Vacant Land Identification in the City of Lakeway Texas
and
Growth potential of the Lakeway Area

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CRP 386 Introduction to Geographic Information Systems
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Executive Summary

Some government entities do not have the resources needed to access Geographic Information Systems (GIS) or to develop products using GIS. The City of Lakeway Texas currently does not have any type of GIS productivity, personnel, or resources. They desire a product that would utilize GIS to perform an analysis of current land use, zoning, and ownership to indicate where developable land is and show possible growth scenarios. The level of detail in the analysis would be at the most elementary level due to the lack of GIS data. Some of the data that will be used is not up to date or specific enough to show very detailed findings. Ideally the maps would display potential growth areas and give a sense to where the developable land is and the limits to constraining that growth. However, due to the lack of data, expertise, time, and resources; the level of analysis will be an experiment to see what can be done with existing data sources to accurately find vacant land in Lakeway and if the process of using GIS accurately reflects current undeveloped land.

This is a first step in a larger process of research and body of work designed to enhance the City of Lakeway’s use of GIS for planning and city management purposes. The area under study is experiencing an intense amount of growth and under current conditions the growth is placing an increased amount of stress on current open space, utilities, and roads. The city is limited in its growth control ability due to its relatively small city limits and extra territorial jurisdiction (ETJ). Within the city limits, the city has the strongest ability to shape development with zoning and building regulations. However, outside the city limits, the city is constrained by limited authority to control development and growth. There are several residential and commercial projects under construction and many more are in the planning stages. This will add hundreds of residential units to the immediate area and will have impacts beyond the Lakeway area.

There are several habitat areas and environmentally sensitive areas within the vicinity of the City of Lakeway. The new development that is occurring in and around the city will most likely encroach on these areas. The need for the identification of these areas and the potential growth patterns will greatly enhance the ability of planners, the public, and developers to at least consider the impacts of the built environment on the natural landscape.

Another area that is under increasing strain is the road network that serves the City of Lakeway and surrounding areas. Envision Central Texas (ECT) or any other desired growth scenarios do not indicate that Lakeway will be a development area; however they do list the nearby City of Bee Cave as a development node. Either way, access for current citizens will be lessened or the road network strained because the road that service Lakeway is limited to just two access points along Ranch Road 620. Traffic is increasing to the point that it is exceeding the built capacity of the current road network.
ECT seeks to control sprawl with a regional effort, but the ECT plan may be unrealistic as the areas that they deem undeveloped are already developing.

To start to develop a base of knowledge using GIS, the city is taking its first steps toward utilizing GIS to influence its planning and management decisions and capability.

**Introduction**

This project hopes to highlight the potential for further development around the Lakeway area. Lakeway is situated along Ranch Road 620 and residents of the area rely solely on this road to access Farm Road 2222, Hwy 71, and Farm Road 2244 for vehicle trips to Austin – the main regional employment center. The areas roads are reaching their built capacity and further development will only add to their use and expansion. The city desires to show future growth scenario under current zoning, land use, and ownership in a dynamic visual format for public presentation as well as for planning studies. A GIS product should fill that need and increase planning regarding growth. A more informed public and political body should increase informed decisions being made regarding growth.

This project will use GIS to discover undeveloped properties within Lakeway’s city limits. This could shed light on the potential for further development in and outside the city limits. Further analysis could show areas within the Lakeway area that are developed, could be developed, and areas that should be protected from development. Additionally, future research could focus on the limits to or the potential for growth management and projections of development and population within the Lakeway area. Those scenarios could be compared to Envision Central Texas’ vision and possible future protected areas that Conservancy organizations would be interested in protecting.

**Problem Statement**

The City of Lakeway is limited in how it attempts to control growth and protects sensitive environmental features and wildlife habitat in its city limits and beyond. Current land control devices in the city limits do little to control growth and development outside the city limits. The city has an increasing need to learn from planning exercises to inform planning decisions as well as educate the public about potential development in the Lakeway area. GIS could be used for this purpose; however, currently there is a lack of geospatial data that is available for the Lakeway area.
**Research Questions**

The end result of the number of research questions answered depended on the quality and the extent of data that was available. The ideal outcome would have been to answer as many of the questions that are listed below with maps.

