Landslide Threats in East Portland

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GIS II

Research Question

Problem: in case of a major earthquake -

- What areas are most susceptible to landslides?
- What roads are most susceptible to closures due to landslides?
- What Neighborhoods hold the highest likelihood of having a road closed due to landslides?
- How does this effect transportation for emergency services?

Avalanche Safety

Safety Considerations

Most avalanches start on slopes that are **30 degrees or greater**. If you stay off of 30 degree (and greater) slopes and avoid traveling beneath them, your risk is greatly minimized.

If you remember anything about avalanches remember this: avalanche danger is greatest during and shortly after intensive snow falls. Traveling on or below 30 degree slopes during intensive storms is very dangerous. (Intensive storms are those in which 1" of snow falls per hour)

One extremely dangerous time in the mountains occurs when a period of cold weather is followed by a sudden warming trend or rain falling on the snow pack. Free water in the snow pack lubricates weak layers and often large avalanches result. Like intensive storms, it is a very dangerous time to be traveling in the mountains.

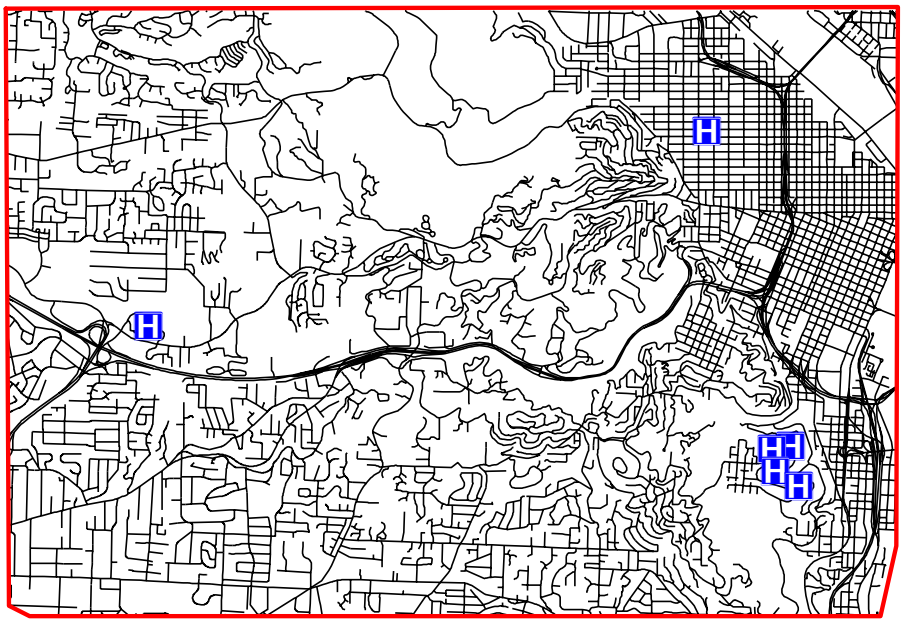
Methods

- Identify areas along roads that are most susceptible to landslide hazards.

