LEARNING FROM THE PAST, PLANNING FOR THE FUTURE:

A GEOGRAPHIC HISTORY OF SAN MARCOS, TEXAS

AND TEXAS STATE UNIVERSITY-SAN MARCOS

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ABSTRACT

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The American college town is a unique place. The symbiotic relationship between the university and its host city is sometimes conflictive, sometimes cooperative. Physical expansion of the campus is an inevitable by-product of the growth of higher education, and often the responsibility to accommodate that growth falls upon the host city. Cities and universities continually draft master plans in efforts to optimize their growth while sharing and preserving limited resources. It is the goal of this researcher to present an historical, geographic view of the City of San Marcos and Texas State University-San Marcos to determine if understanding how these places developed in the past is useful in planning how they should develop in the future.

CHAPTER 1

INTRODUCTION

The growth and development of cities across the United States is an intriguing process whereas each city has its own growth narrative and reasons for becoming what they are today. The story of San Marcos, Texas is one with multiple wrinkles and twists, but one of the most significant implications for its growth and modern development was the chartering of a teachers college which would become a university.

A city hosting a university is a unique type of urban place, influenced by the forces of youth, intellect, and idealism, that has been an important but overlooked aspect of American life. Local communities actively pursued colleges as a way to assure their future by offering land, money and buildings if the college would locate in their town (Gumbrecht 2008). The most common explanation of the proliferation of American college towns is that college founders generally believed that the only proper environment for learning was in a quiet, rural setting away from the temptations of city life. College towns are largely an American phenomenon—there are more communities dominated by colleges and universities in the United States than anywhere else in the world. Gumbrecht (2008, 17-18) explains several factors why this is so:

- The sequence of college development versus urban development is different than elsewhere;

- The size and the cultural and religious diversity of the United States has resulted in a profusion of college towns;
- The perception by college founders believed that a quiet, rural setting was the only proper environment for learning.

One of the most distinctive attributes of the American college town is the campus itself. In the United States there has been an impulse to build campus environments with "an affinity with the purified, safe and calm life of the suburbs" (Bender 1998, 18). The belief that colleges should be set in an open and lush landscape originated at Harvard College and has been followed almost without exception at every college and university founded in the United States since.

The college is usually the largest land owner and most active developer in a college town. The role as a developer exerts a more profound influence over the host city than its role in conflicts caused by student behavior and rental housing expansion. Most higher education institutions are exempt from city taxes, and local zoning laws. Often rapid growth strains the city's ability to provide services and infrastructure, and reduces income because of the cut in tax revenues (Gumpbrecht 2008).

While San Marcos is a smaller city with a large university as a central component of everyday life, there are a few key cultural components making this place different than Gumprecht's traditional college town. First, Texas State University-San Marcos remains largely a regional university and has a lower than average international student population (Lynch 2010). Second, a large percentage of the students and faculty do not reside in San Marcos (Institutional Research 2010). The university itself is similar to other universities in that it is first and foremost a significant source of knowledge and

research activities in science and technology. Additionally, it is considered a center of culture, and contributes in important ways to the economic health and physical landscape of the host city (Perry and Wiewel 2005).

There exists a lot of information and research on the topic of cities and universities—primarily focusing on the university in the urban landscape, or the social, economic, and intellectual impacts of the university on its host community. Less data is available on the geographic growth patterns or the effect of the growth of the university in a non-urban environment on the growth of its host city and vice-versa.

Spatial and Temporal Analysis of San Marcos and Texas State

This research aims to study the spatial and temporal relationship between a university and its host city. The goal of the research is to create a geovisual, comprehensive historical geography of a university and a city. The research identifies the City of San Marcos (San Marcos or the City) and Texas State University-San Marcos (Texas State or the University) as the entities for the case study and poses the following research questions:

- What effect does the increasing enrollment of a university have on the geographic expansion of its host city?
- How did the increasing student population and the university's pattern of student housing affect land use patterns in the city—specifically relating to multi-family housing?
- How did specific land acquisitions by the university affect the civic or political relationships between the university and the city?

- How can Historical GIS help to visualize the spatial relationship and the geographical and land use patterns of the university and the city?
- Can an Historical GIS be used as an effective planning tool?

Motivation

The modern growth of San Marcos is tied intrinsically to the growth and development of Texas State. As a resident of this community for twenty-three years and the GIS Administrator and cartographer for the City of San Marcos for seventeen years, I have seen the phenomenal growth of both San Marcos and Texas State, and witnessed the sometimes conflictive yet increasingly cooperative relations between town and gown.

The City of San Marcos has experienced a dramatic increase in growth—in land area and population. The town was founded in 1851 as part of 640 acres out of the Juan MartinVeramendi League, and at the time, had a population of 1200. The history of San Marcos is described in greater detail in the following chapter. The town's growth during this time was based in part on the availability of a reliable water supply because of the proximity to the San Marcos and Blanco Rivers (Department of History 1996). By 2008, the city's estimated population exceeded 50,000 (City of San Marcos 2010b) and encompassed a total land area over 19,000 acres.

Southwest Texas State Normal School was established in 1899 when the citizens of San Marcos donated 11 acres of land for a state teaching school. Texas State has grown from the original 11 acre site with one building and an enrollment of 303 students to a 471 acre central campus (with an additional 5038 acres of farm, ranch, instructional, and recreational land scattered throughout Hays and Williamson Counties) with 255

buildings and an enrollment of 32,583 as of September 2010 (Texas State University-San Marcos 2010).

A great deal of information is available on the history of Texas State and the history of San Marcos in books, maps, surveys, university publications, municipal publications, newspaper articles and legal documents. What does not exist, however, is a comprehensive and visual history of the geographic growth of these two institutions. The purpose of this research is to create a geographical history using a Geographic Information System (GIS) in order to visualize the simultaneous growth of San Marcos and Texas State.

Both San Marcos and Texas State continually update master plans for their respective jurisdictions. To name a few, there is the Campus Master Plan, the Campus Edge Master Plan, the Downtown Master Plan, Water, Wastewater and Drainage Master Plans, an Airport Master Plan, a Parks Master Plan, and City Sector Plans. With all of this long range planning being done, an historical GIS of San Marcos and Texas State could prove to be an effective planning tool for both institutions.

Limitations of this Research

The scope of this research is limited to the political boundaries of the City of San Marcos (since its incorporation in 1877) and the geographic boundary of the Texas State central campus (since it was founded in 1899). Time intervals will be determined by the availability of maps and spatial data that describe these boundaries. Analyses of land use patterns will be limited to on-campus student housing data and city designations of multi-family land use as it pertains to the historical increase in student population. This

particular land use designation was chosen because of the proliferation of large multi-family apartment complexes in San Marcos over the past 20 years.

Much of the geographic growth of Texas State occurred through purchases of small residential tracts adjacent to the campus. The sale or donation of these privately owned parcels did not seem to present any conflict, so the effect of land acquisitions by Texas State on town-gown relations will be limited to the addition of major land acquisitions which expanded the central campus. The acquisitions chosen for this research are: Riverside Park (now called Sewell Park), the Federal Fish Hatchery, the San Marcos Baptist Academy (now referred to as West Campus), and Aquarena Springs Resort (now called Aquarena Center).

The author acknowledges that several other factors would contribute to a more comprehensive analysis of the City and University:

- The location of San Marcos on the Interstate Highway 35 corridor between Austin and San Antonio;
- Analysis of single family housing trends in relation to student enrollment;
- Economic and political motivations for growth;
- The impact of increasing enrollment on San Marcos's ability to provide adequate public services.

Although very relevant to the subject at hand, these elements are outside the scope of this project. Further studies of all relevant factors would allow for greater analysis of the growth patterns of these two institutions, both individually and as they relate to each other.

CHAPTER 2

HISTORICAL BACKGROUND

This chapter provides an historical geographic background of the City of San Marcos and Texas State University-San Marcos. The components are reviewed as related to the scope of this research.

Geographic History of San Marcos, Texas

San Marcos, Texas is the county seat of Hays County. The City is located on the Balcones Escarpment with the Edwards Plateau to the west and the Blackland prairies to the east.

> The San Marcos River rises from constantly flowing springs to form a scenic waterway that laps the town of San Marcos, county seat of Hays County in Central Texas. The limestone springs bubble up in a fountain to form the headwaters of the San Marcos River at its origin within the city limits. (Stovall 1986, 1)

The area of Spring Lake is one of the oldest, continuously inhabited sites in the United States. Archeological studies near the source of the river revealed Native American artifacts dating back 9,200 years (Stovall 1986).

In 1831, a prominent San Antonio citizen, by the name of Juan Martin Veramendi, located his eleven league land grant (49,000 acres) above and including the springs at the headwaters of the San Marcos River and the surrounding escarpment area.

In 1851, Edward Burleson, William Lindsey, and Eli Merriman bought what remained of the grant from Veramendi's heirs and charted the original town of San Marcos (Department of History 1996). During the decade before the Civil War, the population grew to 1200. The town's growth during this time was based in part on the availability of a reliable water supply from the San Marcos and Blanco Rivers.

From the original two shops, one tavern and five houses in 1851, the town grew to include churches of the Methodist, Baptist and Presbyterian denominations as well as a grammar school, a boarding house and over a dozen shops. Edward Burleson established the first mill on the San Marcos River, as well as the first cotton gin. The City of San Marcos was incorporated in 1877.

The International and Great Northern Railroad came through San Marcos on October 2, 1880, and built the first bridge over the San Marcos River (Department of History 1996). This bridge is visible in Figure 1, the 1881 bird's eye view of the town of San Marcos drawn by Augustus Koch.

Figure 1: Bird's Eye View of San Marcos-1881 (Amon Carter Museum 2005)

San Marcos was now a small frontier town with a railroad, but was also becoming an educational center in Central Texas. The first major educational institution was the Coronal Institute, founded by Professor Orlando Newton Hollingsworth in 1868 as a co-educational school, with military training for boys. The school was named Coronal because of its location crowning a hill overlooking the beautiful San Marcos valley to the picturesque hills beyond.

The institute furnished teachers for the state, but the diplomas did not have the same clout as the certificates issued by Normal Schools, because their certificates were not valid for life. If the institute had been able to issue life certificates, Southwest Texas State Normal School (SWTSNS) may never have been established in San Marcos. The newly established SWTSNS drew from the ranks of the Coronal Institute, because it was less expensive and did offer life teaching certificates. The Coronal Institute closed its

doors in 1919 (Morgan 1936). After 1919, the main building was used as a gymnasium by Southwest Texas State Normal College. The site was purchased by the San Marcos Central Independent School District, and the building is still used in an educational capacity today. The boy's dormitory was converted into the City's hospital and operated from 1922 until 1956. The hospital was later used as a boy's dormitory for the San Marcos Baptist Academy, and then housed the Pi Kappa Alpha fraternity. Arsonists set the structure on fire on April 10, 2007 and it completely burned (Rollins 2007). A private citizen bought the property and is currently constructing a home on the site.

The second major education institution was the SWTSNS which opened its doors in 1903. A detailed history of the school follows in the next section.

The third major education institution was the San Marcos Baptist Academy, which was a co-educational boarding and day school. Like the normal school, the land for this school was also donated by the citizens of San Marcos. The formal opening of the school was September 24, 1908. The school consisted of 57 acres and one building – Carrol Hall. By 1911, there were four buildings and the school was negotiating the purchase of the President's Home. The school continued to grow and by 1935, over 50 of the original 57 acres were developed. The school was sold to the then Southwest Texas State University in 1979 and relocated to a 200 acre site outside of town on Ranch Road 12 in 1981 (Shand 1990).

In 1956 a new era of growth began with the passage of the National System of Defense Highways Act. Aided by the construction of Interstate Highway 35 (IH 35), San Marcos went from a small rural community of 9980 people to a fairly urbanized city of 29,494 in 1994. The construction of IH 35 provided San Marcos with a steady influx of

people. Since San Marcos is conveniently located between San Antonio and Austin, it has been described as the perfect mix of small town charm and big city conveniences (Department of History 1996).

In less than 15 years, the city population has increased by 41 percent. The 2004 publication of San Marcos Today identified two important factors contributing to the dramatic increase in the size and prosperity of San Marcos: a) growth pressures from the Austin and San Antonio metro areas; and b) the large enrollment increases at Texas State University (Quintero 2007).

Geographic History of Texas State University-San Marcos

Since its inception, Texas State University-San Marcos has continually changed. The story begins in 1899, when Fred Cooke, the representative from the 98th district, which included Hays County, introduced legislation to establish a new state school in San Marcos. The act provided that the Southwest Texas Normal School (SWTNS) be established in San Marcos if the city and its citizens would donate the land. The land donation consisted of the 11 acre tract known as Chautauqua Hill. The corner stone for Old Main was laid by Governor Joseph D. Sayers on April 28, 1902, and the doors opened in the fall of 1903. The purpose of the two year normal school was to provide uniform training to the teachers of Texas. The first class of 303 students enrolled in courses offered by a 17 member faculty. Students lived in boarding houses that lined the Hill, Guadalupe, Austin (now LBJ Drive), and North Streets (Brown 1979).

In 1918, the school adopted a four year program and changed its name to Southwest Texas State Normal College. Enrollment for the fall reached 974 students and

the campus expanded to include a gymnasium at the site of the Old Coronal Institute on Hutchison Street. Since then, Texas State has changed status and names four more times: to Southwest Texas State Teachers College in 1925, then to Southwest Texas State College in 1959, then to Southwest Texas State University (SWTSU) in 1969 (Brown 1999), and finally to Texas State University-San Marcos (Texas State) in 2003. The University has grown from the original 11 acre site with one building and an enrollment of 303 students to a 471 acre main campus (with an additional 5038 acres of farm, ranch, institutional, and recreational land scattered throughout Hays and Williamson Counties) with 255 buildings and an enrollment of 32,583 as of the fall semester 2010 (Texas State University-San Marcos 2010). Figure 2 illustrates the campus layout in 2009.

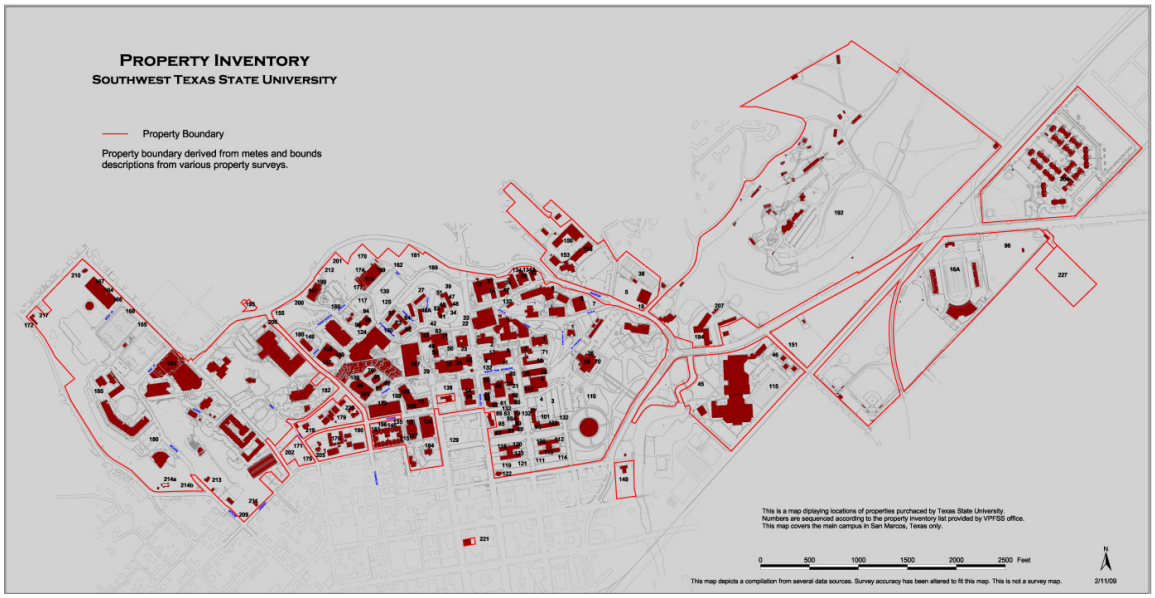


Figure 2: Texas State as of 2009 (Texas State 2010)

Much of the geographic growth of the university occurred through purchases of small residential tracts from private owners adjacent to the campus. However, several large land acquisitions added a great deal of land to the main campus. These acquisitions included Riverside Park, the Federal Fish Hatchery, San Marcos Baptist Academy and

most recently, Aquarena Springs Resort (Brown 1999; Texas State University-San Marcos 2010).