What is the amount and location of developable land within the city limits and ETJ of Lakeway?
How will the city’s open space plan affect sensitive environmental areas?
What are the short and long range plans for the Lakeway area?
What transportation networks currently exist?
What is the current land use within Lakeway’s jurisdiction?
Who owns the property within Lakeway’s jurisdiction?
What are the current open spaces and protected areas in Lakeway?
What is the current population density within Lakeway’s jurisdiction?
Are there areas around Lakeway that need to be protected?

**Methodology**

The first step in the process of the study was to organize a plan of research and list of possible data sources to answer specific questions with GIS. The next step was to seek out the data needed to perform the analysis.

Research questions guided the selection of data that was needed to find solutions to the problem statement. The first step in the process will be to develop a base map of the area.

Formed base maps - Transportation
- Land Use
- Prop ownership
- Protected areas
- Pop density
- Parcel map
- Vacant Land

The next step will be to construct multiple layers using overlay of base maps and perform analysis to answer research questions. Difficulty arose with the base data, specifically the manipulation of census information, address and population Excel files, and TCAD data. A significant amount of time was spent trying to work with this data to make it compatible with GIS. Other drawbacks included the level of data that was available for the area around Lakeway.

Specific procedures for each map are listed in the appendix.
**Findings**

The end result of the number of research questions answered depended on the quality and the extent of data that was available as well as the amount of time available to deal with it. The ideal outcome would have been to answer the statements that are listed below with maps.

1) Show areas that can be developed currently and possible build-out scenarios.
2) Show sensitive environmental areas in the West Austin area that need to be protected from development.

**Map 1:** The Location Map is for understanding the context of the study; it shows the location of the City of Lakeway within Travis County as well as some other cities within the study area. IH 35 is shown on the map of Travis County because it is a landmark that many identify with. The map also shows the area that Travis County occupies within the State of Texas.

**Map 2:** The Population Map shows three frames that display the population, broken into Census Blocks, of Travis County, the Lakeway area, and the City of Lakeway.

**Map 3:** The Road Network Map presents the major and minor roads that service the Lakeway area. It shows that using Ranch Road 620 is the only way to access the City of Lakeway. There are no other significant transportation modes for this area.

**Map 4:** The Improved Value Map shows what parcels are displayed by using the base Parcel layer and separating out all improved values that equal zero from all others. Two types of parcels are displayed – ones with value and ones with no improved value.

**Map 5:** The Vacant Land & Use Map is the result of data manipulation of basically three different shapefiles that could indicate vacant parcels by themselves. By taking the best attributes of the three files and fusing them together, the result is the most accurate representation of where vacant parcels are today. The map also shows the latest (2003) representation of the land use codes for each parcel.

**Map 6:** The Vacant Parcel Values Map lists the value of land per acre of the lots that are currently vacant according to the data.

**Map 7:** The Undeveloped Parcels Map tries to mesh the GIS data indicating vacant parcels to the most recent aerial photo (taken from Google Earth). This shows that the data manipulation was fairly successful in locating the actual vacant parcels.
Conclusions

Based on the analysis completed in this study, it is possible to produce GIS maps for a city that may not have GIS capability of its own. By relying on various organizations, levels of governments, and nearby cities GIS departments, some geospatial data can be gathered and manipulated to produce various maps and analyses.

Through this study, a number of data sets were collected and several descriptive maps were produced. The main question of whether vacant parcels could be located was answered with a resounding “yes.” However, the accuracy may not be as good as expected due to the age of data that was used. Other research questions would have to wait to be answered through future research.

This project definitely created a good starting point and base for future research to contribute to an ongoing study of the Lakeway area. The maps developed for this study certainly give a sense of the potential growth that could occur in the Lakeway area.

