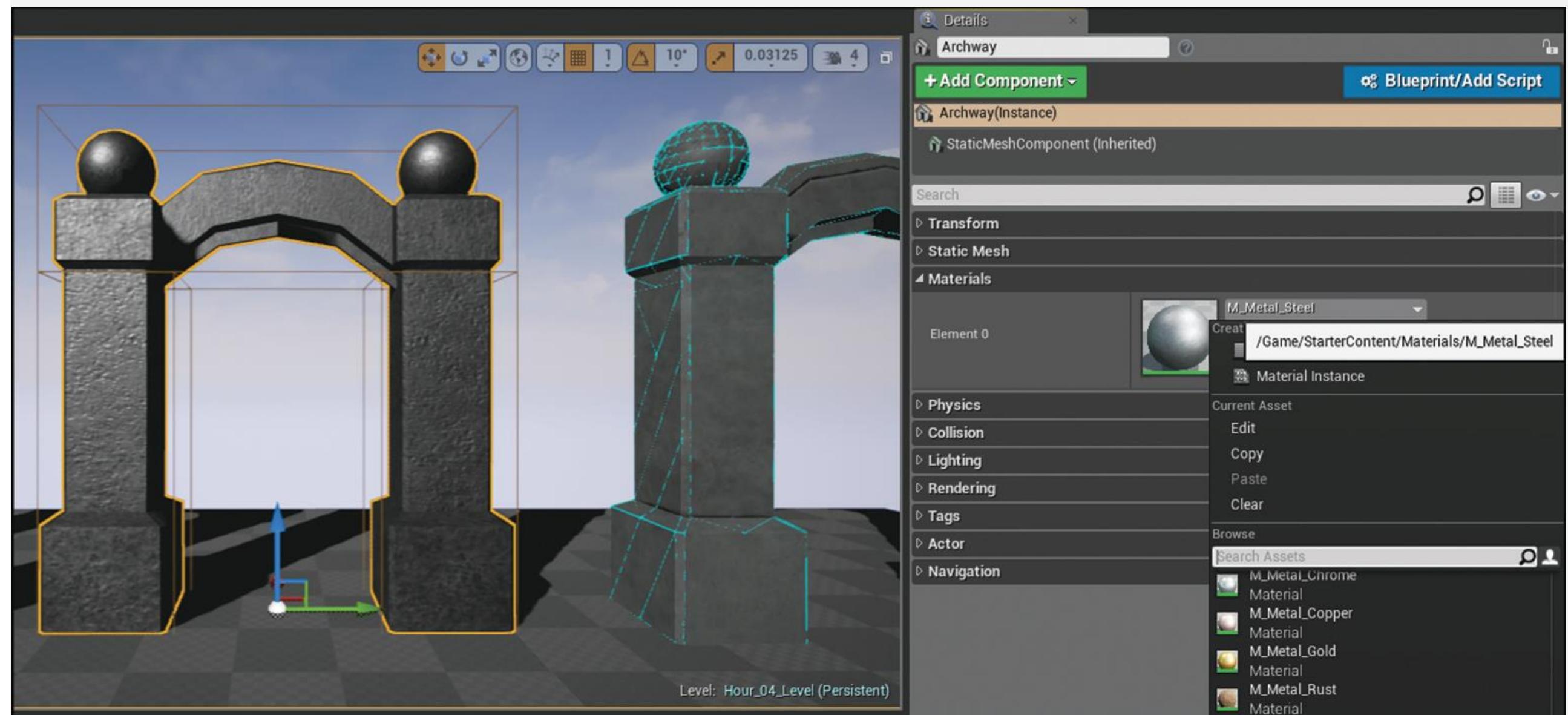


# CHANGING THE MATERIAL ASSIGNMENT ON A STATIC MESH ACTOR

A Static Mesh Actor also has a Material reference that is initially assigned based on the original Material assigned to the mesh asset in the Static Mesh Editor.

You can modify the Material for each Actor in a few ways:

- Drag a new Material from the Content Browser to the thumbnail image of the current Material in the Details panel.
- Click on the drop-down arrow next to the currently assigned Material and select from the list.
- Click and drag the new Material from the Content Browser to any of the Static Mesh Actors in the Level.