Riverside Park, originally called Riverside Resort, was a two acre tract along the San Marcos River located to the east of the Federal Fish Hatchery. In 1916 the college obtained a lease from the Bureau of Fisheries in the Department of Commerce. A second lease in 1921 added more land, a third lease in 1926 added riverbank frontage down to the pump house and a final lease in 1930 added land on the west bank. In 1929, the fish hatchery superintendent permitted the college to construct a cement retaining wall and walkways along the river bank, a diving tower and diving boards, a cement driving bridge, and to set post for adequate lighting. The park was used by the aquatic club, to teach life saving classes, school dances and parties, and the annual water pageant (Brown 1999).

On November 20, 1942, the college purchased the three acres west of the main river channel from the Federal Government for $1000, and in May 1943, the college purchased 18.57 acres on the east bank of the river for $10,000 from private owners. The park was renamed Sewell Park in honor of Dr. S.M. Sewell known as the patriarch and patron saint of the river (Sanborn 1944).

The Federal Fish Hatchery property was transferred from the government to the university in the 1960's while Lyndon B Johnson was the U.S. President. There was a great deal of tension between the college and Johnson because the then college president John Flowers refused to let Johnson end his presidential campaign on campus. When James H. McCrocklin became the next president of the university, he actively sought and obtained the President's support. President Johnson delivered the address when

McCrocklin became college president and later authorized the transfer of the fish hatchery to the college. The University constructed the J.C. Kellam building and the Speech-Drama Center on this property (Brown 1999).

The second largest single adjacent land acquisition was the San Marcos Baptist Academy. In June of 1978 the first talks about the possibility of selling the school to SWTSU began between University President Lee Smith and Academy President Jack Byrom. The university would acquire 18 buildings and 82.6 acres of land. Table 1 lists the buildings as they existed at the time of purchase.

Table 1: San Marcos Baptist Academy Building Inventory (Shand 1990)

Building Name	Year Built	Building Name	Year Built
Carrol Hall	1907	Talbot Hall Boy's Dorm	1909
Music Cottage	1910	Heating & Electric Plant	1910
1st President's Home	1918	Pool	1921
Kokernot Gym	1924	Academy & Lindsey	1925
Lattimore Hall	1937	Alexander Hall Boy's Dorm	1948
Abny Hall Boy's Dorm	1952	Kokernot Hall Girl's Dorm	1955
Crook Hall	1963	Glade Outdoor Theater	1965
2nd President's Home	1966	Robinson Christian Center (Theater Building)	1973

The campus would not cease operations—a new campus in the San Marcos area would be contracted before the sale would be complete. The sale took several years to negotiate, but the university purchased the school for $11,250,000 with the school operating for two years rent free while a new school was being built outside of town on

Ranch Road 12 two and one-half miles from the original location on a 200 acre site donated by Mrs. Velma Robinson of Edna, Texas (Shand 1990).

The most recent and largest land acquisition by Texas State was Aquarena Springs. Originally developed as a tourist attraction by A.B. Rogers in 1926, the park was complete with a hotel, a sky ride, glass bottom boat rides, and an underwater theater with mermaids and Ralph the swimming pig.

The 90.52 acre property was purchased in 1994 with plans to convert the theme park to a 16 million dollar research and education center dedicated to the study and preservation of San Marcos Springs. The center informs visitors about rainfall into the springs, which are the habitat for several endangered species. Included in the development plans is a wetlands project developed by the University Biology Department. The River Center hopes to attract as many as 250 thousand visitors a year (Rodriguez 2000).

In 2002, Texas State founded the River Systems Institute, Aquarena Center. The mission of the Institute is "to develop and promote programs and techniques for ensuring sustainable water resources for human needs, ecosystem health, and economic development" (Texas State University-San Marcos 2010). Park activities include glass bottom boat rides, an aquarium, and a wetlands boardwalk. The River Institute sponsors educational tours, and offers diving authorization courses. The Diving for Science Program helps assure that all dives in Spring Lake are procedurally safe and environmentally sensitive (River Systems Institute 2010).

CHAPTER 3

LITERATURE REVIEW

This chapter provides a general review of local government planning, university land use practices, student housing trends, historical GIS, and geovisualization. The components are reviewed as related to the scope of this research.

Urban Geography and Planning

Like many similar post-industrial cities, San Marcos' growth and development has been significantly impacted by the modern automobile. Automobile-fueled growth creates a distinctive pattern to cities where growth occurs in an outward fashion away from traditional downtown centers (Garreau 1991). This pattern of growth has created strain on the infrastructure of the city as well as the University. Growth machine politics have accentuated the pace of land development in much of the Sun Belt (Scott and Soja 1996) with San Marcos being part of this movement.

Up to the 1940s, there was a rapid spread of comprehensive zoning and land subdivision controls. The increase in automobile production and the growth of streets and highways created new land development problems for professional planners. The Federal Housing Administration provided mortgage insurance programs that established the standard for millions of single family houses that were to be built after World War II.

After the war, the nation saw a vast expansion of suburban housing and the development of the interstate highway system. Municipalities incorporated the use of more technically refined zoning and subdivision controls, and participated in large scale urban renewal programs. In the 1980s, the federal government eliminated support for city and regional planning. Urban and regional planners dealt with critical social, functional, and economic development issues across the entire range of local governments (Gerckens 1988).

Also during the 1980s, there was a push to make planning more compatible with the political process. Comprehensive planning continued to be the ideal, but was incompatible with the decision process of local government. In an attempt to make a planning system that is more relevant to the political process, planners introduced several innovations that substantially modified the planning process, including flexible zoning techniques such as planned unit divisions (PUDs), shorter time horizons, comprehensive plans that are less specific and rely less on maps, and the introduction of growth management programs (Rider 1982).

Since the 1980's, certain urban patterns have evolved. Urban sprawl has increased and is located primarily along major transportation corridors. Cities have greater infill development and older land uses have been upgraded to make them more marketable. Additionally, in central city areas, high land values have lead to the increased restoration of run-down urban areas by the middle class resulting in the displacement of low-income residents. This gentrification further exacerbated the need for affordable housing (Kemp 1993).

Current planning issues involve the need for public officials to treat the future as an opportunity, and proper planning will help these officials accomplish this task by eliminating external threats, taking advantage of opportunities, and being able to respond to issues and problems proactively and in a positive manner. Traditional planning practices are becoming obsolete—long range strategic planning must be applied to the public sector to enable government officials to successfully adapt to the future. Table 2 illustrates the difference between traditional and strategic planning in local government.

Table 2: Characteristics of Traditional vs. Strategic Planning in (Kemp 1993)

Traditional Planning	Strategic Planning
Short-range	Long-range
Single Issue	Multiple Issues
Organizational Issues	Community Issues
Hierarchical	Non-hierarchical
Low Involvement	High Involvement
Staff Oriented	Community Oriented
Management Oriented	Political Oriented
Staff Awareness	Community Awareness
Operations Focus	Policy Focus

The latest development in urban planning is the use of Form-Based Codes (FBC). FBC were developed in response to the modern challenges of urban sprawl, the deterioration of historic neighborhoods, and the neglect of pedestrian safety in new development. FBC focus on creating more livable communities and achieving compatibility of uses through design and orientation, instead of strict land use separation (Purdy 2007).

By definition, Form-Based Codes are:

> a method of regulating development to achieve a specific urban form. Form-Based Codes create a predictable public realm primarily by controlling physical form, with a lesser focus on land use, through city or county regulations (Parolek 2008, 4).

Form-Based Codes (FBC) are a tool for improving the quality of the built environment, and for fighting sprawl and all its detrimental effects. They are different from conventional zoning codes in terms of the process by which they are prepared. The major differences between FBS and conventional land-use zonings are listed in Table 3.

Table 3: Conventional Zoning versus Form Based Codes (Parolek 2007)

Conventional Planning and Zoning Codes	Form-Based Codes
Auto-oriented, segregated land-use planning principles	Mixed-use, walkable, compact development-oriented principles
Organized around single-use zones	Based on spatial organizing principles that identify and reinforced an urban hierarchy, such as the rural-to-urban transect
Use is primary	Physical form and character are primary, with secondary attention to use
Reactive to individual development proposals	Proactive community visioning
Proscriptive regulations, regulating what is not permitted, as well as numeric parameters, like density and FAR	Prescriptive regulations, describing what is required, such as build-to lines and combined min/max building heights
Regulated to create buildings	Regulated to create places

The main components of FBC are a regulating plan, public space standards, building form standards, administration, and definitions. FBC can also include block standards, building type standards, architectural standards, green building standards, landscape standards (Parolek 2008).

For San Marcos and Texas State, the historical context of the strategic planning process, specifically the "identification of trends and critical events, directions, and ideals that characterize the historical context of the organization" (Nutt and Backoff 1987, 49-

50) is a core component of this research. With the major focus on this component of the strategic planning process, this researcher maintains that an historical GIS can be effective as a strategic planning tool.

Land Use Patterns of Universities

The University is a significant source of knowledge, a center of culture and a contributor to the economic health and physical landscape of cities. Almost since the beginning, the relationship between the university and its surroundings has been conflictual. This conflict is most evident in university real estate development practices (Perry and Wiewel 2005). A university's first development responses are those that meet the requirements of their constituents—students, faculty, and alumni. Their goal is to attract and retain good students, faculty, and staff (Dober 2000).

Campus—the Latin term for field—is the single term that seems to capture the logic of the university development practice. It is the common expression for an ensemble of buildings for higher education and according to Muthesius (2000), the term "underlines the self containedness of the institution and thus its separateness".

This model of the university creates the potential for long-term, serious conflict between the university and its neighbors. First, it is common for the private community to angrily critique the university for its unresponsive development policies and intrusive real estate impacts. Second, the university's capital requirements increasingly dictate that real estate development projects are mixed-use, creating projects that are part academic and part commercial. Third, university projects today are a combination of community and city redevelopment as well and educational projects. As a result, it is common for

the university to integrate city-wide planning, design, and development goals into its development plans (Muthesius 2000). In a study of five U.S. universities, Austrian and Norton (2005) identified many common issues affecting their real estate acquisition and development practices:

- Motivation: steady growth in student enrollment, need for top-notch facilities to attract and retain faculty and students, concern about student recruitment and retention that stems from problems in surrounding neighborhoods.
- Physical environment: the physical setting has a direct influence on its property acquisition—is there sufficient room to grow or will expansion put pressure on the surrounding land area? What are the surrounding land uses that surround the campus and how do they affect the process?
- State and Local policy oversight: policies have a less visible but significant impact on university development activities and can originate from multiple sources. Autonomy granted to public institutions differs from state to state—boards of regents, a board of higher education, state legislature.
- University leadership: the university president and top-level administration set the agenda for physical development—they determine which direction the university will take with respect to real estate acquisition and development. This vision for the future of the university and the leadership's perception of the role of the university as a civic partner determine what they will do and how they will achieve it.

The main reason universities engage in real estate development projects is that they need additional space for their core activities. This physical expansion is the inevitable

by-product of the growth of higher education. Research activities of universities continue to expand; student numbers are at or near all-time highs; and the expectation on universities to provide housing, social activities, and support services continue to grow. Over time these project can have a significant effect on the neighborhoods surrounding the campus.

In small cities and towns there may be little distinction between university-community and university-local government relations. Several of the main areas of contention are taxes, services, and the degree to which universities are subject to local ordinances and regulation. Something that is present in many places, are the elements of both conflict and cooperation in the relation between the university and the city. Which force prevails depends in part on the issue, as well as on the politics and attitudes of the leadership and other political factors (Wiewel and Perry 2005).

Student Housing Trends

The earliest residence halls were developed in England during the 13th century and were based on the model of a total academic environment. Professors served as house masters, there were common living spaces and libraries, students slept in shared or private rooms, and meals were served in a common dining area. This model persisted through the first half of the last century. During the 1950s through the 1970s a new model of housing consisted of high rise dormitories with double occupancy rooms clustered around a central elevator with thirty to forty students sharing common bathroom facilities. Eating facilities were provided at central dining halls that served thousands of students and were remote from actual living areas. These high rise dorms were a national

trend due to low interest financing available from the federal government. During the 1950s the first of the 'baby boomer' reached college age and the need for student housing was unprecedented and required the quick construction of dormitories that could accommodate a large number of students.

Today's students have a very different background from student 30 and 40 years ago. As the standard of living and the access to information in this country has risen, the majority of today's students are very sophisticated consumers. This consumerism extends to 'shopping around' several colleges. Where a student lives is beginning to have a major impact on the college selection process. What used to be considered luxuries—single rooms, kitchens, private bathrooms and social spaces—are now considered necessities.

Universities are reacting to the growing off-campus housing competition by providing new housing models ranging from single and double room suites with private bathrooms to two to five bedroom apartments with full kitchens. Meanwhile, the private sector has recognized the demand for student housing as a financial opportunity and are constructing off-campus housing at an incredible rate (Koch, Wesse, and Stickney 2002).

Historical GIS

Geographic Information Systems (GIS) first emerged in the mid- 1960's as a solution to the problem of how to automate mapping of geographical data. GIS is used in three basic categories: as a spatially referenced database, as a visualization tool, and as an analytical tool. Once the database has been created and all of the data is mapped, the researcher is able to explore spatial patterns right from the start of the analysis process.

The map is no longer just a product of finished research, but is an integral part of the research process (Gregory 2003).

GIS consists of three components: the spatial component that describes where a feature is located, the attribute component that describes what a feature is, and the time component that describes when a feature exists (Gregory and Ell 2007). Ideally, all three components would exist for all features. Unfortunately, this is not always the case, especially when working with historical data.

There are several approaches to handling time in GIS. This research will use the "key dates" and "date stamping" approaches. The key dates approach captures data for dates which are either seen as important, or for dates which source maps are available. Date stamping treats time as an attribute of the feature. This allows spatial features to be created and removed as the attributes change over time. Once this attribution is captured, date based queries can be used to map changes in a sequence of images, like the frames of a movie. Each boundary line is assigned a start and an end date and then maps are generated that accurately show all boundaries as they were at a particular date (Knowles 2002a).

Historical GIS is a highly inter-disciplinary subject that combines historical scholarship with expertise using GIS (Gregory and Ell 2007). Knowles states that the key difference between historical GIS and the vast majority of GIS is that "its source data typically include archival material that must be converted from analog to digital form (2000a, 452). The conversion of paper historical sources into digital format poses special challenges for historical scholars. Another difficulty is the task of assigning the geographical coordinates required by GIS to the location of historical places and objects.

Researchers have argued that to truly understand the world, one must understand change through space and time. Massey (1999) adds that we need to be able to understand time to tell how a place developed, and understand space to understand the complexity of the way a place develops.

Historical geographers recognize that space should be an explicit part of analysis because (Knowles 2000b):

- Accurate spatial boundaries are key to calculations derived from geographically located data. Without using historically correct and accurate area boundaries, one cannot tell whether statistical changes reflect changes in population, changes in boundary lines, or both;
- We do not understand the spatial aspects of human history;
- Mapping data reveals dimensions of historical reality that no other mode of analysis can reveal.