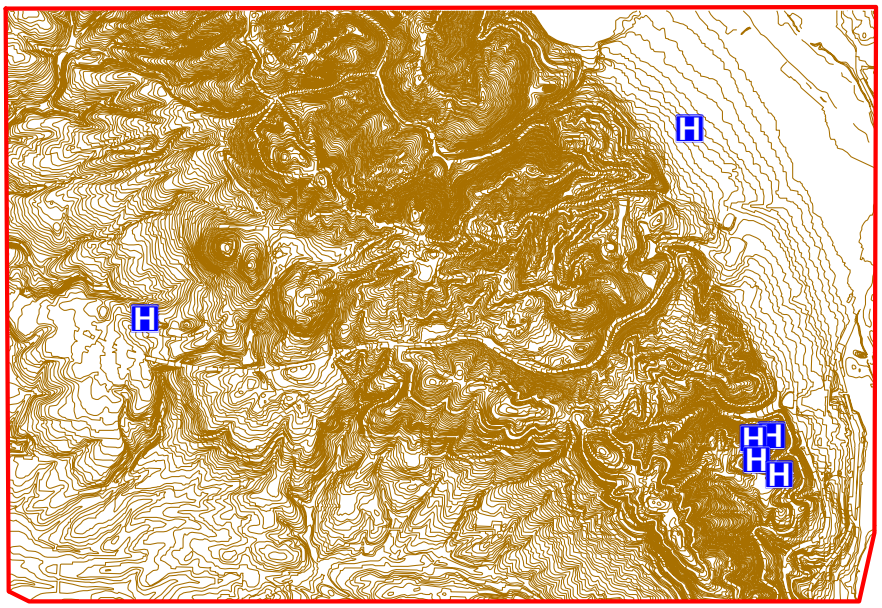
- Identify neighborhoods in which roadside landslides pose the greatest threat.

- Run a network allocation based on the two emergency hospitals.

