GeoGurus

Taking Geo-Spatial Analysis to a Higher Power

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Wimberley Market Days

Site Addressing and Management Analysis

Prepared for Wimberley Lions Club
By GeoGurus – Spatial Analysts
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1. Introduction & Problem Statement

1.1 Introduction

The Wimberley Lions Club owns and operates Wimberley Market Days, the oldest and second largest artisan market in Texas, which is known and cherished for its unique spatial layout and characteristics. The Wimberley Market Days events generate capital for donations to Texas Lions Camp for crippled children, scholarships, student foreign exchange and Lions International charities.

Wimberley Market Days events are held on the first Saturday of each month, from March through September and on the first Saturday and Sunday of October, November and December. The Market Days events are held on Wimberley Lions Club properties in Wimberley, Hays County, Texas. These properties are known, collectively, as Lions Field and are approximately 12.3 acres, including two parking lots, which are approximately 6.8 acres altogether.

Lions Field is located on FM 2325 in Wimberley, TX, about 15 miles northwest of San Marcos and 40 miles southwest of Austin. Wimberley is situated at the eastern edge of the scenic central Texas hill country.

1.2 Problem Statement

Wimberley Market Days has expanded to its current size of 475 vendor booths since it began at Lions Field in 1972. All booths vary in size and shape, and the arrangement of the numbering system, sequential in order of construction, leads to no decipherable pattern. Vendors and customers have a hard time finding their way around on the day of the event.

Each of the 475 booths has a yearly lease agreement which allows the Lions Club to rent that booth to a day vendor, should the yearly lease holder be unavailable for the Market Days

event. The daily renters are provided booths on a first come, first serve basis, pending booth availability. A queue is started several days before the Market Days event via the ShopMarketDays.com website to establish the order in which the potential day vendors may choose available booths. Day vendor check-in proceeds on the day of the event with a traditional hand roster after the perspective day vendors have surveyed the entirety of Lions Field on foot to establish their primary choice in available booths.

GeoGurus address the issues of booth numbering/addressing and day vendor booth allocation in this report. The Wimberley Lions Club identified these two issues as being of primary concern relating to the efficiency in management of the Wimberley Market Days. In solving these problems the Wimberley Lions Club will be able to realize a larger donation budget for charitable causes.

1.2.1 Addressing

The unique spatial layout of Lions Field is difficult to navigate. An improved booth numbering system will alleviate some of the frustrations of locating particular booths. GeoGurus offer several solutions for the booth addressing situation in this report.

Our research of urban addressing, the unique characteristics of Lion Field and the needs of the Lions Club led us to three final recommendations. We feel each of the three options provided is an improvement to the current booth numbering system. The first is a traditional street addressing schematic, the second divides Lions Field into logical sections and the third clusters booths hierarchically. Ultimately, the Wimberley Lions Club now has options to explore, ranging from an extreme departure from the current system to minor adjustments to the current system.

1.2.2 Day Rental Booth Availability

GeoGurus recognized the frustration of the potential day vendors and the Market Days staff during the day rental procedure. This report outlines a web-driven approach to assist daily booth renters in identification of a suitable booth for daily rental. The GeoGurus approach is twofold, using an online database and an online map viewer.

Creating and maintaining a database was an integral part of the Market Days project. GeoGurus designed a database in hypertext markup language (HTML) that is searchable with JavaScript. There are numerous ways to create a database, for example, using Microsoft Excel then importing to Microsoft Access, or using PHP and MySQL. One is not obligated to use the methods we used, however the benefit to using our methods is that the database is relatively easy to manage as long as one knows a few very basic HTML commands.

Typically a programmer would prefer to use MySQL when building a database from scratch, largely because it is one of the best open source database management systems available for free. While creating a database and table is not difficult, especially if a person uses other open source programs such as LAMP (LINUX, Apache, MySQL, PHP) or WAMP (Windows, Apache, MySQL, PHP), designing and connecting the front end of the database (the search page) to the database is considerably difficult. An extensive knowledge of PHP (hypertext preprocessing), a scripting language, is necessary to be able to create the scripts that enable a user to query the database. While it allows for a dynamic website, it is a relatively difficult language to learn. Our database design is simple, yet extensible and effective.

ALOV Map is an open source Java application for the visualization of geographic data on the internet. ALOV Map was chosen by GeoGurus for the Market Days project because of the multitude of features it offers and its free licensing for non-profit organizations. It is robust and capable of displaying multiple geographic file formats; in our case the base geographic data is the shapefile, which is processed with Environmental Systems Resource Institute's (ESRI) ArcGIS software package. Other open source solutions were considered, such as Google Earth, but were found to be inadequate due to the large map scale required. An Adobe Flash solution was also considered but rejected due to the need for overly complex intermediate data processing and database connectivity.

Market Days currently employ internet technology in the day rental procedure in the form of a rental queue. The HTML database and interactive ALOV map will now enable potential day renters to survey booth amenities and locations remotely, via the internet, to ascertain which booths may best suite their needs at the time they enter the rental queue. The database and ALOV Map will integrate easily with ShopMarketDays.com.

2. Literature Review

In order to solve the addressing problem for the Wimberley Lions Club, GeoGurus researched various topics and websites pertaining to codification and addressing systems. Addressing is a very useful tool in society today as it provides a complex system of named and numeric reference points in order for persons to locate businesses or residences, as well as, allowing for city entities such as the police or fire department to do the same.

The study which proved to be most helpful in solving the addressing problem was put together by Special Interest Group in Urban Settlement (SIGUS), School of Architecture and

Planning, MIT prepared by Rienhard Goethert, Anne Beamish and Kristin Little. It provided a systematic, detailed report on implementation of Urban Upgrading. The research provided insight on the implementation of an addressing system in the "shanty-towns" or slums of third world countries. The research gave five keys or steps to implementing an addressing system, the points included: codification, numbering streets, mapping, numbering doorways, and a computerized address directory (The World Bank Group, 2001).

An explanation of each of the five keys is necessary in order to have a better understanding of the process and how to go about actually implementing the addressing system.

1. Codification – the establishment of principles for street identification and numbering of buildings. (i.e. in urban American neighborhoods, some type of reference point is used to determine what street a house faces whether it is a mailbox or the front door of the household.)

2. Numbering streets – establishment of reference points, thus allowing for division of the "city", each section can then be assigned a letter or zone number. (i.e. find some sort of natural break or division, possibly a major street or intersection, even a stream or creek would work.)

3. Mapping – includes the establishment of an address map; as well as, a street index. (i.e. road atlas, key map, state or city map)

4. Numbering doorways – this step is the longest step in the implementation process. Start from the "zero point" or first point on each street and increase the numeric value as you move further away from the starting location.

5. Computerized address directory – serves as a reference for government and city agencies and utilities. The data for this step is compiled during the numbering process (The World Bank Group, 2001).

In the case of an actual city or municipality, addressing usually falls solely on the shoulders of the city or municipality for which the addressing system is to be implemented. There are two important phases here, the implementation and the maintenance of the addressing system. However, since the Wimberley Lions Club owns the property, they may contract out their addressing issues to whomever they so choose. After the decision is made as to whether or not to contract the work out or implement the system on their own, the implementation should be done as quickly as possible to prevent any resistance or negative criticism of the change. Once the system is implemented; the Wimberley Lions Club or their contractor will be responsible for the maintenance and upkeep which should be updated on a regular basis in order to provide current data from month to month. In order for the transition from the old numbering system to the newer recommended addressing system to go smoothly, the Lions Club must make every effort to inform their vendors of all of the positive aspects of the change. The new addressing system will make it easier for not only vendors and day vendors to navigate the property, but it will also make navigation much easier for visitors and in the case of an emergency fire department and or ambulances as well (The World Bank Group, 2001).

3. Data

In order to provide a better mapping system and implement a new addressing system for the Wimberley Lions Club, the GeoGurus collected different types of data:

1. A computer aided design (CAD) drawing

2. A booth inventory attribute list
3. Current photos of every booth within the market
4. Aerial images
5. Property boundaries

The CAD drawing was provided to GeoGurus by the Wimberley Lions Club and was used as a base dataset throughout the entire project. It was received in digital format with a DWG file extension. The CAD drawing was one of the most relevant datasets to the project as it provided a starting point to digitizing the property and booths individually.

A booth inventory attribute list was received from the Lions Club as a digital spreadsheet with a XLS file extension. In order to update the attribute inventory for the booths, GeoGurus went to Lions Field and took a physical inventory for each and every booth on the property itself. The physical inventory is now up-to-date and should be updated perhaps annually in order to better record changes to the booths. The updated inventory was necessary in order to make a database which the Lions, vendors, or visitors can query to find booths providing amenities relevant to an individual's needs.

GeoGurus also obtained digital photos of every booth within the market. The photos will be linked to the dynamic mapping system and are mainly there to aid vendors in locating a booth appropriate to the needs of their business.