There are several problems that limit GIS applications to historical research: a) historical sources are often incomplete, inaccurate or ambiguous; b) GIS does not currently or explicitly handle time; c) GIS is better at handling quantitative rather than qualitative data; and d) GIS data capture is slow, expensive and tedious (Knowles 2000a).

Historical data have limitations that set them aside from other types of spatial data. Much of the geographical historical data is taken from paper maps, which may not be accurate. The digital representation of a paper map is at best equal to the accuracy of the paper map, but it will almost inevitably accrue additional error or inaccuracy (Gregory 2003). Additionally, most historical geographic data come from archives and are often plagued by integrity, uncertainty, completeness and ambiguity issues.

One way of dealing with uncertainty is through metadata. Metadata and documentation are fundamental elements of an historical GIS. Metadata are data that describe the content, quality, and other characteristic of the data within the database in a highly structured form. Documentation, on the other hand, is a much looser concept that allows more in-depth examination of the dataset. When elements from multiple sources are used, particularly if they have varying scales and standards of accuracy, it may be essential to document each individual feature. This documentation may be time consuming, but the lack of it may limit the usefulness of the database. Additionally, it is important to have a preservation strategy, to ensure that the data remain usable over time, regardless of the inevitable changes in technology (Gregory and Ell 2007).

Geovisualization

Geographic information can be presented to the user in many different ways. Maps can be descriptive, analytical, and exploratory. Descriptive maps simply present specific geographic information as a static snapshot of geographic information and are meant principally to show where things are. Analytical maps provide a connection to a geographic information database and provide the tools that allow the user to query information and modify the display. Exploratory maps serve as a "thinking instrument that should visually support its users to confirm or generate hypotheses, detect hidden concepts and value-add the underlying geodatabase" (Meng 2005, 6). One downside to using exploratory maps is that the maximum user freedom in using these maps is coupled with a maximum learning effort.

Creating dynamic visualization to represent changing geographic phenomena is one of the techniques used for exploratory spatial data analysis. This visualization of spatial data can aid in the discovery of spatial and/or temporal patterns and they can often help to communicate very complex sets of information (Graham 2006).

Animation is increasingly used in historical cartography, because it is better at presenting change over time than paper-based cartography (Gregory and Ell 2007). The introduction of computer technologies in the 1960's and 1970's changed the process of animations, because computers and animation software packages became more affordable and more accessible to everyday users (Knowles 2000b).

Multimedia cartography seeks to move geographic visualization beyond the more traditional printed maps by incorporating geographic information, dynamic elements for user interaction, animations and multiple mediums of delivery. Maps can now be created to show change over time via multimedia software such as Adobe Flash ®, Google™ Earth and Environmental Systems Research Institute (ESRI) ArcGIS version 10. These maps can also be produced with interactive interfaces which engage the viewer.

Although the animation of geographic data is helpful for communication and display, it is far from a rigorous analytical technique, because current animation software is not developed as a tool for scientific analysis, but for the gaming and entertainment industries. To produce true multimedia geographic visualization, data must be converted from GIS software and manipulated within animation software such as Google™ Earth or Adobe Flash® (Graham 2006). The process to create map-based animation is tedious and time consuming. The finished product is further limited by the fact that animation can only be published electronically (Gregory and Ell 2007).

CHAPTER 4

RESEARCH METHOD AND DESIGN

This chapter combines the knowledge gained from the literature review and the compilation of historical data to outline a methodology for creating and discussing the usefulness of an HGIS and geovisualization as an effective planning tool for a University and its host city. Through historical geographic and statistical data, this research aims to study the spatial relationship between a university and its host city. The research identifies The City of San Marcos and the Texas State University-San Marcos as the entities for the case study and poses the following research questions:

- What effect does the increasing enrollment of a university have on the geographic expansion of its host city?
- How did the increasing student population and the University's pattern of student housing affect land use patterns in the city—specifically relating to multi-family housing?
- How did specific land acquisitions by the University affect the civic or political relationships between the University and the City?
- How can Historical GIS help to visualize the spatial relationship and the geographical and land use patterns of the University and the City?
- Can an Historical GIS be used as an effective planning tool?

Scope of this research

The scope of this research consists of the political boundaries of the City of San Marcos (since its incorporation in 1877) and the physical boundaries of Texas State's main campus (since its beginning in 1899). Analysis of land use patterns is limited to multi-family designations and to on-campus student housing as it pertains to the historic increase in student population. This particular land use designation was chosen because of the proliferation of large multi-family apartment complexes in San Marcos over the past 20 years, and the conflicts this expansion is causing with those who would cite the less dense expansion models outlined in the City's Sector Plans. Although research comparing multi-family land use with single family land use as it pertains to student enrollment would present a more complete picture, it is beyond the scope of this project.

Although much of the geographic growth of Texas State occurred through the donation or sale of small, privately owned residential tracts adjacent to the campus, these acquisitions did not present any obvious conflict between the San Marcos and Texas State. Only the major land acquisitions that expanded the central campus are considered for this research. These acquisitions are: Riverside Park (now called Sewell Park), the Federal Fish Hatchery, the San Marcos Baptist Academy, and Aquarena Springs Resort.

Data

The process of GIS data capture is slow, expensive and often tedious. Converting source material into GIS features takes up the lion's share of the time, but the rewards of such an investment include the ability to combine and jointly analyze diverse sources,

and the ability to map one's material in the course of research (Knowles 2002a). Below are the main sources used in this project.

City of San Marcos

Data for the City of San Marcos was compiled from census data, City GIS data, historical maps, historical references, and legal documents. Data sources included The City of San Marcos, Hays County Mapping and GIS, Hays County Appraisal District, and the Texas General Land Office.

For this study, large scale maps were necessary in order to provide enough detail for georeferencing to the existing City of San Marcos basemap. The Texas General Land Office maintains an online library of historic maps of cities and counties which is where the earliest map of the City of San Marcos used in this research was found. Additional historic maps from 1910 to 1979 were obtained from the City of San Marcos GIS Department. Table 4 lists the data and sources for the City of San Marcos dataset.

Table 4: Maps and Data Sources for the City of San Marcos

Maps and Data		
City of San Marcos		
Data Description	Year	Data Source
City Limits Map	1881	General Land Office
City Limits Map	1910	City of San Marcos Map Archive
City Limits Map	1933	City of San Marcos Map Archive
City Limits Map	1950	City of San Marcos Map Archive
Annexation Case files	1952-2009	City of San Marcos Planning Department
City Limits	1974	City of San Marcos Map Archive
Multi-Family Housing	1962-2009	City of San Marcos GIS, Hays Central Appraisal District
Census Data	1881-2009	U.S. Census Bureau, City of San Marcos

Annexation case files maintained by the City of San Marcos Development Services-Planning Division completed the data acquisition for the city limits. The earliest case files date back to 1952. The final annexation used in this study was completed in December 2010. Table 5 shows a complete list of the annexed areas.

Table 5: City of San Marcos Annexations (City of San Marcos 2010a)

City of San Marcos Annexations						
DESCRIPTION	ACRES	YEAR		DESCRIPTION	ACRES	YEAR
Millview	36.00	1952		Centerpoint Road	26.67	1994
Mockingbird Hills	205.38	1952		Wyatt Addition	33.86	1994
Springlake Hills	2.60	1968		Gilmore	152.18	1998
Hays Co Civic Center	150.82	1970		Hays Energy	16.25	1998
Wonder World/IH35	47.00	1971		McDonald	4.57	1998
E IH 35/Hwy 80	90.00	1973		Myers/Nichols	97.77	1998
Hunter/Westover/IH35/Uhland	632.00	1973		3700-3800 IH35 South	73.54	1999
RR 12	47.00	1973		4300 IH35 South	24.02	1999
Westover	224.00	1973		Hays Energy	114.16	1999
Butler/IH 35	167.03	1979		Post Road	1.47	1999
Gaertner	5.50	1979		Allen/Morris	55.02	2000
Hughson Heights	29.22	1979		Clovis Barker	71.37	2000
Airport/Hwy 21	1890.00	1980		Hughson	35.43	2000
Barker Warren/Post Rd	66.00	1980		SM Toyota	53.99	2000
Hunter Road	697.00	1980		Galisteo Ranch	495.18	2001
Hwy 80/River Rd/Uhland Rd	334.00	1980		IH-35 at McCarty Lane	463.40	2001
Redwood Rd/IH-35 South	266.00	1980		Majestic Estates	68.41	2001
Salinas/River Rd	20.91	1980		McCarty-Centerpoint	249.96	2001
Cummings/River Rd	6.18	1981		Southwest San Marcos	1253.00	2001
Holt/IH-35 North	133.00	1981		Berry-Post Road	15.31	2002
Indeco/IH-35 South	53.93	1981		IH-35 North	1448.06	2002
Schmehkoff – Post Rd	7.00	1981		SH 123 South – Tract 1	199.23	2002
Capes Camp	135.00	1982		SH 123 South – Tract 2	467.98	2002
Armco-Hunter Rd	78.23	1983		SH 123 South – Tract 3	9.84	2002
Brittain Tract – FM 621	57.67	1983		Holt Remainder	26.26	2003
Carpenter – Post Rd	1.10	1983		Aqua Tierra	594.13	2004
Fish Hatchery-FM 621	189.00	1983		Blanco River Village	103.79	2004
IH-35 North (strip)	60.61	1983		Cottonwood Crk Remainder	13.49	2004
IH-35 North (strip)	60.61	1983		H & H Industrial Park	79.27	2004
JASBA – IH35 South	121.43	1983		Hunter Hollow	160.41	2004
San Marcos Ranch – RR 12	47.24	1983		Purgatory Creek	326.30	2004
Hughson Heights	41.60	1984		San Marcos High School	111.41	2004
Hughson Heights	25.07	1984		Balcones Business Park	232.86	2005
IH-35 South (strip)	108.85	1985		First Baptist Church	77.00	2005
SMCISD Hwy123 & FM 621	20.48	1985		Edwards Tract	30.17	2006
Country Est to Fulton Rd	198.80	1986		Hilburn Tract	50.24	2006
Far South IH-35 (strip)	121.21	1986		Corridor Business Park	30.15	2007

Table 5-cont: City of San Marcos Annexations (City of San Marcos 2010a)

City of San Marcos Annexations						
DESCRIPTION	ACRES	YEAR		DESCRIPTION	ACRES	YEAR
Hills of Hays – FM 621	62.24	1986		Hilltop	270.00	2007
IH 35	5.00	1986		Outlet West	5.81	2007
IH-35	4.57	1986		Post Road Villas	5.82	2007
Indian Creek	28.45	1986		Windmere Ranch	212.56	2007
Indian Creek Residue	1.44	1986		Hillert Tract	563.00	2008
Riverchase	141.95	1986		Yarrington Road	4.31	2008
Robbins/Wheelock RR12	3.75	1986		Buie Tract	26.51	2009
River Rd	196.00	1988		Buie Tract	9.41	2009
IH-35 North	110.86	1989		Encino Pointe	19.78	2009
IH-35 North	50.16	1990		Spring Lake Preserve	195.27	2009
Gary Job Corp	42.47	1991		SWTP	336.16	2009
Country Est to Fulton Rd	198.80	1992		Windemere Ranch	22.50	2009
SE Centerpoint & Lowman	51.62	1992		Kalentari Tract	16.31	2010
Lowman Ranch	23.41	1993		Wonder World Drive	26.93	2010
Ranch Subd, Lot 1 Sec 2	35.28	1993		Paso Robles	956.59	2010

Data for multi-family housing was extracted from building footprints that intersected multi-family zoning designations. All GIS feature classes were obtained from the City of San Marcos GIS Department. The date of construction and the number of apartment units was compiled using building permits, building plans, or tax appraisal data. In cases where the multi-family complex (particularly older ones) did not have any information listed in any of these sources, phone calls were made to the complex office.

Texas State University-San Marcos

Data for Texas State was compiled from historic maps, surveys, and illustrations, supplied by the Facilities Department at Texas State. The survey of the original 11 acre site is recorded at the Hays County Record Office, and subsequent surveys of the university are maintained by the University Facilities Department. This department also works closely with a real estate acquisition specialist to maintain an up to date property

inventory file that was useful in determining the ages of buildings and the dates of property acquisition. Ronald C. Brown's books (1979, 1999) on the history of the university provided supplemental data on building construction and destruction dates as well as historic enrollment figures. Additional information on student enrollment and student housing capacities was extracted from the Texas State Institutional Research Department website.

Table 6 lists the data and sources for Texas State University-San Marcos dataset.

Table 6: Maps and Data Sources for Texas State University-San Marcos

Maps and Data		
Texas State University – San Marcos		
Data Description	Year	Data Location
Original 11 acre site	1899	Hays County Records
Campus Survey	1933	Texas State Facilities Department
Riverside Park Survey	1950	Texas State Facilities Department
SWTSTC Boundary	1938	Texas State Facilities Department
SWTSTC Boundary	1940	Texas State Facilities Department
Federal Fish Hatchery Survey	1941	Texas State Facilities Department
SWTSU existing plan	1967	Texas State Facilities Department
SWTSU existing plan	1976	Texas State Facilities Department
Property Inventory	1899-2009	Texas State Facilities Department
Student Enrollment	1903-1999	Brown, 1999
Student Enrollment	1999-2009	Texas State Institutional Research

Analysis of student housing trends was possible because of the data provided by the Texas State Department of Institutional Research. The historical statistical data on student enrollment was analyzed with major University expansion, on-campus housing city annexations, and off-campus multi-family housing complexes. The Department of Institutional Research provided an addresses file of the current students (Fall 2010)

within the San Marcos zip code (78666). These addresses were geocoded to the current San Marcos address map to illustrate current student housing trends for Texas State.

Creating the Historical GIS

The Historical GIS consists of two major components: a) Historical geographic boundaries that illustrate growth and growth patterns of the two institutions; and b) statistical population and enrollment data, and building data for on and off-campus housing. Below is a discussion of the sources used for this project.

Geographic Boundaries

Spatial data used in Historical GIS come from two basic sources: primary and secondary. Primary sources are data that can be directly captured into the GIS using Global Positioning Systems (GPS), remote sensing from satellites; or land surveys. Secondary sources are data from paper maps that are converted to digital format by scanning the maps to produce raster data, or digitizing the maps to produce vector data. This research used both primary data (land surveys), and secondary data (scanned maps).

Compiling the library of historical boundaries for San Marcos and Texas State required that each map (rendered in its digital form) be imported into ESRI ArcGIS 10.0 GIS application to provide a "backdrop" for creating each GIS layer. Using one or more processes, each historical map was aligned to a basemap and then digitized into the GIS database. The basemap consisted of the following layers provided by the City of San Marcos GIS Department: parcels, rivers, major creeks, railroads, street centerlines, and 6"

resolution orthophotos, digitally captured in early 2009. Figure 3 provides a graphic illustration of one of the processes.