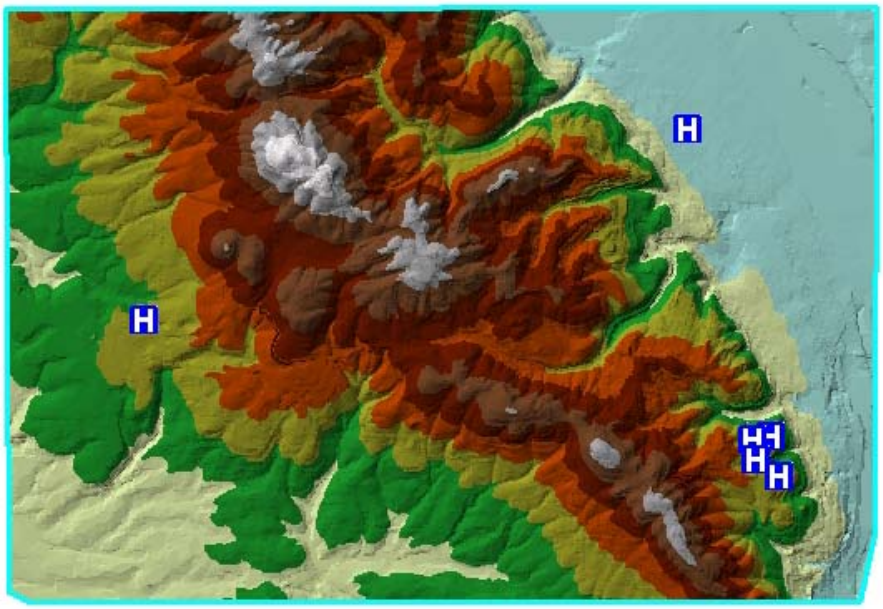
Study Area with Roads



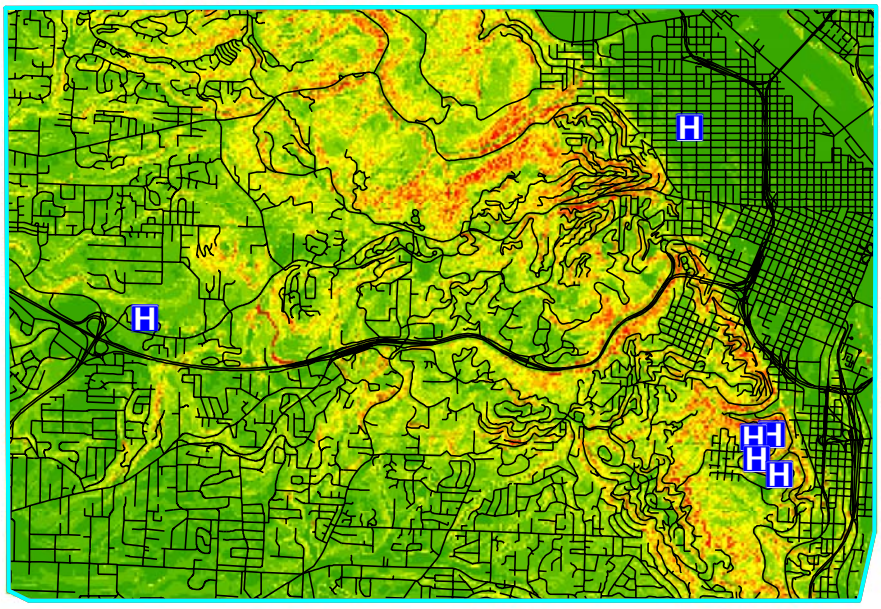
Contour Lines



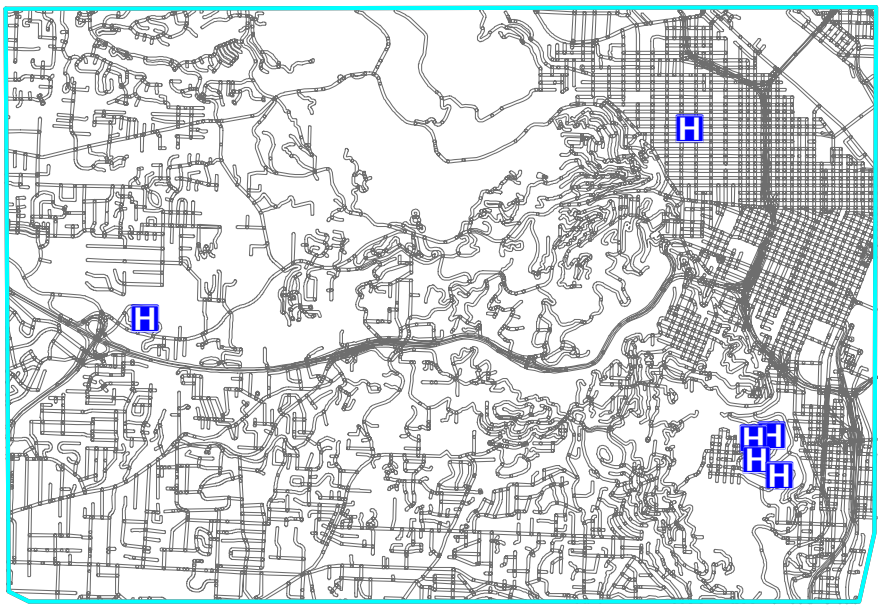
Contours Converted into a TIN

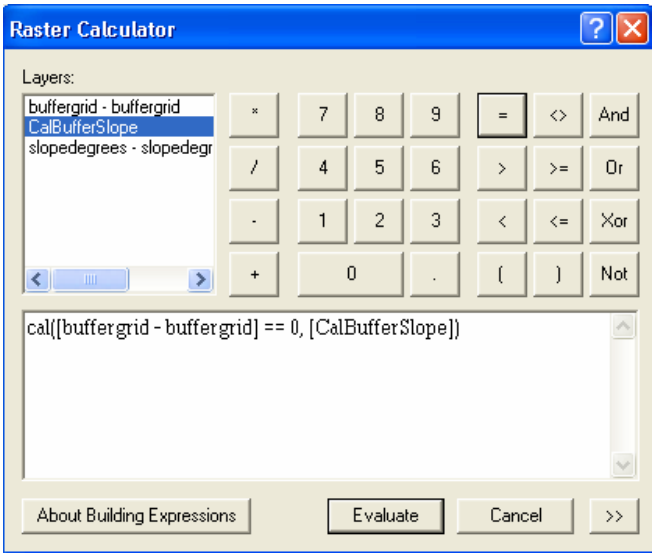


TIN Converted to Slope
