

Assignment 07:

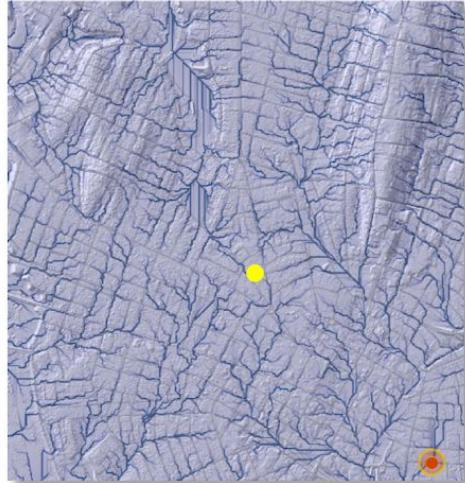
Fluid Dynamics

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Prompt

We know that Pepe's and Sally's in Wooster Square are going to get most of the attention, but surely others should also get a fair chance to show off their talents at the next apizza festival. To help make that happen, we just need to exercise a little travel time and traffic control by reporting a spill at the rear door of the United House of Prayer for All People.

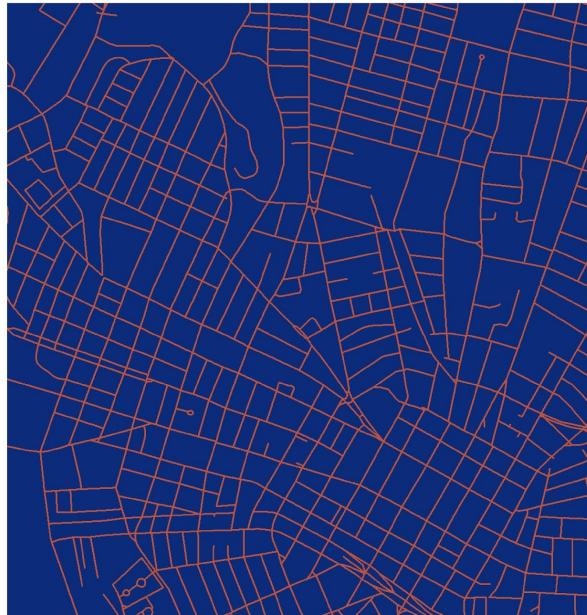
The only real question is whether the spill should be reported as happening 1) just outside that door, 2) a bit closer to the corner, or 3) further around toward the rear of the building.



Assessment Process: Travel Time W/ Street and W/O Spill



Street Map



Reclassified/
Cell Statistics Map

Travel Time W/ Street

Reclassify

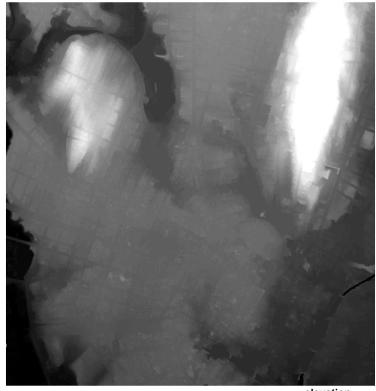
Reclassify streets and areas without streets. Assign travel time cost to streets (1) and areas without streets (20).

Cell Statistics

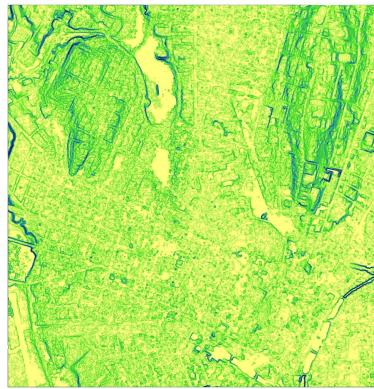
Take the maximum cell statistics of each pixel to generate a new grid of travel time cost with streets.

We use Reclassify and Cell Statistics with the Street Layer to develop a street factor.

