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City of Martindale: Asset Inventory and GIS Database Development

Prepared for

The City of Martindale

Prepared by

GeoCats Solutions

In Association with



Table of Contents

INTRODUCTION

Summary 4

Purpose 4

Objectives 5

Scope 6

PROPOSAL

Data 6

Methodology 7

BUDGET 9

TIMETABLE 10

FINAL DELIVERABLES 10

CONCLUSION 11

PARTICIPATION 12

REFERENCES 12

Introduction

Summary

The City of Martindale is a rural community located along State Highway (SH) in Caldwell County, Texas, that takes pride in historically having maintained a small population despite rapid growth in the surrounding region. According to Envision Central Texas (ECT), a non-profit organization focused on regional growth, Central Texas will add over one million people in the next twenty to thirty years. This inevitable growth within Central Texas makes it necessary for small towns, like Martindale, to develop plans for growth management. Growth in Martindale will increase significantly as a result of the completion of SH 130, as well as the construction of anticipated residential and commercial developments nearby. In response to the looming growth, Martindale city officials, in association with the Lower Colorado River Authority (LCRA), have taken on the task of creating a comprehensive plan. To assist in the creation of this plan, GeoCats Solutions will utilize a Geographic Information System (GIS) for analysis of roads, storm water drainage, land use and housing development, which will provide the City of Martindale valuable tools for visualizing and analyzing city assets for the planning of an expanded infrastructure to accommodate the growth that will occur.

Purpose

In association with the Lower Colorado River Authority (LCRA), GeoCats Solutions will contribute to the development of the City of Martindale's Comprehensive Plan by creating a GIS database. The GIS database will provide city officials with vital geographic information, which can then be used to make informed decisions concerning their current challenges and the anticipated changes occurring in their region. Data and maps provided by GeoCats Solutions will enable the City of Martindale to view current land use, housing, storm water drainage, thoroughfares and street networks. By providing the city access to this data, the process of comprehensive planning will be made more efficient. The key to a successful comprehensive plan is being informed, which is exactly what this GIS database will provide: necessary information for the development of the City of Martindale's Comprehensive Plan.

Objectives

Our first objective is to compile a detailed inventory of current land uses, housing conditions, storm water infrastructure and drainage patterns, and conditions of thoroughfares and streets throughout the study area. After the inventory has been compiled, datasets and maps will be created of all assets. The third and final objective is to propose possible future development based on analysis of all assets. Given the time, GeoCats Solutions may inventory the city's recreational sites, Central Business District (CBD), and water and sewer infrastructure.

Detailed Listing of Primary Objectives:

1. Provide asset inventory of land use, housing, storm water drainage, thoroughfares, and streets
 - a. Develop and update base parcel map of the city and ETJ
 - b. Compile data of all assets through a series of field surveys
 - c. Create maps of all assets
2. Develop geodatabase of all collected data
3. Perform data analysis of land use
 - a. Review current land use
 - b. Illustrate current patterns of land use
 - c. Determine possible alternatives for future land use
 - d. Map possible alternatives for future land use
4. Perform data analysis of housing
 - a. Examine housing characteristics
 - b. Determine areas in most need of improvement
5. Perform data analysis of storm water drainage
 - a. Review current storm water infrastructure
 - b. Map flood plains and contours
 - c. Identify and map problem drainage areas
6. Perform data analysis of thoroughfares and streets
 - a. Review current thoroughfares and streets
 - b. Illustrate the hierarchy of road systems
7. Convert GIS database to format compatible with the Google Earth application

Scope

The geographic extent of this project includes Martindale’s city limits, as well as both their Statutory and Voluntary Extra Territorial Jurisdictions (ETJ). The Statutory ETJ forms a half-mile buffer around the city limits, and an additional twenty square miles around the city forms the Voluntary ETJ.

Proposal

Data

GeoCats Solutions will utilize both primary and secondary data to accomplish completion of the proposed objectives. The team will perform a series of field surveys using Global Positioning System (GPS) units and ground observation to compile a detailed inventory of assets within the city limits and surrounding ETJ, which will be the primary data used. Secondary data will be obtained from the City of Martindale, LCRA, Capital Area Council of Governments (CAPCOG), Texas Natural Resources Information System (TNRIS), the Texas General Land Office (TGLO), the United States Census Bureau, and two former Texas State University GIS project teams, Bobcat Planning and Geo Planning Solutions.

Existing Data:

- Parcel data for Caldwell, Hays and Guadalupe Counties
- Martindale City Limits
- Martindale ETJ boundaries
- Caldwell County Imagery
- Street data
- Flood plains
- Road signage

Datasets to be developed:

- Land use
- Housing conditions
- Storm water drainage infrastructure
- Thoroughfare and street conditions

Methodology

Land Use

The creation of a land use dataset will be used to illustrate the different types of land use in the city limits and ETJs. The development of this dataset will require a field survey of all parcels in the study area. After all data has been collected, a land use polygon dataset will be created using ArcGIS 9.3.1. The dataset will then be used to illustrate existing land use patterns and provide an analysis of the total acres and percentages of each land use within the study area. Finally, after reviewing and analyzing the land use dataset, maps illustrating the city's land use and analysis will be provided to Martindale city officials.

Housing

The dataset which will be developed to represent the housing inventory collected through field surveys will be created initially by digitizing structures from the Caldwell County 2008 Aerial imagery, obtained from the TNRIS website, in an ArcGIS Desktop Environment. Through ground observation and field data collection, housing characteristics including classification, status, building material type, and overall condition, will be recorded for each structure and attributed within the developed dataset. Analysis will then be performed on the resulting dataset to determine what patterns, if any, exist within the dataset attributes, with an emphasis on overall condition. Maps portraying the dataset and all analysis performed will be provided to officials of the City of Martindale to supplement decision making processes concerning potential qualification for various grants and assistance programs for areas in need of housing improvements.

