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Final Report
City of Martindale:
Asset Inventory
and
GIS Database Development

Prepared for

The City of Martindale

Prepared by

GeoCats Solutions

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In Association with

Abstract

The City of Martindale, in association with the Lower Colorado River Authority (LCRA), has worked diligently to finalize and implement a Comprehensive Plan for developing ordinances and establishing updated policies and procedures to effectively manage the population growth anticipated to accompany the completion of State Highway 130 and the resulting commercial and residential development in the area. Texas State University Department of Geography student teams Bobcat Planning and GeoPlanning Solutions both completed projects in the past that involved data collection, dataset development, and asset inventory and provided a foundation from which GeoCats Solutions was able to begin working towards our contribution to the Martindale Comprehensive Plan. To provide city officials valuable tools that will assist in planning expanded infrastructure to accommodate the anticipated population growth, GeoCats Solutions completed a thorough inventory of the current land use, housing, street networks and thoroughfares, and storm water drainage, then utilized a Geographic Information System (GIS) software suite for dataset development, analysis, and extensive mapping of each city asset. As GIS software is not easily accessible and requires a degree of specialized skills to use, the team compiled all data collected and converted each resulting dataset into formats compatible for use with the Google Earth application. GeoCats Solutions also developed a website that provides the data, maps, additional information, and useful resources associated with our completed project.

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1. INTRODUCTION

1.1 Summary

The City of Martindale is a rural community located along State Highway (SH) 80 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.

1.2 Purpose

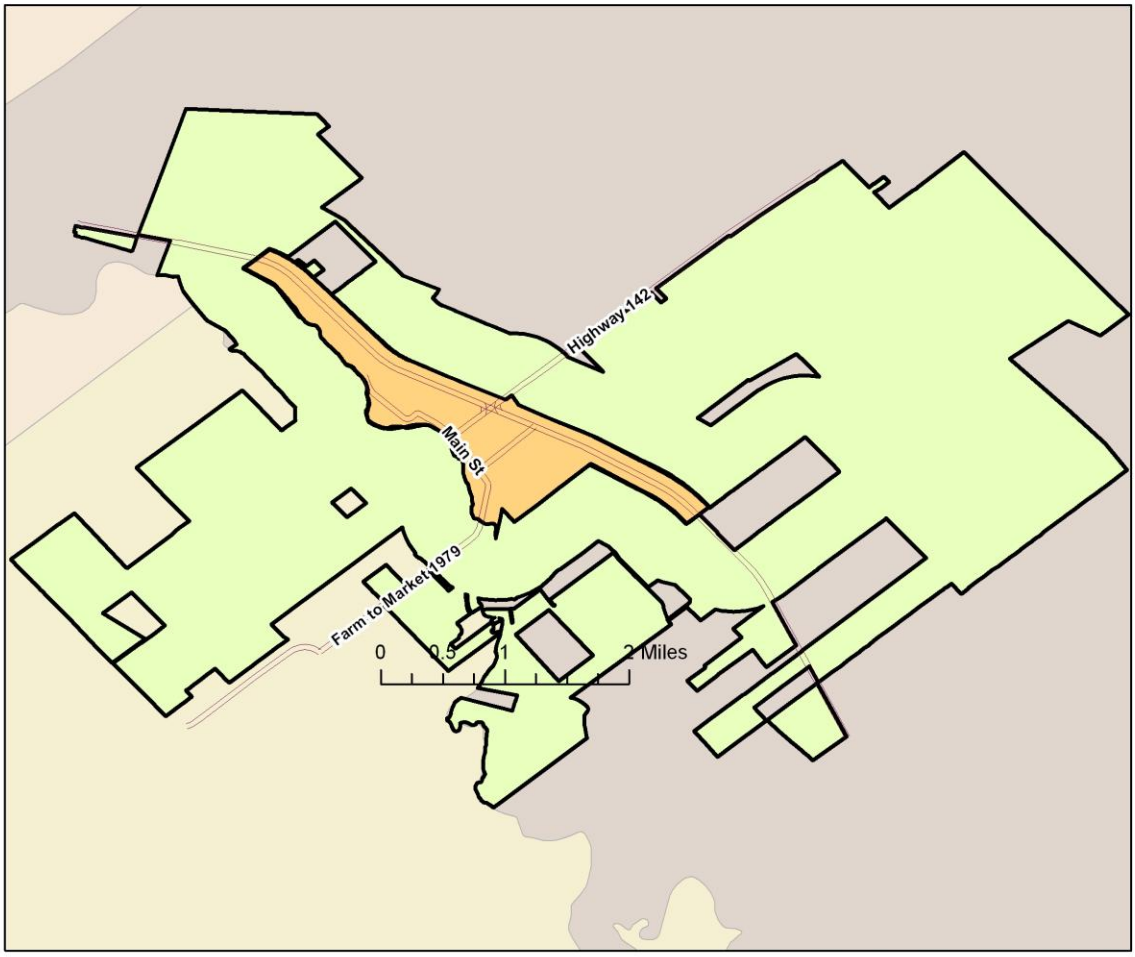
In association with the Lower Colorado River Authority (LCRA), GeoCats Solutions has contributed to the development of the City of Martindale's Comprehensive Plan by creating a GIS database. The GIS database provides city officials with vital geographic information, which can be used to make informed decisions concerning their current challenges and the anticipated changes occurring in their region. This method has been chosen over alternative formats such as

Computer-Aided Design (CAD) because the data is spatially referenced, can easily be converted into formats independent of GIS, is user friendly, and allows for analysis. It is also becoming a national trend for local governments to have a GIS for their town. Using the ArcGIS 9.3 Desktop software package, which includes the ArcMap, ArcCatalog and ArcToolbox applications, the tools and extensions Spatial Analyst and Editor were used in the creation of datasets and feature classes. Layout creation and template creation were used in the creation of maps. Data and maps provided by GeoCats Solutions enables 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 has been made more efficient. As proposed, the completion of this project was expected to result in a full geodatabase including datasets representing each asset, which from the beginning, was intended to provide the City of Martindale valuable tools for visualizing and analyzing city assets.

1.3 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.

City of Martindale



PrimaryStreets
City Limits
Extraterritorial Jurisdiction (ETJ)

Counties

LCRA ENERGY • WATER • COMMUNITY SERVICES
COMMUNITY AND ECONOMIC DEVELOPMENT

Geo Cats Solutions

0 1 2 Miles

NAD 1983: StatePlane Coordinate System
Texas South Central FIPS 4204
Lambert Conformal Conic Projection

2. LAND USE

2.1 Literature Review

Research was conducted of similar studies to find the best possible procedure to collect, combine, and analyze date. The most reputable source found was the American Planning Association (APA), an organization determined to help build professionals in the career of urban planning. Their website provides Land Based Classification Standards (LBCS) to assist local planning agencies throughout their process of surveying land uses. According to the APA, there are five dimensions for classifying land uses: activity, function, structure type, site development, and ownership. These five dimensions refer to different characteristics each parcel of land should be surveyed for.

The first dimension, Activity, refers to the land use based on the physical and observable characteristics. For example, single family homes, multifamily homes, and manufactured homes all serve as a residential activity. The second dimension, Function, refers to the type of economic function using the land. For example, commercial, industrial, and agricultural all relate to an economic function, or enterprise. Although there seems to be little difference between the first dimension and the second, there is. For instance, there could be two parcels of land that serve one functional category, such as agriculture, but one parcel of land has an office activity and the other parcel of land has a farming activity.

The third dimension, Structure, describes the type of structure or building on the land. Examples of structure include single family houses, hospital buildings, land (when there is no structure present), and roads. The fourth dimension, Site Development, describes the physical and observable development characteristics of the land. In most cases, Site Development is

described in terms of whether a parcel of land is developed or undeveloped, but Site Development can also be used for land uses such as parks and open space. The fifth, and final, dimension, Ownership, discusses the relationship between the land use and its land rights. Ownership tends to be described by either being public or private, but rarely ever both. Beyond the five aforementioned dimensions, the LBCS includes a set of color codes, which sets a standard convention for land use categories for maps, GIS, and other visual renderings.

2.2 Data

Secondary data used during the collection process of the City of Martindale's land use inventory included Capital Area Council of Government's (CAPCOG) Caldwell County and Hays County Parcel Data and 2009 Aerial Imagery, and the LCRA's Guadalupe County Parcel Data. Also, property tax data was pulled from Caldwell County, Hays County, and Guadalupe County Appraisal Districts.

Primary data for the land use dataset was primarily collected through several field surveys, which consisted of parcel-by-parcel ground observation. CAPCOG's 2009 Aerial Imagery, as well as property data from each counties' appraisal district was useful throughout the process of quality assurance.

2.3 Methods

There were four main objectives proposed to be completed for the land use asset: data collection, compiling data, reviewing and analyzing data, and mapping the data. Data collection was the first step in creating a land use dataset. Data was primarily collected through a series of

field surveys, which consisted of parcel-by-parcel ground observation. Throughout the process of data collection, a number of challenges occurred. One challenge was coming across a parcel of land that had an unclear land use. For example, there could be a parcel of land surrounded by single family housing and the parcel, too, has the structure of a single family house, but in the front yard there is a business sign for a beauty salon. In this case, the challenge would be to determine whether or not this parcel of land should be considered a single family land use or a commercial land use. For challenges, such as the one above, further research was conducted before identifying which land use was best to characterize the parcel of land. The research primarily consisted of looking into the associated county appraisal district's property data. Another challenge, throughout the process of data collection, was coming across areas that were inaccessible or private. In these areas, reviewing appraisal district data and studying aerial imagery were the primary methods for defining land use.

After data collection was finished, the data was compiled using ArcGIS Desktop 9.3.1. This mainly took place in the editing mode, as to match parcel and property numbers from CAPCOGs and LCRAs parcel data to the newly collected land use data.

The next stage was to review and analyze the land use dataset. The primary methods for reviewing and analyzing the data included "selection by attribute" and calculating percentages of each category of land use for the associated study area.

Finally, the land use dataset was map based on the traditional color-coding standards set out by the American Planning Association's LBCS. Also, associated graphs were created to represent the land use analysis.