Steepest Slopes appear in Red

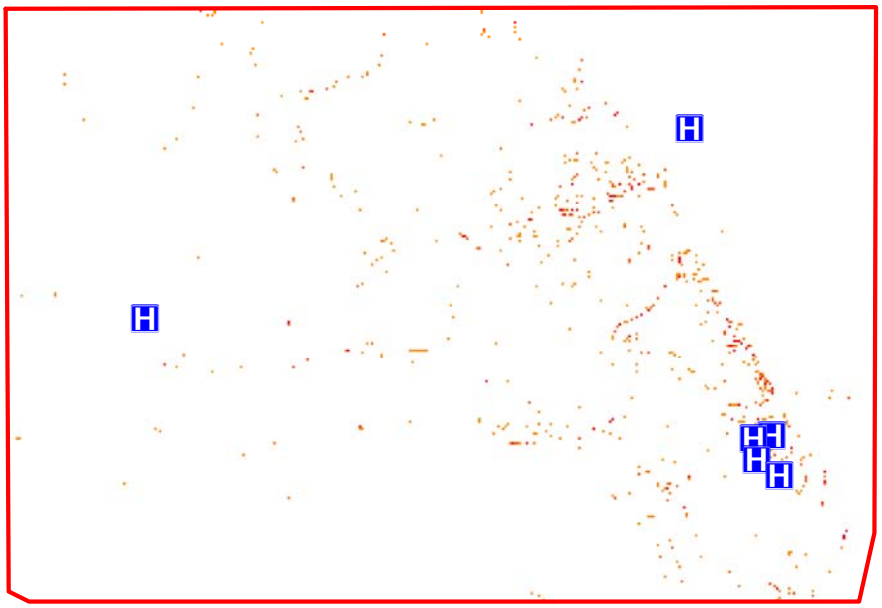


Buffer Created Fifty Feet from Roads
Covert Buffer to Raster

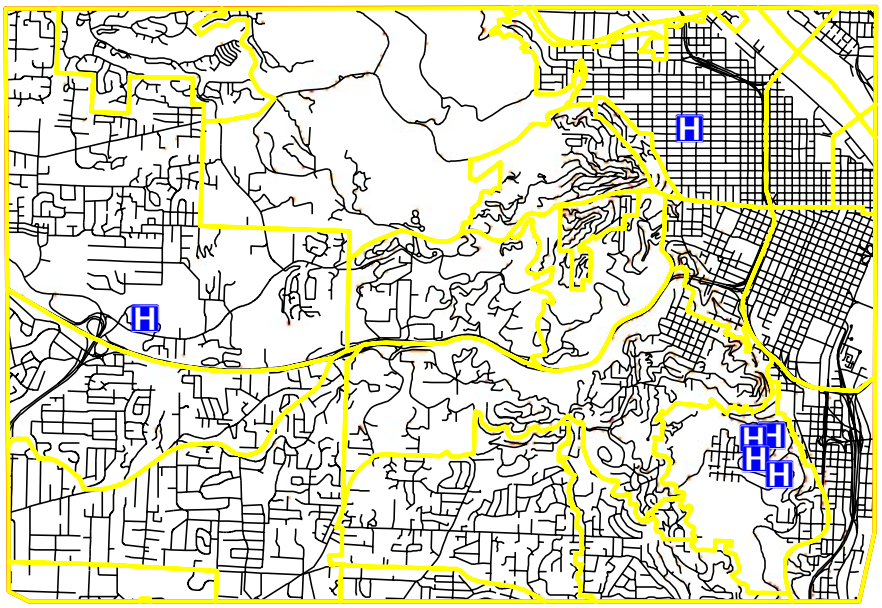




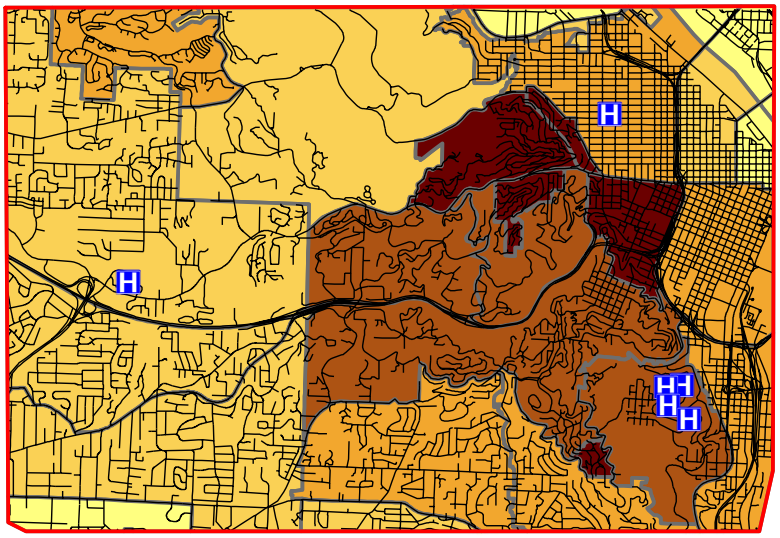