Storm Water Drainage

To effectively show storm water drainage for the City of Martindale, a digital elevation model of the area will be used. Based upon this, a contour map will be developed to depict slope and flow direction. Flood plains will then be determined. Culverts, barrow ditches, channels, ditches, curbs and gutters data will be collected by use of a GPS unit and by manual data entry. Data regarding bridges will come from manual inventory in addition to existing data. Underground storm water drainage inlets and pipes must also be inventoried. This data will then be entered into ArcMap. Problem areas will then be identified based upon slope, flow

direction and amount, and total run off from impervious surfaces. Finally, maps portraying the city's storm water drainage infrastructure and problem areas will be provided to city officials as a basis for possible storm water drainage improvement projects. By designing storm water drainage improvement projects the City of Martindale can keep citizens informed, as well as evaluate impacts of future development on a case-by-case basis. Ultimately, this dataset can be used for long-term cumulative planning.

Literature Review for Storm Water Drainage

In order to effectively model and analyze storm water drainage patterns for the City of Martindale, several sources were reviewed and studied to determine the appropriate methods for completing such work. Municipal Stormwater Management (1995) details multiple appropriate methods, both of which are dependent on the situation and location. The book also addresses why this management is so crucial to the survival of any city, town, or municipality. The City of Arcata, California also published a paper (2009) regarding development of a storm water drainage master plan that was consulted. A portable document format (PDF) was released by the Indianapolis Department of Public Works entitled "Storm Water Drainage and Flooding Concerns" (2006) detailing citizens' responsibilities to maintain and improve storm water drainage in their community. The paper also discusses ways that cities can improve upon their system in addition to the costs of such maintenance and improvements.

Thoroughfares and Streets

The datasets for thoroughfares and streets will be geocoded and digitized in Transportation Computer-Aided Drafting (TransCAD), and then exported into ArcGIS 9.3.1. City and private street files will be gathered from TNRIS and TxDOT, digitized into TransCAD to separate the names and classifications, and then exported into ArcGIS 9.3.1. Street files will then be placed into layers, and checked for accuracy. Finally, the street files will be combined. A legend will also be created to explain the proposed roads and current street files in ArcGIS 9.3.1.

Budget

Data Acquisition

Total Hours.....	130
$([10 \text{ hours/week} * 4 \text{ weeks} * 2 \text{ Consultants}] + [7.5 \text{ hours/week} * 4 \text{ weeks} * 1 \text{ Consultant}] + [5 \text{ hours/week} * 4 \text{ weeks} * 1 \text{ Mgr.]}$	
Hourly Pay.....	\$20
Total	\$2,600

Data Analysis

Total Hours.....	210
$([10 \text{ hours/week} * 6 \text{ weeks} * 3 \text{ Consultants}] + [5 \text{ hours/week} * 6 \text{ weeks} * 1 \text{ Mgr.]}$	
Hourly Pay.....	\$35
Total	\$7,350

Systems Management

Project Manager

Total Hours.....	50
Hourly Pay.....	\$45
Total pay.....	\$2,250

Webmaster

Total Hours.....	10
Hourly Pay.....	\$35
Total Pay.....	\$350
Total	\$2,600

Equipment Costs

Digital Camera.....	\$350
GPS Unit.....	\$200
(2 Garmin eTrex GPS Units @ \$100 each)	

Workstation

4 Workstations @ \$1,500 Each	
Depreciation.....	\$385
$([\$6,000 \text{ [Total Cost of Workstations]} / 156 \text{ [Equipment Life in Weeks]}] * [10 \text{ Weeks}]$	
Total	\$935

Software


ArcGIS 9.3.1 License (10 Weeks of Use).....	\$4,808
(Based on Texas State University's License @ \$25,000/ Year)	
Total	\$4,808

Travel Expenses

200 Miles @ \$0.50/Mile.....	\$100
Total	\$100

TOTAL COSTS	\$18,393
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Timetable

	City of Martindale: Asset Inventory and GIS Database Development										
	Week 1	Week 2	OFF	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
	Feb-22	Mar-01	Mar-08	Mar-15	Mar-22	Mar-29	Apr-05	Apr-12	Apr-19	Apr-26	May-3
Data Acquisition/ Collection	█		█	█							
Data Processing				█							
Data Analysis					█						
Data Interpretation							█				
Website Development								█			
Final Deliverables										█	

Final Deliverables

1. CD

- All Data
- Metadata
- Poster
- The Final Report
- The Final Presentation: Microsoft Powerpoint Format
- AASHTO and FHWA guidelines for Street Development
- Instruction on how to use the CD
- Instructions on how to use and update ArcReader

2. Final Report

- Data
- Maps
- Metadata
- References

3. Professional Poster to be displayed in the Evans Liberal Arts Building

4. ArcReader Software and Instructions

5. All GIS data will be provided in a format compatible with the Google Earth Application

6. WebPage

Conclusion

GeoCats Solutions expect the completion of this project to result in a fully developed geodatabase consisting of datasets that accurately depict the current land use, housing conditions, storm water drainage infrastructure, thoroughfares and streets within the City of Martindale and the associated ETJ. All data will be provided to city officials in a format compatible for use with the Google Earth application for the purpose of continued use by the city, independent of a GIS. The resources to be provided upon completion of this project will significantly contribute to the ultimate goal of the City of Martindale, in association with the LCRA, in the development of a comprehensive plan.

Participation

Slaton McCauley

Timeline

Lauren Bain

Budget

Michelle Couden

PowerPoint

Hannah Rogers

Logo

Collective Participation

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Final Deliverables

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References

References

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