Lab 9: CREATING TIN AND 3D SCENES (ArcScene)

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NOTE:
The following mappings were performed in ArcScene. All layer projections & datums are defined to Lambert_Conformal_Conic & NAD_1983_StatePlane_California_III_FIPS_0403_Feet.

QUESTION 1

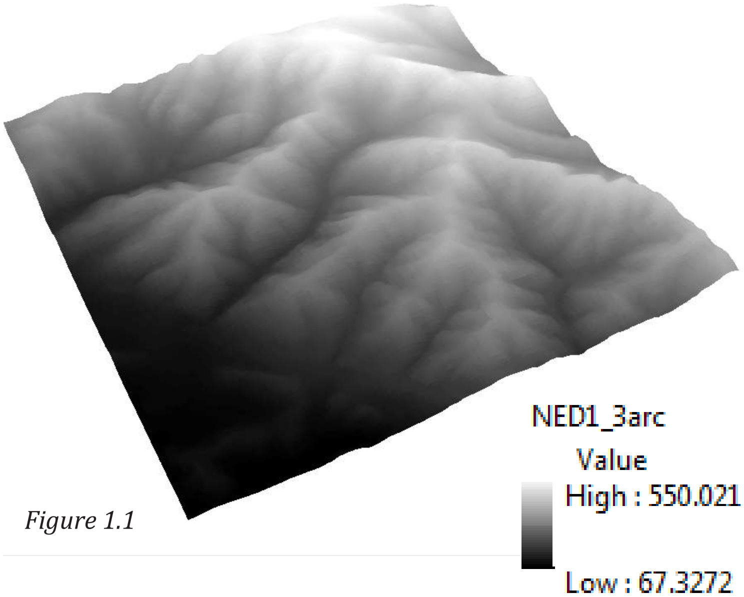


Figure 1.1

NED Display *(Figure 1.1)*
I chose the NED 1/3 Arc Second data for this lab. I altered the layer's base height by choosing 'Floating on a custom surface' to match the data 'NED 1_3arc' and converted the layer elevation from meters to feet.

Contour Display *(Figures 1.2 & 1.3)*
In order to create the 10 and 20 meter contours from the NED data, I choose "Contour' from ArcToolbox (Spatial Analyst Tools —> Surface —> Contour). For both the 10 and 20 meters my 'Input raster' = NED1_3arc and the 'Output polyline features' = cont_10m (contour interval = 10) // cont_20m (contour interval = 20).

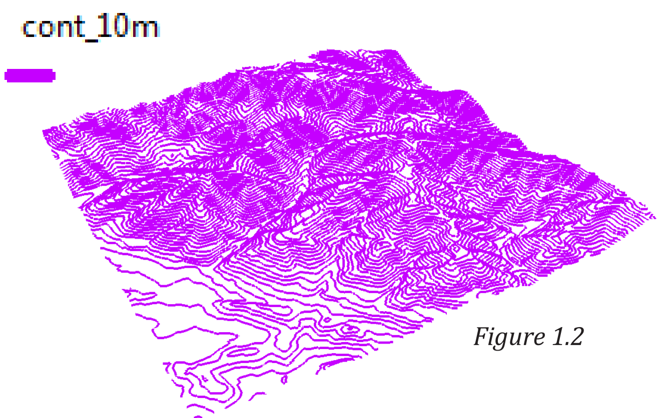


Figure 1.2

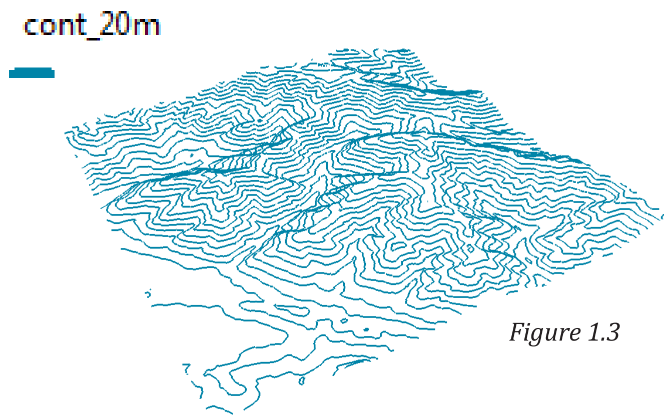


Figure 1.3

QUESTION 2

TIN Display *(Figures 2.2 & 2.3)*
To create TINs from contours, I first add a new field to each of the contours' attributes table and label it as 'Spot_ft.' I use Field Calculator to calculate the 'Spot_ft' to equal "Contours * 3.281). Once the new field is prepared, I then go the contours' base heights and select 'Use a constant value or expression.' I click on the calculator symbol next to the blank box and choose the newly calculated 'Spot_ft' from the list of Fields. This allows the contours to have the correct Z-values.

