



GIS9312 – Geospatial Visualization

Assignment #1

3D Analysis in ArcGIS 1

Due Date: April 20, 2016, Noon; to be placed in your X drive

Grade Value: 30% of Final Grade

Background:

This assignment serves as an introduction to the creation and analysis of three-dimensional data using **ArcGIS**. More specifically, you will gain a working ability for the applications of surface data queries, TIN slope and aspect analysis, hillshade visualization and contour derivation using the **3D Analyst** extension of **ArcGIS**.

You will be analyzing the TIN models that you created within Workshop 1.

Purpose:

- To gain a basic familiarity with the techniques of TIN surface analysis using the **ArcGIS 3D Analyst** extension,
- To query surface data,
- To calculate slope and aspect,
- To visualize terrain using hillshading,
- To create contours from a TIN.

Deliverables:

Within your folder, you will provide the following:

1. A formal letter, transmitting a formal word document that contains the answers to the following questions (Please use screen captures, where appropriate, to support your answers):

Q1: What is the slope (in degrees) and the aspect (also in degrees) of the east facing slope at the Glendale Avenue interchange of the QEW. Figure 1, below details the location of this slope:

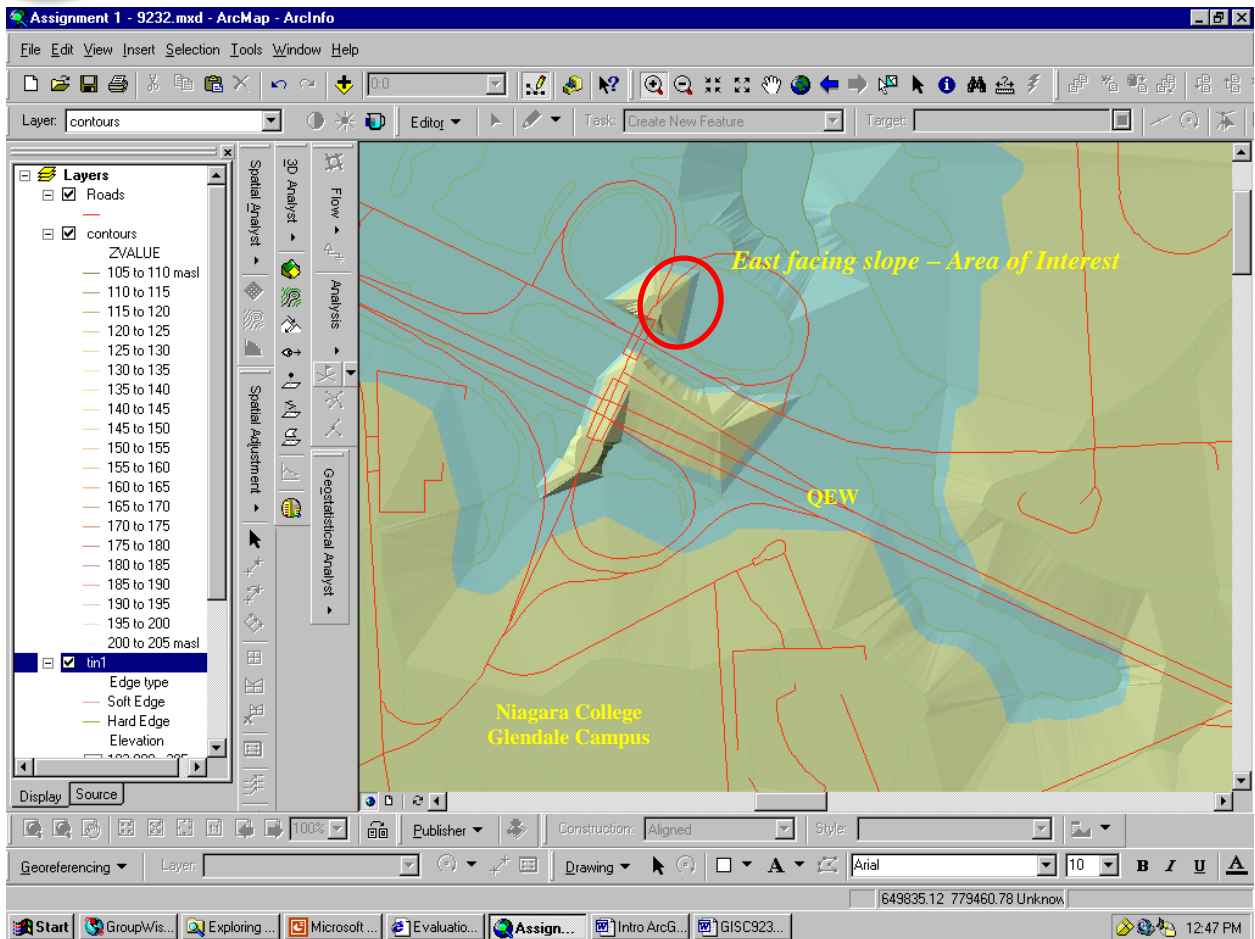


Figure 1 – QEW/Glendale Avenue Interchange Structure – Area of Interest.

Q2: What does aspect mean? What is an aspect of zero degrees?

Q3: What range of slopes is found on the Niagara Escarpment that faces the Glendale Campus, immediately south of the campus (in percent – include a graphic)?