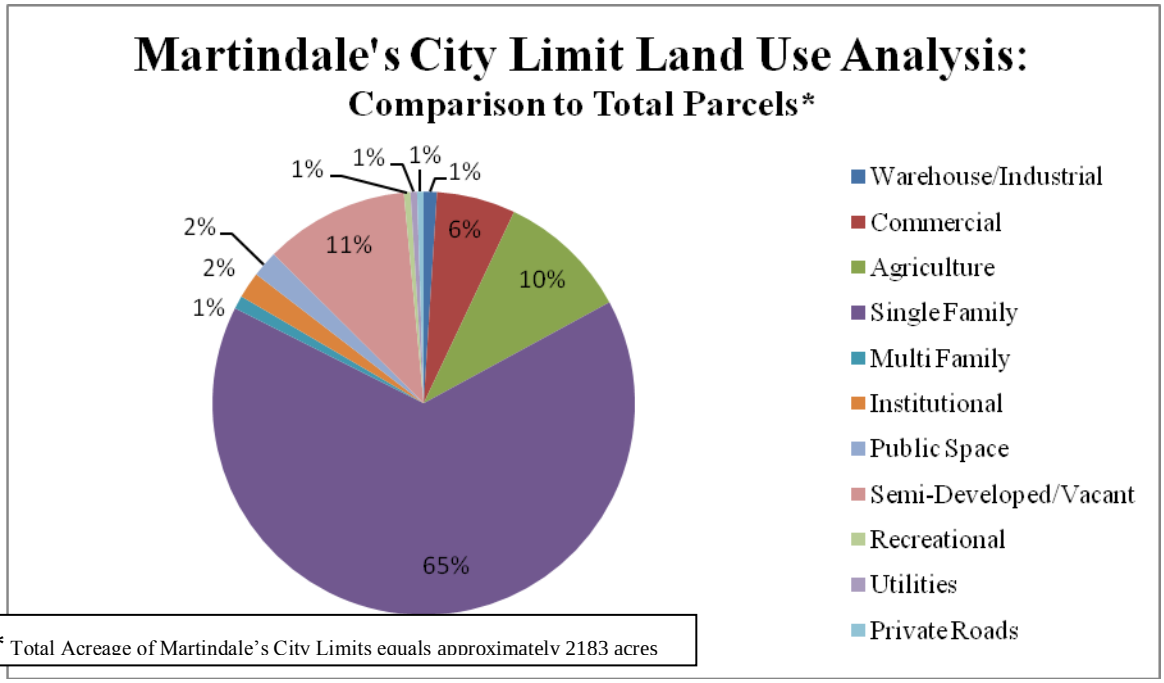
2.4 Results

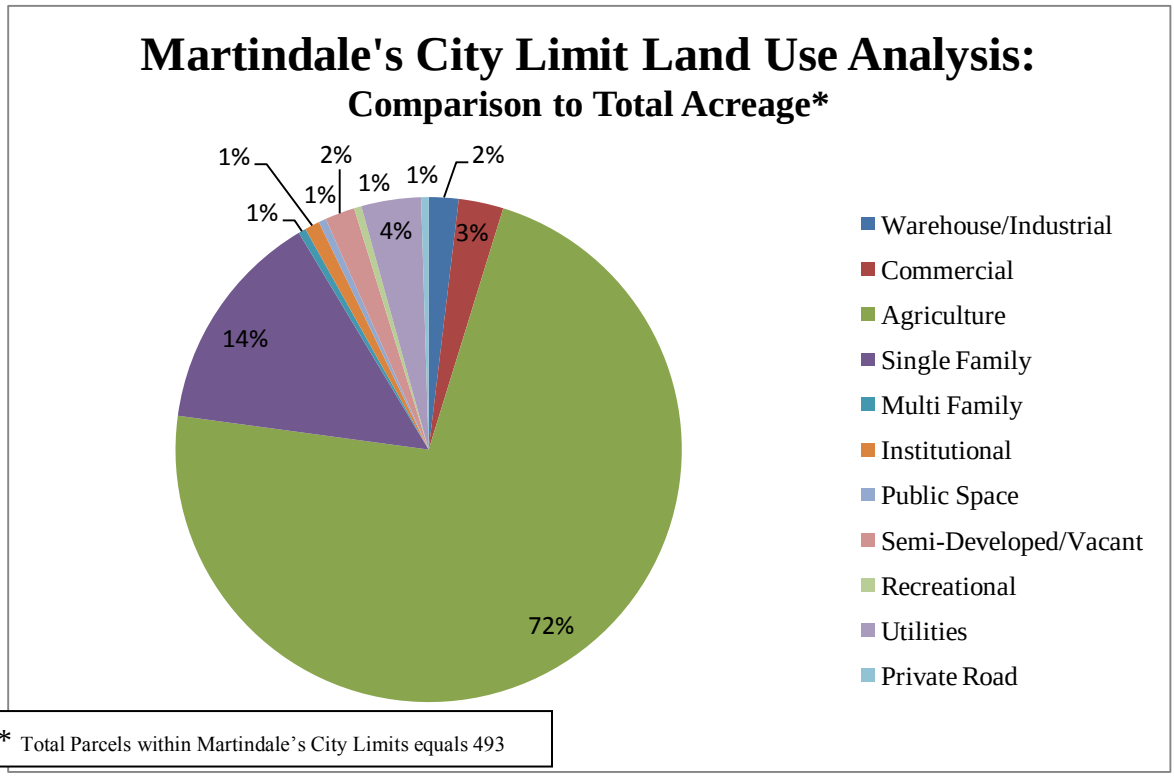
The land use dataset was completed for all 1091 parcels of land within the study area. Illustrated in the following table and charts, are the results of the land use dataset analysis.

Martindale's City Limits Land Use Analysis: Based on Acreage and Parcel

Land Use	# of Parcels	Acres	% of Total Parcels*	% of Total Acres*
Agriculture	49	1,662	10	76
Commercial	31	73	6	3
Warehouse/Industrial	7	44	1	2
Single Family	322	318	65	15
Multi Family	6	9	1	>1
Institutional	12	17	2	1
Public Space	8	10	2	>1
Semi-Developed/Vacant	52	40	11	2
Recreational	2	2	>1	>1
Utilities	3	95	>1	4
Private Road	1	4	>1	>1

* Total Acreage of Martindale's City Limits equals approximately 2183 acres. ** Total Parcels within Martindale's City Limits equals 493


Martindale's City Limit Land Use Analysis:
Comparison to Total Parcels*
1%
1%
1%
1%
6%
10%
2%
11%
2%
1%
65%
Warehouse/Industrial
Commercial
Agriculture
Single Family
Multi Family
Institutional
Public Space
Semi-Developed/Vacant
Recreational
Utilities
Private Roads
* Total Acreage of Martindale's City Limits equals approximately 2183 acres


Martindale's City Limit Land Use Analysis:
Comparison to Total Acreage*
1%
2%
1%
1%
1%
2%
1%
4%
3%
14%
72%
Warehouse/Industrial
Commercial
Agriculture
Single Family
Multi Family
Institutional
Public Space
Semi-Developed/Vacant
Recreational
Utilities
Private Road
* Total Parcels within Martindale's City Limits equals 493

2.5 Discussion

Although the land use dataset is complete for all 1091 parcels of land within the study area, there are steps that should be taken to further guarantee accuracy. In particular, someone with the authority and credentials should look into areas that are inaccessible or private. These areas are, mainly, subdivisions that have private roads and parcels of land that are too large to be observed completely from the road.

Also, although time did not permit for this project, the land use dataset should be further analyzed and compared with the current zoning maps and zoning ordinances to find areas of non-compliance.

Hopefully, the land use dataset and the associated analysis results will help the City of Martindale determine where they can make land use and zoning changes to benefit the city aesthetically, as well as economically.

3. HOUSING

3.1 Data

Secondary data used to create the residential structures datasets included a polygon shapefile depicting the Martindale City Limits, which was obtained from the LCRA, a polygon shapefile of the Martindale ETJ, which was provided by the Bobcat Planning project from a previous semester, and a polygon shapefile depicting the Federal Emergency Management Agency (FEMA) Floodplain, which was obtained from the CAPCOG Geospatial Data Information Clearinghouse. The Caldwell County Martindale Address Points shapefile used to

reference residential structures was also obtained from the Bobcat Planning project, and 2009 six inch resolution MrSID (Multiresolution Seamless Image Database) format compressed 18:1 natural color aerial orthoimagery obtained from the CAPCOG Geospatial Data Information Clearinghouse was used. All vector data was in the NAD 1983 State Plane Coordinate System Texas South Central FIPS 4204 datum used in a Lambert Conformal Conic projection. A separate shapefile containing a half-mile buffer around the Martindale City Limits dataset was created for the purpose of indicating the statutory ETJ. Two primary vector datasets for residential structures were developed in this projection. The first dataset is polygon geometry and the second is a point geometry dataset, both created in ArcCatalog and given identical attribute fields.

3.2 Methods

Completing the first objective for residential structures involved performing a thorough inventory of housing in Martindale through manual field observations of the structure type, residential use, condition, and occupancy status. This information was recorded on paper maps depicting parcels or paper maps of aerial imagery and later entered feature by feature into the dataset. The polygon and point vector datasets were created in ArcCatalog using the NAD 1983 State Plane Coordinate System Texas South Central FIPS 4204 datum in a Lambert Conformal Conic projection, consistent with all secondary data used. Both datasets were given text attribute fields for structure type, residential use, occupancy status, neighborhood association, jurisdiction location, and additional notes, and a short integer attribute field for housing condition ranking. Structure type, residential use, occupancy status, and condition rankings were coded based on the

field survey symbology provided by LCRA. Structure type was coded “SB” for stick-built homes, “M” for manufactured homes, and “UNK” for homes of unknown build. Residential use codes included “SFD” for structures of single family, detached use, “DPL” for duplexes, “GH” for guest homes, including garage apartments, and “OT” for all other residential uses. Occupancy status codes were “O” for occupied structures, “V” for vacant structures, and “UNK” for structures with unknown occupancy status. The LCRA residential structure condition rankings given were one, two, and three for good, fair, and poor condition, respectively. Two additional condition rankings included in the dataset attributes were zero for residential structures of undetermined condition and four to indicate dangerous structures.

Features in both datasets were developed using the editor tool in the ArcMap 9.3.1 environment by manual on-screen digitizing of residential structures based on the 2009 six-inch resolution aerial imagery. This was completed through use of the Editor Toolbar Sketching function. As field observations were completed, all attribute data collected was manually entered for each feature in both datasets. For assigning jurisdiction location to each feature, the features in each dataset were selected based on location relative to the Martindale City Limits shapefile, the Martindale Statutory ETJ shapefile, and the Martindale ETJ shapefile and attributes were given codes of "MCL," "SETJ," "VETJ," and "OT" accordingly. Residential structure characteristics examined were the percentage of each structure type, residential use, condition rank, and occupancy status. This analysis involved selecting structures from the dataset by each attribute and calculating the percentages of the total dataset made up of features with each attribute. Residential structures were mapped by condition to determine areas with higher concentrations of lower condition rankings.

3.3 Results

Completion of the analysis on residential structures resulted in percentage figures for each aspect of housing characteristics. All features for which attribute information is unknown were inaccessible for observation. Both datasets had a total of 837 features, 117 of which were located within the FEMA Floodplain.