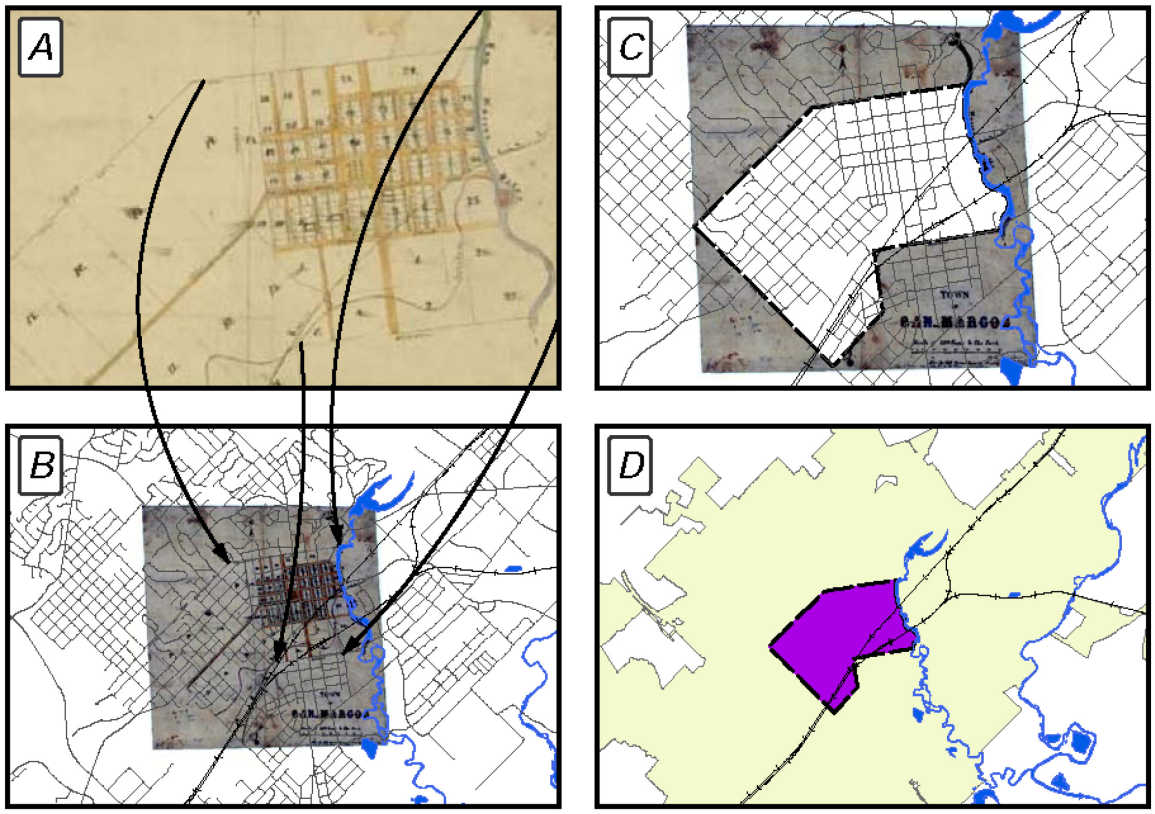


Figure 3: Boundary Digitizing Process. An historical map (A) is georeferenced with the GIS basemap (B). The location is digitized (C) so that a boundary can be created for a particular date (D) within the GIS

Land surveys provided the most accurate data capture, where the boundary was digitized using coordinate geometry. Digitized historical maps were aligned to the basemap using the ArcGIS georeferencing tool and then digitized. In some cases, georeferencing created a great deal of distortion of the historical maps. These maps were georeferenced and digitized in sections or visually referenced to the nearest block on the basemap. The goal was to create the closest estimation of the city limit boundary for each particular year.

The most current archived paper map of San Marcos used in this research was a detailed parcel map created by Byrn Engineering in 1974. Geographic expansion after that date was illustrated by adding each annexed area using case files maintained by the City of San Marcos Development Services Department. Each of these cases files contain a metes and bounds description of the property which was digitized using the ArcGIS traverse tool.

The historical boundaries for Texas State were created using the same methodology as San Marcos, but there was less geographic information available. The Texas State Facilities Department provided the historical maps and surveys of the main campus and the four major land acquisitions used in this research. The purchase or donation of private lots contributed to the contiguous growth of Texas State, but were not cataloged in this research because historical land ownership data was not easily obtainable. Their incorporation into Texas State is included in the boundary maps provided by Texas State.

Two polygon feature classes were created for each set of boundaries. One set displayed the complete boundary at a specific time, and the other set displayed only the change in the boundary at a specific time, by including only annexed or disannexed property. This 'clipped' feature class allows the user to view the previous boundaries as new property was added or removed. Both techniques were used in order to illustrate various animation effects. A date field was included in the attribution as a 'time stamp' so that the feature could be animated in the map.

Population, Enrollment, and Housing

The population statistics for San Marcos were obtained from the City of San Marcos Development Services Department-Planning Division. This division is responsible for maintaining census data and population estimates from the U.S Census Bureau for various publications and master plans, including the Horizons Master Plan, Sector Plans, and Annexation Plans. Estimated population statistics used in this research were extracted from the "Annual Estimates of the Population for Incorporated Places in Texas, Listed Alphabetically: April 1, 2000 to July 1, 2007" table from the Population Division U.S. of the Census Bureau. Population estimates for the years 2008, 2009, and 2010 are the estimates calculated by City of San Marcos Planning Division.

Enrollment figures for Texas State were gathered from several sources. Ronald Brown's 1999 comprehensive history of SWTSU provided enrollment statistics for the years 1903 – 1998 in five year increments, and annual enrollment statistics for 2000 - 2010 were provided by the Texas State University Department of Institutional Research (Institutional Research 2010).

Student housing was categorized as either on-campus or off-campus housing, and was limited to housing inside the city limits. The enrollment figures for fall 2010 show that almost 60% of students do not reside in San Marcos, a figure that warranted a separate discussion. Student housing patterns for 2010 will be discussed in the following chapter.

On-campus housing is coordinated by the Department of Housing and Residential Life. Their mission is to provide students with a safe, comfortable and convenient living environment, while offering opportunities for increased campus involvement, social

interaction and academic assistance. The 2010-2011 housing policy requires students under the age of 20 with fewer than 30 credit hours to live in on-campus housing. All students who graduated from high school within the preceding 12 months of the semester of their admission are also required to live on-campus. The Department offers several housing options to these students: traditional, modified traditional, adjoining suites, super suites, individual contract apartments, and traditional lease apartments (Department of Housing and Residential Life 2010). Capacity for on-campus housing was gathered from the department website. The buildings were dated using information gathered on the department website or from the Texas State property file maintained by the Facilities Department (2008). Dorm capacity is quantified by the number of beds in each dormitory or complex.

Options for off-campus housing include single family houses, duplexes, townhomes, mobile homes and apartments. The San Marcos City Code sets an occupancy restriction on single family housing:

> all dwelling units located in SF-R, SF-11, SF-6, SF-4.5, DR, TH, PH-ZL zoning districts shall be restricted to occupancy by a family, and up to one other person who is not related to any of the family members by blood, legal adoption, marriage, or conservatorship.

Multi-family (MF) residential districts are intended for the development of multi-family, apartment residences at a density of either 12, 18 or 24 units per acre (City of San Marcos 2010a).

A multi-family housing feature was created by selecting building footprints that fell were within MF-12, MF-18, or MF-24 zoning districts. A multi-family housing feature was created for one neighborhood with Duplex (D) zoning, because of the high

density of student population. This particular zoning district is in the neighborhood commonly referred to as the 'student ghetto'.

Building dates and the number of units for each complex were extracted from building permits, site development plans, and property appraisal information. If the information was unavailable from any of these sources, phone calls were made to the individual complexes or the property management companies in an attempt to complete the database. The original off-campus housing dataset consisted of 11,497 units. Only 196 units (1.8%) could not be dated, and these complexes were omitted from the data used in this research. Since the date for multi-family housing could be based on either the date the building permit was issued, or the date that the building was completed, and some complexes could have taken up to two years for construction, this date must be considered as an estimated date.

For this research, off-campus multi-family housing was calculated using the number of apartment units. It is important to recognize the distinction between the number of units and the number of bedrooms. The actual capacity of the complex would allow for greater accuracy in the analysis, but the data was not readily available at the time.

Addresses for students enrolled in the fall semester were geocoded to Texas zip codes, to determine geographic distribution. The addresses within the San Marcos zip code (78666) were geocoded again using an address point feature class. The pattern of student population within the San Marcos City Limits was illustrated using proportional point symbology and by creating 'hot spots' using kernel density analysis. Student

addresses were overlayed onto multi-family housing complexes to analyze the current pattern of student residency.

Data Consolidation

Once the GIS database was complete, the next step was to develop a method to consolidate the data into features classes that represented specific points in time. The database consisted of 37 city limit boundaries dating from 1881-2010, 15 university boundaries dating from 1899 -2010, 26 on-campus housing dating from 1941-210, and 137 off-campus housing features dating from 1962-2010. Yearly intervals were determined by the availability of the data. A yearly feature was created if there was a significant change in the city limit or university boundary, or if housing statistics increased dramatically. For each designated year, the city limit and the university boundaries are displayed singularly, and on-campus and off-campus housing are displayed cumulatively.

A 129 year time span was represented by 33 feature classes. The average interval between yearly feature classes was three and one-half years. The longest interval between features was 23 years, from 1910 to 1933. Features from 1881 to 1974 were created using the scarcest and the most unreliable data. Fewer boundary maps for that time period were available, annexation files were not maintained by the City Planning Department until 1952, and the age of the earliest housing complexes were estimates. The data for 2000 to 2009 presents the most accurate boundaries and housing dates, annual population estimates and enrollment figures. Since actual student addresses were

available for 2010, the pattern of current student housing in San Marcos will be analyzed using his data.

The final data consolidation schema is defined in the following table. The matrix describes each layer by the date of the most recent city limit and university boundary, the time frame used for housing data, and the date for the population and enrollment figures (see Table 7).

Table 7: Data Consolidation Matrix

	1881	**1899**	**1910**	**1933**	**1938**	**1940**	**1941**
City Limit	1881	1881	1910	1933	1935	1935	1935
University Boundary	-	1899	1903	1920	1938	1940	1941
On-Campus Housing	-	-	-	-	-	-	1941
Off-campus Housing	-	-	-	-	-	-	-
Enrollment	-	-	1910	1933	1938	1938	1938
Population	1880	1880	1910	1930	1930	1930	1940
	1943	**1950**	**1952**	**1957**	**1963**	**1967**	**1970**
City Limit	1935	1950	1950	1950	1963	1963	1970
University Boundary	1941	1950	1950	1957	1960	1967	1967
On-Campus Housing	≤1943	≤1947	≤1952	≤1957	≤1963	≤1967	≤1967
Off-campus Housing					≤1963	≤1967	≤1967
Enrollment	1943	1948	1948	1953	1963	1963	1968
Population	1940	1950	1950	1950	1960	1960	1970
	1974	**1976**	**1980**	**1981**	**1983**	**1985**	**1990**
City Limit	1974	1974	1980	1981	1983	1985	1990
University Boundary	1967	1976	1980	1980	1980	1980	1990
On-Campus Housing	≤1974	≤1976	≤1980	≤1981	≤1983	≤1985	≤1990
Off-campus Housing	≤1974	≤1976	≤1980	≤1981	≤1983	≤1985	≤1990
Enrollment	1973	1973	1978	1978	1983	1983	1990
Population	1970	1970	1980	1980	1980	1980	1990
	1994	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
City Limit	1994	2000	2001	2002	2003	2004	2005
University Boundary	1990	1990	1990	1990	1990	1990	1990
On-Campus Housing	≤1994	≤2000	≤2001	≤2002	≤2003	≤2004	≤2005
Off-campus Housing	≤1994	≤2000	≤2001	≤2002	≤2003	≤2004	≤2005
Enrollment	1990	2000	2001	2002	2003	2004	2005
Population	1990	2000	2001	2002	2003	2004	2005

Table 7-cont: Data Consolidation Matrix

	2006	2007	2008	2009	2010	-	-
City Limit	2006	2007	2008	2009	2010	-	-
University Boundary	1990	1990	1990	2009	2010	-	-
On-Campus Housing	≤2006	≤2007	≤2008	≤2009	≤2010	-	-
Off-campus Housing	≤2006	≤2007	≤2008	≤2009	≤2010	-	-
Enrollment	2006	2007	2008	2009	2010	-	-
Population	2006	2007	2008	2009	2010	-	-

Creating the Geovisualization

The preceding methods for data creation and analysis provided the foundation for this research, but explain only part of the complex history of San Marcos and Texas State. An important decision at this juncture was deciding which software programs would be best for creating the geovisualization for this research. To communicate the results of this study beyond simply reporting statistics and creating static maps, two types of interactive animated maps were produced. The first animation process provided an interactive dynamic geovisualization of the maps, but was insufficient as a multimedia outlet. The second animation process offered an interactive interface of different types of data, but was limited by the inability to display maps at various scales. Since neither process could adequately communicate all of the data adequately, both processes were used.

Google™ Earth

Google™ Earth proved an appropriate tool for creating the interactive dynamic geovisualization used in this research. Google™ Earth is a virtual globe, map and geographical information program created in 2001 by Keyhole, Inc., a company acquired

by Google ™ in 2004. The software maps the Earth by superimposing satellite imagery, aerial photography, and vector graphics onto a GIS 3D globe. The program is internet based, free and available for use on almost all personal computers (Selkin 2009).

Google™ Earth allows the user to import information as Keyhole Markup Language (KML) or Compressed Keyhole Markup Language (KMZ) files as overlay images, or place marks. Dynamic placemarks contain information that changes through time and can be viewed using a time slider tool. This tool automatically appears when time stamped data is imported and selected. The user can control the visibility of overlays or placemarks by adjusting the active time range, or play through the time line as an animation.

Time enabled GIS features were created and symbolized in the ESRI ArcGIS environment and converted to KML using the Feature to KML conversion tool. Once the KMZ files were created, they were simply 'dragged and dropped' onto the temporary places location. The features overlayed on aerial orthophotos were historical city limits, historical university boundaries, on- campus housing, and off-campus housing. The imported features were overlayed on aerial orthophotos built into the software program.

Google ™ Earth was also used to display student housing data for 2010. The pattern of student housing was illustrated using proportional point symbology for the students living in San Marcos. Additional feature classes: multi-family zoning; student address points; housing units per complex; and chart points illustrating the percentage of students living in each complex, were overlayed onto the student addresses for a complete picture of off-campus housing. This data was more suitable for Google™ Earth because of the ability to view the data at different scales.

The main limitation of using Google™ Earth for this research was a less robust user interface and the difficulty creating a multi-media product that presents additional data in the form of charts and tables.

Adobe Flash®

Adobe Flash ® has a well established reputation as the premier 2-D vector animation program – it is relatively easy to learn and offers a great deal of flexibility in creating an interactive animation that is user friendly.

Vector based GIS data is not directly compatible with Flash, so each historical layer was exported from the HGIS database to Adobe Illustrator® files, which are directly recognized by Flash. Once all GIS data was converted to a usable format within Flash (based on the compilation methodology outlined in the previous section), two layers were created for each year. The first layer displayed the map, and the second layer displayed statistical data for the year – acreage, population, enrollment, on-campus housing and off-campus housing.

Each year was allocated ten frames on the timeline, and the playback speed was set to seven frames per second. Frame allocation and sequencing for each year was set in the Flash timeline (see Figure 4).