# EDITING COLLISION RESPONSES ON A STATIC MESH ACTOR

With a Static Mesh Actor selected in a Level, you can find the collision settings for the Actor in the Level Editor Details panel.

To view Actor collision hulls in the Level Editor Viewport, press Alt+C to toggle collision hull visibility.

The screenshot shows the Unreal Engine Level Editor's Details panel for an 'Archway' actor. The panel is divided into sections: Transform, Static Mesh, Materials, Physics, Collision, Lighting, Rendering, Tags, Actor, and Navigation. The Collision section is expanded, showing various collision-related properties:

- Simulation Generates Hit Events: A checkbox that is unchecked.
- Phys Material Override: A dropdown menu set to "None".
- Generate Overlap Events: A checkbox that is unchecked.
- Collision Presets: A dropdown menu set to "BlockAll".
  - Collision Enabled: A dropdown menu set to "Collision Enabled".
  - Object Type: A dropdown menu set to "WorldStatic".
  - Collision Responses: A table showing responses for different object types.

	Ignore	Overlap	Block
Trace Responses	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Camera	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
  - Object Responses: A table showing responses for specific object types.

	WorldStatic	WorldDynamic	Pawn	PhysicsBody	Vehicle	Destructible	Projectile
WorldStatic	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
WorldDynamic	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
Pawn	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
PhysicsBody	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
Vehicle	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
Destructible	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
Projectile	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
- Lighting
- Rendering
- Tags
- Actor
- Navigation



# EDITING COLLISION RESPONSES ON A STATIC MESH ACTOR

Clicking the triangle to the left of Collision Presets in the main Editor Details panel, you can expand the window to show more options.

With a preset already assigned, you see that the collision response options are grayed out and can't be modified.

The presets define common settings for collision responses for Actors with different object types.

To unlock the options, choose Custom Preset.

The screenshot shows the Unreal Engine's Details panel for an object named "Archway". The panel is organized into sections with expandable headers:

- Archway(Instance)**: A header section containing a "Blueprint/Add Script" button.
- StaticMeshComponent (Inherited)**: A header section.
- Search**: A search bar.
- Transform**: A section with a dropdown menu.
- Static Mesh**: A section with a dropdown menu.
- Materials**: A section with a dropdown menu.
- Physics**: A section with a dropdown menu.
- Collision**: An expanded section:
  - Simulation Generates Hit Events**: A checkbox.
  - Phys Material Override**: A dropdown menu set to "None".
  - Generate Overlap Events**: A checkbox.
  - Collision Presets**: An expanded section:
    - Collision Enabled**: A dropdown menu set to "Collision Enabled".
    - Object Type**: A dropdown menu set to "WorldStatic".
      - Ignore**: An unchecked checkbox.
      - Overlap**: An unchecked checkbox.
      - Block**: A checked checkbox.
  - Collision Responses**: An expanded section:

	Ignore	Overlap	Block
<b>Trace Responses</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Camera	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
  - Object Responses**: An expanded section:

	Ignore	Overlap	Block
WorldStatic	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
WorldDynamic	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pawn	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PhysicsBody	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vehicle	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Destructible	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Projectile	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- Lighting**: A section with a dropdown menu.
- Rendering**: A section with a dropdown menu.
- Tags**: A section with a dropdown menu.
- Actor**: A section with a dropdown menu.
- Navigation**: A section with a dropdown menu.



## COLLISION ENABLED

The Collision Enabled property on the Details panel lets you turn collisions on and off for the selected Actor.

When this is selected, even if the referenced Static Mesh asset for the Actor has a collision hull, the Actor will not process collision interactions and events.

The screenshot shows the Unreal Engine Details panel for an 'Archway' instance. The panel is organized into sections: Transform, Static Mesh, Materials, Physics, Collision, Lighting, Rendering, Tags, Actor, and Navigation. The Collision section is expanded, showing settings like 'Simulation Generates Hit Events' (unchecked), 'Phys Material Override' (set to 'None'), 'Generate Overlap Events' (unchecked), and 'Collision Presets' (set to 'BlockAll'). The 'Collision Enabled' dropdown is highlighted with a blue border. Below it, the 'Object Type' dropdown is set to 'WorldStatic'. The 'Collision Responses' table shows checkboxes for Trace Responses, Visibility, Camera, and various Object Responses (WorldStatic, WorldDynamic, Pawn, PhysicsBody, Vehicle, Destructible, Projectile) all of which are checked. The 'Lighting', 'Rendering', 'Tags', 'Actor', and 'Navigation' sections are also visible at the bottom.



