Analysis and Geoprocessing
3D Analyst: Feature and Volumetric Analysis
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Workshop Outline

• Introduction
• Demonstrations
  - Sub-surface Analysis
  - Volumetric Analysis
  - Line-of-sight Analysis
  - Shadow Analysis
• Conclusion
• Questions & Answers
3D Analyst Components

- **3D Visualization App Programs**
  - ArcScene
  - ArcGlobe
- **3D Analysis - GeoProcessing:**
  - Surface Analysis
  - Conversions
  - Feature-oriented Analysis (new at 10)
Why 3D GeoProcessing?

- Prepare data for visualization/analysis
- Performing surface/feature 3D analysis
- Batch/non-interactive data processing
Different Ways to Run GP Tools

1. Graphical Tool Dialog
   - New additions at 10
2. In-App Python Window
   - Replacing command line
3. Model Builder
4. Scripting

Python 2.6.5 with arcpy module:

```python
>>> import arcpy
>>> arcpy.CheckOutExtension('3D')
>>> arcpy.env.workspace = 'C:/UC10'
>>> arcpy.CreateTin_3d('MyTin4')
```
What’s New at 10?

- 27 new tools added
- 9 old tools deprecated
- 91 tools total
- New toolset: 3D Features
  - True 3D analysis
  - Skyline suite of tools
3D Features Toolset

- **True 3D Analysis Tools**
  - Difference 3D
  - Inside 3D
  - Intersect 3D
  - Intersect 3D Line with Multipatch
  - Is Closed 3D
  - Near 3D
  - Union 3D

- **Skyline Analysis Tools**
  - Skyline
  - Skyline Barrier
  - Skyline Graph

- **Others**
  - Add Z Information
  - Construct Sight Lines
  - Feature to 3D by Attribute
Demo 1: Sub-surface Analysis

Extrude Between
Intersect 3D
Demo 2: Volumetric Analysis

Skyline
Skyline Barrier
Intersect 3D Line
Demo 3: Line-of-sight Analysis

Construct Sight Line
Line of Sight
Add Z Information
Two Modes of the Line of Sight Tool

- If no multipatch in the input
  - The output line is draped on the surface
- Otherwise
  - The output line is NOT draped on the surface
- In either case, the optional obstruction point would be where the LOS hits something (surface or multipatch feature)
Demo 4: Shadow Analysis

Skyline
Intersect 3D
Inside 3D
### 3D Data Types

<table>
<thead>
<tr>
<th></th>
<th>Vector</th>
<th>Raster</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surface</strong></td>
<td>TIN/Terrain</td>
<td>Grid/DEM</td>
</tr>
<tr>
<td><strong>Feature</strong></td>
<td>Point/Line/Polygon</td>
<td>Multipatch</td>
</tr>
</tbody>
</table>

### Questions:

1. What’s special about multipatch?
2. Which data type is true 3D or close to it?
Summary New 3D GeoProcessing Tools

• True 3D analysis capability
• Sophisticated virtual city analysis & visualization tool
• Flexible and versatile use scenarios
• Examples showed:
  - Sub-surface analysis
  - Volume analysis
  - Line of sight analysis
  - Shadow analysis
Questions & Answers

3D GIS Resource Center:
http://resources.arcgis.com/content/3dgis/10.0/about