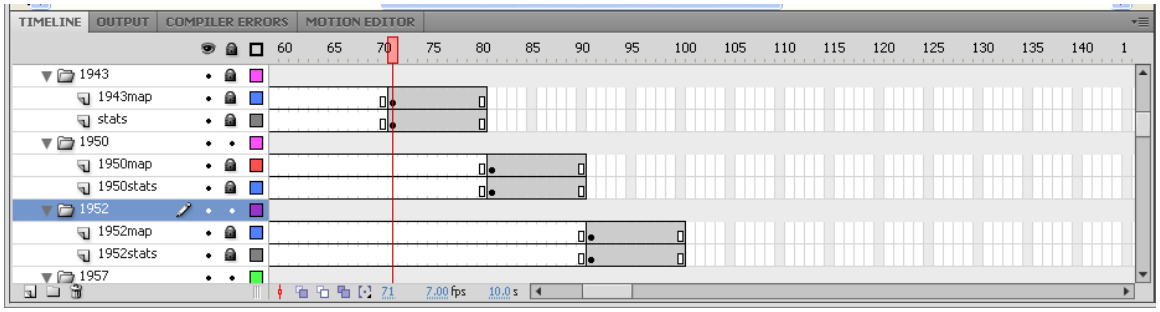


Figure 4: Flash Timeline

Several elements of user interactivity were added to the geovisualization to allow the user to control the map animation and view relevant charts and data. Standard media control buttons allow the user to start, stop, and replay the animation. Additional animation control was added by allowing the user to jump to a specific year by clicking on the timeline. The user can view charts and statistical data by clicking the 'charts' button and selecting the data of interest. The charts and tables included in the Flash geovisualization are:

- Statistical Data
- Consolidation Matrix
- Population and Enrollment 1870-2000
- Population and Enrollment 2001-2010
- Population and Enrollment Rate of Change 1870-2000
- Population and Enrollment Rate of Change 2001-2010
- On-Campus and Off-Campus Housing
- Student Housing Rate of Change
- Acreage Rate of Change
- Student Residency – 2010

Additional controls allow the user to navigate between the statistical data and the maps.

Major University Land Acquisitions

Although education is the primary task of the college or university, the institution can also be a key factor in city and regional development (Laub 1972). Universities

expand in order to meet the requirements of their constituents. Their goal is to attract and retain quality students, faculty, and staff (Dober 2000). Through the purchase or donation of many adjacent, privately owned lots of land, the physical boundary of Texas State continually expanded. However, the geographic growth of Texas State included several large tracts of land which facilitated the rapid and contiguous expansion of the central campus. These acquisitions included – Riverside Park (Sewell Park), the Federal Fish Hatchery, the San Marcos Baptist Academy (West Campus), and Aquarena Springs (Aquarena Center). The total land area of these four tracts constituted 33.90% of the central campus in 2009 (see Figure 5).

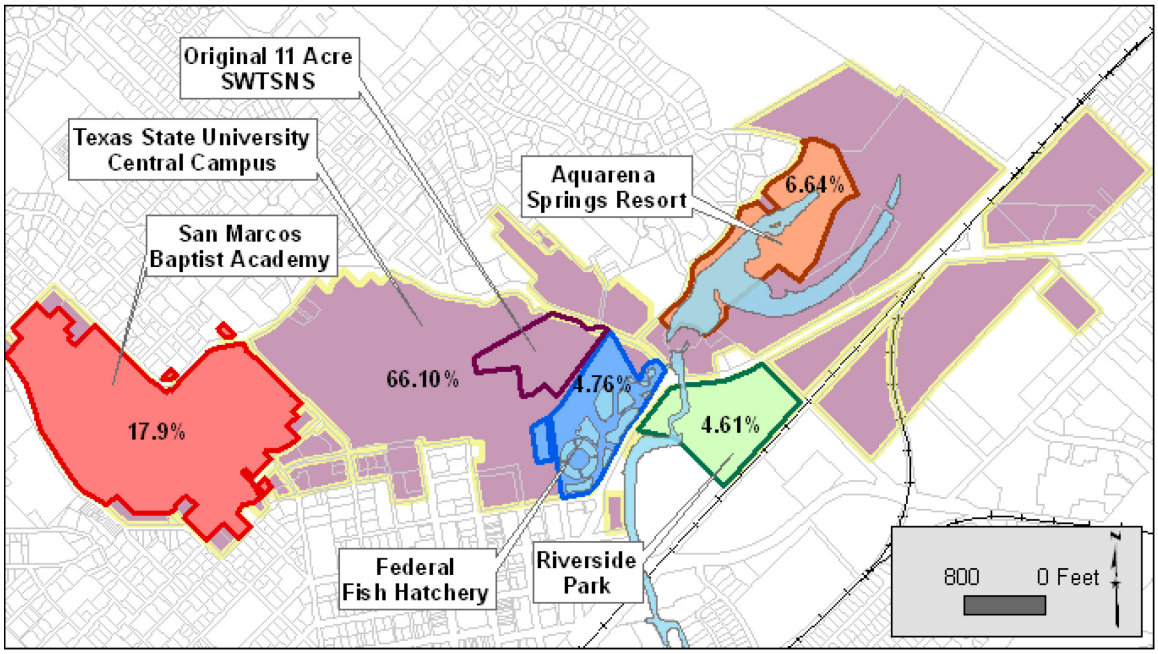


Figure 5: Texas State Major Land Acquisition Map

These areas were chosen for this research because: a) they each significantly increased the physical boundary of Texas State; b) they provided space for a variety of core activities and services; and c) they exhibited varying levels of conflict with local

citizens and politicians. This research analyzed each major land acquisition based on these criteria to using historical references and newspaper articles.

Historical GIS as a Planning Tool

Urban applications of GIS can be divided into three categories: planning, operation, and public information. The intent of this research is to determine if an historical GIS can actually be used as a planning tool and not just as a source of public information. I identified four activities that form a framework process for using historical data in the planning process: collect historical data, illustrate data sequences, identify trends, evaluate trends and formulate plans. The use of historical data in the planning process is illustrated in Figure 6.

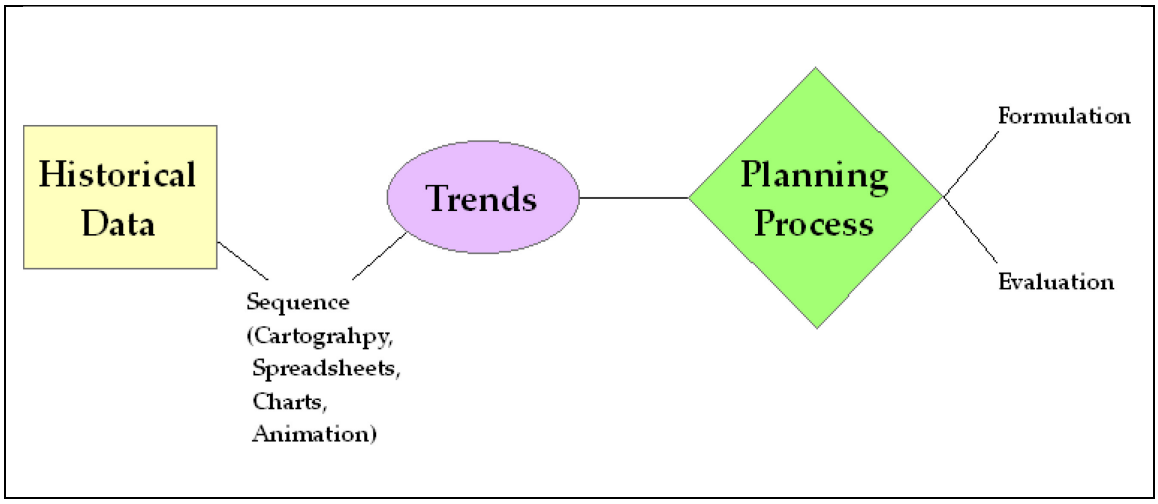


Figure 6: Historical Data in the Planning Process

The historical research data was compiled into charts, static maps, and an historical animation using Google™ Earth and Adobe Flash® and was presented to a panel of representatives from the City of San Marcos and Texas State University-San Marcos. Members of the panel were chosen because of their roles as planners, and/or

decisions makers. An informal meeting was held on February 17, 2001 with representative of the City of San Marcos. Attending were Jim Nuse, City Manager; Laurie Moyer, Assistant City Manager; Mathew Lewis, Interim Planning Director; and Bill Couch; Development Coordinator. To accommodate conflicting schedules, the data was presented to Texas State representative Nancy Nusbaum, Associate Vice President for Finance and Support Services Planning and chair of the Master Plan Steering Committee, on February 21, 2011.

The panel was shown the animated historical data on both software platforms. The primary purpose of the presentation was to obtain opinions on the geovisualization products and their relevance and usability as a tool in the planning process. The researcher presumed that the panel would focus heavily on the actual data instead of the process, so an attempt was made to steer the discussion around the following questions:

- Do you feel that a geographic history of the city and the university is a valuable planning tool?
- For what specific purpose could this tool be used?
- Was the presentation well organized and was the data easy to understand?
- Which presentation format was better at displaying the data?
- What did you like/dislike about the presentations?
- What suggestions do you have to improve the presentation of the data?

CHAPTER 5

RESULTS

This chapter provides an overview of historical GIS and usability of geo-visualization based on methodology provided in the previous chapter. This research sought to examine the historical relationship between the City of San Marcos and Texas State University- San Marcos. An historical geovisualization was presented to key planning personnel to ascertain the usability of HGIS as an effective planning tool. Major University land acquisitions were examined and statistical data was analyzed for historical growth trends and land use patterns. Five research questions were posed:

- What effect does the increasing enrollment of a university have on the geographic expansion of its host city?
- How did the increasing student population and the University's pattern of student housing affect land use patterns in the city – specifically relating to multi-family housing?
- How did specific land acquisitions by the University affect the civic or political relationships between the University and the City?
- How can Historical GIS help to visualize the spatial relationship and the geographical and land use patterns of the University and the City?
- Can an Historical GIS be used as an effective planning tool?

Geographic Expansion

City of San Marcos

The earliest City of San Marcos map used in this research is dated 1881, four years after the city was incorporated. At that time, San Marcos encompassed 632 acres of land bounded by the San Marcos River, the International and Great Northern Railroad and the Balcones Escarpment. As of December 2010, San Marcos encompassed 20,579 acres, almost 33 times its original size.

The expansion of San Marcos has followed a fairly linear pattern along the IH 35 corridor and has grown around the San Marcos River and the University. The Blanco River is a natural bounding feature to the northeast and the northwest edges of the City. Over the years, the City has remained relatively compact, dense, and has resisted sprawl.

The city is located at the southeast corner of Hays County, where it abuts Caldwell, Guadalupe and Comal Counties. The majority of San Marcos lies in Hays County but over the years, it has stretched into Caldwell and Guadalupe Counties. Figure 7 compares the city limit boundary in 1881 and the city limit boundary in 2010, and illustrates the spatial relationship of San Marcos to the rivers, IH 35, the railroad and county boundaries.

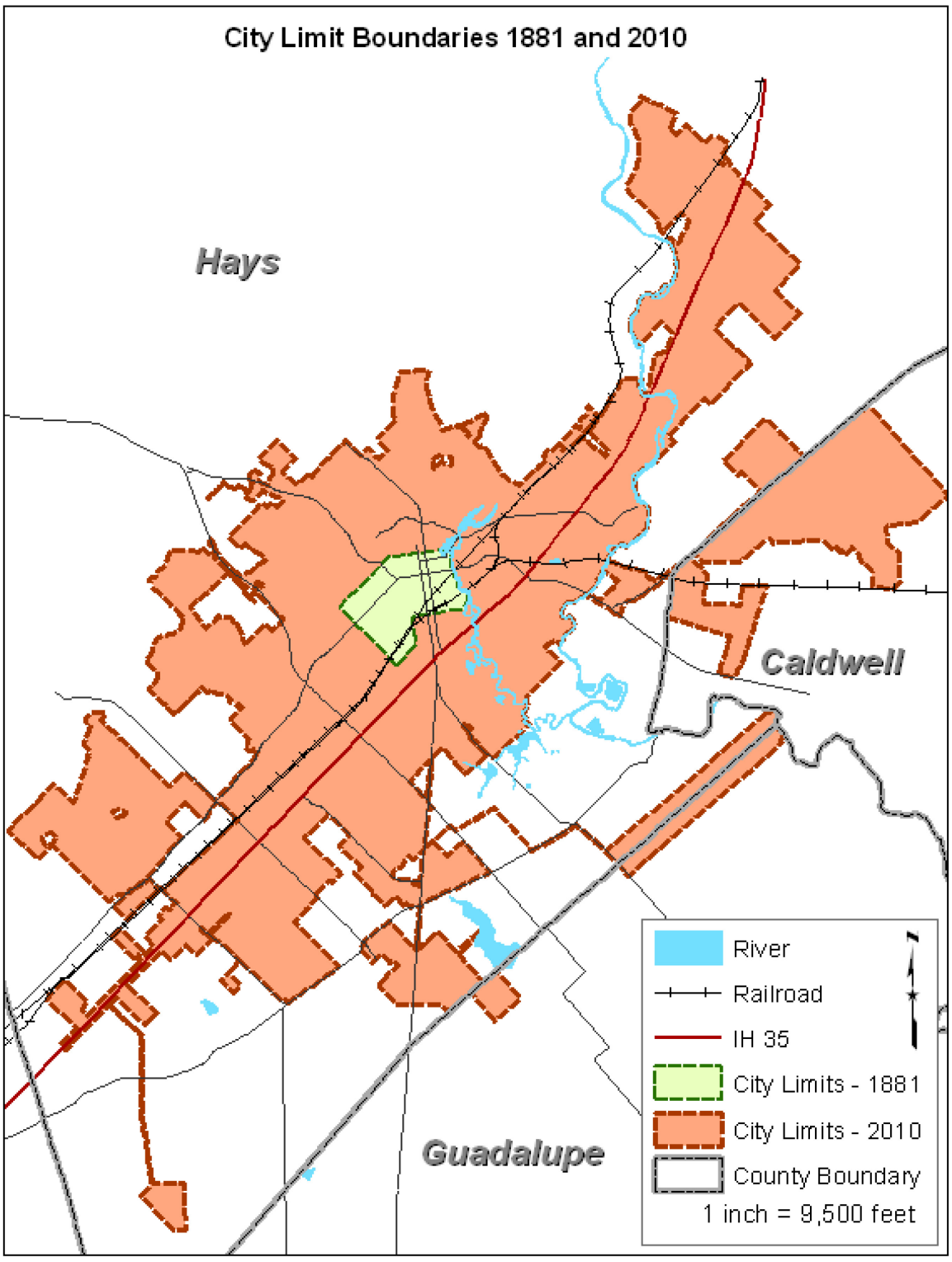


Figure 7: City Limit Map 1881 and 2010

The early expansion of San Marcos was restricted by the San Marcos River and the railroad. By 1950, the city limits extended across the San Marcos River and began expanding toward what was to become Interstate Highway 35. The construction of IH 35 changed the growth pattern of San Marcos to a northeasterly to southwesterly expansion along the Interstate. The Hays County Boundary confined expansion east of the Interstate, with the exception of the Airport (which is entirely in Caldwell County) and property in Guadalupe County annexed for private development in the future.

Based on the feature layers created for this research, over the past 129 years the city limit boundary has grown at an average rate of 10.85 % per feature year, with several notable 'growth spurts'. The first large expansion occurred after the establishment of SWTSNS. The second, and the greatest increase in the city limit boundary, happened around 1950. Government subsidized housing for World War II veterans was the most likely reason for the 68% land increase. In 1950, the city limits encompasses 4,416 acres, and at least 45% of that land is now single family residential districts. The residential neighborhoods within the 1950 city limit boundary account for 57% of all of the current politically represented neighborhoods in San Marcos today. The last significant increase in land occurred between 1976 and 1980. During that period, San Marcos annexed the land that would become the Municipal Airport, and industrial areas on North IH35, and in the southwest area of town on Hunter Road.

Not all of the land annexed by San Marcos has remained within San Marcos's jurisdiction. The land above Aquarena Springs was part of the 1950 boundary, but excluded after 1970 (no disannexation file was available). The city re-annexed this property as greenspace in 2009. In 1990, San Marcos annexed a 2.5 mile strip of land

adjacent to Ranch Road 12 which was disannexed by 1994. In 2001, in an effort to increase average home values, manage growth, and increase the number of voters, San Marcos annexed 550 homes on 1,253 acres in Southwest San Marcos, despite considerable opposition from residents (Embry 2003). Two years later, San Marcos disannexed six of the subdivisions, which resulted in the largest decrease in the city growth rate.