# OBJECT TYPE

The Object Type property on the Details panel allows you to set what kind of object type this Actor is, so when other Actors collide with it, they will know how to respond.

For example, if a Static Mesh Actor is set to Static under Transform, then its object type should be set to WorldStatic, but if it is set to Movable under Transform, the object type should be set to WorldDynamic.

The screenshot shows the Unreal Engine Details panel for an 'Archway' actor. The 'Object Type' dropdown in the Collision section is highlighted with a blue border and contains the value 'WorldStatic'. Other options in the dropdown include 'WorldDynamic', 'Pawn', 'PhysicsBody', 'Vehicle', 'Destructible', and 'Projectile'. The Collision section also includes settings for Simulation Generates Hit Events, Phys Material Override (set to 'None'), and Generate Overlap Events. Below the Collision section, there are sections for Collision Responses, Trace Responses, Visibility, Camera, and Object Responses, which lists various actor types like WorldStatic, WorldDynamic, Pawn, PhysicsBody, Vehicle, Destructible, and Projectile, each with checkboxes for Ignore, Overlap, and Block.



# OBJECT TYPE

Every Actor that can collide has an assigned object type.

There are seven object types:

- WorldStatic
- WorldDynamic
- Pawn
- PhysicsBody
- Vehicle
- Destructible
- Projectile

The screenshot shows the Unreal Engine's Details panel for an actor named "Archway". The "Collision" section is expanded, showing settings for collision generation, material override, and collision responses. The "Object Type" dropdown is set to "WorldStatic", which is highlighted with a blue border. The "Collision Responses" table shows that "WorldStatic" objects respond to other "WorldStatic", "WorldDynamic", "Pawn", "PhysicsBody", "Vehicle", "Destructible", and "Projectile" objects by blocking them. Other rows in the table represent "WorldDynamic", "Pawn", "PhysicsBody", "Vehicle", "Destructible", and "Projectile" objects, each with different response settings.

Object Type	WorldStatic	WorldDynamic	Pawn	PhysicsBody	Vehicle	Destructible	Projectile
WorldStatic	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WorldDynamic	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pawn	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PhysicsBody	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Destructible	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
Projectile	<input type="checkbox"/>	<input checked="" type="checkbox"/>					



# COLLISION RESPONSES

The Collision Responses section of the Details panel allows you to set how the selected Static Mesh Actor will respond to other Actors with defined object types.

There are three interaction states for collision interactions:

- **Ignore**: Ignore any collision responses of these object types.
- **Overlap**: Check to see if the mesh's collision hull is intersecting with another Actor.
- **Block**: Stop another Actor from passing through the mesh's collision hull.

The screenshot shows the Unreal Engine Details panel for an 'Archway' actor. The 'Collision' section is expanded, displaying settings for collision generation, material override, overlap events, and collision presets. A blue box highlights the 'Collision Responses' table, which lists various object types and their interaction states (Ignore, Overlap, Block). The table shows that the actor responds to Trace Responses, Visibility, Camera, and Object Responses by blocking them. It also blocks WorldStatic, WorldDynamic, Pawn, PhysicsBody, Vehicle, Destructible, and Projectile objects, while ignoring them. Other sections like Lighting, Rendering, Tags, Actor, and Navigation are visible at the bottom.

	Ignore	Overlap	Block
Collision Responses	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Trace Responses	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Visibility	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Camera	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Object Responses	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
WorldStatic	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
WorldDynamic	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pawn	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PhysicsBody	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vehicle	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Destructible	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Projectile	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

# CUSTOM COLLISION PRESETS

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You can create your own collision presets for a project by selecting Edit > Project Settings > Collision in the Level Editor main menu.

When you're first starting out, however, it is easiest to just choose the custom preset and modify the collision response for each Actor directly on the selected Static Mesh Actor.