Using Raster Calculator Clipped Slope by Buffer
Slopes shown from 27 – 70 degrees



Neighborhoods added to map

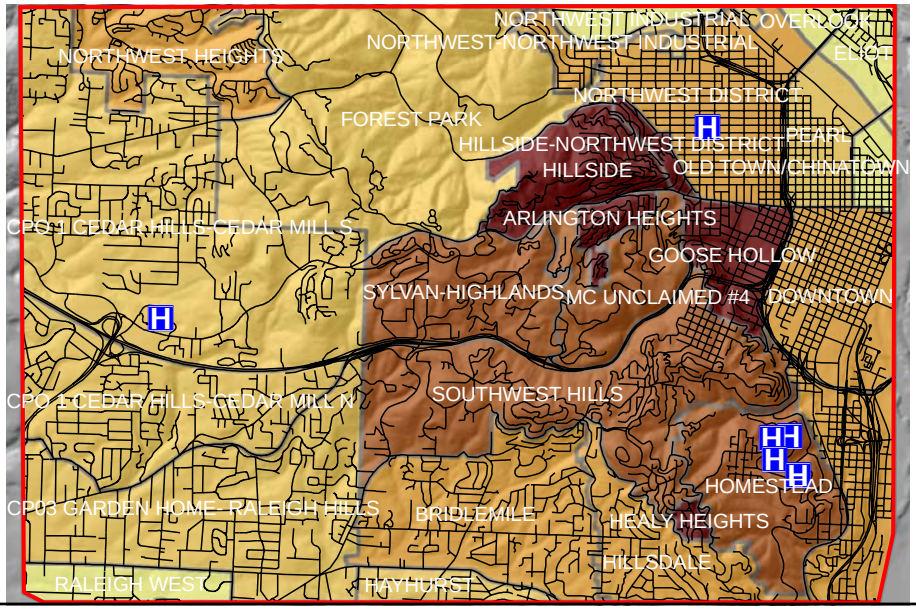


Utilizing Zonal Stats Calculated Total Number of possible slope failures
Classified by Sum normalized by NBHood Area