The City's geographic growth rate is illustrated in Figure 8.

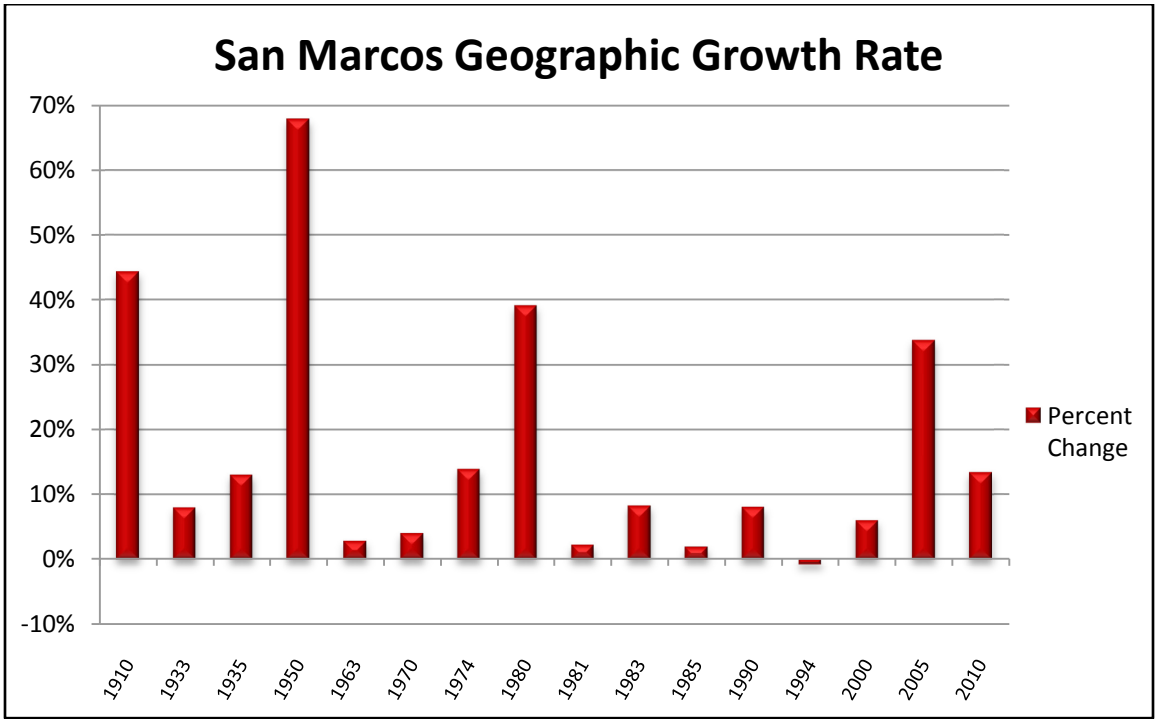


Figure 8: San Marcos Geographic Growth Rate

The average rate of growth for the City of San Marcos is just over 11%, and is fairly consistent, with the three exceptions mentioned earlier.

Texas State University-San Marcos

The original 11 acres tract for SWTSNS is described in the deed recorded at the Hays County Clerk's office. As of December 2010, the Texas State central campus covered 471 acres, over 47 times its original size. Additionally, Texas State has land holding of over 5,038 acres in San Marcos, and Hays and Williamson Counties.

Texas State has expanded around Old Main, which was built on the top of Chautauqua Hill, overlooking the City of San Marcos. Figure 9 compares the University boundary in 1899 and the University boundary in 2010.

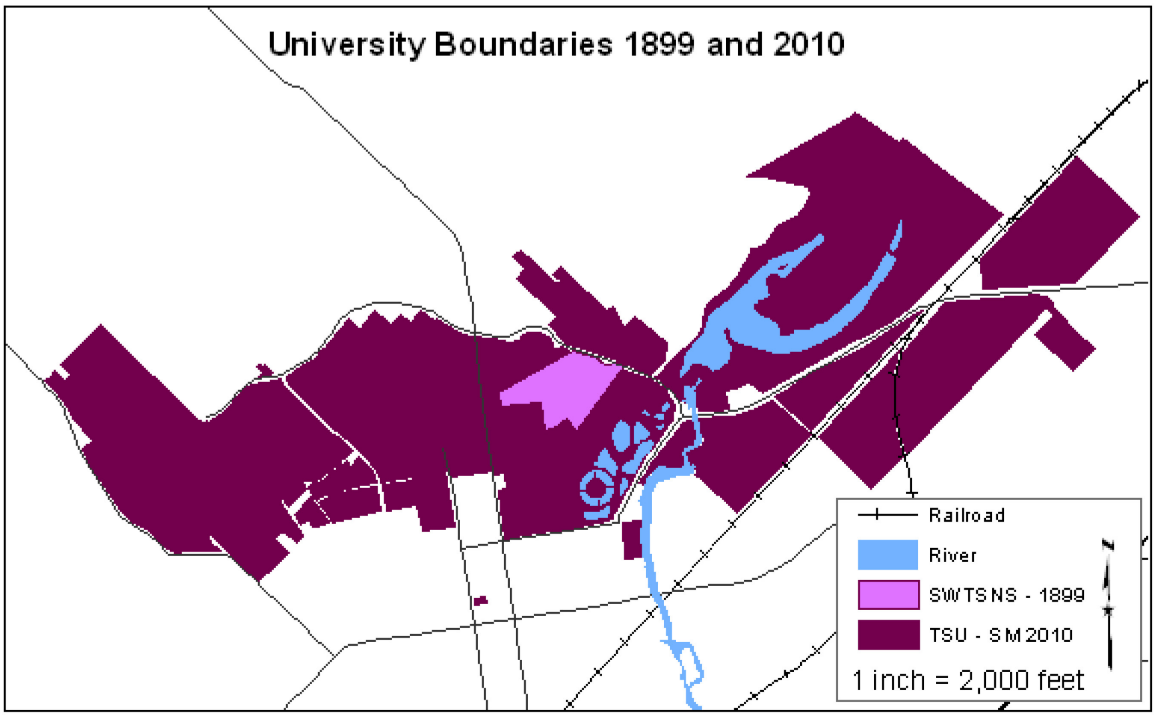


Figure 9: University Boundaries 1899 and 2010

The expansion of the central campus was somewhat restricted by its location in the center of San Marcos. Early expansion slowly added onto the original 11 acre site, south of Sessom Street and east of the San Marcos River, through the purchase or donation of adjacent private lots.

Based on the feature layers created for this research, over the past 111 years the boundary for the central campus has grown at an average rate of 21.23 % per year. Fewer geographic boundaries for the university were incorporated into this research, so it appears that the growth rate for Texas State has more years with a large percentage growth rate, but there were fewer yearly features and each feature contained a greater time span per feature. Even so, like San Marcos, Texas State had several notable 'growth spurts'.

The first large expansion included the acquisition of property that was not contiguous to the existing campus, including the Old Evans Practice Field on Sessom Street. For the first time, the university boundary crossed public right of way. During the period from 1941 to 1950, the university boundary increase significantly with the purchase of Riverside Park and just over 21 acres of private property on the west bank of the San Marcos River. The university more than doubled in size from 1967 to 1970. It was during this period that Texas State expanded on the west side of the San Marcos River and across Sessom Street. Right of way was purchased from San Marcos, creating a more contiguous campus. Much of the additional land was used for on-campus student housing. Dorm capacity increased by 1,856 rooms—from 1,485 in 1963 to 3.341 in 1967.

The largest single adjacent land acquisition occurred when Texas State purchased the 78.5 acre San Marcos Baptist Academy in 1979. The University did not occupy the existing facilities until 1982, when the new Academy was opened. The last significant growth rate increase was due to the purchase of Aquarena Springs Resort in 1994. The University's growth rate for this research is illustrated in Figure 10.

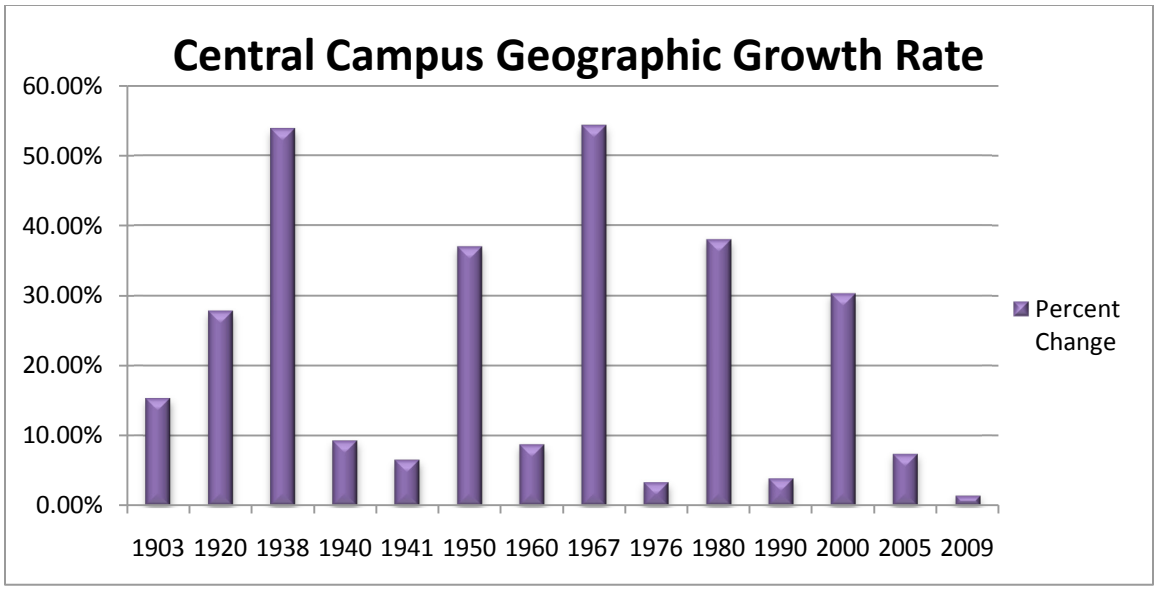


Figure 10: Central Campus Geographic Growth Rate

The growth rate for Texas State is inconsistent over the 111 year time span. The data available for the university was compiled into fewer boundary files for the HGIS, so there was a greater time span between each representative year.

Statistical Analysis of Enrollment and Geographic Growth

Previous sections presented geographic growth data for San Marcos and Texas State as separate entities, and this section compares their geographic growth, and analyzed the effect increasing enrollment may have had on the geographic growth of the City. Figure 11 compares the growth rate of San Marcos to the growth rate of Texas State.

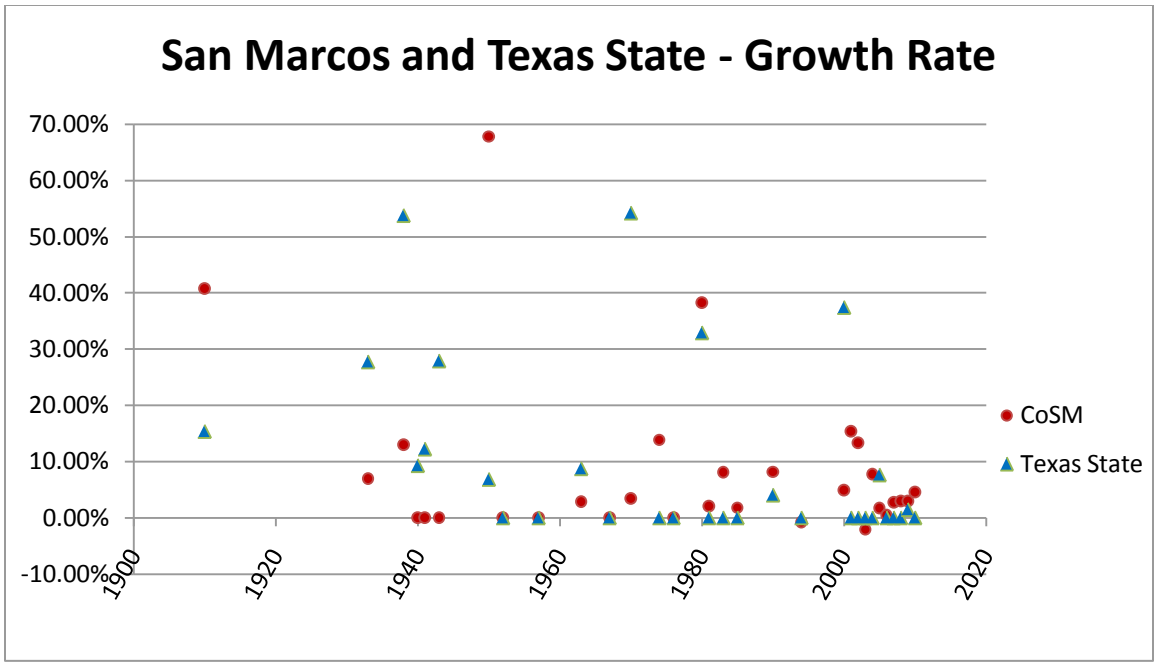


Figure 11: San Marcos and Texas State Geographic Growth Rate

To identify the statistical relationship between increasing enrollment and the geographic growth of San Marcos, a simple linear regression was performed on the temporal extent of the data. Setting the enrollment as the dependent variable and the total acreage as the independent variable revealed an interesting trend.

Over the 111 year history, linear regression analysis reveals a very strong positive relationship between enrollment and City's geographic growth (r^2 value of 0.9781). This figure is only slightly smaller than the r^2 value for the regression analysis of enrollment on the geographic growth of the University, which was 0.9831. Figures 12 and 13 illustrate the regression analysis for enrollment and city growth, and enrollment and the central campus growth respectively.