Q4: Woodend Conservation area contains a large 'bluff' that overlooks the Niagara College Glendale Campus – actually a part of the Niagara Escarpment. From a point atop the bluff as indicated in Figure 2 below, create a line of sight that proceeds (approximately) through the Glendale Campus. Why can the areas that are indicated as not in the line of sight not be seen? Provide a graphic to support your answer.

Question 5 gives you an option to undertake either 5a or 5b as follows (Please only do one of the two options):

Q5a: Again, from the vantage point given in Figure 2, create a viewshed of the area of the college campus. Assume the person viewing is 1.7 metres tall. How does this analysis differ from the Line of Sight analysis? How is it similar? Again, support your answer with a graphic.

Q5b: Figure 2, above displays a second vantage point. Create a line of sight that proceeds through the QEW/Glendale Highway interchange berm. Why can the areas that are indicated as not in the



line of sight not be seen? Provide a graphic to support your answer. Contrast this answer with Question 4.

Q6: Create a hillshade analysis for the two OBM tiles you have been working with. The sun specs should be estimated given the following:

- March 21st, noon (eastern standard time).

Determine only those areas that experience full shade at this date/time. Provide a graphic that shows these areas. Finally, using the ArcScene JPG export utility of ArcGIS' 3D Analyst, create an output (jpeg) not larger than 400 kilobytes that includes, at a minimum, the TIN model (transparent) over the hillshade. It should be prepared as a formal map (layout) and then exported to a jpeg. Do not forget to include the new jpg file in the e-mail for grading!