GeoGurus also obtained two aerial photos to help with the process of digitizing the CAD drawing. The images were used to spatially adjust the CAD drawing and analyze the accuracy and spatial distribution of the booths and facilities at Lions Field. One of the aerial photos was obtained from the United States Geological Survey (USGS) website and was taken in February

2006 with a two foot resolution. The other aerial photo that GeoGurus used was obtained from Texas Natural Resources Information System (TNRIS) and is a National Agricultural Imagery Program (NAIP) photo that was taken in July 2004 with a one meter resolution. The USGS photo was helpful in identifying and digitizing the general placement of the market and clearly outlining the network of paths throughout the market. The aerial photo from TNRIS also proved to be quite helpful in assessing Lions Field.

4. Methods

4.1 Addressing

A survey of the Lions Club Market Day site first was conducted in order to identify potential encompassing sections of vendor booths, which have either natural boundaries or arbitrary administrative-type boundaries. Various addressing systems were then considered for the Lions Club Market Day site according to their ability to conform to these natural or arbitrary boundaries and therein result in a logical numbering system.

After analyzing various addressing systems, preference was given to a system based on natural boundaries. Given the layout of Lions Field, the most obvious naturally occurring boundaries cluster booths into “islands” separated by footpaths and contained by the property boundary. The islands were therefore independent of one another and coded alphabetically. The booth numbering system was created in a clockwise order per island, and the order was designed to begin at the corner nearest to a gate or bottom left-hand corner of the island. Each island-section is easily identifiable on the map and has a numbering system independent of other islands.

GeoGurus presented the Lions Club our preferred addressing system based on these natural section boundaries, or islands. With their input from this meeting GeoGurus developed two additional addressing systems which provide the Wimberley Lions Club with options.

An arbitrary sections addressing system was created that consists of four large sections with titles thematic to our client (L-I-O-N). The sections were created with natural boundaries if possible; otherwise the most logical section break was identified. Each of the four sections contains its own numbering system. The booth layout per section was analyzed in order to create the most logical flow of booth numbers possible. Gaps were left in the numbering system to accommodate booth partitioning, and information was included in the data Attribute Table to record the "alternative number and street" identification for each applicable booth feature.

A street-centric addressing system was also created. The beginning and end of each street was identified, and corner booths were identified with the most appropriate street. Non-corner booths that face two streets were identified with either the major street (such as Lion Way) or most appropriate minor street. Each street section was designed with its own numbering system. From the beginning of the street, the even numbers are always on the left side and the odd numbers are on the right side. The beginning of each street was identified as either at the gate entrance or branching off from the main street "Lion Way." Gaps were left in the numbering system to accommodate booth partitioning, and information was included in the data attribute table to record the "alternative number and street" identification for each applicable booth feature.

4.2 Database

GeoGurus received an Excel spreadsheet from the Market Days management that contained the information of all 475 booths including the booth number, booth status (leased, locked, etc), and whether or not the booth had a roof, tables or racks. On our first venture to Market Days, we doubled checked that the information provided was as true and accurate as possible, making edits to the spreadsheet as we felt needed. For the most part, the spreadsheet was up to date so there were relatively few adjustments we had to make to it.

With a newly updated booth inventory we designed a database that would reflect the unique character of each booth located at Lions Field. Booths may have the same attributes on paper, but comparing them side by side was like comparing apples and oranges. As mentioned before, there are many ways to design a database. We, however, opted to take a different approach to the situation. We felt it was necessary to build a database that one could query with optimum results, but was also easy enough for any member of the Lions Club to be able to update, not just the webmaster.

We used Alleycode HTML Editor to create our database. Using the html tag (<html>) tells a server that the file is a webpage. To create the table, we first had to set the parameters of the table. We input the size of the headers and the spacing we wanted in pixels, as well as the font type and size within a style tag (<style></style>) between the head tag (<head></head>), which stores all the information that isn't displayed on the webpage itself. In between the closing style and head tag we inserted a JavaScript. Java is a scripting language that is relatively easy to learn and use. There are numerous websites online that offer free JavaScript that allow web-designers to make their websites dynamic without the fuss of having to learn PHP. We found a

script online that allows us to filter our table the same way a database is queried when you search for something. The only difference is that the filter allows you to see the table first, whereas with PHP all you get is a search form; the table is hidden. The JavaScript embeds a pre-generated JavaScript file that allows a Java feature to properly execute, which we will discuss in more detail later.

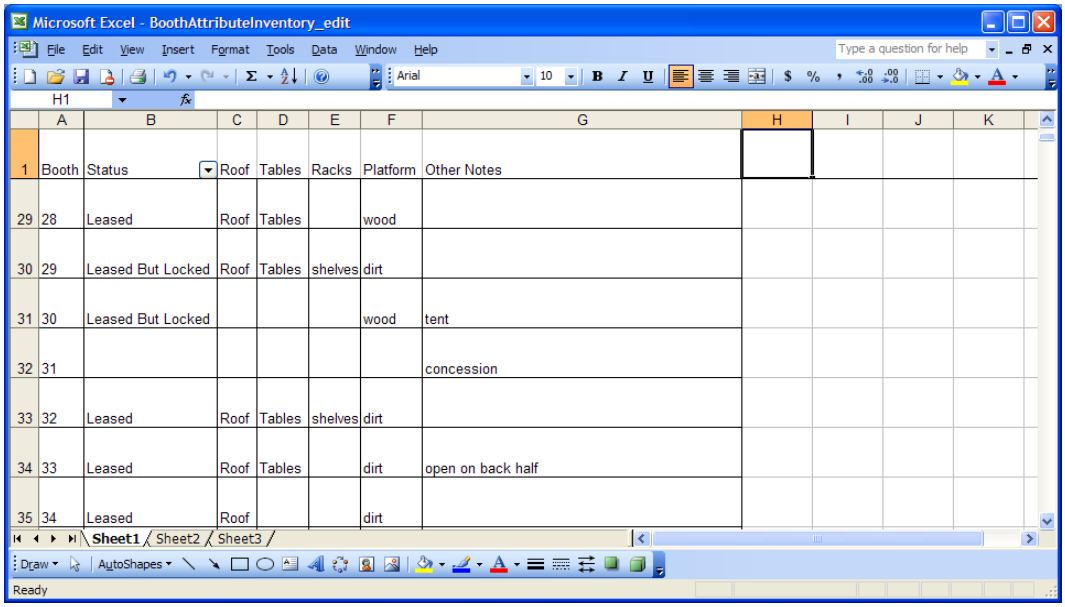


Figure 1. The Booth Attribute List in Excel format.

Directly underneath the body tag (<body>) is where the top of the webpage begins. After adding a title, we began to create the table itself. We inserted a table tag (<table>) and proceeded to name the table (in our case, it is “table2”). Using a <tr> tag, which we used to create new table rows, we created the first row where the headers were going to be located. With the first row established, we used the <th> tag to create the table headings, or columns, for our table. A total of eight columns were created: Booth Number, Booth Status, Roof, Tables, Racks, Platform Type, Other Notes and Pictures. With the headings complete, we closed the headings and rows tag, </th> and </tr>, respectively. With that in place, we began to fill in the information for each

booth. Every time we added new a new booth we opened the tags for a new row and then used the <td> tag to set off each cell in a row. Once we filled in the information for one column, we would close the tag (</td>) and open another one, filled in the information, and closed it etc until we filled in all the necessary information in the row for the booth. We then closed the row (</tr>) and proceeded to open another one to fill in the information for the next booth. We continued this process until we had entered all the booths and their attributes into the table. To complete the table, we simply closed the table tag (</table>).

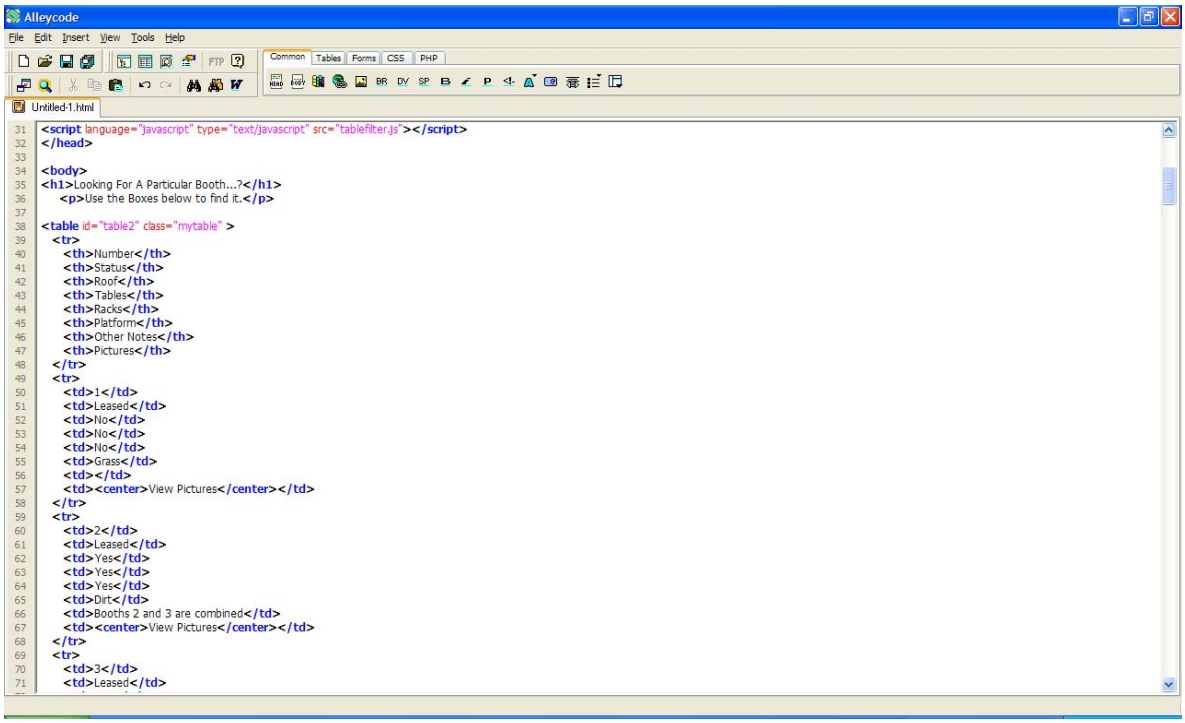


Figure 2. Various tags used to create the headings and rows of the table.