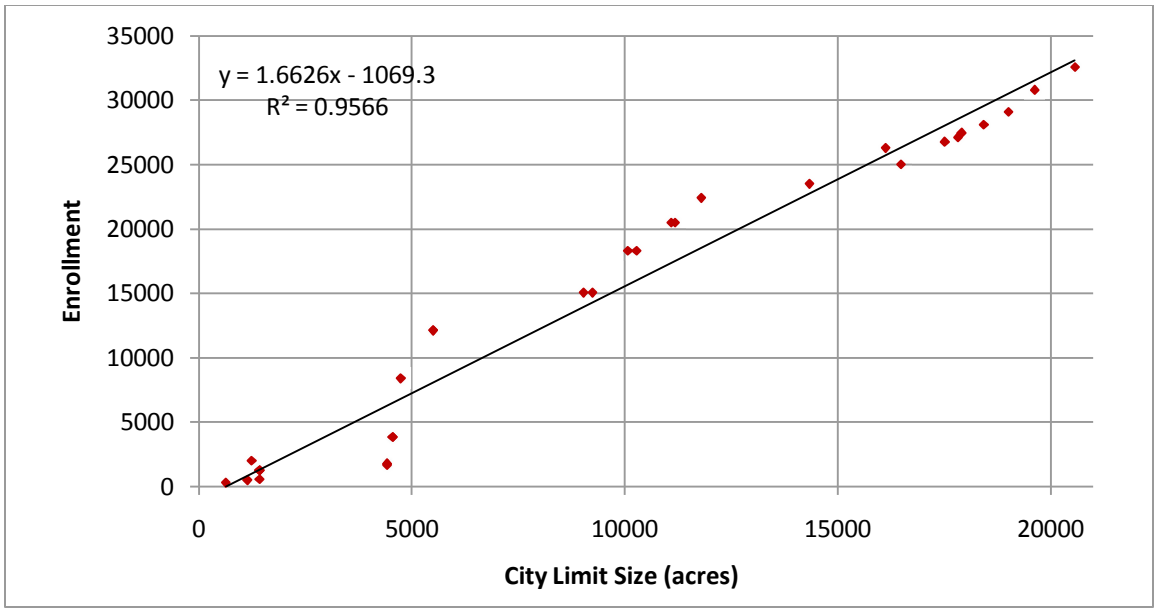


Figure 12: Enrollment Regression Chart: City Limits

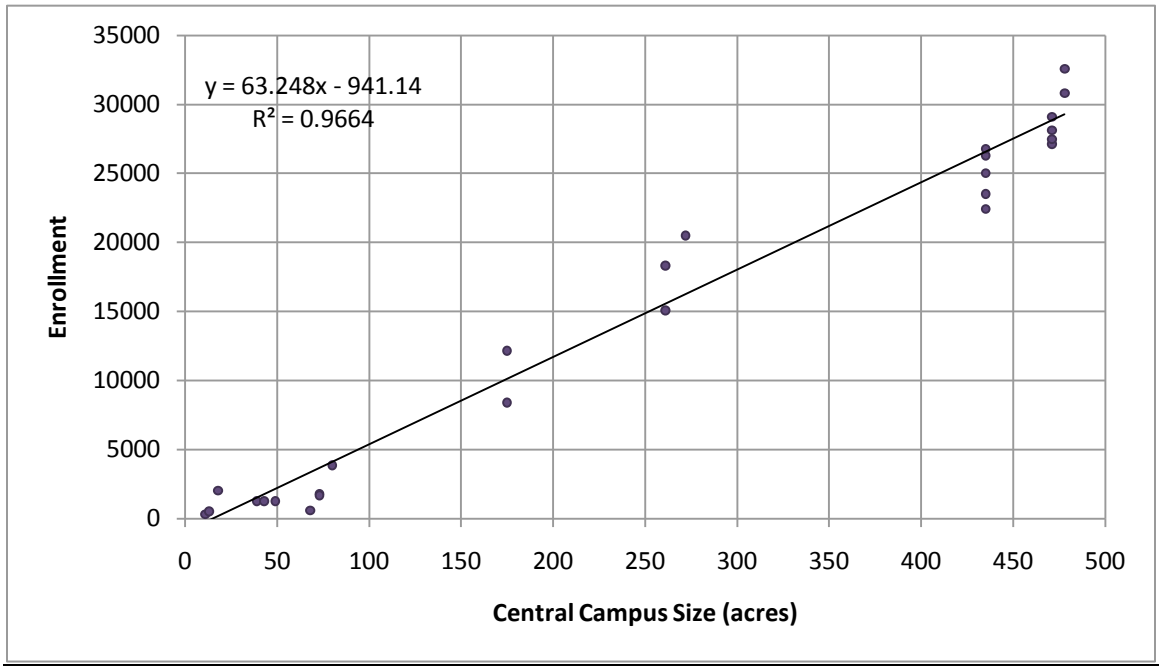


Figure 13: Enrollment Regression Chart: Central Campus

Major Land Acquisitions

Several criteria were used to qualitatively analyze the major land acquisitions:

- the significant increase to the geographic boundary of Texas State;
- the addition of core activities and services;
- the level of conflict with local citizens and politicians.

Riverside (Sewell) Park

Prior to the purchase of the land containing and surrounding Sewell Park, the geographic boundary of Texas State encompassed 49 acres of land. The addition of Riverside Park and the 18.57 acres on the west bank of the San Marcos River increased the land holdings to 68 acres, a 27% increase in geographic area.

Riverside Park provided the greatest recreational attraction to Texas State. The park was originally used for recreational swimming, life saving classes, the annual water pageant, and school dances and parties. Sewell Park is still an extremely popular attraction for students and locals, for swimming, volleyball, annual cheerleading camps, and other activities. Strahan Coliseum and Jowers Center are located on the land on the west bank of the San Marcos River. Three of the six married student housing buildings constructed in the 1940's still provide on-campus student housing.

The literature did not present information that demonstrated conflict between Texas State and San Marcos over this land acquisition. The San Marcos River is considered the jewel of San Marcos and one of the biggest attractions to the city. Texas State owns a considerable piece of this prized asset, as does the City of San Marcos. The city owns and operates nine public parks between Sewell Park and IH 35. So it seems that both San Marcos and Texas State each got their fair share of the river. Figure 14 shows land ownership along the San Marcos River from Charles Austin Drive to IH 35.

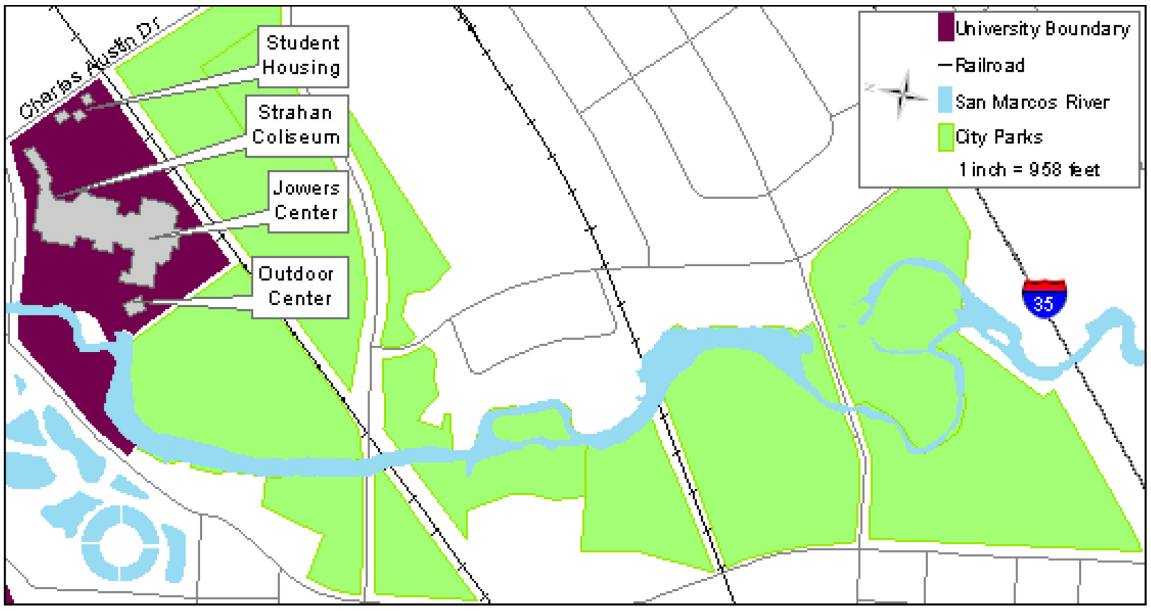


Figure 14: Land Ownership along the San Marcos River

Federal Fish Hatchery

The Federal Fish Hatchery property was transferred to the University in the mid 1960's. Although the exact date the title was transferred was not found, the addition of the 22 acres site contributed to the largest growth period in Texas State history. The Texas State geographic boundary increased from 80 acres to 175 acres during the 1960's – a 54% increase. The Federal Fish Hatchery accounted for 12.5% of that increase.

The contribution of this land to the charm and character of the university setting is perhaps its greatest asset. The ponds, fountains, and the moat around the circular Theater Center building make this the most unique area of the campus. The Theater Center contributes to the educational core, and the J.C. Kellum building is the main administrative building on campus.

As property of the Federal Government, there was no tax revenue generated for the city, and no tax revenue loss when the title was transferred. If there was any conflict

surrounding this property, it revolved around the relationship the University had with President Lyndon B. Johnson and the University President at the time.

San Marcos Baptist Academy

The purchase of the San Marcos Baptist Academy in 1979 was one of the most significant acquisitions in the history of Texas State. Although not the largest, it was certainly the most substantial in terms of existing assets. The 82.6 acres accounted for an 31.6% increase in the geographic boundary of the central campus. In addition to the land, eighteen buildings were included in the sale.

The property has added significantly to several core activities of Texas State—primarily recreational and residential, but also academic and auxiliary. The current West Campus has four on-campus housing facilities, including the largest. These facilities account for 22.5% of on-campus housing with 1461 dorm rooms. The Student Recreation Center, West Athletic Field, and the Bobcat Soccer Field comprise the recreational component of West Campus. Academic facilities include the Supple Science Building, the Mitte Technology, Physics and Art Building, the Family Consumer Sciences Building, the Frio Building, Canyon Hall, and the Child Development Center. Auxiliary facilities are the President's House, San Marcos Hall Parking Garage, West Campus Parking Garage, Harris Dining Hall, the West Maintenance Building, the Performing Arts Center and The Glade Outdoor Theater. Figure 15 maps the core activities by facility on West Campus in 2010.

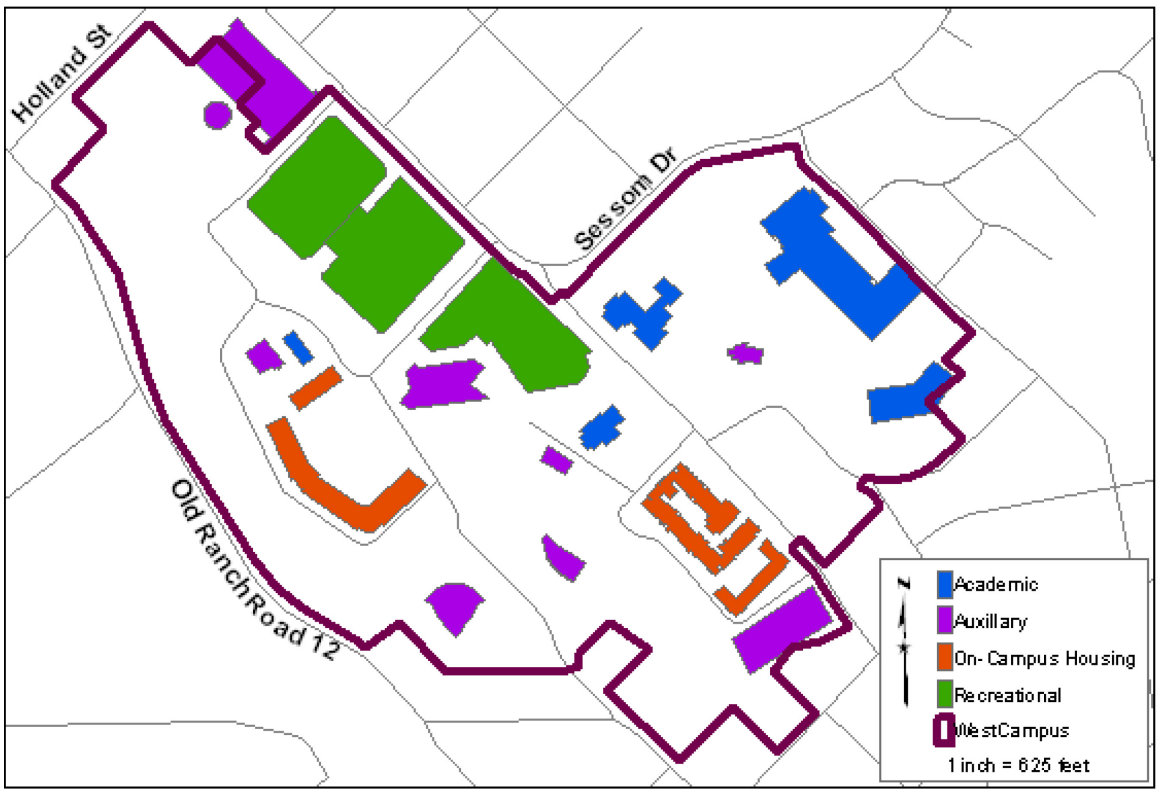


Figure 15: West Campus-2010

The Baptist Academy operated as a tax exempt entity, so San Marcos did not lose any property tax revenue when Texas State acquired the property.

Aquarena Springs Resort

The largest and most recent land acquisition was the purchase of Aquarena Springs Resort in 1994. For many years, Aquarena Springs was one of Texas' most popular roadside attractions, famous for its underwater shows, its glass-bottom-boat rides, its lush surroundings, and Ralph the swimming pig. In 1985, Aquarena drew 300,000 visitors – but by the early nineties it could only lure half that number, due in part to increased competition from regional rivals Sea World, Fiesta Texas and Schlitterbahn (Patoski 1997).

The University purchased the 90.52 acre theme park and surrounding springs for 7 million dollars. The property increased the central campus boundary by 20.8 % and gave the University ownership to the second largest complex of springs west of the Mississippi. Figure 16 is an aerial view of Aquarena Center taken in 2009.

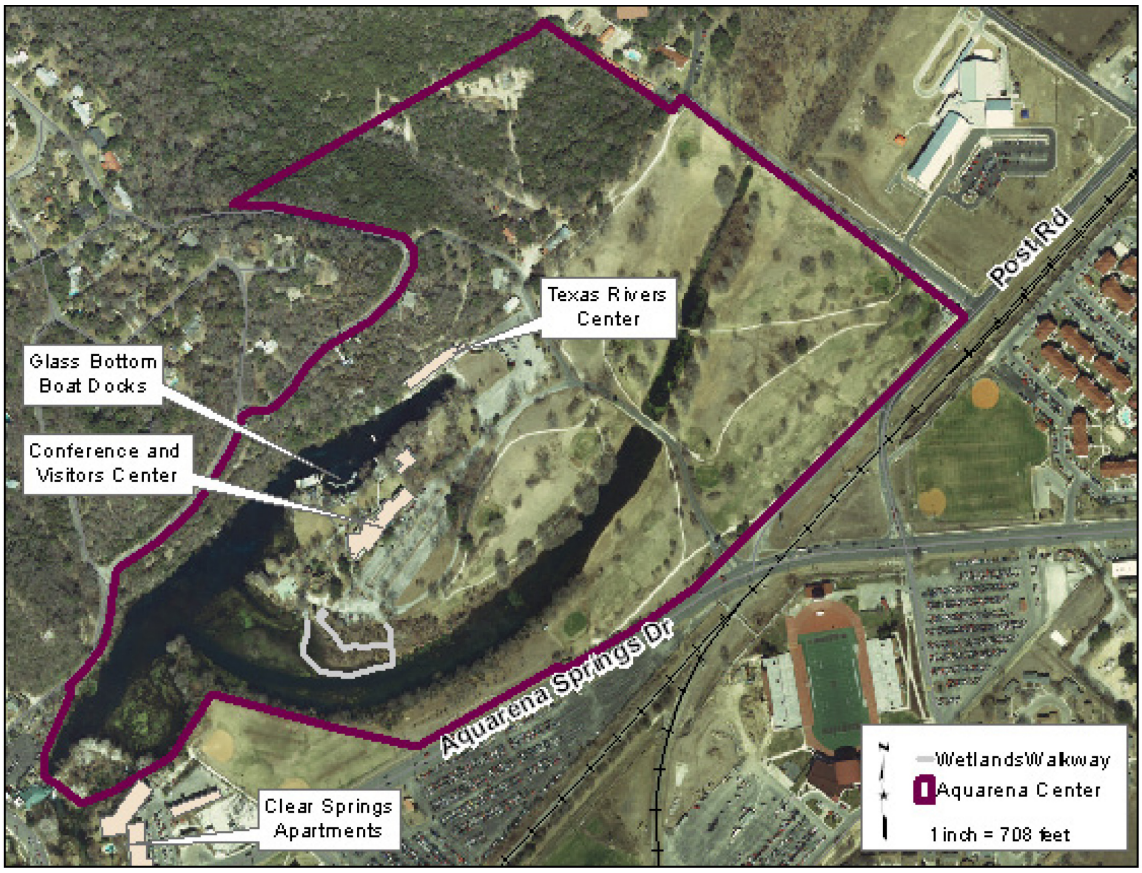


Figure 16: Aquarena Center-Aerial View, 2009

SWTSTS promised to keep Aquarena Springs on the tax rolls as an amusement park, but fourteen months and $1.4 million in operating losses later, the University's regents voted to convert the amusement park to an educational center, and, according to the state auditor, the property was no longer subject to taxation. SWTSU paid the City of San Marcos, Hays County and the San Marcos Central Independent School District a $200,000 settlement for lost future revenue (Schwartz 2002).