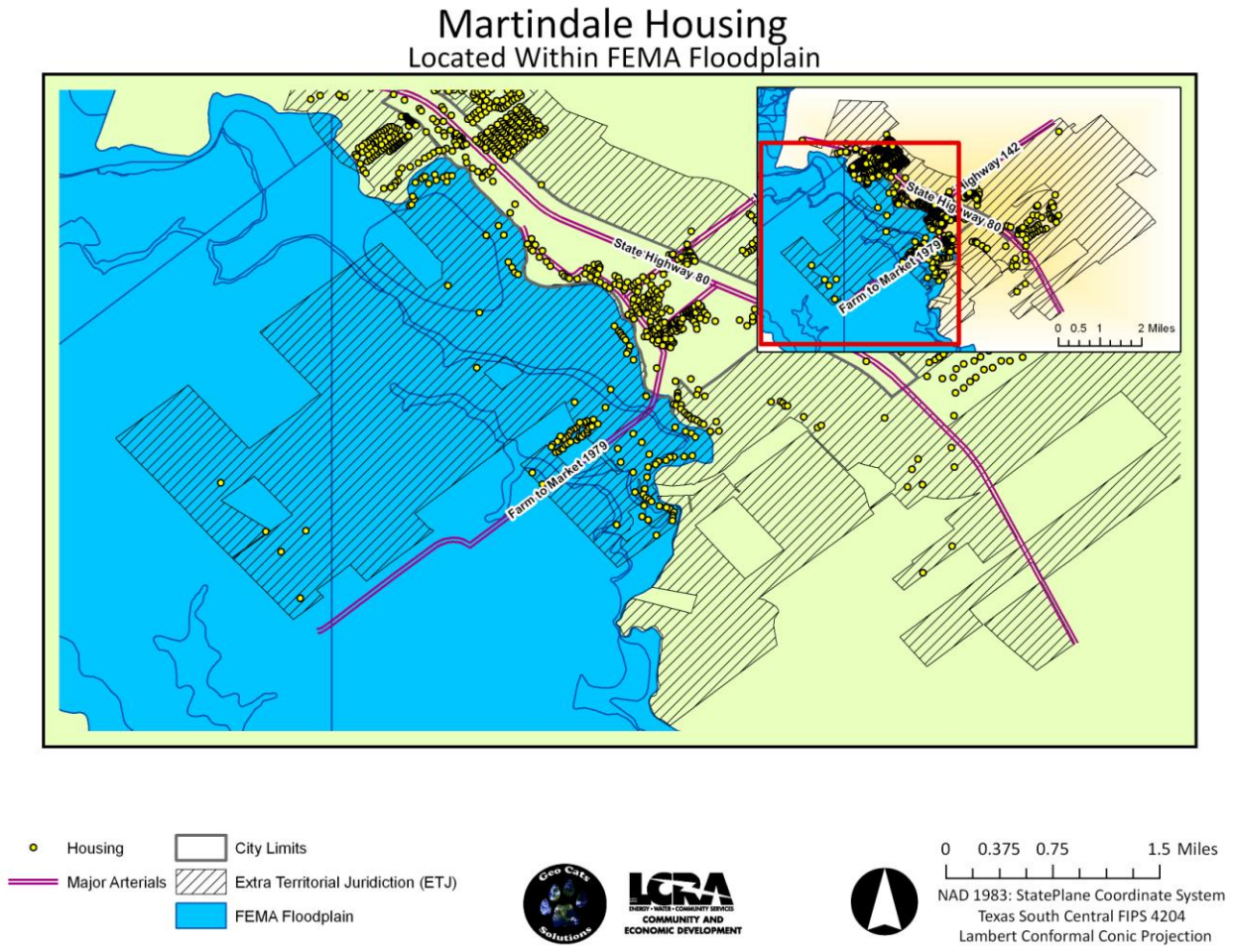


Figure 1.
Housing Located Within FEMA Floodplain

There were 592 stick-built homes, defined as a standard built home that is built with lumber (sticks) on site (Riggs), 228 manufactured homes, and 17 homes of unknown structure type. These have to meet local codes and may be inspected during the building process.

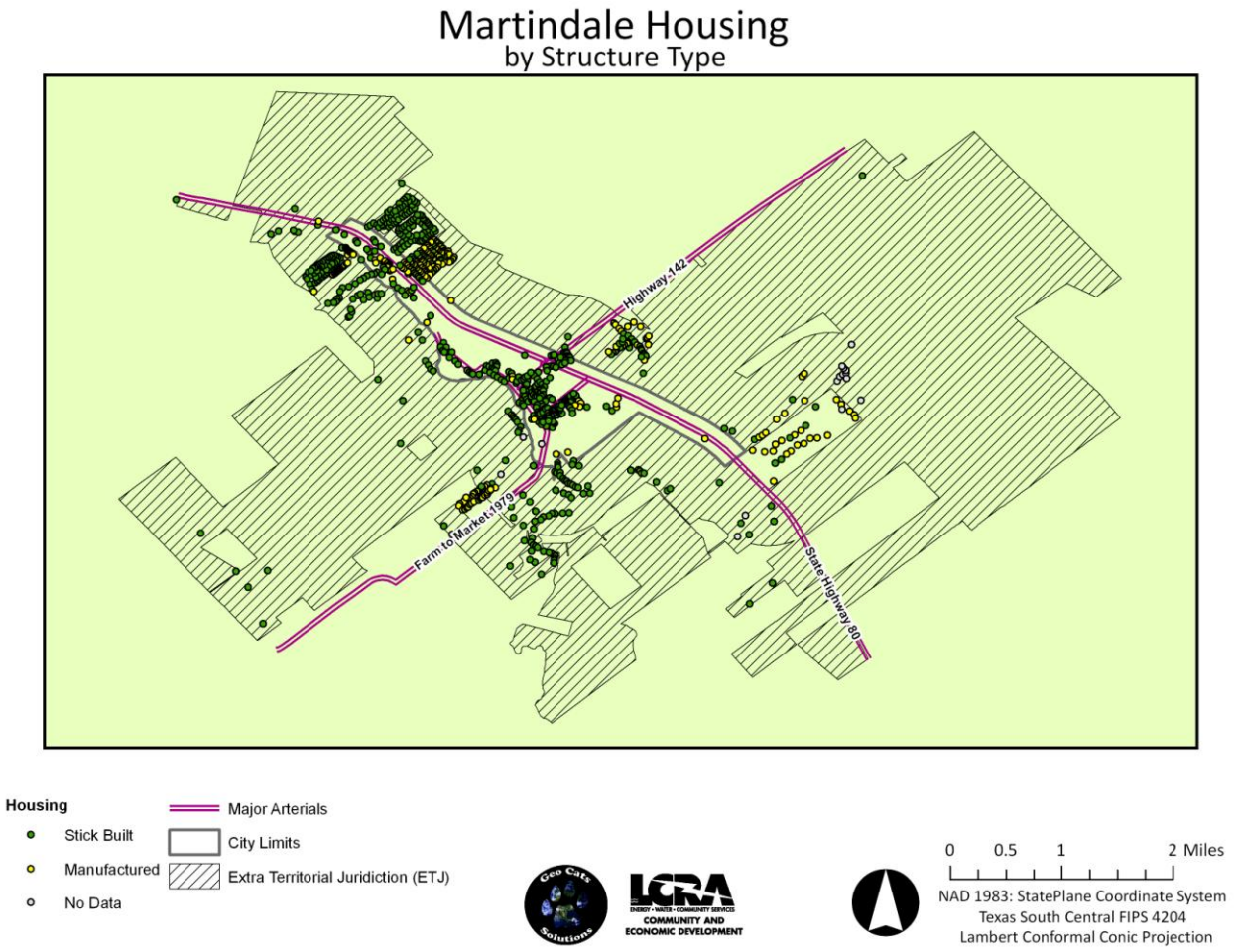


Figure 2.
Housing by Structure Type

The majority of housing in the dataset, which included 803 features, were classified as single family, detached residential use. There were 21 duplexes, 9 structures designated guest

homes, 2 structures of unknown residential use, and 2 additional inhabited non-residential structures which were considered other residential use.

GeoCats Solutions was unable to obtain condition ranking for 50 features in the dataset. There were 511 residential structures considered in good condition, 203 in fair condition, 63 in poor condition and ten features in the dataset designated as dangerous structures.

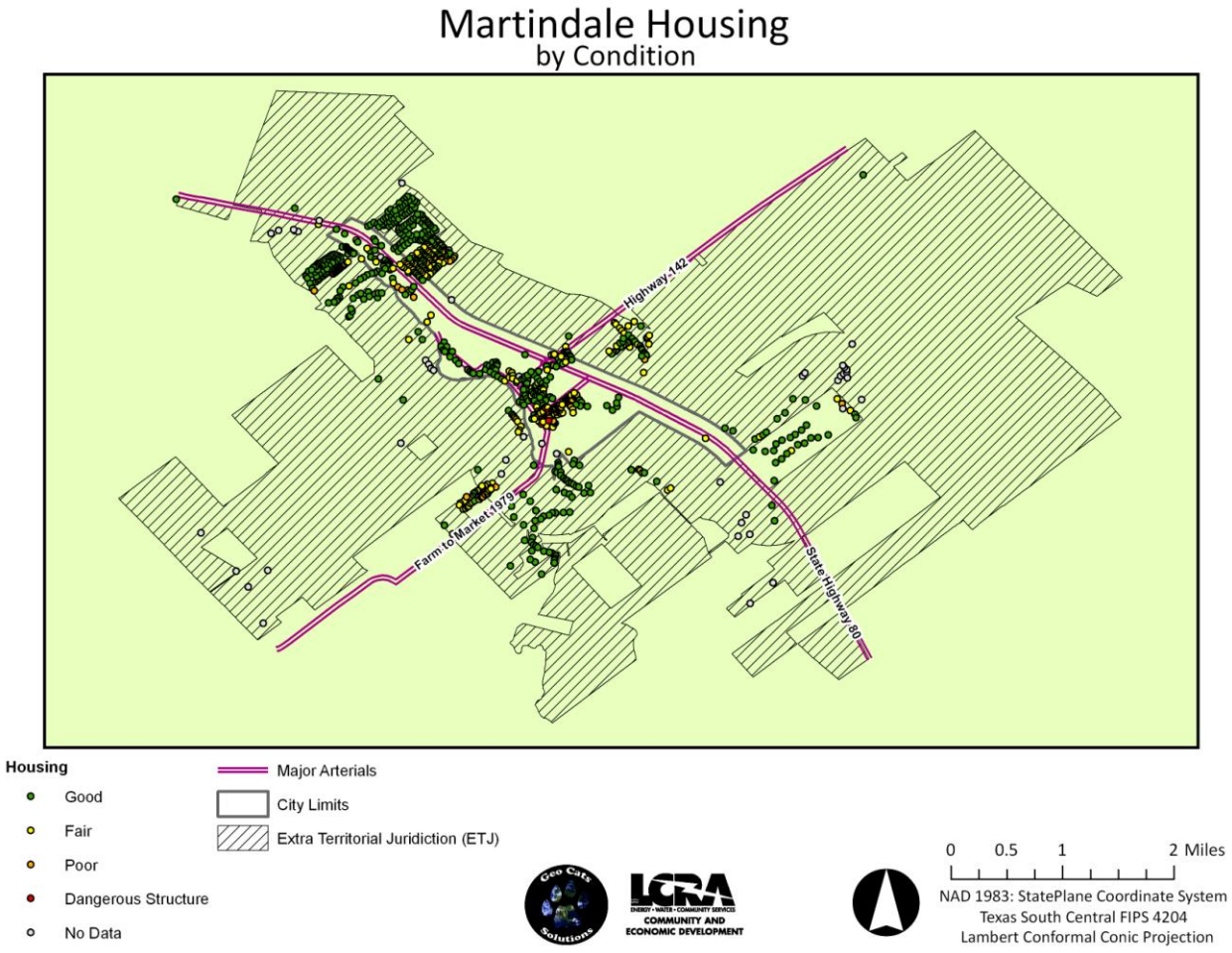


Figure 3.
Housing by Condition

Most of the housing, 786 features, were occupied, 18 vacant, and 33 features of unknown occupancy status.

