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Final Project Writup
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I. Title: Fire Station Response Planning and Site Analysis

II. Synopsis:
The time it takes to respond to a fire incident is greatly impacted by proper planning and knowledge of the site. Using geospatial technologies and concepts, situational awareness can be improved upon and potentially provide faster response times. Two main factors in providing a prompt and efficient response are: (1) The shortest route from the fire station to the geocoded address; and (2) the closest fire hydrant to the incident. The python script in this project identifies and outputs both the shortest route and closest hydrant to a html page to help fire fighters better respond to an incident.

III. Abstract:
The City of Charleston GIS department currently creates map books that outline streets and hydrant locations. These books are used in the field to locate an incident and also as a method for determining which hydrant(s) are nearby. There is often little time to plan during time-sensitive emergency responses and the process of finding the incident address and locating a nearby hydrant may be inefficient. Without proper planning, there is a decreased level of situational awareness and a possible loss of time due to routing complications. While in the field, identifying and locating fire hydrants can be difficult and often times time consuming. Ideally, once a dispatch system is notified of an incident, the closest station should be notified and instantly provided with the fastest route and closest hydrant.

This project delivers the information to the fire station and personnel through a web based medium. By using the web as the primary medium, fire stations and personnel can quickly receive routing and hydrant information as well as utilize the service through a wide variety of devices. Equipment carried along with the truck such as computer or mobile devices equipped with GPS can tie into the routing and help firefighters quickly identify the nearest hydrant. The shortest route and nearest route is also stored in a geodatabase that can then be used in static map creation for additional uses.

To identify the nearest route, a travel time surface was first created from the street speed limits. Next, a shortest path analysis is calculated between the provided incident address and fire station input. To add the shortest path as a polyline feature, a raster to polyline process was used and converted to KML for web mapping. The nearest hydrant to the incident was found using a buffer analysis and sort method to find the closest hydrant within the buffer (hose length). Finally, a search cursor was used to identify the name of the image associated with the nearest hydrant. For the final product, python launches the site that outlines the fastest route on a Google map along with the image of the closest hydrant.

IV. Pseudocode:

```
Get fire station ID
Get incident address
Set input geodatabase
Set scratch geodatabase
Set fire hydrants
Set fire stations
Set travel raster
Set fire hose length
Call locate address
Call locate closest hydrant
Call find shortest path
Call convert path to kml
Call parse KML (for client side KML parsing)
Call create html
Call remove tables from geodatabase
```

V. Acknowledgements:

Google Maps JavaScript API V3

VI: KEYWORDS:

fire department, emergency response, shortest path, automated mapping, fire hydrants