Afterwards I select 'Create TIN' from the ArcToolbox (3D Analyst Tools —> Data Management —> TIN —> Create TIN). I create a TIN for each of the contours separately, but for this explanation I will use the 20 meter contours as my example. I select 'cont_20m' for my input features, change the height field to Spot_ft, and change the SF type to softline. The output TIN will be 'tin_20m.'

[QUESTION 2 CONTINUED . . .]

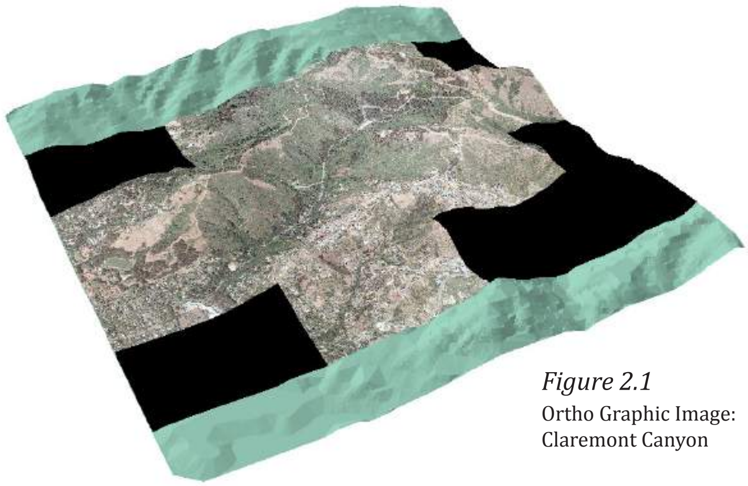


Figure 2.1
Ortho Graphic Image: Claremont Canyon

In order to make the TIN a single color, I refer to the Symbology tab in the 'tin_20m' layer's properties. I add a new elevation (contour with the same symbol) and deselect 'Edge types' and 'contours' from being seen. I leave the classification to be Equal Interval but I change the number of classes to equal 1. Then I choose what color I would like the TIN to be.

Image Drapping *(Figure 2.1)*
The draped image is an ortho image of the Claremont Canyon. I need to create pyramids when I first add the data into ArcScene. To assign the correct Z-values for the ortho image, I change the image's base height to 'Floating on a custom surface" and select 'tin_20m' as the custom surface.

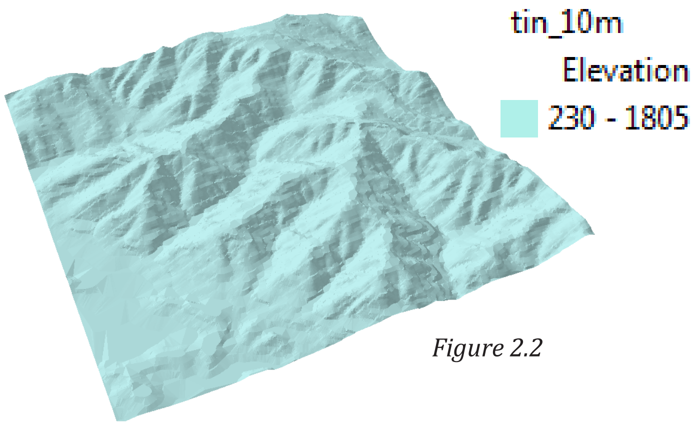


Figure 2.2

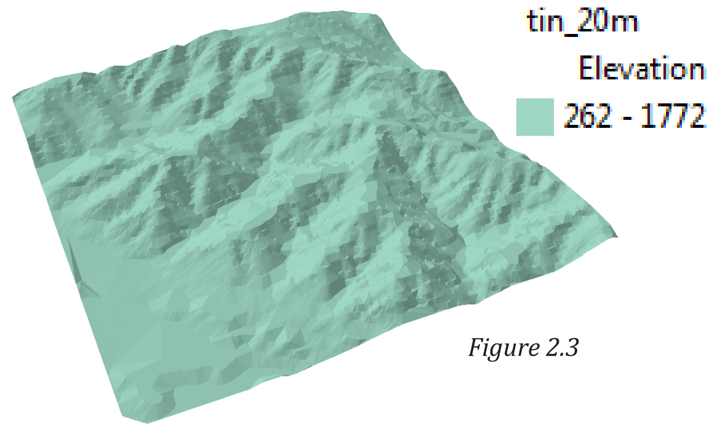


Figure 2.3

QUESTION 3

1 Line, Polygon, and Extruded Layer

(cc_veg_02, cc_veg_95, and cc_houses, respectively)
(Figures 3.1, 3.2, & 3.3)
Each layer's base height was changed to 'Floating on a custom surface' with 'tin_20m' as the custom surface. The extrusion of 60 feet is applied by adding it to each feature's minimum height. Since the majority of houses are sloping, the extrusion means that the 60 foot addition will be calculated from the lowest elevation of the layer as opposed to adding it from the highest elevation point or adding the height from both high and low elevation points. As a result, the houses all have flat roofs (no sloping).