Caveats

With additional data manipulation and time, additional maps and analysis could be produced using the base data that is currently available. Even though it is limited for the area under study, it is possible to create improved and more accurate results. For a better analysis, original data could be produced at the city level as long as it kept pace with new development, recorded many variables, and was organized in a usable format. Below are caveats for each map.

Map 1: None to state.

Map 2: The Population Map does not indicate the population density within the Census Blocks. This is due to the base data that was used to form the map. When the information is downloaded from the Geography Network, it does not include the area measurement of the Census Blocks. Because the blocks are not uniform in size, this will misrepresent the actual concentrations of population within Travis County. If area was included to normalize the population, it would present a better way to calculate and display population density.

Map 3: The attribute table of the transportation shapefile did not separate out major and minor roads. The data could have been pared down a little more to symbolize each road differently. However the map does display the routes (in red) that people who reside in the study area have to use.
Map 4: By separating out all improved values that equal zero from all others in the attribute table of the Parcel layer, the Improved Value Map shows parcels separated into two classes. This does not take into account properties that cannot be developed – like utility owned property or designated green belts among others.

Map 5: Initial data that would have been used was from Travis County Central Appraisal District. This was in text (.txt) format and was accessible by using Microsoft Access which proved difficult to work with. The data might have been useful but do to time limitations other data sources were selected for this map.

Due to the age of the base data that was used to form the Vacant Land & Use Map, the result is the most accurate representation of where vacant parcels are today, however this result is not totally grounded with reality. The data is several years old and the pace of development in the Lakeway area would quickly outpace this data as presented from the various organizations that produced them. Suggested improvement to this analysis would be to add a database that is updated at the city level to accurately represent the true locations of vacant parcels.

Map 6: The values of these parcels may be higher than listed because the data is outdated and from Travis County Central Appraisal District which is also different from true market value on the real estate market.

Map 7: Although the data manipulation was fairly successful in locating the actual vacant parcels according to the most recent aerial photo (taken from Google Earth). There are several problems with this analysis. In the Undeveloped Parcels Map, the data used is several years old and the pace of development in the Lakeway area would quickly outpace this data as presented. The aerial photo is also dated and therefore not an accurate representation of reality – where the vacant parcels are today.

Additional information about the addresses of parcels was incorporated in the map; however, the format of the information was not ideal and proved almost useless for this map. The data would need to be manipulated further before it was added to ArcGIS to be more useful as a tool for display or analysis.

**Further Research**

Questions that were partly answered with this study are listed below. This analysis could be improved with further research.

What is the amount and location of developable land within the city limits and ETJ of Lakeway?
What is the current land use within Lakeway’s jurisdiction?
Who owns the property within Lakeway’s jurisdiction?
What are the current open spaces and protected areas in Lakeway?
What is the current population density within Lakeway’s jurisdiction?

Questions listed below that were not answered with this study that could be answered with future research.

What is the amount and location of developable land within the ETJ of Lakeway?
How will the city’s open space plan affect sensitive environmental areas?
What are the short and long range plans for the Lakeway area?
Are there areas around Lakeway that need to be protected?

- Work with local conservation organizations to identify the parcels and analyze the resources needed to protect those parcels.
- Compare that analysis with the vision of the City of Austin (Smart Growth Initiative) and Envision Central Texas.

References

Citation
Datum: NAD 83
Projection: NAD 1983 State Plane Texas Central FIPS 4203 (feet)


Appendix

Map 1 – Location Map
Map 2 – Population Map
Map 3 – Road Network Map
Map 4 - Improved Value Map
Map 5 - Vacant Land & Use Map
Map 6 - Vacant Parcel Values Map
Map 7 - Undeveloped Parcels Map

Land Use Code Definitions

Description of Map Procedures
Travis County

**IH35**

**Lake Travis**

**CITY OF AUSTIN**

**Travis County Census Blocks**

**Travis County**

**Study Area**

**Lakes and Streams**

**Roads**

**Study Area Cities**

**CITY**

**CITY OF BEE CAVE**

**CITY OF LAKEWAY**

**VILLAGE OF POINT VENTURE**

**VILLAGE OF THE HILLS**

Sources:

Datum: NAD 83
Projection: NAD 1983 State Plane Texas Central FIPS 4203 (feet)

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Sources:

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December 14, 2007
Fall 2007 - Intro to GIS - Final Project
Datum: NAD 83
Projection: NAD 1983 State Plane Texas Central FIPS 4203 (feet)
Sources:


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Fall 2007 - Intro to GIS - Final Project
Datum: NAD 83
Projection: NAD 1983 State Plane
Texas Central FIPS 4203 (feet)
Sources:
Vacant Land & Use

Vacant Parcels and Zoning

Vacant Lots
Addl. Vacant Lots
City of Lakeway
Travis County

Sources:

*See Table for Land Use Code definitions

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December 14, 2007
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Datum: NAD 83
Projection: NAD 1983 State Plane
Texas Central FIPS 4203 (Well)
Vacant Parcel Values

Datum: NAD 83
Projection: NAD 1983 State Plane
Texas Central FIPS 4203 (feet)

Sources:

Land Value per Acre

Vacant Land Value / Acreage

- Lot Lines
- City of Lakeway
- Travis County

VP2003Union

Vacant land use inventory:
- 0 - 40,000
- 50,000 - 100,000
- 200,000
- 300,000 - 400,000
- 500,000 - 1,000,000

Lot Lines
City of Lakeway
Travis County

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Location Map
- Used ArcCatalog to reproject (Geographic coordinates NAD83) Census Block Layer to NAD 1983 State Plane Texas Central FIPS 4203 (feet). Counties layer metadata matches the Census Block Layer. Reprojected Transportation layer to NAD 1983 State Plane Texas Central FIPS 4203 (feet).
- Add Counties, Census Block, and Transportation layer from [Created folder]
  - Selected and created Travis County “only” shapefile from Counties layer
  - Add Census Block Demographics to attributes of Census Block layer
- Add Hydrography layer (already projected)
- Add Travis County City Limits layer (already projected)
- Create map layout showing the City of Lakeway population and inset view of Travis County population. Used extent rectangle on inset map to show location of study area.
  - Created separate IH35 layer from roads layer
  - Include all necessary map elements and sources
  - Created two legends based on maps with different symbology

Road Network Map
- Add Travis County layer
- Add City Limits layer
  - Clip to Travis County
- Add Transportation layer
  - Clip to Travis County
  - Select by attribute: "FCC" = 'A15' OR "FCC" = 'A35' OR "FCC" = 'A25' OR "FCC" = 'A31' OR "FCC" = 'A21' for major roads selection
- Add Hydrography layer
  - Clip to Travis County
- Create map with three layouts showing the major and minor roads near the City of Lakeway
  - Include all necessary map elements and sources

Land Use / Property Ownership / Protected Areas (Vacant Land and Use Map)
- Add Travis County layer
- Add Hydro layer
- Add City Limits layer
  - Clip to Travis County
  - Created City of Lakeway shapefile
- Add Vacant Land Inventory layer (existing projection)
  - Clip to Travis County
  - Clip to City of Lakeway
Select by attributes (and reverse selection to get vacant land that’s probably not dedicated park or open space):
"Improv_Val" = 0 AND "Pct_Improv" = 0 AND "Ag_Land" = 'No'
  o VLI Clip Selection

• Add Land Use 2003 layer
  o Added layer first then link to shapefile
  o To large to clip to Travis County, so clipped to City of Lakeway
  o Symbolized land uses according to City of Austin categories
  o Select by attributes - "LU2003" = 630 OR "LU2003" = 640 OR
    "LU2003" = 710 OR "LU2003" = 720 OR "LU2003" = 750 OR "LU2003" = 830 OR "LU2003" = 860 OR "LU2003" = 870 OR "LU2003" = 940 to
    create selection
    grinned
    o Select by attribute - "LU2003" = 900
    o Land use2003 Clip Selection 2 created
      grinned
      Union with Travis Parcels Clip Erase