Assessment Process: Travel Time W/ Slope and W/O Spill

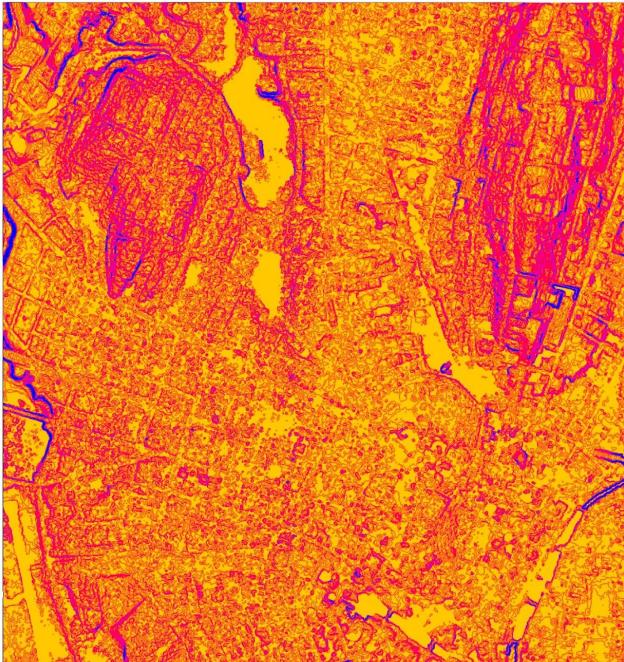


Elevation



Slope Map

Slope
Reclassify



Reclassified Map

Travel Time W/ Slope

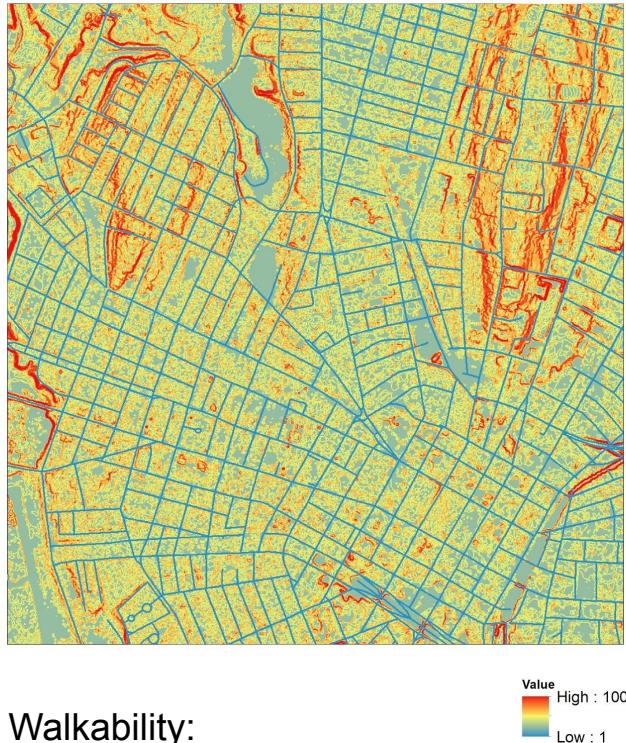
Slope

We use Slope and the elevation layer to identify the slope from each cell.

Reclassify

We then reclassify slopes into five classes. Assign travel time cost to five classes according to slope (1, 2, 3, 4, 5).