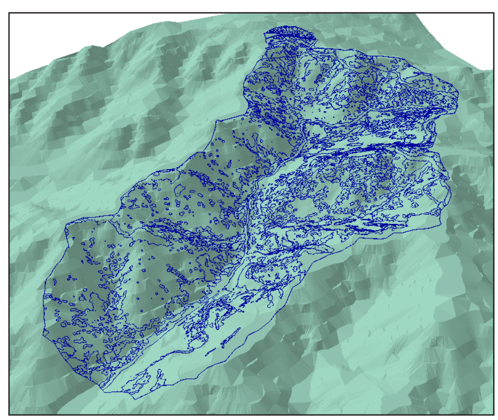


Figure 3.1
Line Layer

cc_veg_02

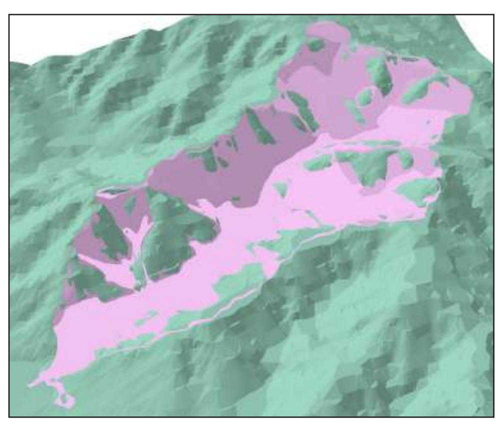


Figure 3.2
Polygon Layer

cc_veg_95

[QUESTION 3 CONTINUED . . .]

[QUESTION 3 CONTINUED . . .]

Problems & Limitations

The most prominent problem with draping these layers was that they did not drape clearly over the TIN surface. To make the layers fully show up on the TIN, I changed the 'Factor to covert layer elevation values to scene units' from a custom value of 1.0000 to 1.0100—the layers are floating an extra 1% (0.01) above the TIN surface. This allows for the majority of the layer to show up clearly. Despite this alteration, parts of the polygon layer (cc_veg_95) were still hidden beneath the TIN surface.

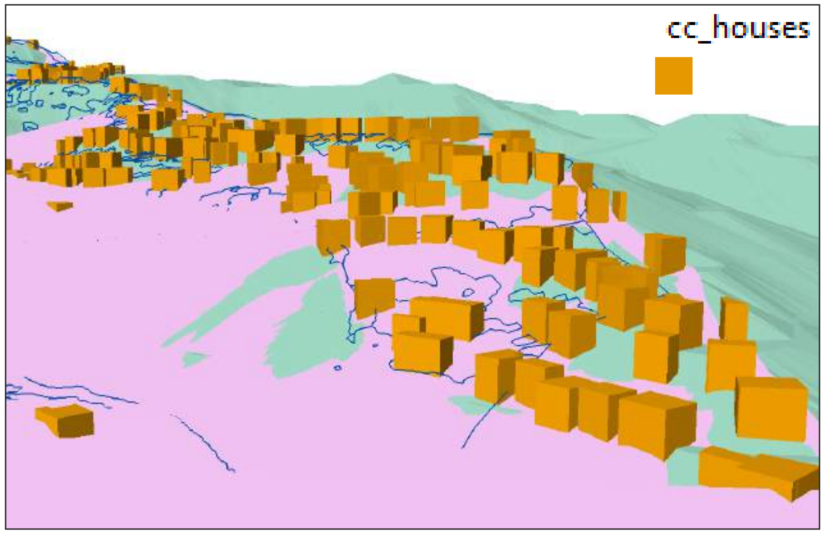


Figure 3.3
Extruded Layer

QUESTION 4

Aspect *(Figure 4.1)*

To create aspect, I used Surface Aspect from ArcToolbox (3D Analyst —> Triangulated Surface —> Surface Aspect). My input surface was 'tin_20m' and I labeled it as 'aspect_20m.' To classify it I utilized 'Unique Values' under categoriesandchoseallvaluesbutexcludethevalueof'Flat.'