Before we could save the file, we had to insert one more JavaScript after the table close tag. This script created drop down boxes on top of each columns we specified. Each box then searched its respective column for the different variables listed and saved them on its drop down list.

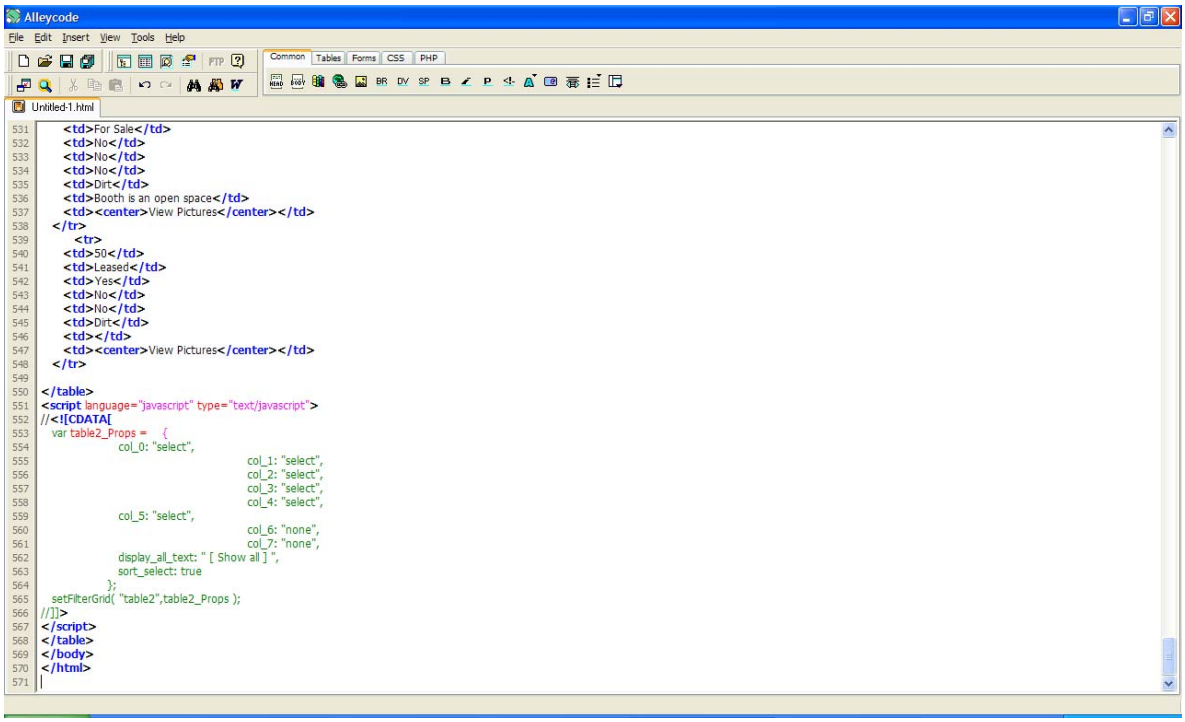


Figure 3. The inserted JavaScript.

4.3 Map viewer

ALOV Map is a Java application which displays digital geographic data files via web browsers. There are four steps to implementing the ALOV Map: acquire and configure the Java application onto a web-server, create a webpage to display the application, develop geographic data and interface the application, webpage and geographic data using a scripting language.

The ALOV Map viewer was downloaded from the ALOV.org website, free of charge, and configured to a GeoGurus web-server for initial testing and implementation. A webpage was developed in HTML to display the map viewer in a web browser and uploaded to a localhost web server. There were four maps of Lions Field GeoGurus felt should be included on the map viewer: the current numbering system, the islands numbering system, the large sections

numbering system and the streets numbering system. Each of these maps was developed using ESRI ArcGIS and therefore has a shapefile associated with it; shapefiles are form of digital geographic data compatible with ALOV Map. Each shapefile was then uploaded onto the web-server. An Extensible Markup Language (XML) script was written to link the geographic data to Java application being displayed on the web-page. XML is a common scripting language used to share data between different types of computer applications.

The webpage was successfully tested on the GeoGurus web server. The application was then uploaded onto the web server at http://geosites.evans.txstate.edu/~g4427s08-02. Further refinements of the XML script continued until each map view was deemed acceptable by GeoGurus staff.

