W. E. T.

Water Elevation Technologies

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Analysis of Costs Associated with Obtaining Elevation Certificates for Low-Income Households in San Marcos, Texas

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1. Introduction

1.1. Summary

One of nature's more frequently occurring disasters is flooding. Due to climate change, urbanization and many other factors, flooding is a natural disaster that we are likely to see more of in the future (Oak Ridge National Laboratory and the U.S. Department of Energy). Flooding and its effects can be widespread and damaging. The application of GIS to model past flood ranges to compute areas within San Marcos that are highly prone to experience flooding is beneficial to help locate areas that need flood insurance.

1.2. Purpose

The aim of this project is to determine the cost of providing elevation certificates, which are necessary to obtain flood insurance, to low-income areas within the City of San Marcos that fall within the flood plain.

1.3. Scope

This study will cover the city of San Marcos, Texas and the city's extraterritorial jurisdiction. The main focus will be around the floodway, the 100-year flood plain, and the 500-year flood plain, and on areas damaged by past floods.

2. Proposal

2.1. Data

The data being used for this project was provided by the City of San Marcos, with the help of Joni Hickey in the Planning and Development Services Department, and also the Federal Emergency Management Agency (FEMA). Primarily the data will be vector with some incorporation of raster datasets, mainly DEMs. In addition there will also be use of some tabular data for the insurance information and the location of the elevation certificates.

File Name	Data Type	Feature Type	Description	Source
Flood_100yr.shp	Shapefile	Polygon	100 Year Flood Plain	FEMA
Flood_500yr.shp	Shapefile	Polygon	500 Year Flood Plain	FEMA
AddressPoints.shp	Shapefile	Point	Address Points	City of San Marcos
Building.shp	Shapefile	Polygon	Building Footprints	City of San Marcos
CityLimit2006_07.shp	Shapefile	Polygon	City Limits	City of San Marcos
ETJ2006_07.shp	Shapefile	Polygon	Extraterritorial Jurisdiction	City of San Marcos
Floodway.shp	Shapefile	Polygon	FEMA Floodway	City of San Marcos
gpsfm98.dwg	Shapefile	Polyline	Flood Plain Cross Section Lines	City of San Marcos
Major_Creeks.shp	Shapefile	Polyline	Major Creeks	City of San Marcos
Parcels.shp	Shapefile	Polygon	Parcels	City of San Marcos
FloodDamage98.shp	Shapefile	Polygon	Properties damaged in the flood of October 1998	City of San Marcos
Elevation_Certificates.shp	Shapefile	Point	Properties with elevation certificates	City of San Marcos
GISMGR_Railroad.shp	Shapefile	Polyline	Railroads	City of San Marcos
GISMGR_River.shp	Shapefile	Polygon	San Marcos River and bodies of water	City of San Marcos
Centerlines.shp	Shapefile	Polyline	Street centerlines	City of San Marcos
485505 Active Policies 043006.xlsx	Table	Tabular	Active flood insurance policies as of 30 April 2006	City of San Marcos
485505 Historical Claims 043006.xls	Table	Tabular	Historical flood insurance claims	City of San Marcos
Blanco River.xls	Table	Tabular	Gauge elevations, Blanco River July 2002	City of San Marcos
485505 Additional Data	Table	Tabular	Data about certain	City of San Marcos

043006.xls			properties with multiple claims	

In addition, Joni Hickey provided the area inundated by the flood of October 1998, with annotations of elevations reached by the floodwaters, in DXF format.

Data on property tax appraisals for parcels within the study area is yet to be obtained as of this writing.

2.2. Methodology

The data described in Section 3.1 will be used to estimate the cost of obtaining elevation surveys for low-lying, low-income properties within the City of San Marcos.

Data on existing elevation certificates and previous flood damage claims has known problems with imprecise locations or misspelled addresses. This data will need to be fixed as soon as possible prior to analysis; one file provided by the City of San Marcos in AutoCAD (DXF) format will need to be converted to a shapefile before analysis can be done. No programming will be necessary.

Parcel boundaries and FEMA data will be joined to determine those parcels most likely to flood, with a repeat of the flood of October 1998, which inundated areas well outside the 500-year floodplain, serving as a worst-case scenario. From this data, the areas with parcels having low property values (serving as a substitute for low-income households, since data on income at that granularity is not easily obtained) will be selected as the basis for the cost to provide elevation surveys to all residents in that area.