3.4 Discussion

All known residential structures for the area within the scope of this project were digitized and carefully attributed. The information provided in the housing datasets can be used to determine areas of eligibility for residential improvement programs and areas of housing in non-compliance with zoning ordinances. Future expansions on this dataset could include adding housing value, parcel information, and physical address associated with each structure.

4. STREETS AND THOROUGHFARES

4.1 Literature Review

The American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Association (FHWA) are government institutions and set the federal bar on all standards and materials of street and highway construction. Documentation was used from these federal agencies to determine street width, roadway materials to be used in improvement, and highway capacity to determine the depth of roadway material to be used and the street width standard for mid-size cities. AASHTO provided us the standard materials to be used and FHWA helped us to determine highway capacity and how it is calculated to determine the width and depth of the material used in particular roadways. City street widths are also determined by city, county, and federal laws. We used the City of San Marcos Construction

requirements (City of San Marcos, 2005) and the construction standard documents of the City of Elgin Infrastructure Project of 2002 (City of Elgin, 2002) to assist us in the understanding of what standards might be implemented for the City of Martindale based on city population.

4.2 Data

Data was primarily created in the project as well as gathered from secondary sources. We utilized both types of data to accomplish our objectives. Primary data used for streets and thoroughfares was obtained through a series of field and windshield surveys, and ground observation from within the city limits and statutory ETJ. Secondary data used for this section include CAPCOG for 2009 six inch aerial imagery, Texas Natural Resources Information System (TNRIS) for aerial imagery, Texas Department of Transportation's (TxDOT) Commache Public Server for aerial imagery, traffic stations, and street and roadway network. The coordinate system used was North American Datum 1983 because it was the coordinate system that the street network was built on and it could not be changed. The data we used is relevant to the project because one objective we had proposed was to show the City of Martindale's condition of roadways and whether they should be repaired or replaced. The hierarchy by use of traffic counts was used to determine how wide the roadways should be and how deep the materials should go beyond surface level. We also set out define the arterials roadways as being minor or major.

4.3 Methods

Streets were geocoded and digitized by using TransCAD (Transportation Geographic Information System) to more accurately digitize then ArcGIS is capable of doing. This was also used to separate the names and classifications by changing the attribute table by whole field and row. TransCAD was used because the work we needed to do for the street file would be made faster and more efficient. From the CAD program we exported the DBD (Standard Geographic File) into a shapefile to start using ArcMap for the remainder of the analysis process. We began with using aerial imagery to look to see what streets were missing from the street network gained from TxDOT. Missing streets were then digitized using the Editor Toolbar Sketch function, then labeled and addressed to complete the street network. We conducted analysis of the data by adding important fields into the attribute table and then using the field calculator and selection tool to mark all the streets that were similar in condition or material values. The LCRA residential structure condition rankings given were one, two, and three for good, fair, and poor condition, respectively. Once the condition and material values were added to the attribute table, we then created a new layer in the existing data frame of the streets with their proper labels and addresses, and then added the layer of station points. We added the traffic station counts around the city and created symbology based categorization of unique values for use in identifying and analyzing the hierarchy of streets and identification of major and minor arterials. For analyzing the materials, we used six inch CAPCOG aerial images and the windshield survey completed by driving through and around the city. Once all layers were complete we analyzed by using symbology to qualify the proper levels of arterial roadways and materials used on the city's streets and thoroughfares to show the condition of the city streets.

4.4 Results

After gathering the data and using some methods through ArcMap our findings were pretty simple. The city needs to develop their roadways for the future. The first result of the manipulation of data was to determine the condition of the city streets and roadways.

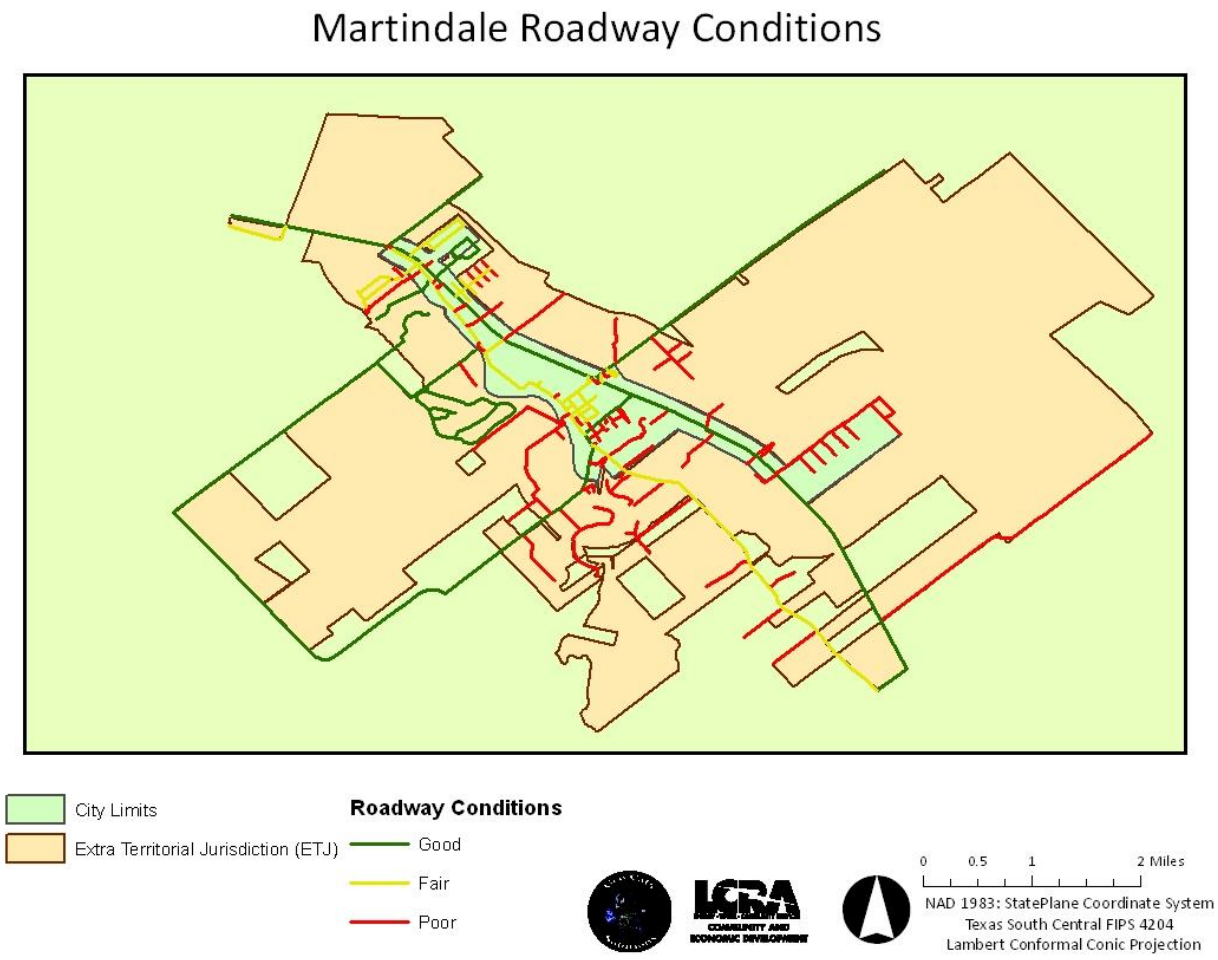


Figure 1.
Condition of Roadways

After entering the field data in the attribute table, the result showed that approximately 55 percent of their roads were inadequate. The second result of the data was the compilation of

traffic counts to the road system for the city. Results indicate that approximately 55 percent of the roads in the city are small to medium streets with few minor or major arterials.

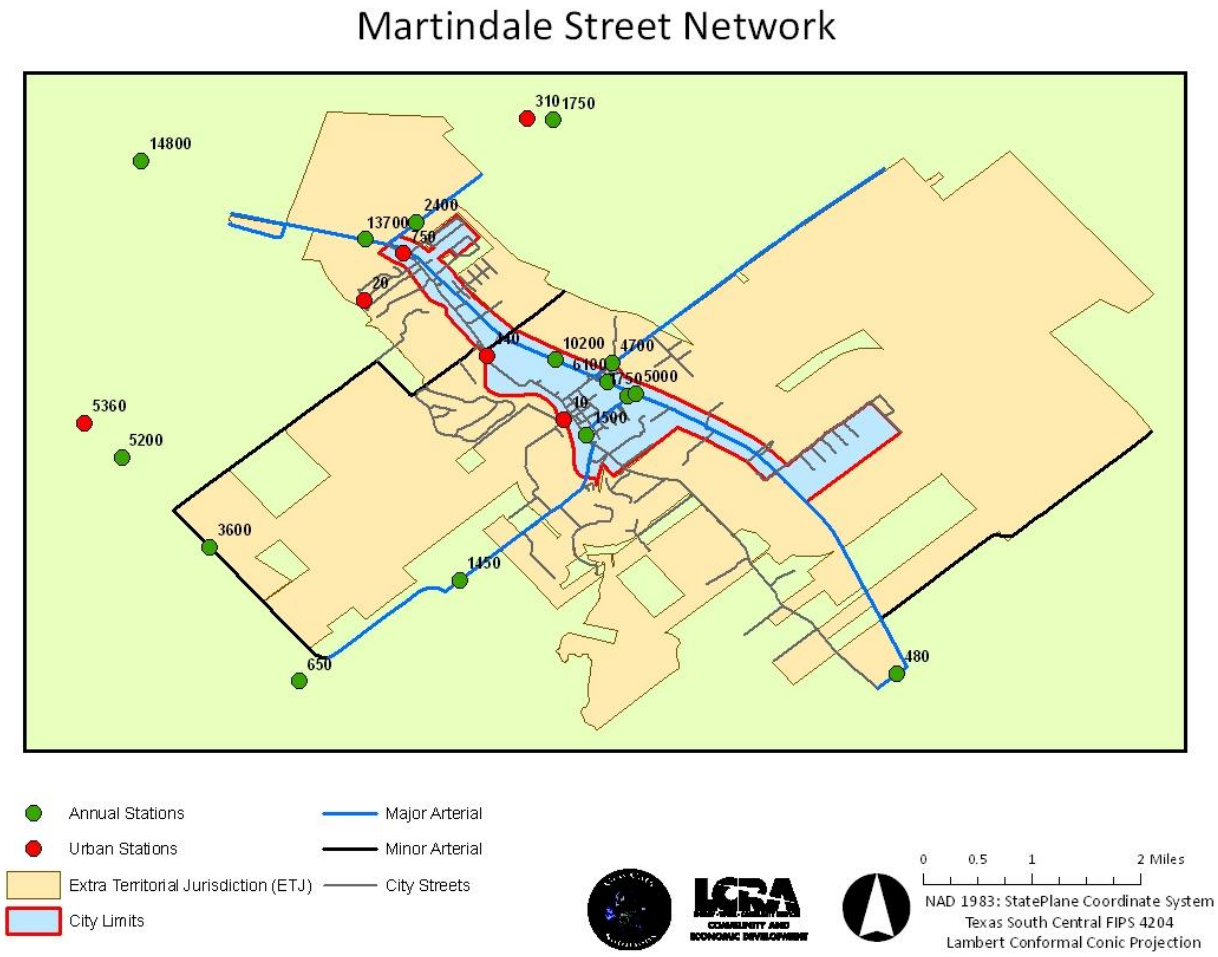


Figure 2
Street Hierarchy

The last result indicated materials that the streets were made of. The methods used showed that around 40 percent of their roads are gravel and that about 60 percent of the roads are composed of basic asphalt.