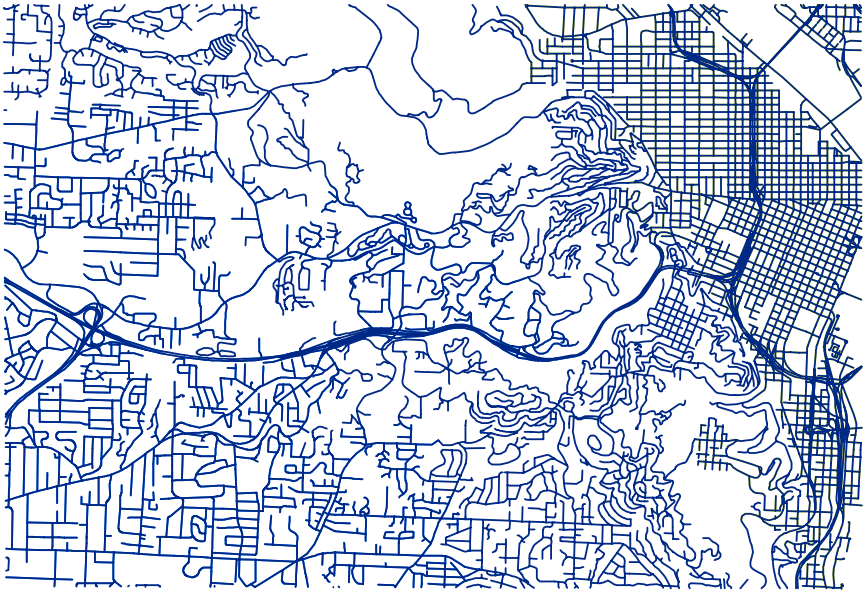


Results of Neighborhood analysis

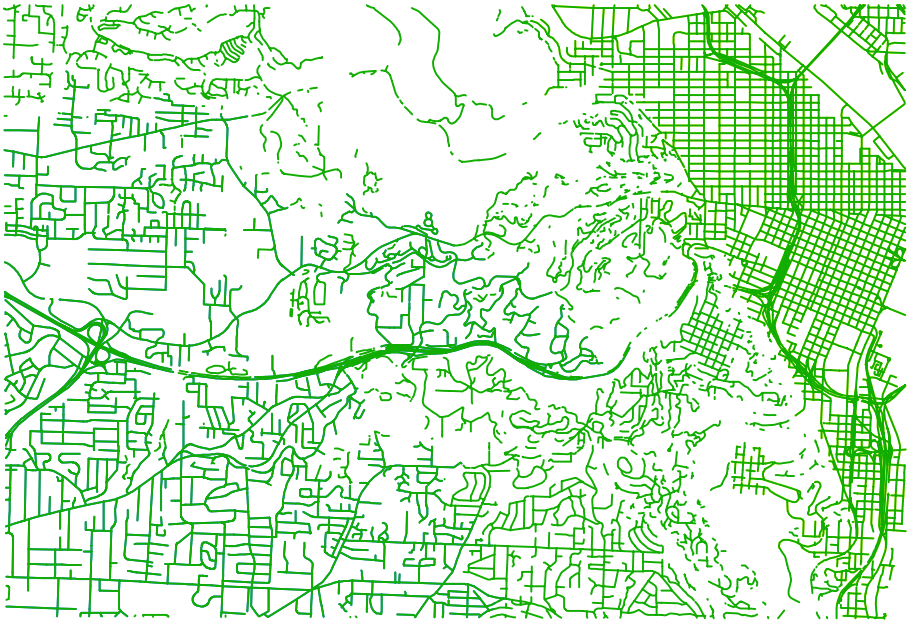
Neighborhoods Showing Greatest Slope Failure Likelihood includes
Hillside, Hillside-Northwest, Arlington Heights, Goose Hollow