2.3. Implications

- The analysis of the data will provide the city with a view of the areas of San Marcos, Texas that are lying within the floodway, the 100-year flood plain, and the 500-year flood plain.
- An analysis using tax appraisal data will allow WET to view the houses that are within a low income bracket, about $30,000 and below (Glen and Misenheimer), and evaluate how many are within the flood plains. This data will be accompanied with the elevation certificate data to determine the number of properties which already have elevation certificates and do not need assistance in obtaining one.
- Looking at the tax appraisal data, coupled with the residences that are within the flood plains, will allow WET to evaluate a proposed amount for a block grant that will be used help the low income families in this area to get the elevation certificates needed to apply for flood insurance. This will help reduce the secondary effects of a major flood, as in 1998, and allow people to rebuild more quickly after such an event.
- The analysis of the data will be used to show the following:
    - Locations of residences that have filed an insurance claim following the 1998 and 2000 floods. This will allow for a focusing in on the residences that are within the flood plain, 100 year flood plain, and the 500 year floodplain.
    - Locations of residences that are outside of the flood plains that filed for insurance claims. This will show to some extent how far the flooding extended outside of the projected floodplain areas.
- The Block grant can be used in the following ways:

- Help low income families acquire an elevation certificate and, if they already have one, provide a fraction of the cost of flood insurance.
- Allow the City of San Marcos, Texas to see the areas that are most susceptible to a major flood and use this information in the development of the city in regards to residential and commercial zoning.

2.4. Budget

Personnel

3 Analysts × 10 hours/week × 12 weeks × $40/hour	$	14,400.00
1 Project Leader × 10 hours/week × 12 weeks × $55/hr	$	6,600.00
Personnel Subtotal	$	21,000.00

Equipment

No equipment needed	$	0.00

Travel

No travel expected	$	0.00

Miscellaneous

Office supplies and printing	$	1,000.00
Computer maintenance and repair	$	1,000.00
Contingency	$	2,000.00
Miscellaneous Subtotal	$	4,000.00

Grand Total	**$**	**25,000.00**

2.5. Timetable

Weeks in which a task is expected to be in progress are shaded in blue.

	Data Collection/ Acquisition	Data Pre-processing	Analysis	Web Site	Meta-data	Interpretation	Final Deliverables
29 Jan							
05 Feb							
12 Feb							
19 Feb							
26 Feb							
05 Mar							
12 Mar							
19 Mar							
26 Mar							
02 Apr							
09 Apr							
16 Apr							
23 Apr							
30 Apr							

Note: The week of 12th March 2007 is Spring Break; no work will be performed during this week.

2.6. Final Deliverables

The deliverables at the conclusion of the project will include the following:

- Final Report (2 copies; paper)
- Poster for Display
- All data used or created
- Website
- CD containing the following: (2 copies)
    - Data provided (as modified during the pre-processing phase)
    - Data generated as the result of analysis
    - Metadata
    - Electronic copy of Final Report in MS Word format.
    - Electronic copy of Poster for Display
    - PowerPoint Presentation
    - "Readme" directions on use of the CD

3. Conclusions

Using all the information available, this study will show the areas in San Marcos falling within a flood plain which can be classified as being both low-income. Along with the help from data accumulated from the previous floods, we can have a better idea of where flooding more frequently occurs within the flood plain. With the help of this Grant, the residences that meet both of these criteria could then get the Elevation Certificate that they need in order to get flood insurance.

4. Participation

David Lynch
Project Manager, Webmaster

Proposal: Methodology, Budget, Timetable, Final Deliverables
Project: Web Site, Development of Block Grant, Data Editing and Analysis

Clinton Buehring
GIS Analyst

Proposal: Summary, Purpose, Conclusions, Participation
Project: Contact for Surveyors and Insurance, Data Editing and Analysis

Jeff Gravett
GIS Analyst

Proposal: Data
Project: Data Editing and Analysis, Insurance data, 2D Mapping

Miriam Mosher
GIS Analyst, Metadata Master

Proposal: Scope, Implications, References, Logo
Project: Metadata, Income data, Data Editing and Analysis, 3D Mapping

5. References

CSIAC/ESD/ORNL.2005. Oak Ridge National Laboratory and the U.S. Department of Energy. The United States Historical Climatology Network (USHCN), United States. http://cdiac.ornl.gov/epubs/ndp/ushcn/newushcn.html. Last accessed February 1, 2007.

State Farm Insurance. Wier Glen, personal reference.

State Farm Insurance. Charles Misenheimer, personal reference.