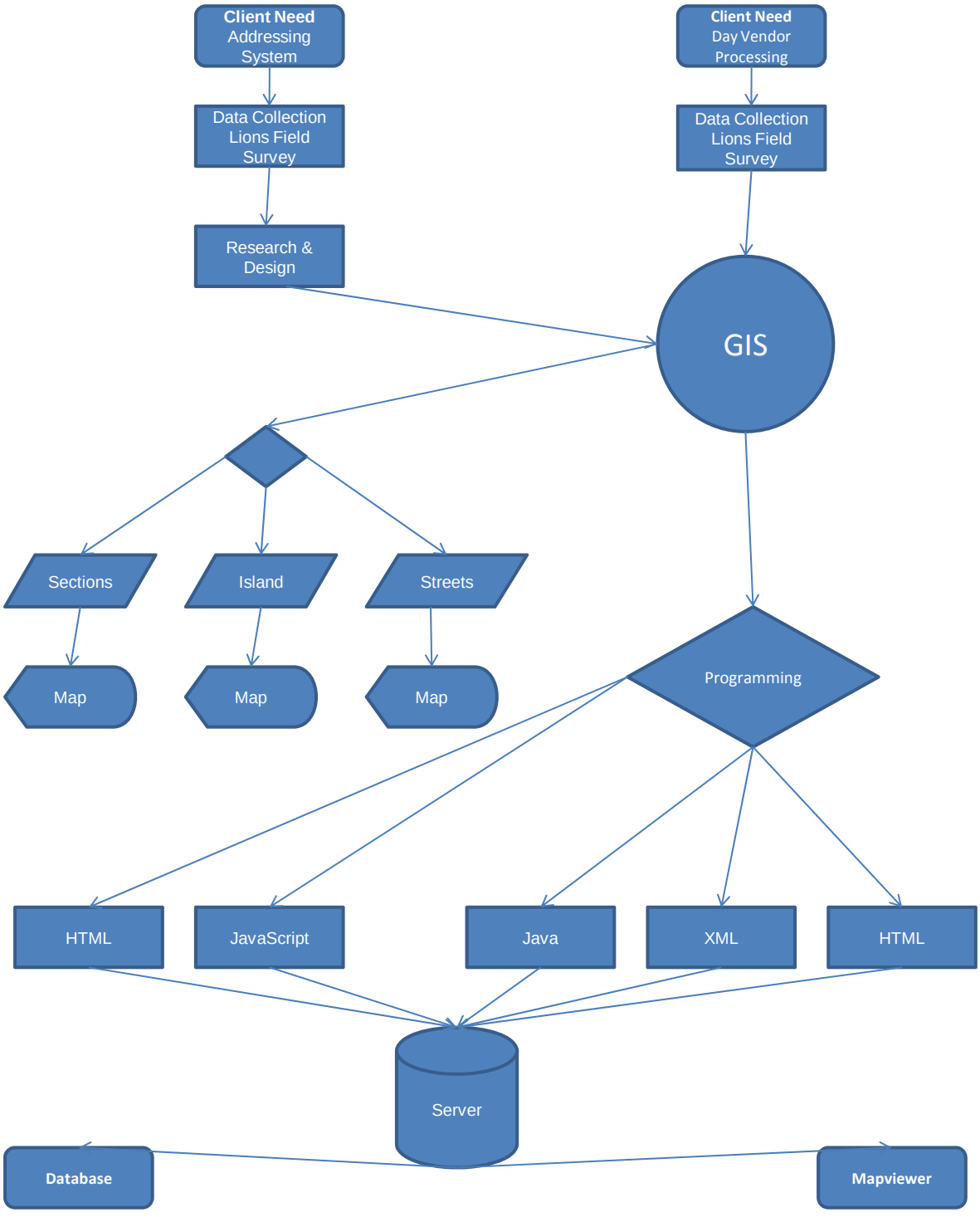


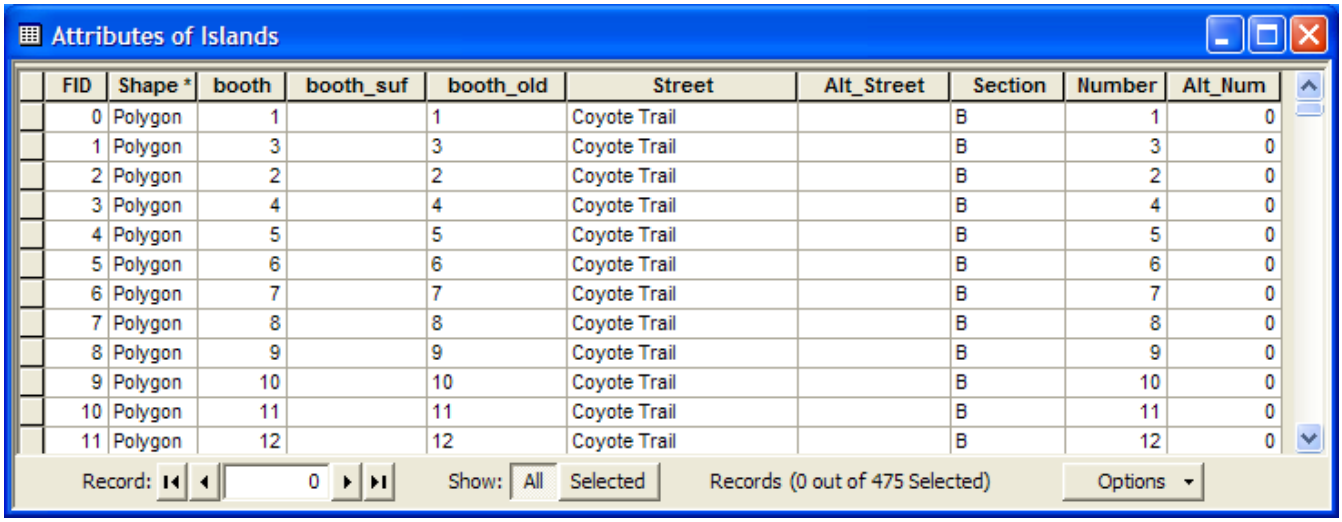
Figure 4. Flowchart of overall project methods.

5. Results

5.1 Addressing System

The addressing systems resulted in the three previously mentioned forms: islands, large sections (L-I-O-N), and streets.

The islands addressing system resulted in twenty-one sections, identified alphabetically in a logical spatial flow from the left (east) side of Lions Field, to the right (west) side of Lions Field. Each island section is color coded on the final map design to aid visual identification. The booths' data are stored in the attribute tables as follows: unique feature identification (FID), type of feature (Shape), former booth number (booth), former suffix (booth_suf), former booth ID with number and suffix (booth_old), street location (Street), alternative street location (Alt_Street), island section (Section), booth number (Number), and alternative booth number (Alt_Num).

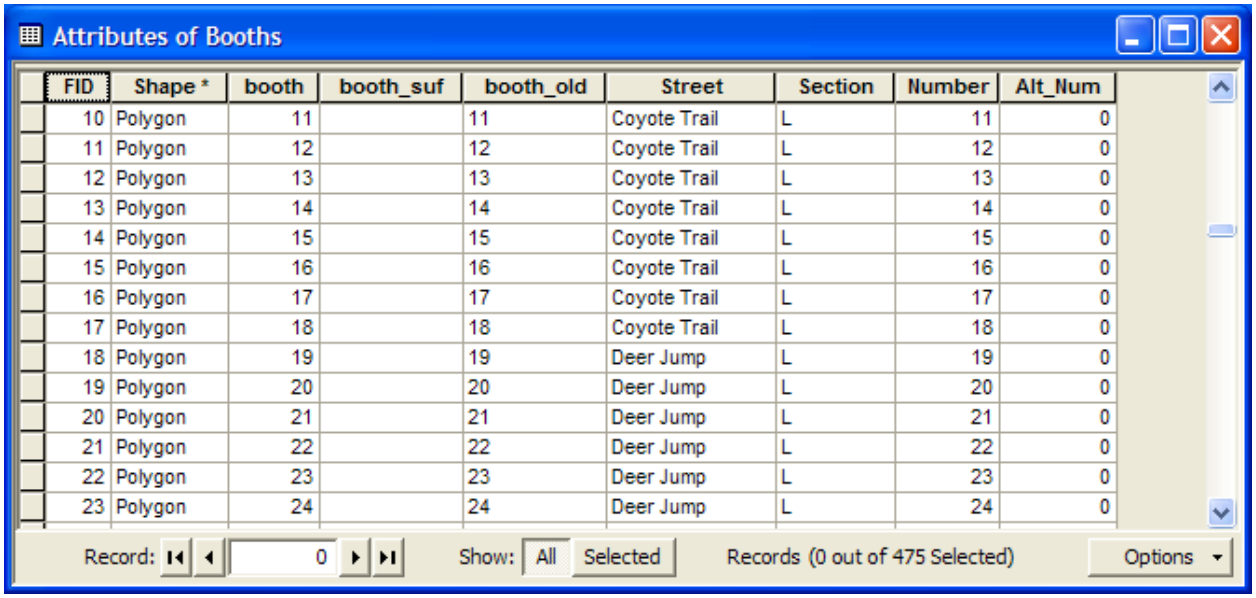


FID	Shape *	booth	booth_suf	booth_old	Street	Alt_Street	Section	Number	Alt_Num
0	Polygon	1		1	Coyote Trail		B	1	0
1	Polygon	3		3	Coyote Trail		B	3	0
2	Polygon	2		2	Coyote Trail		B	2	0
3	Polygon	4		4	Coyote Trail		B	4	0
4	Polygon	5		5	Coyote Trail		B	5	0
5	Polygon	6		6	Coyote Trail		B	6	0
6	Polygon	7		7	Coyote Trail		B	7	0
7	Polygon	8		8	Coyote Trail		B	8	0
8	Polygon	9		9	Coyote Trail		B	9	0
9	Polygon	10		10	Coyote Trail		B	10	0
10	Polygon	11		11	Coyote Trail		B	11	0
11	Polygon	12		12	Coyote Trail		B	12	0

Figure 5. Attribute Table of Islands Addressing System.

The large sections addressing system resulted in four sections (L-I-O-N), based on the current sections identified by the Lions Club (sections I, II, III, and IV). However, the current Lions Club sections uses a continuous numbering system, crossing section boundaries, whereas the new sections, L-I-O-N each contain their own numbering system. In addition, a new, more identifiable boundary was drawn between current sections II and III, or the new sections "I" and "O". Each large section is color coded on the final map design to aid visual identification.

The booths' data were stored in the attribute table as follows: unique feature identification (FID), type of feature (Shape), former booth number (booth), former suffix (booth_suf), former booth ID with number and suffix (booth_old), street location (Street), section ID (Section), booth number (Number), and alternative booth number (Alt_Num).



FID	Shape *	booth	booth_suf	booth_old	Street	Section	Number	Alt_Num
10	Polygon	11		11	Coyote Trail	L	11	0
11	Polygon	12		12	Coyote Trail	L	12	0
12	Polygon	13		13	Coyote Trail	L	13	0
13	Polygon	14		14	Coyote Trail	L	14	0
14	Polygon	15		15	Coyote Trail	L	15	0
15	Polygon	16		16	Coyote Trail	L	16	0
16	Polygon	17		17	Coyote Trail	L	17	0
17	Polygon	18		18	Coyote Trail	L	18	0
18	Polygon	19		19	Deer Jump	L	19	0
19	Polygon	20		20	Deer Jump	L	20	0
20	Polygon	21		21	Deer Jump	L	21	0
21	Polygon	22		22	Deer Jump	L	22	0
22	Polygon	23		23	Deer Jump	L	23	0
23	Polygon	24		24	Deer Jump	L	24	0

Figure 6. Attribute Table of the Large Sections Addressing System.

The street-centric addressing system resulted in nineteen sections named per street. Each street-based section is color coded on the final map to aid visual identification. The following data are stored for all booths in the attribute table: unique feature identification (FID), type of

feature (Shape), former booth number (booth), former suffix (booth_suf), former booth ID with number and suffix (booth_old), new booth number (Number), street identification (Street), alternative booth number (Alt_Number), and alternative street identification (Alt_Street).