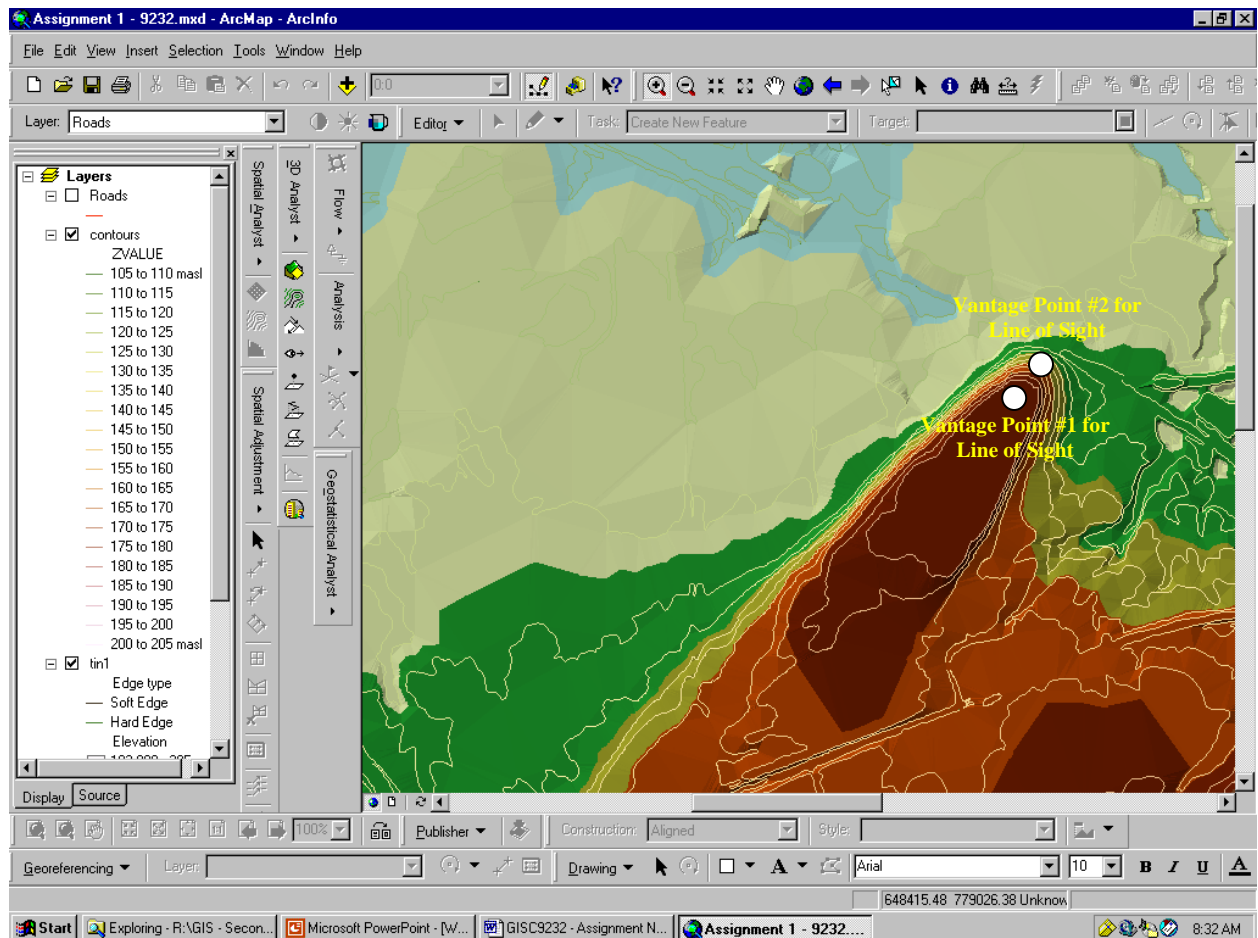


Figure 2 – The 'bluff' at Woodend Conservation Area, south-east of the Glendale Campus.

Procedure:

As you have already seen (from Workshop 1), the OBM data for this exercise are located on the GIS Server under the data share or X: drive. The path to the data is as follows:

Data on 'Gissrv' (X:) \\Municipal Maps and Data\ Ontario Base Mapping Series



Again, we are working with the OBM tiles for the Niagara College Glendale Campus area. The two tiles, coded as **64504775** and **65004775**, will form the basis for our analysis. From the workshop, you will use the TIN that you created using the contour data. Please ensure that you have 'adjusted' the TIN cartographically, so that its appearance conveys the elevation data appropriately (proper colour ramp, legend, etc.). You will also have to include the 2D roads on the TIN surface to locate areas of interest in this assignment.

For slope and aspect analyses, you will utilize the 3D Analyst Surface Analysis Functions. These functions create new rasters that depict slope and aspect.

For Line-of-sight, Viewshed and Hillshade analyses, you will again utilize the 3D Analyst Surface Analysis Functions. These functions create new rasters that depict viewable areas from a given vantage point and shading given specified sun (light source) parameters.

Grading:

20% for presentation and grammar/spelling,
60% for questions,
20% for jpg.