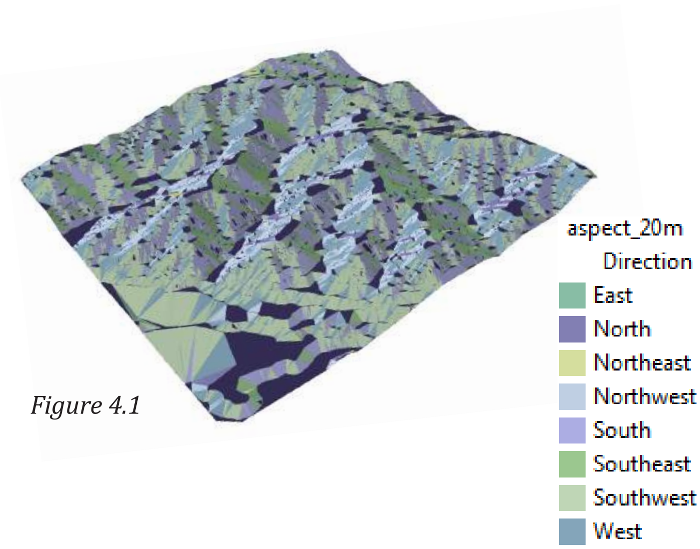
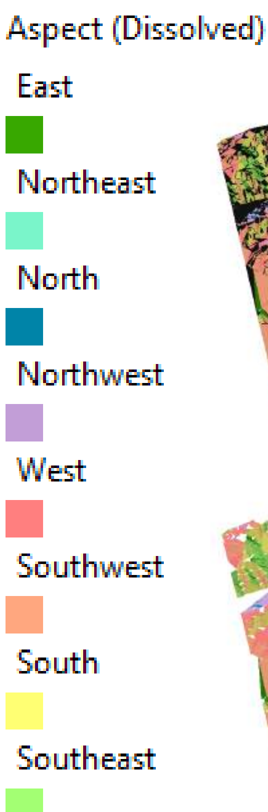


Figure 4.1

Dissolve *(Figures 4.2, 4.3, 4.4, & 4.5)*

Dissolving the attribute polygons proved to be quite complicated. I tried a few different commands but to avail.Finally, I figured out to individually select each attribute (i.e. East, West, etc.) from 'aspect_20m' and then dissolve it (3D Analyst Tools —> Data Management Tools —> Generalization —> Dissolve). My dissolve field was 'Aspect Code' and, most importantly, I UNCHECKED the 'Create mulipart features' box. By unchecking the box I was able to get distinct polygons rather than a jumble of lines connecting to other lines to form distorted polygons.



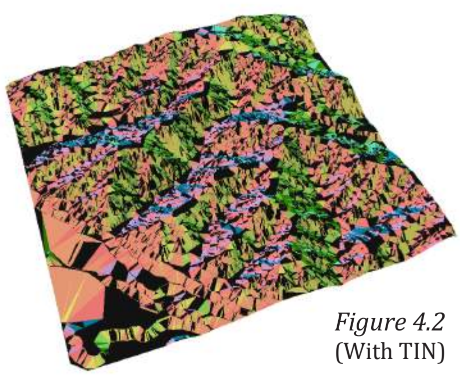


Figure 4.2
(With TIN)

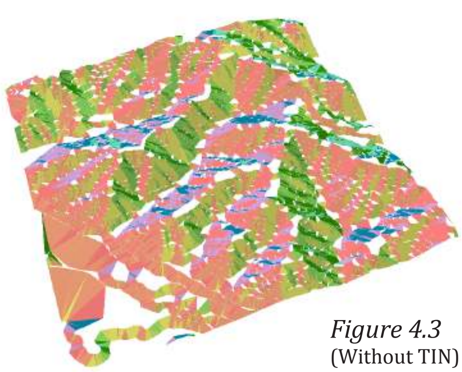
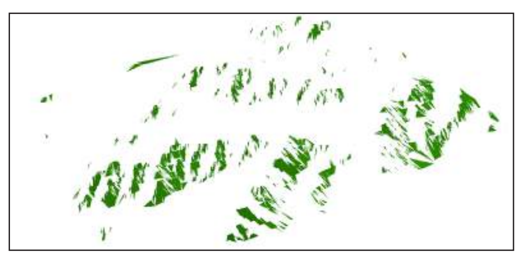


Figure 4.3
(Without TIN)

East Aspect:
Good Dissolve
Figure 4.4



East Aspect:
Bad Dissolve
Figure 4.5