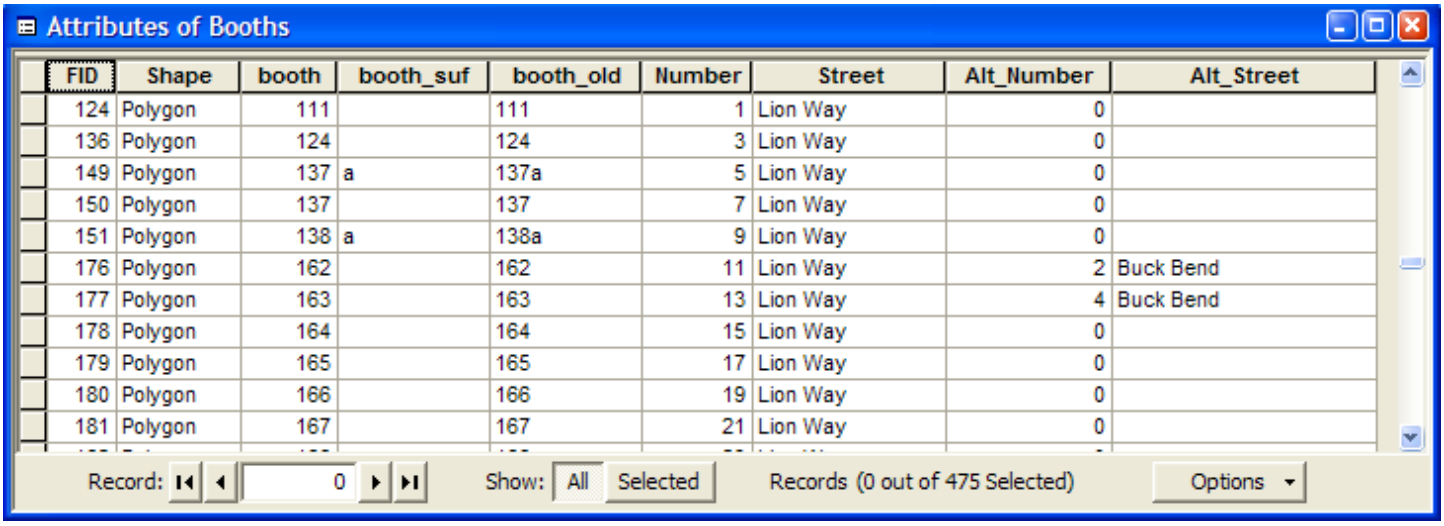
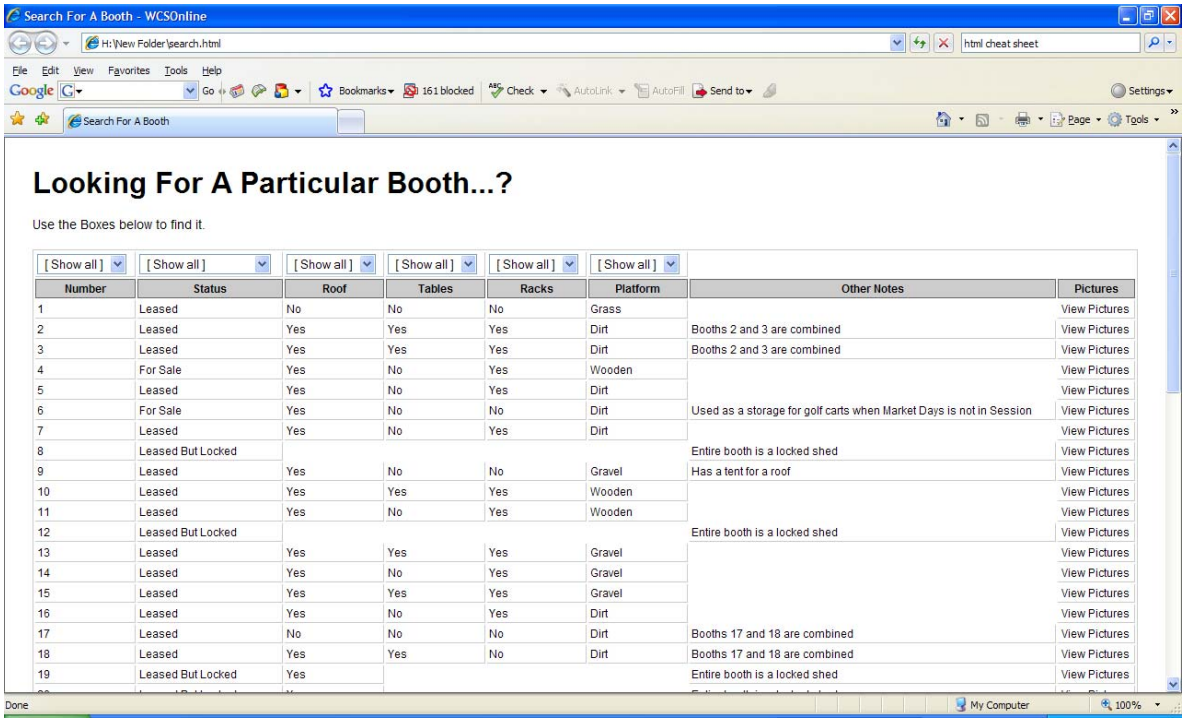


Figure 7. Attribute Table of Street-Centric Addressing System.

5.2 Database

Exploring the attributes for each of the 475 booths is now extremely easy. For Example, if you clicked the drop down box atop Booth Status, it would give you, “For Sale,” “Leased,” or “Leased But Locked,” as options to allow you to search for a booth that is for sale, leased or locked. If you clicked the Roof drop down box, it would only have “Yes,” or “No,” for options to allow you to search for a booth with or without a roof. By closing the body and html tags, and saving the file as an html file, we successfully created a database and table in the form of a webpage that contains all of the booth information we added so that we can query it.

Figure four shows our completed database. When one wants to search for a particular booth, they use the drop down boxes to find exactly what they are looking for, such as figure five.



[Show all]	[Show all]	[Show all]	[Show all]	[Show all]	[Show all]		
Number	Status	Roof	Tables	Racks	Platform	Other Notes	Pictures
1	Leased	No	No	No	Grass		View Pictures
2	Leased	Yes	Yes	Yes	Dirt	Booths 2 and 3 are combined	View Pictures
3	Leased	Yes	Yes	Yes	Dirt	Booths 2 and 3 are combined	View Pictures
4	For Sale	Yes	No	Yes	Wooden		View Pictures
5	Leased	Yes	No	Yes	Dirt		View Pictures
6	For Sale	Yes	No	No	Dirt	Used as a storage for golf carts when Market Days is not in Session	View Pictures
7	Leased	Yes	No	Yes	Dirt		View Pictures
8	Leased But Locked					Entire booth is a locked shed	View Pictures
9	Leased	Yes	No	No	Gravel	Has a tent for a roof	View Pictures
10	Leased	Yes	Yes	Yes	Wooden		View Pictures
11	Leased	Yes	No	Yes	Wooden		View Pictures
12	Leased But Locked					Entire booth is a locked shed	View Pictures
13	Leased	Yes	Yes	Yes	Gravel		View Pictures
14	Leased	Yes	No	Yes	Gravel		View Pictures
15	Leased	Yes	Yes	Yes	Gravel		View Pictures
16	Leased	Yes	No	Yes	Dirt		View Pictures
17	Leased	No	No	No	Dirt	Booths 17 and 18 are combined	View Pictures
18	Leased	Yes	Yes	No	Dirt	Booths 17 and 18 are combined	View Pictures
19	Leased But Locked	Yes				Entire booth is a locked shed	View Pictures

Figure 8. The Completed Table.

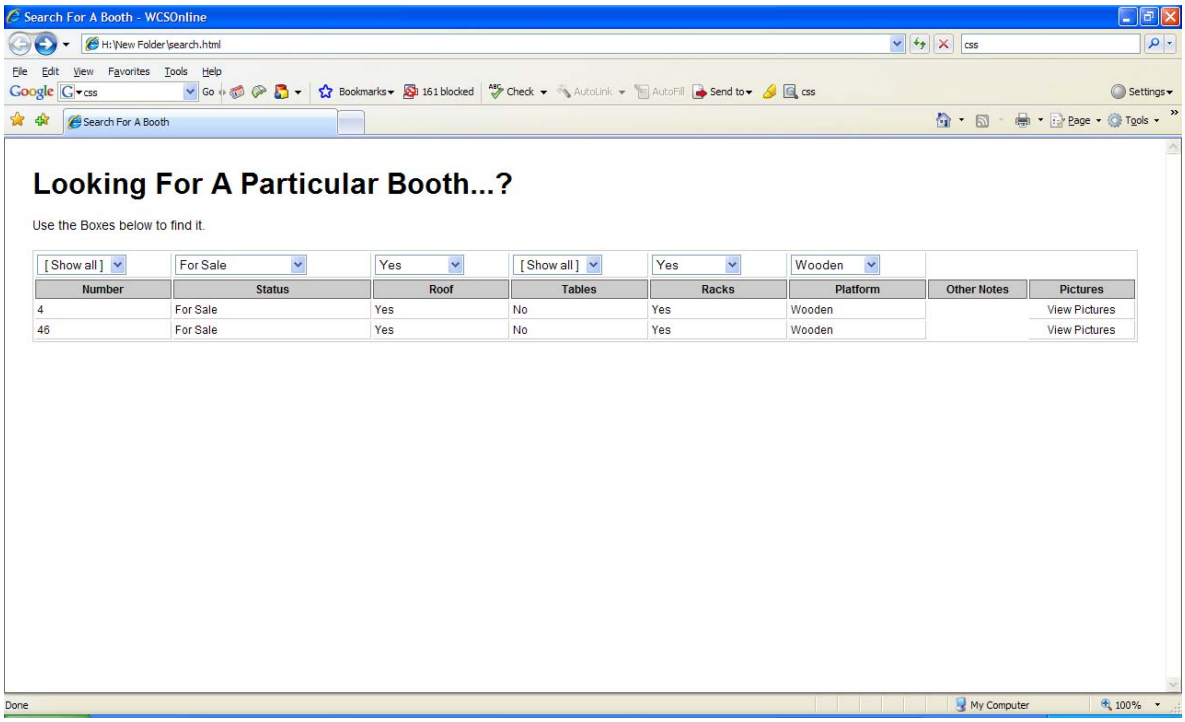


Figure 9. Results of query to find booths for sale with roof, racks and wooden platform.