Assessment Process: Travel Time W/O Spill



Travel Time W/O Spill

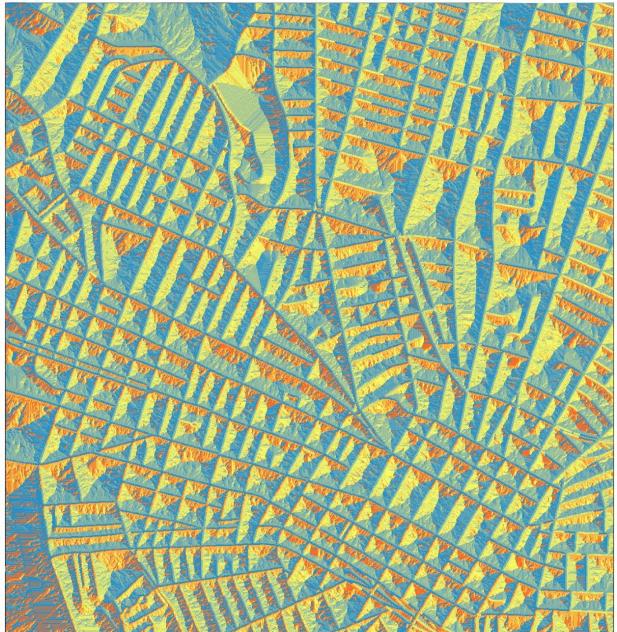
Raster Calculator

We use Raster Calculator to multiply the street factor and the slope factor.

Cost Distance

We then use Cost Distance to measure the cumulative cost (travel time) to Wooster Square from any location in the area, given the grid of costs is calculated using raster calculator.

Assessment Process: Travel Time W/O Spill



Flow Direction



Flow Accumulation

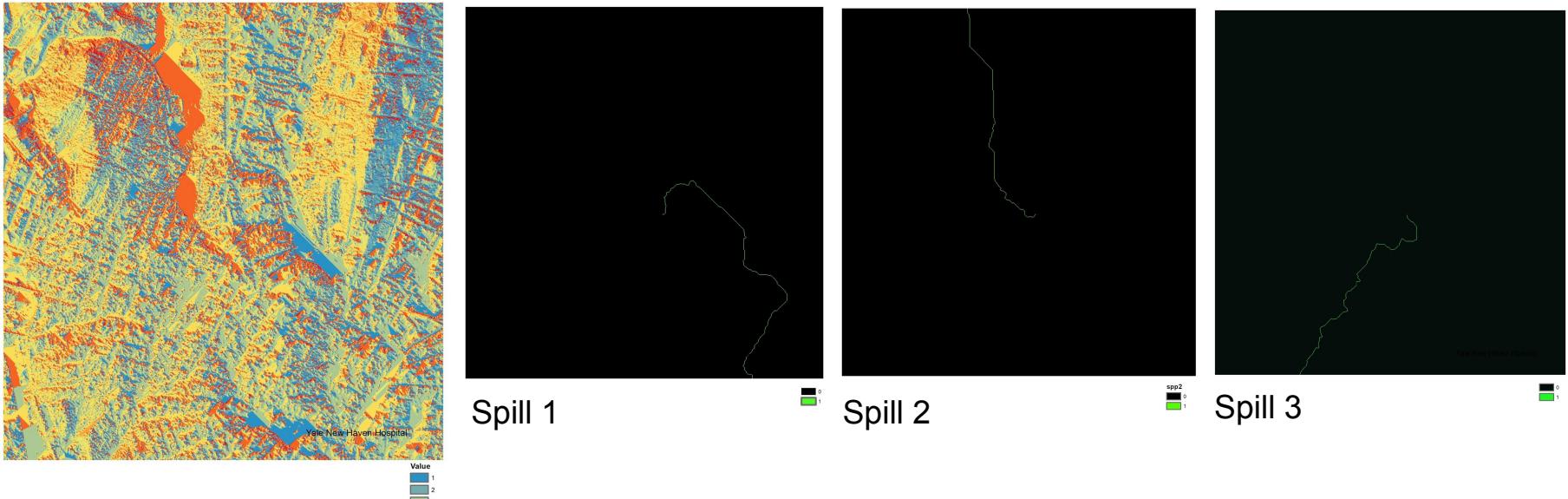
Travel Time W/O Spill

Flow Direction & Flow Accumulation

We first use Flow Direction to create a raster of flow direction from each cell to its downslope neighbor, or neighbors.