• Add Travis County Parcels layer
  o Symbolize: add only two categories – 0-20,00 value and “all other”
  o Clip to City of Lakeway
    grinned
    Symbolize: add only two categories – 0-163 lowest value and
    others
    o Select by attributes – "Improv_Val" = 0 OR "Improv_Val" = 1
      OR "Improv_Val" = 2 to create selection
      grinned
      Travis Pcls Clip Selection
      grinned
      Land Use2003 clip selection subtracted from this
      grinned
      Travis Parcels Clip Erase shapefile created
      grinned
      Union with Land use2003 Clip Selection 2

• Add Transportation layer
  o Clip to Travis County
  o Label roads in lot level only

• Created Union2003 layer that should be the most accurate at indicating the
  location of vacant parcels.
  o Show two displays – the whole of Lakeway and zoomed-in to lot level
  o Symbolize by vacant lots and land use
  o Include all necessary map elements and sources

Parcel Map (Improved Value Map)
The purpose of this map is to show parcels that are potentially undeveloped by using
assessed value information (improved value). If improved value is “0” or close to 0 then
the property is most likely undeveloped. Contacted TCAD to retrieve City of Lakeway
assessed value information. After a struggle with the TCAD (Microsoft Access [text
files]), I was finally able to open the information with a Macro. There is a roadblock in
that the file that contains the improved value only has Property ID as an identifier (the
text file contains Parcel ID) where as the shape files attributes contain Geo_IDs. This
would have presented an additional complication due to the issue of trying to combine
tables with no common attributes. However, all of this frustration is not necessary as I
was finally able to figure out that the CAPCOG Travis 2005 Parcel Geodatabase, which
was not downloading well, contains parcel information and an attribute column for
improved value.

- Add *Travis County* layer
- Add *Hydrography* layer
- Add *City Limits* layer
  - Symbolize according to major cities and other
- Add *Travis Parcel* layer downloaded from CAPCOG
  - Symbolized according to Improved Value – two categories, “0” and all
    other values showing the potential vacant parcels
  - Show two displays – entire Travis County and the City of Lakeway
  - Include all necessary map elements and sources

### Vacant Parcel Values Map

- Add *Travis County* layer
- Add *City of Lakeway* layer
- Add *Travis Parcel Clip* shapefile created from Vacant Map
- Add *Vacant Parcel 2003* shapefile created from Vacant Map
- Display two frames – whole Lakeway and part of Lakeway
  - Symbolize Vacant Parcels according to Land Value normalized by
    Acreage

### Undeveloped Parcel (Address) Map

- Add *Travis County* layer
- Add *Transportation* layer
- Add *Address* Excel file from the City of Lakeway
  - Join to Parcel attribute table
- Add *Travis Parcel Clip* shapefile created from Vacant Map
- Add *Parcels* layer from consultant
- Display two frames – Lakeway intersection and specific parcels
  - Label property numbers and roads
  - Insert aerial photo to indicate vacant parcels
    - Create map layout showing the lots that are vacant
      - Add labels to aerial photo to close in display to indicate vacant parcels
      - Include all necessary map elements and sources

### Population Map
• Used ArcCatalog to reproject (Geographic coordinates NAD83) Census Block Layer to NAD 1983 State Plane Texas Central FIPS 4203 (feet). Counties layer metadata matches the Census Block Layer. Reprojected Transportation layer to NAD 1983 State Plane Texas Central FIPS 4203 (feet).
• Add Counties, Census Block, and Transportation layer from [Created folder]
  o Selected and created Travis County “only” shapefile from Counties layer
  o Add Census Block Demographics to attributes of Census Block layer
• Add Hydrography layer (already projected)
• Add Travis County City Limits layer (already projected)
• Create map layout showing the City of Lakeway population and inset view of Travis County population. Used extent rectangle on inset map to show location of study area. Symbolized by number of people per census block
  o Include all necessary map elements and sources
  o Created two legends based on maps with different symbology