With the database set up, it is relatively easy for any one with or without programming experience to go back and edit it. Using Microsoft Notepad or any other html editor, one can add more booths, delete booths that no longer exist or update the existing ones.

5.3 Map viewer

The dynamic map viewer is accessed via the “Mapviewer” link at the top of the GeoGurus home page. This link opens a map view with the current booth numbering system. On the top of the map viewer is a control bar. The first arrow is the selection tool; this tool will link to booth photos in the Current booth numbering theme. The “spy-glasses” with the “+” and “-“ symbols zoom in and out on the map while the “arrowed cross” pans the map. The drop

down menu titled “full” refreshes the current map. These functions are the same for each booth numbering theme, except for the selection tool.

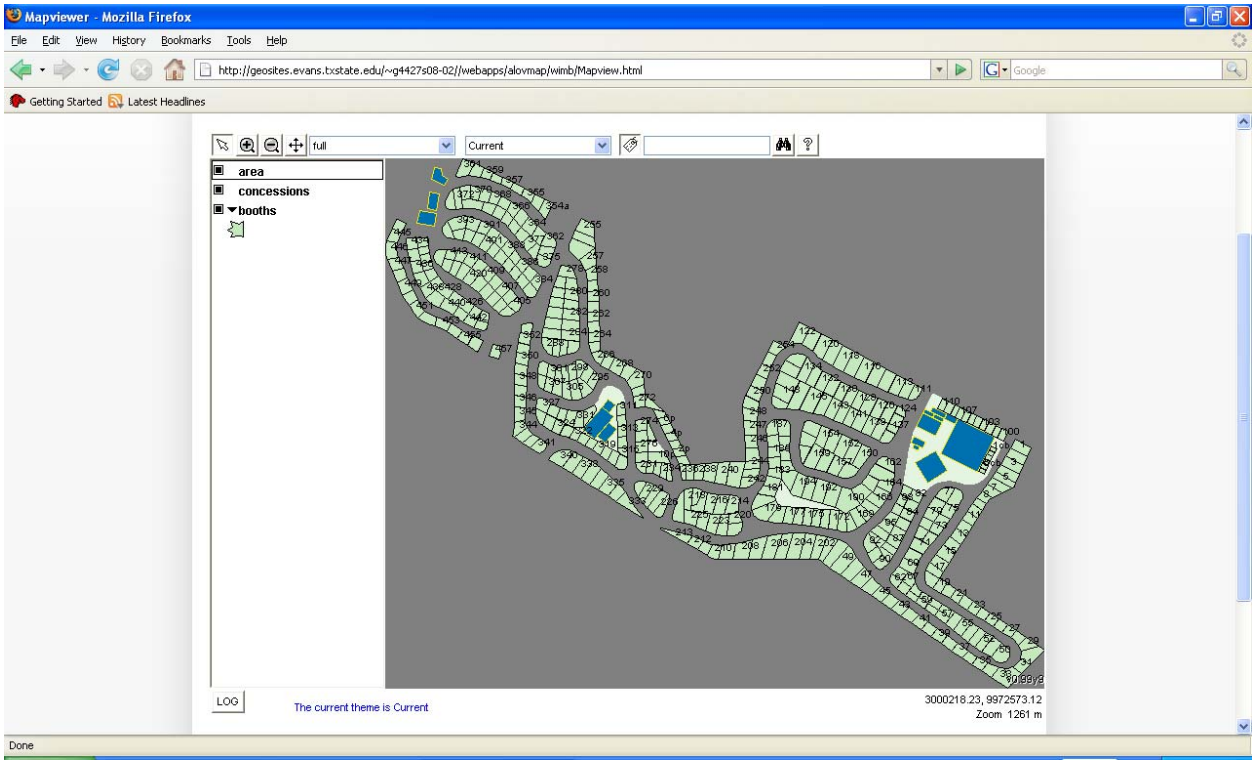


Figure 10: Dynamic map viewer.

To switch map themes use the drop down box which by default is titled “Current.” This box links to the islands, sections and streets booth numbering themes. Simply drop the box and choose a different booth numbering theme by name. For these three map themes the selection arrow will link directly to the attribute data of the selected booth. The several remaining buttons on the toolbar are search functions. Unfortunately these functions are not enabled at this time.

6. Discussion & Conclusion

6.1 Addressing Discussion

6.1.1 Islands Addressing System

The islands addressing system is GeoGurus preferred addressing system because the sections have distinct natural boundaries within a conglomeration of random booth layouts. The alphabetizing of the island sections is a hierarchical spatial arrangement, in which the relative location of one section to another is easily recognizable. The alphabet could be replaced with any other logical, hierarchical cataloging structure.

The islands resulted in twenty-one sections, which vary in size and number of booths. However, only two of twenty-one sections include more than 40 booths, and only two sections include less than 10 booths. Thus seventeen sections include about 10 to 40 booths each. The two largest island sections, "B" and "H," contain about 60 booths but have a logical mid-way breaking point so that the sections could be divided. Conversely, the two smallest island sections, "J" and "K," could be combined due to their relative location.

The islands schematic has both positive and negative results. One positive result is that each "island" is independent of every other island when addressed; this is a hierarchical addressing structure. A small portion of the numbering sequence and no other islands will be affected if a modification to the section occurs, such as the addition of a new booth or division of a current booth. This dilemma was identified by the Lions Club as an issue of vital importance.

The island sections are also easily spatially queried; booth identification (section letter plus number) is easily queried. The islands are spatially arranged in a hierarchical order and contain a logical, clockwise numbering system, whereas larger sections result in a more confusing numbering pattern.

The negative result of the island addressing schematic is having so many sections; it is visually overwhelming on the final display map when all sections are color-coded. However, if

not color-coded, the booths in each section must be labeled with the section plus number ID, such as “B60,” and this would require small font and would likely be overwhelming on the final display map as well. The other negative result is that the various sections or “island” addressing on each side of a street may be confusing to the market’s visitors on the ground. This concern, however, should be eliminated with the distribution of maps to visitors.

6.1.2 Large Sections Addressing System

The large sections addressing system, formed by a combination of natural and arbitrary boundaries, resulted into four sections L, I, O and N. The sections are nearly equal in size and include over 100 booths each. The sections are divided arbitrarily by gate entrances; except for the boundary between section “I” and “O” where a natural break was identified. Though some of these breaks, or boundaries, seem natural on a map, they may not seem natural to the Market Days visitor on the ground. However, color-coding of booth identification signs can help to solve this problem.

The large sections schematic also has both positive and negative results. The four sections permit a creative title (L-I-O-N) which is pleasingly related to Market Days management, the Wimberley Lions Club, and are visually pleasing in the final map design. However, the large sections are difficult to number in a logical spatial arrangement due to the unique arrangement of booths. Therefore, a relative location in number sequence from one booth to another does not exist throughout each section. Rather, the sections have certain “end-points” and “start-points” which break the spatial continuity of the booths.

6.1.3 Street-Centric Addressing System

The nineteen resulting street-centric sections follow the traditional urban system in a very non-traditional site location. Most sections include less than 30 booths, whereas the "main street section" on Lion Way includes over 100 booths. A beginning and end of each street was identified, although these points may not be as obvious to the market visitor on the ground. The weakness of this system is the irregular corner- and non-corner booths that face two streets. These booths were identified with the most appropriate street, however, the shape of each street section is often confusing and not visually pleasing on the final map design.

6.2 Database Discussion

The database designed by GeoGurus will be something that the Lions Club can implement on their website. Currently, their website allows a person to search for a particular product or for a vendor. It doesn't, however, allow a person to see if any booths are for sale without having to call the Lions Club. Our online database on the other hand, allows people to search for a particular booth (i.e. one that is for sale) as well as certain amenities so they can find the perfect booth that suits their needs. This gives day vendors, as well as people seeking an annual lease, an opportunity to see what options they have ahead of time.

Throughout the course of this project, we came across numerous problems that made our job just that much more difficult. Possibly the biggest problem faced by the Lions Club is that fact that their check-in process takes longer than what it should. While at Market Days, we saw that everything is done on paper and pencil. It does get the job done, but with day vendors waiting in the wings, the last thing they want to do is have them lose time and consequently, money. The fact of the matter is, we are now in the 21st century. The technology we have now is

better than it was 10 years ago. We as a group tossed around ideas such as using barcode scanners, similar to the ones used when one goes to a concert, to scan a barcode given to yearly vendors when they sign a lease, as they enter the facility. The beauty of those scanners is that they update on the fly, so instead of compiling all the papers and inputting into Excel the booths that are vacant, printing the list out and taking it over to the day vendors, they could just connect the scanners to the computer and have the list automatically populated and updated. Unfortunately, due to time and budget constraints, we could not afford to buy the technology. What we can do, though, is recommend the Lions Club look into that sort of technology to replace the paper and pencil method, as well as the PDA method, which proved to be just as big a headache.

