



Andrea Nieto, Project Manager/GIS Analyst

Bryan Heisinger, Assistant Manager/GIS Analyst

Matthew Mitchell, GIS Analyst

Nadine Oliver, GIS Analyst

Spatial Analysis for Construction of a San Marcos Fire Station

Prepared for:



Prepared by: CenTex 360°

March 25, 2013

Purpose

CenTex 360° has written this progress report to inform the City of San Marcos of the status of the fire station location analysis project. We will be reviewing our progress and identifying the problems we have encountered during the last few weeks of data processing. We hope that this will provide insight and continue to build a working relationship with the City of San Marcos.

Background

To meet the demand of an increasing growth trend, the City of San Marcos is proactively developing a plan to construct a new fire station. The City of San Marcos has approached CenTex 360° to analyze factors based on a previous study published in 1994, *An Equation for Station Location*. A GIS implementation would enable the San Marcos Fire Department to an even distribution of fire service across the city.

Project Description

To identify potential parcels that demonstrate a need for a future fire station, we will calculate and analyze data based on parcels found in 11 grid cells that have been pre-determined by the City of San Marcos. We will perform calculations on the following factors to complete our analysis: parcel area, parcel value, day/night time population, square footage of buildings, value of improvements, conflagration potential and wildlife urban interfaces.

Tasks

Total Parcel Area

To determine parcel area of each grid cell, we have separated the parcels that are completely contained in the grid cell from those that overlap onto another grid cell. Using the calculate geometry tool, we are able to accurately determine the area of the parcels within each cell. Once we have done this separately for these two categories, we will add them together to get the total area of the parcels in each grid cell.

Developed, Vacant, Multifamily and Total Parcel Value

Our team found the developed, vacant, multifamily and total parcel values for the grid cells 8, 13, and 16. We have taken into account the clipped parcels in each of these grid cells when conducting this analysis and applied the parcels area percentages in our calculations to calculate the parcel values. We determined if the parcel was developed by looking at the vacant field in the parcels attribute table. If the parcel was not vacant, we added the buildings layer and then used our best judgment in determining whether it was developed. If the parcel was developed, we then looked at the *SUB_CATEGO* field in the attribute table of the buildings layer to determine if the parcel was multifamily.

Value of Improvements

We have been able to successfully calculate the total Value of Improvements (VOI) for the grid cells 8, 13 and 16. When we encountered parcels that were divided by 2 or more grid cells, we found the percentage area of the clipped parcel and multiplied that percentage by the value found in the *TOTALIMPMK* field of the parcels attribute table. We then divided this number by 100 to find the percentage of value of improvements in each of the clipped parcels. After the percentages were found for the clipped parcels, we added each parcel's *TOTALIMPMK* value together that was within the grid cell boundary to find the total VOI.

Conflagration Index

The conflagration index is progressing well. We successfully implemented a model builder that determined the amount of area that is within 40' from two buildings. After our model created a 20' buffer around each building, we intersected the buffers to give us specific areas where the two buildings are within 40' proximity to each other. The second component of the conflagration index, wildlife/urban interface, will be calculated upon the completion of the developed/undeveloped parcel classification. The third component, building height, we will have to revisit because of inconsistencies in the data that make this calculation difficult. We discovered that only about 10% of features in the buildings layer have building height information. If this third factor becomes unavailable we will adjust the index appropriately. Fortunately, building height was the least weighted of the factors in the index.

Wildland/Urban Interface

The Wildland/Urban Interface will be calculated upon the completion of the developed/undeveloped parcel classification. Since this task requires us to first describe each parcel as developed or undeveloped, this analysis will have to be done later in our timeline. Once we finish the parcel classification, we will then be able to calculate the total boundary length in a grid where undeveloped and undeveloped parcels meet.

Square Footage of Buildings

This calculation is relatively simple to complete and we already have values for the two grids we've worked with most. Due to the quick and easy nature of this factor, we don't predict any reason we won't be able to complete this process.

Population

Finding the population has proved to be one of our biggest challenges. Most of the population data that has been provided to us is not an accurate representation of the parcel layer's true population values. Due to time limitations and difficulty trying to incorporate Census data into our studies, we have decided to use the population data that has been provided to us "as is." We will decide whether a parcel is commercial, industrial, or residential by looking at its associated zoning code. These zoning codes will help us find the day and night time population of the parcels. We will also take into account the parcels that have been clipped by the grid cell and adjust those population values by the parcel's percentage of area.

Summary

Overall our project is going quite well, despite some unsuspected challenges and revisions. We hope this discussion has provided you with some insight on the work that is currently taking place in order to complete this comprehensive analysis. We are looking forward to the final results of this project and anticipate future use of this study by the City of San Marcos to expand on our maps, models, and spreadsheets to meet their evolving needs as the city grows.

Participation

| | |
|--|--|
| Andrea Nieto Project Manager GIS Analyst | <ul style="list-style-type: none">• Wrote the purpose, background, project description and timetable• Organized the final draft of the of the progress report• Prepared final draft of PowerPoint presentation |
| Bryan Heisinger Project Assistant Manager GIS Analyst | <ul style="list-style-type: none">• Wrote the percent area multifamily, developed/vacant and total parcel value and VOI• Revised population and summary• Prepared final draft of PowerPoint presentation |
| Matthew Mitchell GIS Analyst | <ul style="list-style-type: none">• Wrote population and the summary |
| Nadine Oliver GIS Analyst | <ul style="list-style-type: none">• Authored square footage of buildings, Wildland/Urban Interface, Conflagration Index |