Then Flow Accumulation creates a new grid in which each pixel is set to a value indicating a neighborhood sum of values drawn from a specified input grid.

Assessment Process: Travel Time W Spill



Reclassify

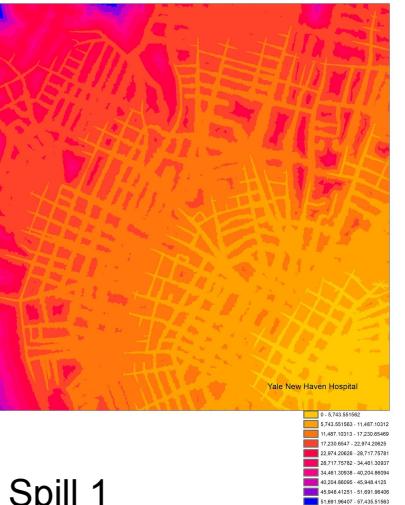
We first reclassify the three spills and create three separate layers.

Flow Direction & Flow Accumulation

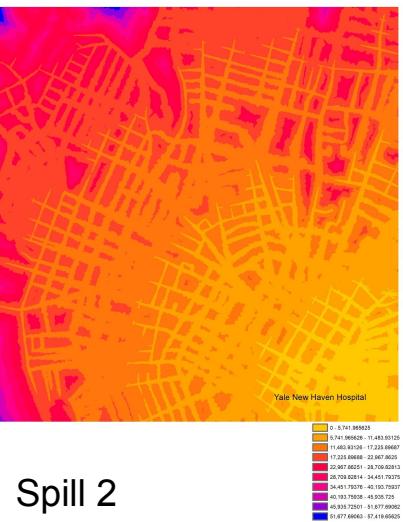
Then we use Flow Direction and Flow Accumulation to generate the flow path from spill 1, spill 2, spill 3.

Raster Calculator
= Flow
Accumulation +
Walkability

Cost Distance



Spill 1



Spill 2



Spill 3

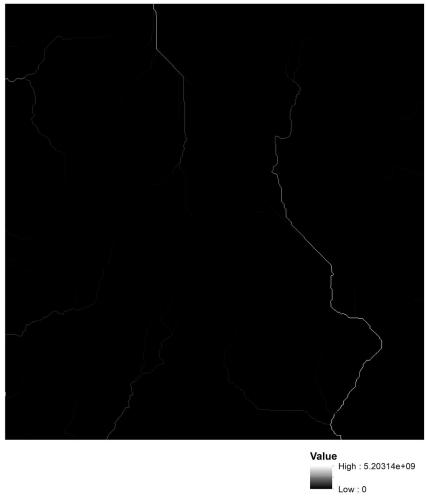
Raster Calculator
= Travel Time W/
Spills - Travel Time
W/O Spills

**Spill 1 has the
most travel time
difference.**



Assessment Process: Travel Time W and W/O Spill

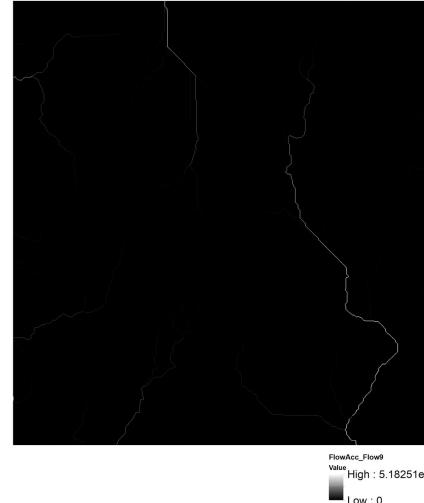
Spill 1



Spill 2



Spill 3



Travel Volume

Flow Accumulation

We use Flow Accumulation to calculate travel volume.

Spill 1 has the most travel volume and spill 2 has the least volume.

Therefore, spill 1 has the most difference in travel time and traffic volume among the three spills.

Recommendations



Spill 1 should be reported as happening.