6.3 Map viewer

The dynamic map viewer is best described as a "beta" version, or precursor of what is possible to achieve with this technology. The current map viewer can be fine tuned to the needs of the Market Days management, vendors and visitors. For instance, the search functions can be linked to the database and functions found to be unnecessary removed. GeoGurus put considerable time and effort into rotating the map view to be consistent with most other Market Days maps. Unfortunately, a coding solution was never achieved. This and nearly any other implementation can be solved with more time and XML coding.

6.4 Conclusion

The Wimberley Lions Club outlined three impediments to the efficiency of their operation: booth numbering/addressing, the day rental process and booth boundary identification. GeoGurus chose to tackle the former two issues, feeling they were more within our expertise and project time schedule. The latter is an important issue.

The booth addressing options provided by GeoGurus to the Wimberley Lions Club should make a comprehensive booth boundary survey easier. We feel or research and products establish a more secure groundwork to tackle an accurate survey of each of the 475 vendor booths.

The ShopMarketDays.com website is an invaluable tool, for the Market Days management, but, has not reached its potential. The GeoGurus website was designed to showcase how the ShopMarketDays.com website can be improved. The GeoGurus-Market Days website was designed to be user-friendly with easily navigated pages and fun features to keep users interested in the content. This is coupled with useful information; the database, and different options of maps both static and dynamic (interactive) are information tools that can save time and increase efficiency during day vendor check-in on Market Days events.

The Geogurus-Wimberley Market Days project is as unique as the Market Days themselves. It turned out to be more involved in web-based products and innovative thinking and less GIS-intensive than the other projects in the GEO4427 class.

7. References

The Future of African Cities: Challenges and Priorities for Urban Development. Farvacque-Vitkovic, Catherine, and Godin, Lucien. 1998. The World Bank, Washington, D.C. Pp 133-139. http://web.mit.edu/urbanupgrading/upgrading/issues-tools/tools/street-addressing.html (accessed April 25, 2008.)

8. Appendices

8.1 Metadata

8.1.1 Primary Metadata: Islands Sections

Identification_Information:
  Citation:
    Citation_Information:
      Originator: GeoGurus
      Publication_Date: 20080427
      Title: islands_sections
      Geospatial_Data_Presentation_Form: vector digital data
      Online_Linkage:
  Description:
    Abstract: Dataset of Wimberley Market Days vendor booths owned and operated by the Wimberley Lions Club. Data include the address (section and number) of each booth and street location.
    Purpose: To identify unique identification and address of each booth according to the "islands" addressing system based on natural boundaries.
  Time_Period_of_Content:
    Time_Period_Information:
      Single_Date/Time:
        Calendar_Date: 200804
    Currentness_Reference: ground condition
  Status:
    Progress: Complete
    Maintenance_and_Update_Frequency: As needed
  Spatial_Domain:
    Bounding_Coordinates:
      West_Bounding_Coordinate: -98.110903
      East_Bounding_Coordinate: -98.106850
      North_Bounding_Coordinate: 30.005140
      South_Bounding_Coordinate: 30.002284
  Keywords:
    Theme:
      Theme_Keyword_Thesaurus: unknown
      Theme_Keyword: vendor booths, parcels, address
  Access_Constraints: none
  Use_Constraints: none

Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Jessica Spangler
Contact_Organization: GeoGurus
Contact_Position: Assistant Manager
Contact_Voice_Telephone: 512-423-1782
Contact_Electronic_Mail_Address: js1495@txstate.edu
Native_Data_Set_Environment: Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 9.2.2.1350
Data_Quality_Information:
Lineage:
Process_Step:
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Vector
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: G-polygon
Point_and_Vector_Object_Count: 475
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Map_Projection_Name: Lambert Conformal Conic
Lambert_Conformal_Conic:
Standard_Parallel: 30.116667
Standard_Parallel: 31.883333
Longitude_of_Central_Meridian: -100.333333
Latitude_of_Projection_Origin: 29.666667
False_Easting: 2296583.333333
False_Northing: 9842500.000000
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000000
Ordinate_Resolution: 0.000000
Planar_Distance_Units: survey feet
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257222
Entity_and_Attribute_Information:
Detailed_Description:
Entity_Type:
Entity_Type_Label: islands_sections

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: booth
Attribute_Definition: Booth number in original numbering system.
Attribute:
Attribute_Label: booth_suf
Attribute_Definition: Booth suffix in original numbering system.
Attribute:
Attribute_Label: booth_old
Attribute_Definition: Combined booth number and suffix in original numbering system.
Attribute:
Attribute_Label: Street
Attribute_Definition: Name of street to which booth faces.
Attribute:
Attribute_Label: Alt_Street
Attribute_Definition: Name of alternative street to which booth faces.
Attribute:
Attribute_Label: Section
Attribute_Definition: Island section in which booth belongs.
Attribute:
Attribute_Label: Number
Attribute_Definition: Booth number within island section.
Attribute:
Attribute_Label: Alt_Num
Attribute_Definition: Alternative number of booth within island section.
Distribution_Information:
Resource_Description: Downloadable Data
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Transfer_Size: 0.076
Metadata_Reference_Information:
Metadata_Date: 20080427
Metadata_Contact:

Contact_Information:
Contact_Organization_Primary:
Contact_Organization: GeoGurus
Contact_Person: Jessica Spangler
Contact_Position: Assistant Manager
Contact_Address:
Address_Type: REQUIRED: The mailing and/or physical address for the organization or individual.
City: REQUIRED: The city of the address.
State_or_Province: REQUIRED: The state or province of the address.
Postal_Code: REQUIRED: The ZIP or other postal code of the address.
Contact_Voice_Telephone: 512-423-1782
Contact_Electronic_Mail_Address: js1495@txstate.edu
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Extensions:
Online_Linkage: http://www.esri.com/metadata/esriprof80.html
Profile_Name: ESRI Metadata Profile

8.1.2 Primary Metadata: Large Sections

Identification_Information:
Citation:
Citation_Information:
Originator: GeoGurus
Publication_Date: 20080427
Title: Sections_booths
Geospatial_Data_Presentation_Form: vector digital data
Online_Linkage:
Description:
Abstract: Dataset of Wimberley Market Days vendor booths owned and operated by the Wimberley Lions Club. Data include the address (section and number) of each booth and street location.
Purpose: To identify unique identification and address of each booth according to the large sections addressing system based on natural and arbitrary boundaries.
Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 200804
Currentness_Reference: ground condition
Status:
Progress: Complete
Maintenance_and_Update_Frequency: As needed

Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -98.110903
East_Bounding_Coordinate: -98.106850
North_Bounding_Coordinate: 30.005140
South_Bounding_Coordinate: 30.002284
Keywords:
Theme:
Theme_Keyword_Thesaurus: unknown
Theme_Keyword: vendor booths, parcels, address
Access_Constraints: none
Use_Constraints: none
Point_of_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Person: Jessica Spangler
Contact_Organization: GeoGurus
Contact_Position: Assistant Manager
Contact_Voice_Telephone: 512-423-1782
Contact_Electronic_Mail_Address: js1495@txstate.edu
Native_Data_Set_Environment: Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 9.2.2.1350
Data_Quality_Information:
Lineage:
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Vector
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: G-polygon
Point_and_Vector_Object_Count: 475
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Map_Projection_Name: Lambert Conformal Conic
Lambert_Conformal_Conic:
Standard_Parallel: 30.116667
Standard_Parallel: 31.883333
Longitude_of_Central_Meridian: -100.333333
Latitude_of_Projection_Origin: 29.666667
False_Easting: 2296583.333333
False_Northing: 9842500.000000
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000000

Ordinate_Resolution: 0.000000
Planar_Distance_Units: survey feet
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257222
Entity_and_Attribute_Information:
Detailed_Description:
Entity_Type:
Entity_Type_Label: Sections_booths
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: booth
Attribute_Definition: Booth number in original numbering system.
Attribute:
Attribute_Label: booth_suf
Attribute_Definition: Booth suffix in original numbering system.
Attribute:
Attribute_Label: booth_old
Attribute_Definition: Combined booth number and suffix in original numbering system.
Attribute:
Attribute_Label: Street
Attribute_Definition: Name of street to which booth faces.
Attribute:
Attribute_Label: Section
Attribute_Definition: Large section letter ID to which booth belongs.
Attribute:
Attribute_Label: Number
Attribute_Definition: Booth number within large section.
Attribute:
Attribute_Label: Alt_Num
Attribute_Definition: Alternative number of booth within large section.
Distribution_Information:

Resource_Description: Downloadable Data
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Transfer_Size: 0.076
Metadata_Reference_Information:
Metadata_Date: 20080428
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: GeoGurus
Contact_Person: Jessica Spangler
Contact_Position: Assistant Manager
Contact_Address:
Address_Type: REQUIRED: The mailing and/or physical address for the organization or individual.
City: REQUIRED: The city of the address.
State_or_Province: REQUIRED: The state or province of the address.
Postal_Code: REQUIRED: The ZIP or other postal code of the address.
Contact_Voice_Telephone: 512-423-1782
Contact_Electronic_Mail_Address: js1495@txstate.edu
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Extensions:
Online_Linkage: http://www.esri.com/metadata/esriprof80.html
Profile_Name: ESRI Metadata Profile
Metadata_Extensions:
Online_Linkage: http://www.esri.com/metadata/esriprof80.html
Profile_Name: ESRI Metadata Profile

8.1.3 Secondary Metadata: Lions Parcels

Identification_Information:
Citation:
Citation_Information:
Originator: GeoGurus
Publication_Date: 20080418
Title: Lions_parcels
Geospatial_Data_Presentation_Form: vector digital data
Online_Linkage: \\GEO-306650\E\WimbMkt_GISdata\Lions_parcels\Lions_parcels.shp
Description:
Abstract: This is a polygon feature class representing parcel and tax roll information.