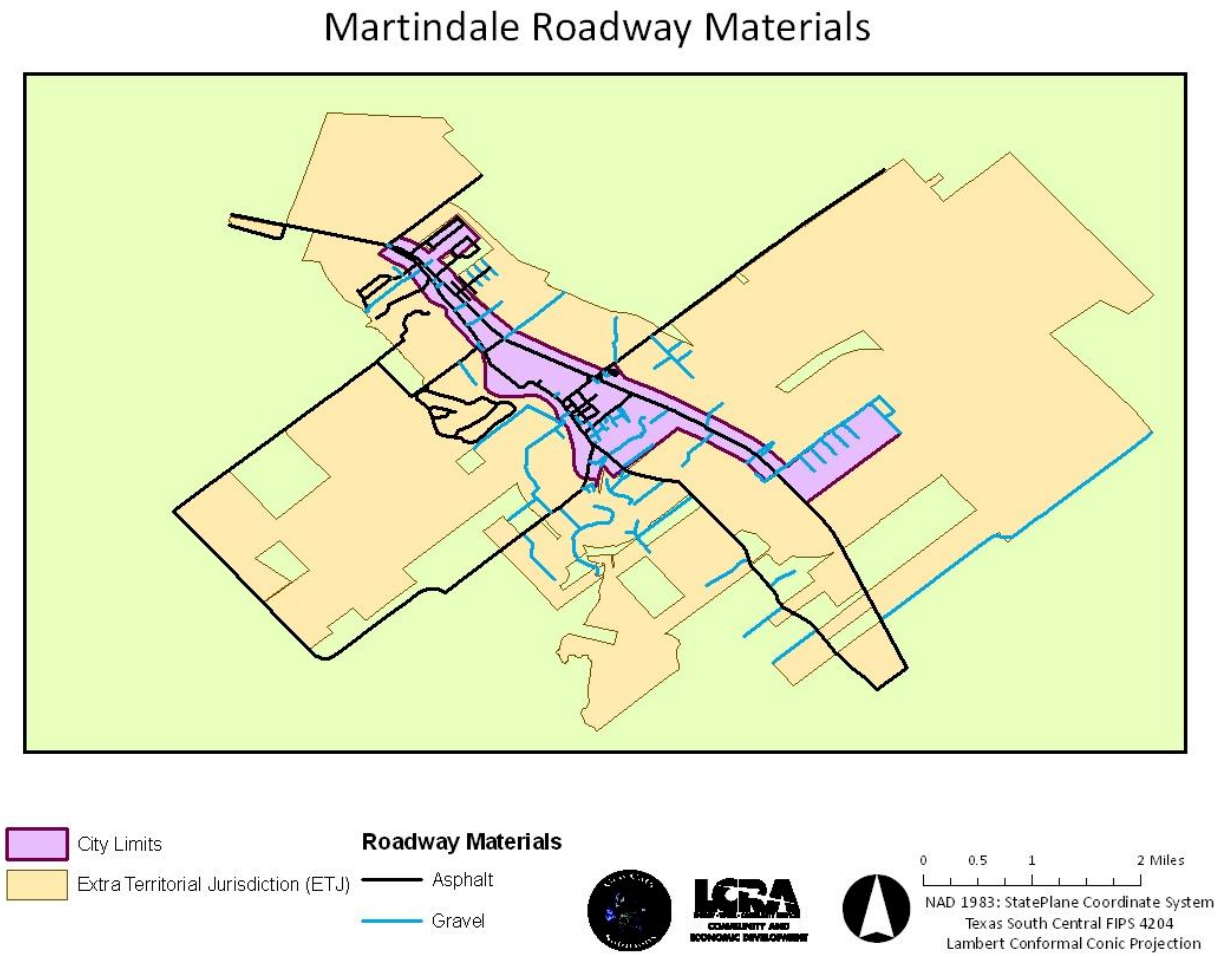


Figure 3
Roadway Materials

4.5 Discussion

From the results, it is apparent that city streets need improvement. Street data quality shows us how many vehicles are driving on the roads by reviewing count stations that the State of Texas gathers throughout the year. The data collected was accurate and showed that the city streets in Martindale should be widened and fixed based on the amount and flow of traffic. Many houses along the city streets are in the city's right of way, meaning that the

porch or front part of the house would have to be removed to widen the roads into a 40 foot standard. Imminent domain also applies, meaning that the state has final authority regarding the first ten feet of your property from the road. The paving of the roads is another aspect that the city of Martindale needs to focus on and consider improving in the future. For example, a simple spray down asphalt rock, which is when tar is sprayed down on the roadway and rock gravel is laid down on top of it, should be considered as a possible alternative to current conditions. The data regarding the width of all city streets was not gathered in its entirety, limiting the ability of GeoCats Solutions to determine what streets should be widened, based on a forty foot standard. We would not recommend expanding the roadway system that is currently in use and instead focusing on development around SH-80 which would contribute to city revenue.

Problems that occurred during this aspect of the project included time and access to the City of Martindale in reference to ground observation and field surveys. Solutions to this problem were gaining approval or permission from LCRA and the city of Martindale.

5. STORM WATER DRAINAGE

5.1 Literature Review

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 (Debo, 1995) detailed multiple

appropriate methods, both of which are dependent on the situation and location. The book also addressed why this management is so crucial to the survival of any city, town, or municipality. The City of Arcata, California also published a paper (Andre, 2006) 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" (2009) detailing citizens' responsibilities to maintain and improve storm water drainage in their community. The paper also discussed ways that cities can improve upon their system in addition to the costs of such maintenance and improvements. In addition, LCRA provided field survey symbology which enabled GeoCats Solutions to comply with the Authority's standards on the labeling of city assets.

5.2 Data

In order to properly assess the current storm water drainage conditions in Martindale, secondary data from several sources was gathered as well as primarily created. A shapefile containing the FEMA floodplain was retrieved from CAPCOG to assist in identifying houses located in the area. Their GIS data clearinghouse also had 2009 Aerial Imagery which was consulted during the identification and mapping of drainage attributes including bridges, culverts, and barrow ditches. CAPCOG has a reputation as being an organization that provides high quality, updated GIS data. Roadway data, retrieved from TxDOT for the greater Martindale area, was essential in the identification, mapping, and analysis of storm water drainage, because the bulk of storm water drainage infrastructure is located alongside roadways. The LCRA provided a shapefile delineating the city limit boundaries and Texas Natural Resources

Information System (TNRIS) supplied a Digital Elevation Model (DEM) for Caldwell County. Because TxDOT, LCRA, and TNRIS are government agencies, their data quality is guaranteed to be held to current GIS standards. Bobcat Planning, a former Texas State University Geography Department GIS student project group, created a shapefile containing the ETJ boundaries for Martindale that was also used as reference. The quality was not described and a disclaimer was noted regarding accuracy but as a former class at Texas State, they are bound to abide by the university honor code in terms of being truthful and ethical.

Primary data collection took place in a two step process. First, waypoints were collected using a Garmin GPS eTrex Legend Global Positioning System (GPS) with an accuracy of two to nine meters. These points were then transferred into ArcGIS using DNRGarmin software. NAD 1983 State Plane Coordinate System Texas South Central FIPS 4204 was the datum used in a Lambert Conformal Conic projection. Using ArcCatalog, the following polygon shapefiles were created; areas without drainage, barrow ditches, bridges, curbs, culverts, detention ponds, and problem drainage areas. Areas without drainage are spaces in which no storm water drainage infrastructure is present, often problem areas. Problem areas, however, are defined as areas lacking proper storm water drainage, including areas that are completely submerged during heavy rainfall, usually low lying areas or areas lacking slope. Barrow ditches, also known as bar bitches, are defined as roadside ditches less then six feet in depth used to collect excess rainfall. Detention ponds are low lying areas designed to temporarily hold a set amount of water while slowly draining to another location (Debo, 1995). Based on this data, we planned to discover and understand the current locations and conditions of storm water drainage infrastructure in Martindale, Texas.

5.3 Methods

In regards to secondary data, the shapefiles were retrieved, saved, and the data was added to ArcMap. The city limit boundaries, ETJ boundaries, and FEMA floodplain zones required no modification. The DEM and roads layers were clipped using the ETJ boundary. The Spatial Analyst extension toolbar allowed us to derive a five foot contour and slope from the DEM by using the surface analysis function. The Flow Direction tool located in ArcToolbox's Spatial Analyst tools allowed creation of a shapefile displaying flow direction to be derived from the DEM as well.

Using ArcCatalog, storm water drainage polygon shapefiles were created and a personal geodatabase was produced to store the feature dataset. Features were then digitized in ArcMap using the Editor toolbar by means of the sketching function. Because it is the most important feature of storm water drainage infrastructure, an attribute table was then expanded for the culvert shapefile containing the following fields; corrugated metal piping width, total number of pipes, percentage clogged, and type. The three types of culverts are reinforced concrete box culverts which house corrugated metal piping, reinforced concrete box culverts that do not, and corrugated metal piping that is not reinforced by concrete. Although all of the primary data was created in a polygon format, the locations of bridges and culverts were displayed as points in the maps for symbology purposes. GeoCats designed a Map Template that was used throughout the course of the project for consistency purposes. We also engaged in layout creation, on a case by case basis.

5.4 Results

The completion of this feature dataset resulted in a GIS that contains polygon shapefiles representing the locations of areas without drainage, barrow ditches, bridges, curbs, culverts, detention ponds, and problem drainage areas. These aspects of storm water drainage have also been mapped. Figure 1 displays Martindale's slope and the location of bridges and culverts throughout the city.