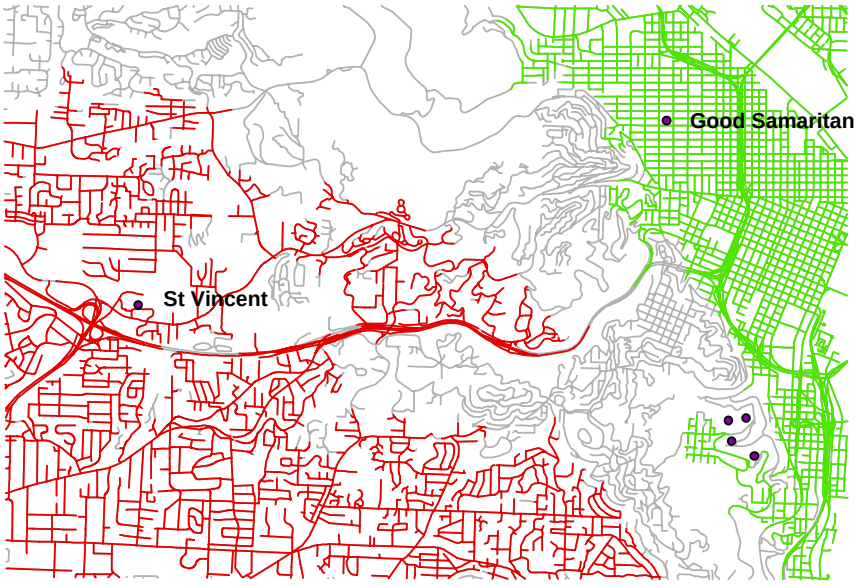
Identifying transportation hazard zones



Roads erased based on slope shapefile

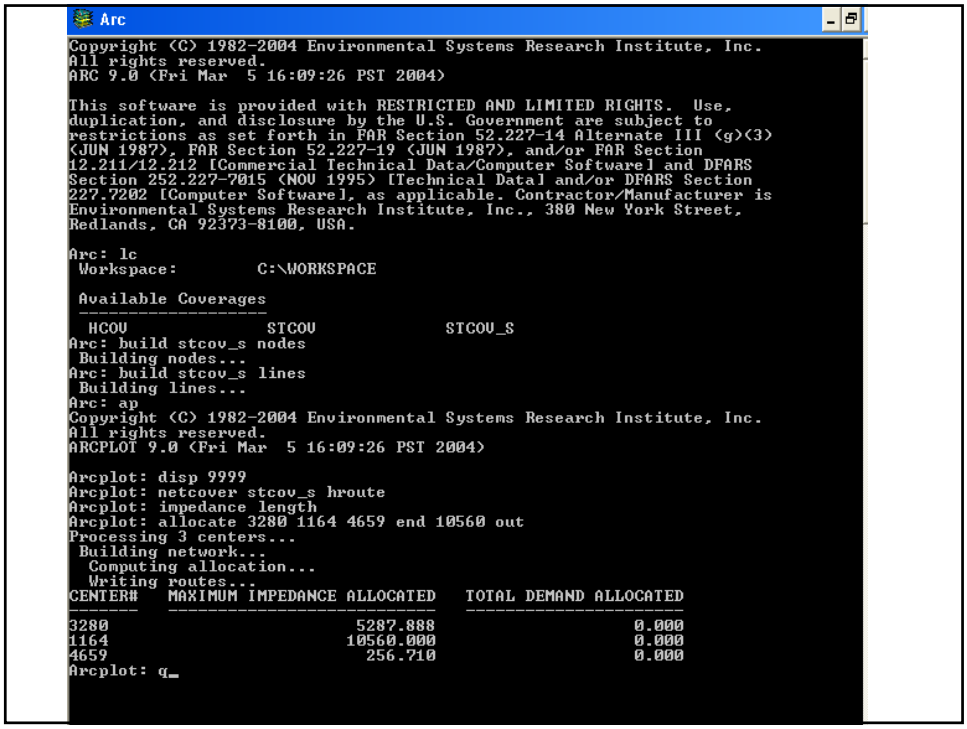


Results of Street Allocation for Good Samaritan and St Vincent Hospitals



Conclusions

- In the event of a major earthquake the neighborhoods of Hillside, Hillside-Northwest, Arlington Heights, and Goose Hollow are likely to experience the greatest roadside damage.
- Routes located between Good Samaritan and St Vincent Hospitals need to be carefully planed in order to avoid hazard zones.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Building lines...
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Arcplot: impedance length
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Writing routes...
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Arcplot: q