Purpose: Will identify boundaries and important information of land parcels belonging to the Wimberley Lions Club.

Supplemental_Information:

This polygon feature class was extracted from the original Hays County parcels dataset from Capital Area Council of Governments (CAPCOG).

CAPCOG collected the parcel data from multiple sources. The underlying parcel data may be inconsistent and/or spatially inaccurate. Spatially adjusting parcel boundaries is beyond the scope of this project.

Each parcel includes one or more of the following appraisal district assigned state land use code(s):

A: Real Property: Single-Family Residential
B: Real Property: Multifamily Residential
C: Real Property: Vacant Lots and Tracts
D1: Real Property: Qualified Agricultural Land
D2: Real Property: Non-qualified land
E: Real Property: Farm and Ranch Improvements
F1: Real Property: Commercial
F2: Real Property: Industrial (Manufacturing)
G1: Real Property: Oil, Gas and Other.Minerals
G2: Real Property: Other Mineral Reserves
G3: Real Property: Non-producing minerals
H: Tangible Personal Property: Nonbusiness Vehicles
J: Real and Tangible Personal Property: Utilities
L1: Personal Property: Commercial
L2: Personal Property: Industrial (Manufacturing)
M1: Mobile Homes (Owner different from landowner)
M2: Other Tangible Personal Property Not Taxable
N: Intangible Personal Property Only
O: Real Property: Residential Inventory
S: Special Inventory
X: Totally Exempt Property

Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2005
Currentness_Reference: ground condition
Status:
Progress: Complete
Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -98.111323
East_Bounding_Coordinate: -98.106828

North_Bounding_Coordinate: 30.006121
South_Bounding_Coordinate: 30.002284
Keywords:
Theme:
Theme_Keyword: regional, parcel, land, improvement, market, value
Access_Constraints: none
Use_Constraints:
The geospatial and tabular data developed and/or distributed by the Capital Area Council of Governments (CAPCOG) is being made available to the general public under certain terms and conditions. As a condition to obtaining the data, the Licensee hereby agrees as follows:

1) No warranties of any kind, including warranties of suitability for any particular purpose, warranties of merchantability, warranties of accuracy, warranties of fitness for a particular purpose, or any warranty of any kind or nature whatsoever are made by CAPCOG with regard to the accuracy or completeness of the data.

2) As a specific condition to receiving the data, the Licensee agrees that CAPCOG shall not be liable for any damages, including any indirect, special, incidental, consequential, or damages of any other kind whatsoever, arising out of or connected in any way with the use, re-use modification, or re-publication of the data.

3) The Licensee shall indemnify and hold CAPCOG and their respective officials, employees, and agents harmless against any claim, suit, or cause of action, in any court or administrative proceeding, including attorney's fees and costs of court, arising out of or connected in any way to the use of the data.

4) CAPCOG specifically disclaims any and all liability arising out of or connected to the use of the data in combination with any other spatial data resulting in any overlay maps or other work product of any kind which might be subject to misinterpretation due to discrepancies in accuracy, scale, point(s) of origination, and/or direction.

5) CAPCOG also specifically disclaims any and all liability arising out of or connected to the use of data developed using historical, current, and/or predictive models.

I have read the provisions set forth above and as a condition of obtaining and using any data developed and/or distributed by CAPCOG, I specifically agree that the provisions contained herein are binding upon myself, individual, and upon any organization I may represent.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: GeoGurus
Contact_Person: Jessica Spangler
Contact_Position: Assistant Manager
Contact_Voice_Telephone: (512) 423-1782
Contact_Electronic_Mail_Address: js1495@txstate.edu

Data_Set_Credit: Data were collected by GeoGurus from the Capital Area Council of Governments (CAPCOG). CAPCOG collected its data from the County Central Appraisal District of Hays County.
Native_Data_Set_Environment: Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 9.2.2.1350
Data_Quality_Information:
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Capital Area Council of Governments (CAPCOG)
Publication_Date: 20060523
Publication_Time: 09161000
Title: Capital Area Council of Governments
Geospatial_Data_Presentation_Form: vector digital data
Online_Linkage: http://www.capcog.org/Information_Clearinghouse/parcelsGDB.asp
Online_Linkage: http://www.capcog.org/Information_Clearinghouse/data/web_planimetrics/hays_co_parcels.zip
Source_Time_Period_of_Content:
Time_Period_Information:
Single_Date/Time:
Calendar_Date: 20060523
Source_Currentness_Reference: publication date
Source_Citation_Abbreviation: Capital Area Council of Governments
Process_Step:
Process_Description: GeoGurus extracted the parcels belonging to the Wimberley Lions Club from the Hays County parcels dataset created by Capital Area Council of Governments (CAPCOG).
Process_Date: 20080418
Process_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: GeoGurus
Contact_Person: Jessica Spangler
Contact_Position: Assistant Manager
Contact_Voice_Telephone: 512-423-1782
Contact_Electronic_Mail_Address: js1495@txstate.edu
Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Vector
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: G-polygon
Point_and_Vector_Object_Count: 8
Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:

Map_Projection:
Map_Projection_Name: Lambert Conformal Conic
Lambert_Conformal_Conic:
Standard_Parallel: 30.116667
Standard_Parallel: 31.883333
Longitude_of_Central_Meridian: -100.333333
Latitude_of_Projection_Origin: 29.666667
False_Easting: 2296583.333333
False_Northing: 9842500.000000
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000000
Ordinate_Resolution: 0.000000
Planar_Distance_Units: survey feet
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1983
Ellipsoid_Name: Geodetic Reference System 80
Semi-major_Axis: 6378137.000000
Denominator_of_Flattening_Ratio: 298.257222
Vertical_Coordinate_System_Definition:
Altitude_System_Definition:
Altitude_Resolution: .000010
Altitude_Encoding_Method: Explicit elevation coordinate included with horizontal coordinates
Entity_and_Attribute_Information:
Detailed_Description:
Entity_Type:
Entity_Type_Label: Lions_parcels
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: LU_Code
Attribute:
Attribute_Label: SHAPE_Area

Attribute_Definition: Area of feature in internal units squared.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Positive real numbers that are automatically generated.
Attribute:
Attribute_Label: Mkt_Value
Attribute:
Attribute_Label: Land_Value
Attribute:
Attribute_Label: Geo_ID
Attribute:
Attribute_Label: Acreage
Attribute:
Attribute_Label: Shape
Attribute_Definition: Feature geometry.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain: Coordinates defining the features.
Attribute:
Attribute_Label: SHAPE_Leng
Attribute:
Attribute_Label: Improv_Val
Distribution_Information:
Resource_Description: Downloadable Data
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Transfer_Size: 0.001
Metadata_Reference_Information:
Metadata_Date: 20080427
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: GeoGurus
Contact_Person: Jessica Spangler
Contact_Position: Assistant Manager
Contact_Address:
Contact_Voice_Telephone: 512-423-1782
Contact_Electronic_Mail_Address: js1495@txstate.edu
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Extensions:
Online_Linkage: http://www.esri.com/metadata/esriprof80.html
Profile_Name: ESRI Metadata Profile

8.2 Contribution of Each Team Member

- Literature Research & Review
    - Patrick Wild found literature from World Bank/MIT.
    - Jessica Spangler found literature from United Nations.
    - Dennis Wilson wrote up overview for final report.
- Data Collection
    - All team Members helped to update the Booth Attribute Inventory List.
    - Jonathan and Jessica collected GPS point.
    - Patrick and Jessica downloaded data from online.
- Addressing Systems
    - Jessica Spangler created shapefiles and attribute data for each addressing system.
    - Dennis Wilson contributed to the addressing theory.
- Map Design
    - Brad Smilgin created final map design with Adobe Illustrator with some help from Jessica Spangler.
- Database
    - Jonathan Flores researched programming methods and implemented the queryable database.
- MapViewer
    - Patrick Wild
- Website
    - Brad Smilgin
- Powerpoints
    - Brad Smilgin
- Metadata
    - Jessica Spangler