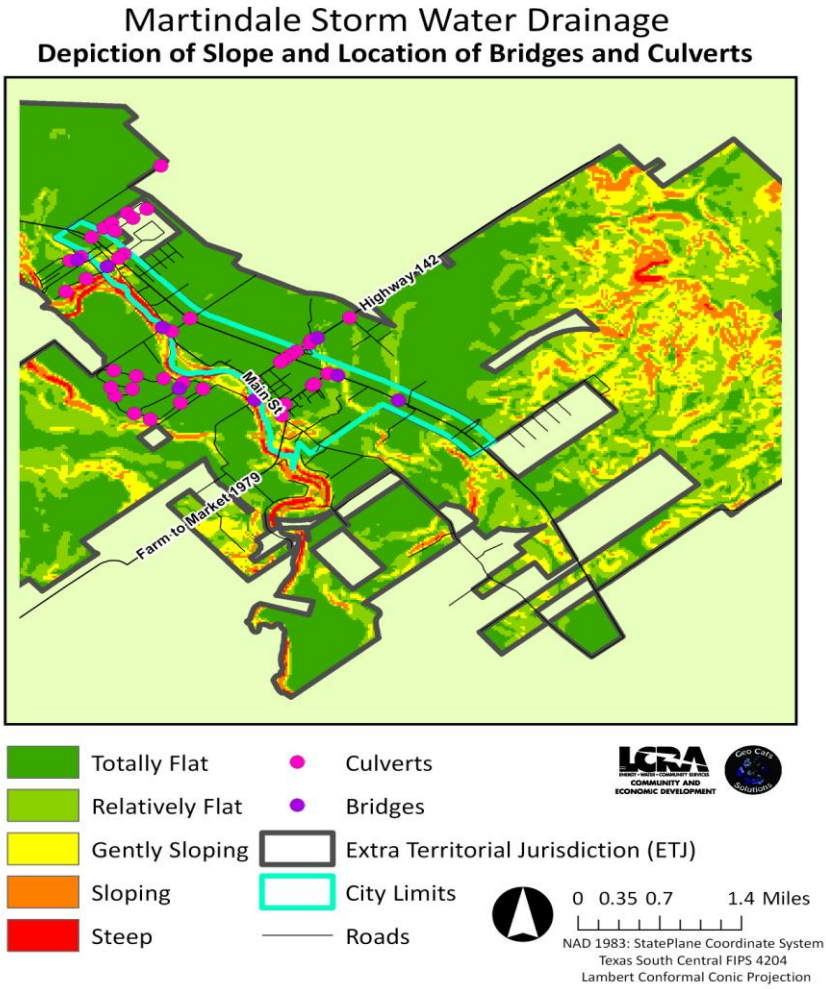


Figure 1
Depiction of Slopes and Bridges

Figure 2 shows the locations of detention ponds, problem areas, curbs, barrow ditches, and areas without drainage.

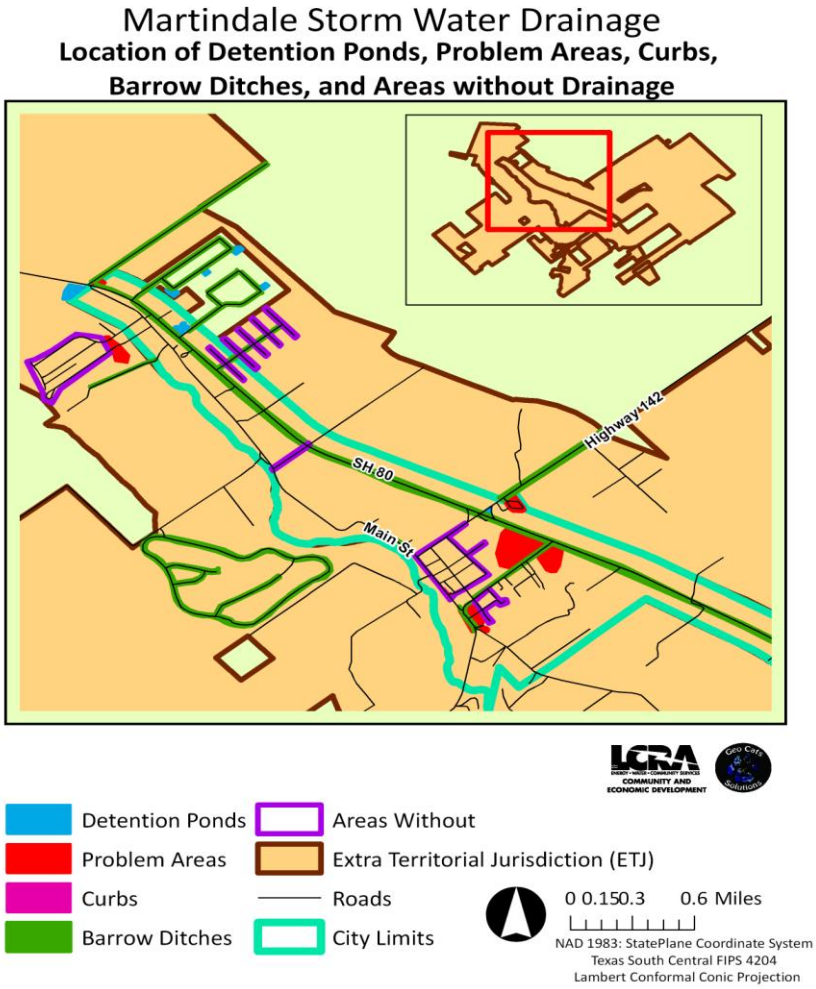


Figure 2
Detention Ponds, Problem Areas, and Ditches

Figure 3 exhibits the flow direction throughout the Statutory ETJ and contours at intervals of five feet.

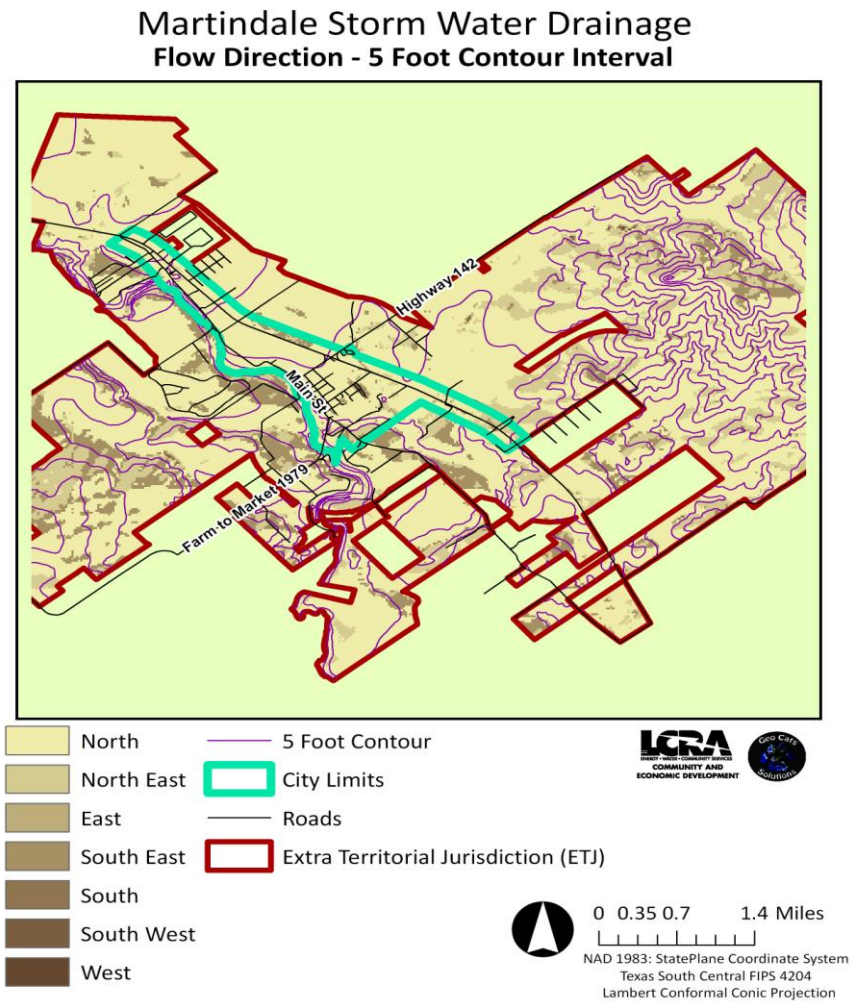


Figure 3
Flow Direction

This outcome showcases the completion of the objectives as defined in the proposal of this project.

5.5 Discussion

From the results, it became apparent that the current storm water drainage infrastructure in the City of Martindale is in need of some updating, improvements, and additions. State and

county maintained roadways that run through the city, including SH-80, FM 1979 and FM 1984 all contain adequate drainage, including culverts that are free-flowing and barrow ditches in which storm water is capable of properly flowing to detention areas and eventually into the San Marcos River. Overall, the storm water drainage that does exist is in very good condition. It is apparent that it has been well maintained with percent clogged, on average, less then thirteen percent. The majority of subdivisions in the city have some form of storm water drainage present, with some being better then others. However, the downtown area of Martindale and corresponding neighborhoods contain almost no storm water drainage whatsoever, which has seen to be very problematic especially during surges of heavy rainfall. Implications of these findings include the local residents of Martindale gaining a better understanding of what storm water drainage is and the current conditions in their city. It is also the basis for the local government to recognize what action needs to be taken based on these results. Specifically, problematic areas can be highlighted for potential future improvements.

Potential limitations included identifying locations of culverts during field surveys due to grass cover and assessing their percentage clogged. When reviewing the actions taken, we do not see other options that might have been taken in achieving the objectives. Throughout the course of this project, we learned that while the significance of storm water drainage in a city's infrastructure is very high, it is often overlooked and misunderstood.

6. GEODATABASE

6.1 Methodology

The geodatabase that housed all primary datasets was created using ArcCatalog. A separate feature dataset was created within the geodatabase for each asset, and all primary data for each asset were imported into the respective feature dataset as individual feature classes. Each primary dataset created by GeoCats Solutions was also converted to a format compatible for use with the Google Earth application.

7. OVERALL DISCUSSION

GeoCats Solutions is proud to announce the completion of asset inventory and the creation of a geodatabase which houses datasets for land use, housing, streets and thoroughfares, and storm water drainage. With this, the City of Martindale should have a better understanding concerning the current status of these assets. This should also help them in preparing their Comprehensive Master Plan. Throughout the course of this project, we learned through personal experience the importance of group cooperation. We also gained firsthand experience with client interaction. Both of these aspects will be crucial to our success as individuals in the future. We can see no other approaches we might have taken in terms of data collection, methodology, or analysis. If we had more time, we would extend the current project to include parks and recreation, water and sewage, and the central business district. We recommend the next stage of the project to be continuous update of the geodatabase as circumstances change. Anyone

continuing the work that was started in this project should keep in mind that the data collection process is quite lengthy and can be very unpredictable, in terms of access as well as identification. The future potential of this project is limitless. The City of Martindale still has several other assets that need to be addressed in the assistance of the completion of their Comprehensive Master Plan.

8. CONCLUSION

GeoCats Solutions has completed the development of a geodatabase consisting of datasets that depict the current land use, housing conditions, storm water drainage infrastructure, and thoroughfares and streets within the City of Martindale and the associated ETJs. Although the GIS analytical process was suitable for this project, the majority of our work consisted of data collection and representation. The completion of the asset datasets and the correlating GIS database will allow city officials to make informed decisions concerning future development and improvement, as well as enable residents to view current conditions and better understand the surroundings in which they live. The data has been 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 GIS software. This project was presented to the Martindale City Council in early May, 2010. GeoCats Solutions is very satisfied with the final outcome of this project.

9. REFERENCES

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10. APPENDIX I

9.1 Land Use

Identification_Information:

Description:

Abstract: This dataset includes land uses throughout the City of Martindale's City Limits, Statutory Extraterritorial Jurisdiction (ETJ), and Voluntary ETJ. The land uses include: Agriculture (AG), Single Family (SF), Multi Family (MF), Public Space (PS), Institutional (I), Utilities (U), Commercial (C), Warehouse/Industrial (WI), Recreational (R), Semi-Developed/Vacant (SD, V, SD-SF), and Private Roads (P).

Purpose: To provide the City of Martindale with current land uses within their city limits and their associated ETJs.

Data_Quality_Information:

Attribute_Accuracy:

Attribute_Accuracy_Report:

The data was collected through many field survey and ground observations. This consisted of driving throughout the city limits and associated ETJS, and determining land use data parcel by parcel. There were challenges, especially in areas that were inaccessible or private. When areas were inaccessible, land use data was taken from the associated county appraisal districts data and 2009 CAPCOG aeiral imagery. It would be best if someone with more authority could go to these areas to guarantee more accurate information. Other areas of concern included parcels of land where there seemed to be mixed land uses. An example of this woul be a structure that in physical character looked like a single family home, and was surrounded by

similar single family homes but had a sign out front signifying a business of some sort. In the case of this dataset, if the only uncertanity was a sign out front advertising a business-such as in the example, the land use would be labeled Single Family.

Hays and Caldwell Counties Parcel Data was provided by Capital Area Council of Governments (CAPCOG).

Guadalupe County Parcel Data was provided by the Lower Colorado River Authority.

Aerial Imagery was provided by CAPCOG, and was from the year 2009, with 6 inch resolution.

Completeness_Report: This dataset includes land uses for all 1091 parcels of land within the City of Martindale's city limits and associated ETJs.

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Geographic:

Geographic_Coordinate_Units:

Geographic Coordinate System: GCS_North_American_1983

Datum: D_North_American_1983

Prime Meridian: Greenwich

Angular Unit: Degree

Projected Coordinate System:

NAD_1983_StatePlane_Texas_South_Central_FIPS_4204_Feet

Planar:

Map_Projection:

Lambert_Conformal_Conic:

Standard_Parallel:

Standard_Parallel_1: 28.38333333

Standard_Parallel_2: 30.28333333

Latitude_of_Projection_Origin: Latitude_Of_Origin: 27.83333333

False_Easting: False_Easting: 1968500.00000000

False_Northing: False_Northing: 13123333.33333333

Geodetic_Model:

Horizontal_Datum_Name:

GCS_North_American_1983

D_North_American_1983

Entity_and_Attribute_Information:

Overview_Description:

Entity_and_Attribute_Overview:

The Land Use Field is broken down into several categories:

AG: Agriculture

SF: Single Family

MF: Multi Family

C: Commercial

WI: Warehouse/Industrial

U: Utilities

I: Institutional

PS: Public Space

R: Recreational

SD: Semi-Developed

SD-SF: Semi- Developed Single Family

V: Vacant

P: Private Road

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: GeoCats Solutions, 2010- Texas State University, San Marcos. Department of Geography.

Contact_Person: Lauren Bain

Distribution_Liability:

Metadata_Reference_Information:

Metadata_Date: May 5, 2010

Metadata_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Lauren Bain

Contact_Organization:

GeoCats Solutions

Advanced GIS II- Spring 2010

Texas State University-San Marcos

Department of Geography

9.2 Housing

Identification_Information:

Citation:

Citation_Information:

Originator:

Slaton McCauley, GeoCats Solutions

Department of Geography

College of Liberal Arts

Texas State University - San Marcos

Publication_Date: May 2010

Title: Residential Structures in Martindale, Texas

Edition: 2010

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: San Marcos, Texas

Publisher:

Slaton McCauley, GeoCats Solutions

Department of Geography

College of Liberal Arts

Texas State University - San Marcos

Online_Linkage:

Description:

Abstract:

The attributes of this dataset were collected through manual field observations performed within the Martindale, Texas city limits and statutory and voluntary extra-territorial jurisdictions. The geometry of this dataset was developed by on screen digitizing in Environmental Systems Research Institute ArcGIS Desktop ArcMap 9.3.1 environment using 2009 6 inch resolution MrSID format generation 2 compressed 18:1 natural color aerial orthoimagery obtained from the Capitol Area Council of Governments (CAPCOG) Geospatial

Data Information Clearinghouse.

Purpose:

This dataset was developed to provide officials for the City of Martindale an asset inventory of residential structures within the city limits, statutory extra-territorial jurisdiction, and voluntary extra-territorial jurisdiction.

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: February, 2010

Ending_Date: May, 2010

Currentness_Reference: ground condition

Status:

Progress: Complete

Maintenance_and_Update_Frequency: As needed

Spatial_Domain:

Bounding_Coordinates:

Keywords:

Theme:

Theme_Keyword_Thesaurus: Housing

Theme_Keyword: Residential

Access_Constraints: None

Use_Constraints:

Point_of_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person:

Slaton McCauley

GeoCats Solutions

Contact_Organization:

Department of Geography

College of Liberal Arts

Texas State University - San Marcos

Contact_Electronic_Mail_Address:

Slaton1242@gmail.com

GeoCatsSolutions@gmail.com

Data_Quality_Information:

Attribute_Accuracy:

Attribute_Accuracy_Report: Individual attributes were manually recorded from field observation.

Spatial_Data_Organization_Information:

Spatial_Reference_Information:

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: Martindale_p_Housing

Entity_Type_Definition: Point geometry dataset of residential structures in Martindale, Texas

Entity_Type_Definition_Source: GeoCats Solutions

Attribute:

Attribute_Label: OBJECTID

Attribute_Definition: Internal feature number

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential, unique, automatically generated whole numbers

Attribute:

Attribute_Label: SHAPE

Attribute_Definition: Feature geometry

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining features

Attribute:

Attribute_Label: PROPERTY_ID

Attribute_Definition: Identifier of parcel on which residential structure is located.

Attribute_Definition_Source:

Derived from parcel data maintained by county or governmental entity determined by respective structure location.

Attribute:

Attribute_Label: STRUCT_TYPE

Attribute_Definition: Build type of structure

Attribute_Definition_Source: GeoCats Solutions

Attribute:

Attribute_Label: RESIDENTIAL_USE

Attribute_Definition: category of structure use

Attribute_Definition_Source: GeoCats Solutions

Attribute:

Attribute_Label: CONDITION

Attribute_Definition: Rank of structure condition

Attribute_Definition_Source:

Lower Colorado River Authority

GeoCats Solutions

Attribute:

Attribute_Label: STATUS

Attribute_Definition: Determination of structure occupancy

Attribute_Definition_Source: GeoCats Solutions

Attribute:

Attribute_Label: NEIGHBORHOOD

Attribute_Definition: Name of subdivision or neighborhood in which structure is located

Attribute_Definition_Source: GeoCats Solutions

Attribute:

Attribute_Label: LOCATION

Attribute_Definition: Structure location

Attribute_Definition_Source: GeoCats Solutions

Attribute:

Attribute_Label: NOTES

Attribute_Definition: additional notes

Attribute_Definition_Source: GeoCats Solutions

Distribution_Information:

Distributor:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Slaton McCauley, GeoCats Solutions

Contact_Electronic_Mail_Address:

Slaton1242@gmail.com

GeoCatsSolutions@gmail.com

Resource_Description: Downloadable data

Metadata_Reference_Information:

Metadata_Date: 20100505

Metadata_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Slaton McCauley, GeoCats Solutions

Contact_Electronic_Mail_Address:

Slaton1242@gmail.com

GeoCatsSolutions@gmail.com

9.3 Streets and Thoroughfares

9.3.1 City Limits

Identification_Information:

Citation:

Citation_Information:

Originator: Texas Department of Transportation

Publication_Date: September 2005

Publication_Time:

Title: Traffic Urban Counts

Edition:

Geospatial_Data_Presentation_Form:

Series_Information:

Publication_Information:

Other_Citation_Details:

Online_Linkage:

Larger_Work_Citation:

Description:

Abstract: The dataset is a point file of street counts representing the traffic in the state of texas

Purpose: to show flow of traffic on road

Supplemental_Information:

Time_Period_of_Content:

Status:

Spatial_Domain:

Keywords:

Access_Constraints:

Use_Constraints:

Point_of_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Michelle Couden

Contact_Organization: Texas Department of Transportation

Contact_Organization_Primary:

Contact_Position:

Contact_Address:

Address_Type:

Address: 118 East Riverside Dr

City: Austin

State_or_Province:

Postal_Code:

Country:

Contact_Voice_Telephone:

Contact_TDD/TTY_Telephone:

Contact_Facsimile_Telephone:

Contact_Electronic_Mail_Address:

Hours_of_Service:

Contact_Instructions:

Browse_Graphic:

Data_Set_Credit:

Security_Information:

Native_Data_Set_Environment:

Cross_Reference:

Data_Quality_Information:

Attribute_Accuracy:

Attribute_Accuracy_Report: Attribute is accurate to federal and state standards

Quantitative_Attribute_Accuracy_Assessment:

Logical_Consistency_Report:

Completeness_Report: Urban counts are complete and accurate from TxDOT

Positional_Accuracy:

Lineage:

Cloud_Cover:

Spatial_Data_Organization_Information:

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Geographic:

Geographic_Coordinate_Units: North American Datum 1983

Vertical_Coordinate_System_Definition:

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: Traffic Urban Counts

Entity_Type_Definition: Urban counts for the state of texas

Entity_Type_Definition_Source:

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential numbers that are aoutmatically generated

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Shape

Attribute_Definition: feature geometry

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: coordinates defining the features

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: ID

Attribute_Definition: numerica value for dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: numeric value given to sort attribute table

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Area

Attribute_Definition: numeric value for dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: numeric value given to describe total area measurement of city limits

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Data

Attribute_Definition: numeric value for dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: numeric value describing the data that is associated with city limits

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: name

Attribute_Definition: description given for dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: description given to describe the label of the area of city limits

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: district

Attribute_Definition: description of dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: description given to describe the district used from the state of texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: NUM_STATION

Attribute_Definition: numeric value to describe the dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: numeric value given to describe the specfic number station in the city limits

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: DISTRICT_N

Attribute_Definition: description of dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: description numeric value to the district used for the state of texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label:

Attribute_Definition:

Attribute_Definition_Source:

Attribute_Domain_Values:

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Overview_Description:

Distribution_Information:

Metadata_Reference_Information:

Metadata_Date: 2010504

Metadata_Review_Date: 20100504

Metadata_Future_Review_Date:

Metadata_Contact:

Metadata_Standard_Name:

Metadata_Standard_Version:

Metadata_Time_Convention:

Metadata_Access_Constraints:

Metadata_Use_Constraints:

Metadata_Security_Information:

Metadata_Extensions:

Metadata_Language:

9.3.2 Streets

Identification_Information:

Citation:

Citation_Information:

Originator: Texas Department of Transportation

Publication_Date: September 2005

Publication_Time:

Title: Street Network

Edition:

Geospatial_Data_Presentation_Form:

Series_Information:

Publication_Information:

Other_Citation_Details:

Online_Linkage:

Larger_Work_Citation:

Description:

Abstract: The dataset is a polygon file of a line network representing the streets of the state of Texas.

Purpose: To use this dataset for the analysis of street conditions and roadway materials in prsent use and future development.

Supplemental_Information:

Time_Period_of_Content:

Status:

Spatial_Domain:

Keywords:

Access_Constraints:

Use_Constraints:

Point_of_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Michelle Couden

Contact_Organization_Primary:

Contact_Organization: Texas Department of Transportation

Contact_Position:

Contact_Address:

Address: 118 East Riverside DR Austin, Texas 78704

Contact_Voice_Telephone:

Contact_TDD/TTY_Telephone:

Contact_Facsimile_Telephone:

Contact_Electronic_Mail_Address:

Hours_of_Service:

Contact_Instructions:

Browse_Graphic:

Data_Set_Credit:

Security_Information:

Native_Data_Set_Environment:

Cross_Reference:

Data_Quality_Information:

Attribute_Accuracy:

Attribute_Accuracy_Report: Attribute is accurate to federal and state standards of current road system.

Logical_Consistency_Report:

Completeness_Report: Street network is complete system for the State of Texas

Positional_Accuracy:

Lineage:

Cloud_Cover:

Spatial_Data_Organization_Information:

Indirect_Spatial_Reference:

Direct_Spatial_Reference_Method:

Point_and_Vector_Object_Information:

Raster_Object_Information:

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Geographic:

Latitude_Resolution:

Longitude_Resolution:

Geographic_Coordinate_Units: North American Datum 1983

Vertical_Coordinate_System_Definition:

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: Streets

Entity_Type_Definition: Street Network in Texas

Entity_Type_Definition_Source:

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential numbers that are automatically generated

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Shape

Attribute_Definition: Feature geometry

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining the features

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute:

Attribute_Label: RTE_NM

Attribute_Definition: Street name

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: name given to the street

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: RTE_PRFX

Attribute_Definition: abbreviated name

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Abbreviation of of road type

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: RTE_NBR

Attribute_Definition: Number

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Number given to street

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: RTE_SFX

Attribute_Definition: Letter

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Suffix letter given to roadway to distinguish between sets

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: NUM_LANES

Attribute_Definition: number

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Number given to show how many lanes of traffic for roadway

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: STNAME

Attribute_Definition: Name

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Name given to streets city or arterials

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: ST_TYPE

Attribute_Definition: text

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Label given to streets to state what part of the address it is to be labeled

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: CITY_NM

Attribute_Definition: text identifying name

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: City name given to identify location in state

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: CNTY_NM

Attribute_Definition: Numbers identifying county number

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Number given to identify what county in the state is represented

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: DIST_NM

Attribute_Definition: Numbers identifying district number of the state of Texas

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Number given to the districts to locate them throughout the state of Texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: DISTRICT

Attribute_Definition: text identifying the name of the proper district

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: name given to identify district name in the state of texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: RTE_ID

Attribute_Definition: number given identify route in the state of texas

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Number given to identify the certain route or street in the state of texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Hierarchy

Attribute_Definition: number

Attribute_Definition_Source: Michelle Couden, LCRA

Attribute_Domain_Values:

Unrepresentable_Domain: number value given to identify what class of roadway it is per traffic count

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Condition

Attribute_Definition: number identifying geographic feature

Attribute_Definition_Source: LCRA, Michelle Couden

Attribute_Domain_Values:

Unrepresentable_Domain: number identifying the condition of the roadway being it poor or good

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Materials

Attribute_Definition: number identifying a geographic feature

Attribute_Definition_Source: LCRA, Michelle Couden

Attribute_Domain_Values:

Unrepresentable_Domain: number given identifying what kind of materials are used for the roadway in the city

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Detailed_Description:

Distribution_Information:

Distributor:

Resource_Description: Downloadable Data

Distribution_Liability:

Standard_Order_Process:

Custom_Order_Process:

Technical_Prerequisites:

Available_Time_Period:

Metadata_Reference_Information:

Metadata_Date: 20100504

Metadata_Review_Date: 20100504

Metadata_Future_Review_Date: 20100510

Metadata_Contact:

Metadata_Standard_Name:

Metadata_Standard_Version:

Metadata_Time_Convention:

Metadata_Access_Constraints:

Metadata_Use_Constraints:

Metadata_Security_Information:

Metadata_Extensions:

Metadata_Language:

9.3.3 Traffic Annual Counts

Identification_Information:

Citation:

Citation_Information:

Originator: Texas Department of Transportation

Publication_Date: September 2005

Publication_Time:

Title: Traffic Annual Counts

Edition:

Geospatial_Data_Presentation_Form:

Series_Information:

Publication_Information:

Other_Citation_Details:

Online_Linkage:

Larger_Work_Citation:

Description:

Abstract: The dataset is a point file of traffic counts, numeric data.

Purpose: To use the dataset for the analysis of hierarchy of streets by traffic counts.

Supplemental_Information:

Time_Period_of_Content:

Status:

Spatial_Domain:

Keywords:

Access_Constraints:

Use_Constraints:

Point_of_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Michelle Couden

Contact_Organization: Texas Department of Transportation

Contact_Organization_Primary:

Contact_Position:

Contact_Address:

Address: 118 East Riverside DR

Contact_Voice_Telephone:

Contact_TDD/TTY_Telephone:

Contact_Facsimile_Telephone:

Contact_Electronic_Mail_Address:

Hours_of_Service:

Contact_Instructions:

Browse_Graphic:

Data_Set_Credit:

Security_Information:

Native_Data_Set_Environment:

Cross_Reference:

Data_Quality_Information:

Attribute_Accuracy:

Attribute_Accuracy_Report: Attribute is accurate to federal and state standards of traffic count system.

Quantitative_Attribute_Accuracy_Assessment:

Logical_Consistency_Report:

Completeness_Report: Traffic counts are annual counts for the State of Texas

Positional_Accuracy:

Lineage:

Cloud_Cover:

Spatial_Data_Organization_Information:

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Geographic:

Geographic_Coordinate_Units: Nort American Datum 1983

Planar:

Local:

Geodetic_Model:

Vertical_Coordinate_System_Definition:

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: Traffic Annual Counts

Entity_Type_Definition: Yearly counts for Texas

Entity_Type_Definition_Source: TxDOT

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential numbers that are automatically generated

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Measurement_Frequency:

Attribute_Label: Shape

Attribute_Definition: Feature geometry

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordiantes defining the features

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: ID

Attribute_Definition: Internal feature number

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: sequential numbers given to attributes to sort them

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Longitude

Attribute_Definition: number to state placement on earth

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Number given to describe placement of station on coordinate grid

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: Latitude

Attribute_Definition: number to describe placement on earth

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: number given to show placement on coordinate grid

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: T_DISTRICT

Attribute_Definition: name given for recognition

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Name given to describe the district that the station is in for the State of Texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: T_DIST_NUM

Attribute_Definition: numeric value for dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Number given to describe the district name for the State of Texas.

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: T_COUNTY

Attribute_Definition: letter description of county

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: Name given to describe the county used in the state of texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: T_CNTY_NUM

Attribute_Definition: numeric value for dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: number given to describe the county used in the state of texas

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label: T_SITE_ID

Attribute_Definition: numeric value for dataset

Attribute_Definition_Source: TxDOT

Attribute_Domain_Values:

Unrepresentable_Domain: numeric value given to describe the station used for the traffic count in that location

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Attribute_Label:

Attribute_Definition:

Attribute_Definition_Source:

Attribute_Domain_Values:

Beginning_Date_of_Attribute_Values:

Ending_Date_of_Attribute_Values:

Attribute_Value_Accuracy_Information:

Attribute_Measurement_Frequency:

Overview_Description:

Distribution_Information:

Distributor:

Resource_Description: Downloadable Data

Distribution_Liability:

Standard_Order_Process:

Custom_Order_Process:

Technical_Prerequisites:

Available_Time_Period:

Metadata_Reference_Information:

Metadata_Date: 20100504

Metadata_Review_Date: 20100504

Metadata_Future_Review_Date:

Metadata_Contact:

Metadata_Standard_Name:

Metadata_Standard_Version:

Metadata_Time_Convention:

Metadata_Access_Constraints:

Metadata_Use_Constraints:

Metadata_Security_Information:

Metadata_Extensions:

Metadata_Language:

9.4 Storm Water Drainage

Identification_Information:

Citation:

Citation_Information:

Originator: Texas State University, Department of Geography, Advanced GIS II Class, GeoCats Solutions Project Group

Publication_Date: 2010

Title: Culvert Locations

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: San Marcos, TX

Publisher: GeoCats Solutions

Description:

Abstract: The culvert locations in this data were created primarily. The data contains information regarding culvert type, corrugated metal pipe width, corrugated metal pipe total, and percentage clogged.

Purpose: This data was created in order to show the locations of culverts in Martindale, TX. The data is also useful for informational purposes regarding the type of culvert, number of pipes, and percent clogged.

Status:

Progress: Complete

Maintenance_and_Update_Frequency: As needed

Keywords:

Theme:

Theme_Keyword_Thesaurus: None

Theme_Keyword: Storm Water Drainage

Theme_Keyword: Stormwater Drainage

Place:

Place_Keyword_Thesaurus: None

Place_Keyword: Martindale, TX

Place_Keyword: City of Martindale

Temporal:

Temporal_Keyword_Thesaurus: None

Temporal_Keyword: 2010

Data_Quality_Information:

Attribute_Accuracy:

Completeness_Report: All culverts, including their attributes, located within the Statutory ETJ were inventoried in their entirety

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Lambert_Conformal_Conic:

Grid_Coordinate_System:

State_Plane_Coordinate_System:

SPCS_Zone_Identifier: Texas South Central FIPS 4204

Geodetic_Model:

Horizontal_Datum_Name: North American Datum of 1983

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: Culverts

Entity_Type_Definition: Culvert locations in Martindale

Entity_Type_Definition_Source: GeoCats Solutions

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition: Feature geometry.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining the features

Attribute:

Attribute_Label: PerClogged

Attribute_Definition: Short numerical value.

Attribute_Domain_Values:

Unrepresentable_Domain: Percent clogged

Attribute:

Attribute_Label: CMP_Width

Attribute_Definition: Short numerical value.

Attribute_Domain_Values:

Unrepresentable_Domain: Corrugated Metal Piping Width

Attribute:

Attribute_Label: Type

Attribute_Definition: Text string.

Attribute_Domain_Values:

Unrepresentable_Domain:

Distinguishes between Reinforced Concrete Box Culvert (RCBC) and Corrugated Metal Piping (CMP)

Note - Some contain both.

Attribute:

Attribute_Label: Pipe_Total

Attribute_Definition: Short numerical value

Attribute_Domain_Values:

Unrepresentable_Domain: Number of pipes present

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: GeoCats Solutions

Contact_Electronic_Mail_Address: GeoCatsSolutions@gmail.com

Resource_Description: Downloadable Data

Distribution_Liability: For informational purposes only

Standard_Order_Process:

Digital_Form:

Digital_Transfer_Information:

Format_Name: AVSHP

File_Decompression_Technique: WinZip

Transfer_Size: 0.030

Digital_Transfer_Option:

Online_Option:

Offline_Option:

Offline_Media: none

Recording_Format: n/a

Fees: none

Ordering_Instructions: none

Metadata_Reference_Information:

Metadata_Date: 20100504

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: GeoCats Solutions

Contact_Electronic_Mail_Address: GeoCatsSolutions@gmail.com

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

11. APPENDIX II

10.1 Lauren Bain

- Land Use – methods, data, metadata, map creation
- Final Presentation Power Point

10.2 Slaton McCauley

- Housing – methods, data, metadata, map creation
- Geodatabase Creation

10.3 Michelle Couden

- Streets and Thoroughfares – methods, data, metadata, map creation
- Website Creation

10.4 Hannah Rogers

- Storm Water Drainage – methods, data, metadata, map creation
- Poster Creation