The loss of revenue and the displeasure over other issues, including the temporary closure of a popular swimming spot beneath Spring Lake Dam (due to structural problems), prompted the San Marcos City Council to vote in favor of placing a nonbinding proposition on the ballot asking voters whether the city should negotiate with SWTST to acquire the property (Gee 2000). On May 6, 2000, the citizens of San Marcos voted in favor of the following proposition:

PROPOSITION NO. 15

> The non-binding proposal to authorize and recommend that the City Council negotiate with the State of Texas and Southwest Texas State University for the City's acquisition of the property commonly known as the Aquarena Springs property, including the Spring Lake Dam and associated water rights, and the restaurant site adjacent to the Spring Lake Dam, for a cost not to exceed the fair market value of the property, as an addition to the city's parks and greenspace system, with costs for conversion to park and greenspace use not to exceed the acquisition cost of the property (City of San Marcos 2000).

The proposition was basically a vote of no confidence – a statement that the citizens of San Marcos were not pleased with the way the University was managing the property. This researcher could not find any literature that addressed the issues after the election. Collette Jamison, Assistant City Manager recalls that nothing happened after the vote, and the issue eventually faded from the City's political agenda. Several factors could have contributed to this: negotiations for the property were never initiated, because it was never for sale; citizens were pleased when the University repaired the swimming hole beneath the Spring Lake Dam; the passage of time calmed the collective nerve of the city; and changing City Council brought new and different the political issues to the table (Jamison 2011).

The acquisition of Aquarena Springs was the only one (singled out for this research) that I could find that created tension between the University, the City Council, and the citizens of San Marcos. Tensions have eased as Texas State continues to "preserve the beautiful, ecologically fragile site for the state, while opening up classroom, lab and research possibilities for the university" (River Systems Institute 2010).

Population and Enrollment

The City population and University enrollment have steadily increased over the past 120 years, with one notable exception to enrollment in the 1940s. Figure 17 shows the actual population and enrollment for the decades from 1880 to 2000 and the estimated population and actual enrollment for 2001 through 2010.

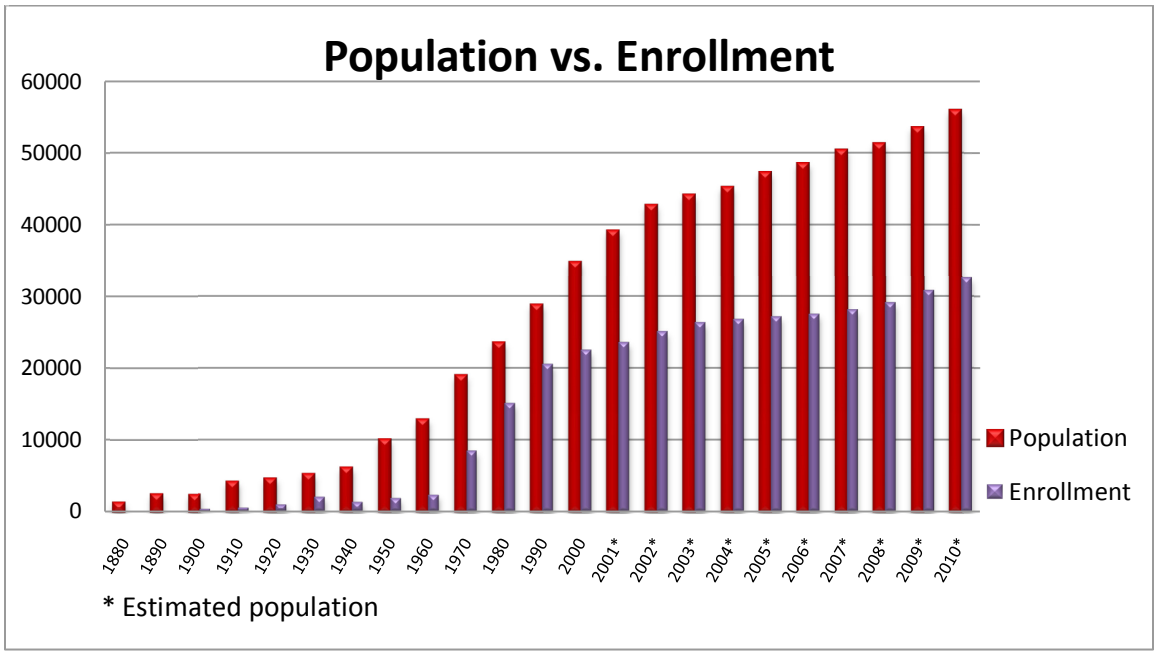


Figure 17: Population versus Enrollment 1870-2010

Enrollment in 1933 was 2027, but dropped to 1266 students in 1940 and then to 584 students in 1943. This resulted in a 37% decrease for the first seven years in this

period and a 53% decrease for the last three years in this period or an overall decrease of 71% for the entire ten year period. This decrease in student enrollment was undoubtedly due to U.S. involvement in World War II.

Since 1900, university enrollment has increased and average of 29% per decade. Removing the data from the time around WWII, the average enrollment rate increases to 34%. The greatest increase in enrollment, 72%, coincided with the transition of Texas State from a college in 1959 to a university in 1969.

Population for the City of San Marcos has also steadily increased. Since 1880, the average growth rate was 25% per decade. This figure is very close to the average growth rate for the University enrollment. The population did not decrease during the same period that the enrollment decreased, but did increase by 40% in the decade following WWII. Figure 18 compares the rate of change for population and enrollment.

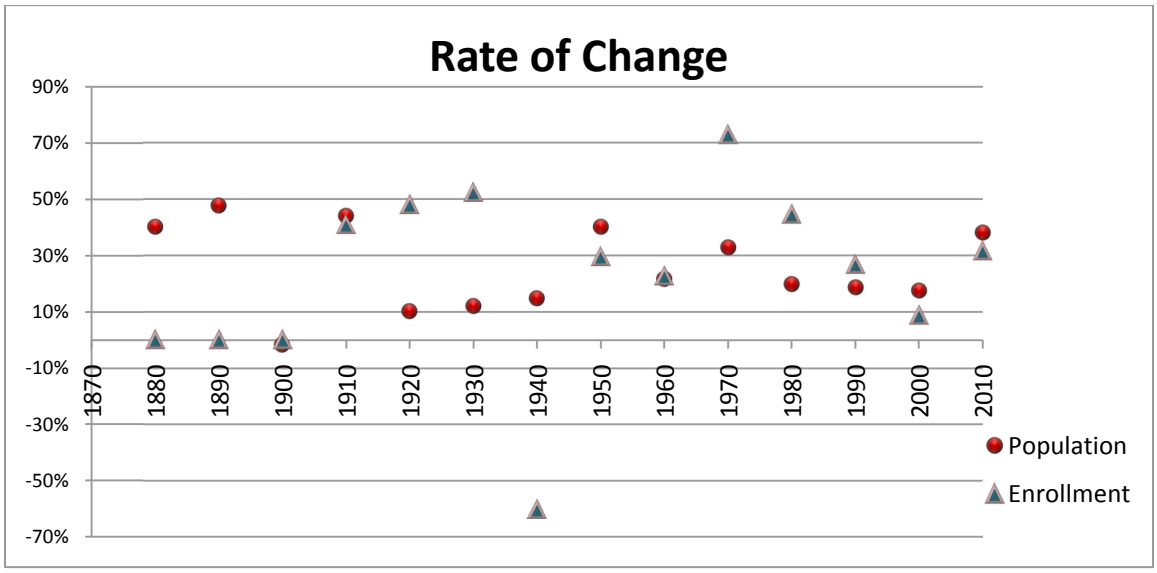


Figure 18: Population and Enrollment Rate of Change 1870-2010

This section includes one final analysis of student demographic data – the comparison of the student population of San Marcos in 2000 and 2010. Figure 19 shows,

by census tract, the student population in 2000 to the number of student addresses geocoded for the fall semester 2010.

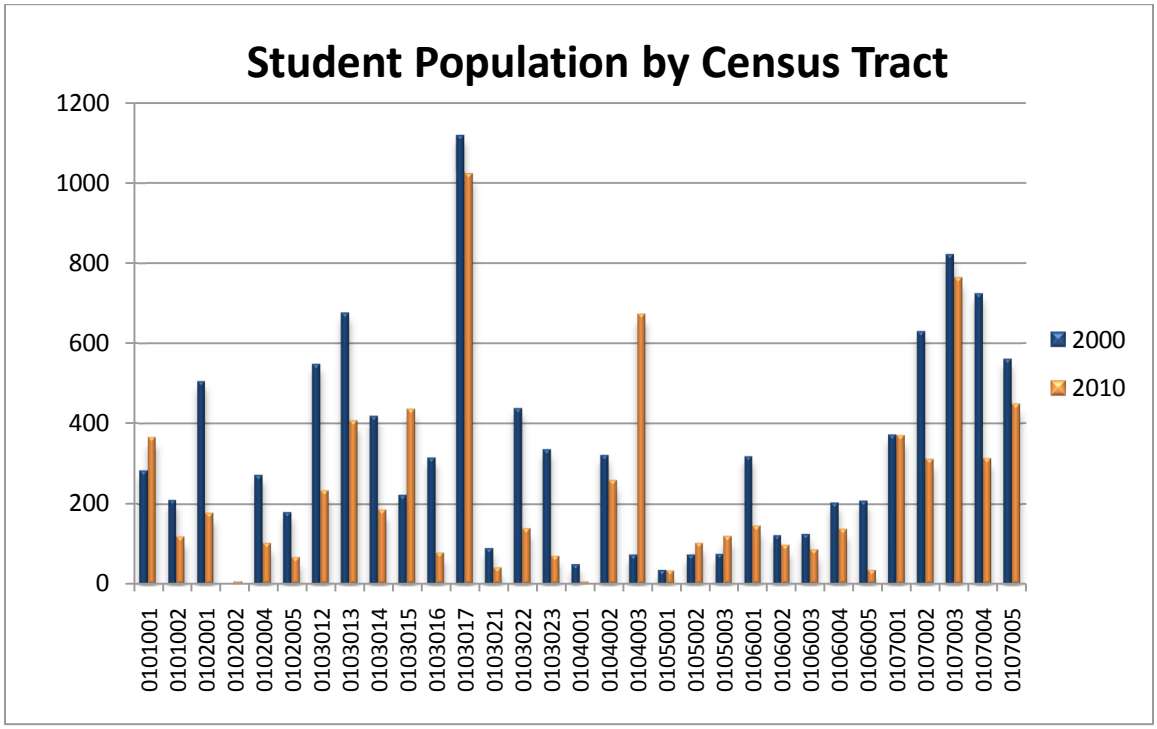


Figure 19: Comparison of Student Population 2000 and 2010

For visual purposes, the census tract (0102003) that encompasses the on-campus student housing was omitted from the previous table because the totals for this tract are so much greater that then rest of the census tracts. The student population for this tract increased from 4,777 in 2000 to 6,597 in 2010.

The 2010 San Marcos city limits encompassed or intersected 33 different census tracts. Student population decreased in 25 of those tracts, and increased in only 6 tracts. The most dramatic increase (89%) was in census tract 0100403. Population for this tract rose from 73 students in 2000 to 674 students in 2010. Figure 20 shows the spatial representation of population statistics for 2000 and 2010.

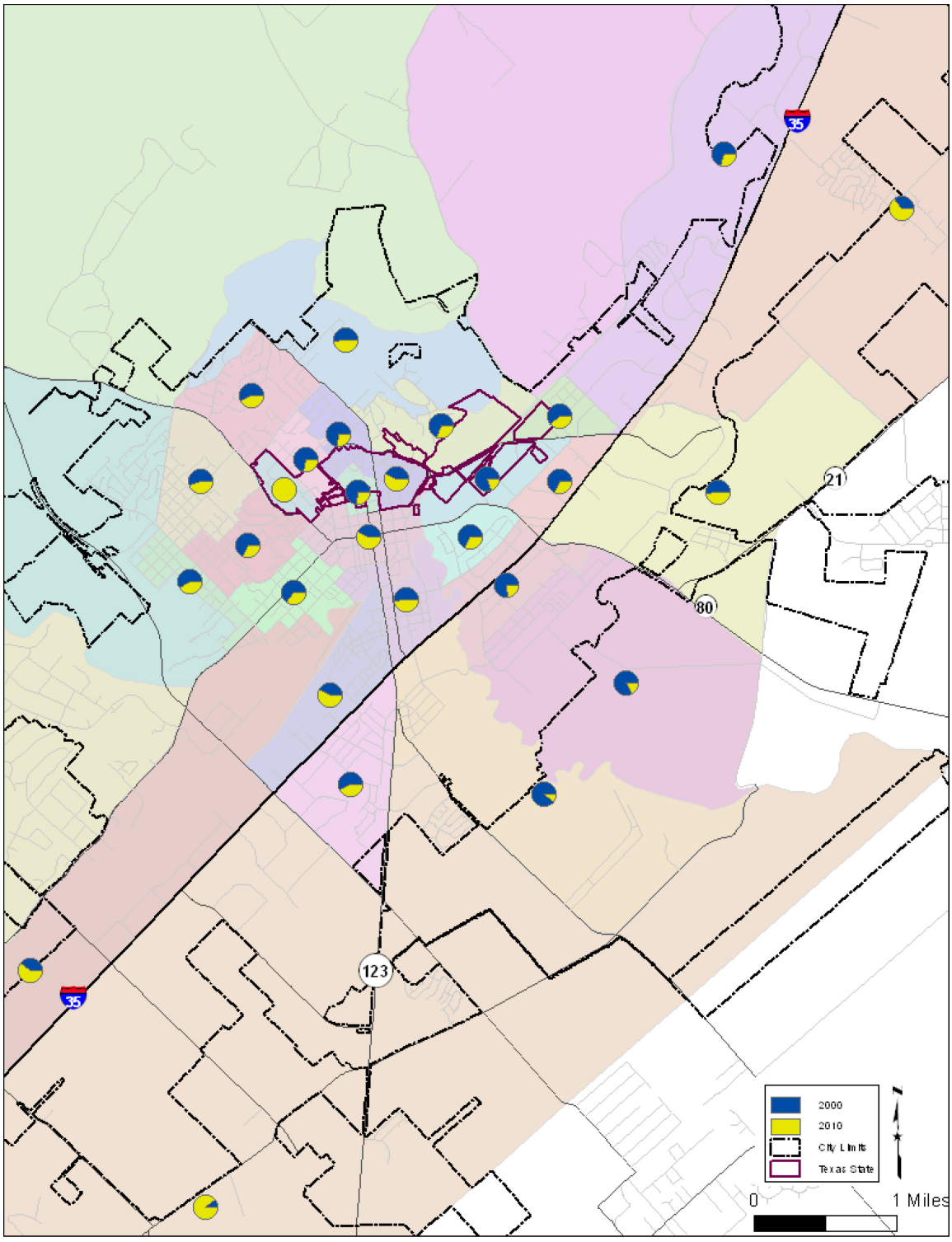


Figure 20: Student Population Map – 2000 and 2010

Overall, the student population inside the San Marcos city limits decreased 8% during the past ten years even though the general population increased by 38%. This

statistic raises several interesting questions: where are Texas State students living, and why aren't they living in San Marcos? The former question is addressed in the following section, and the latter is beyond the scope of this research.

Student Housing

This section will discuss student housing, both on and off-campus. The first part will discuss historical student housing from 1903 to 2009, and the second part will discuss student housing only in 2010. Residential development is one of the biggest political issues facing the current City Council and the City Administration, and the availability of more detailed data made it possible to perform a more comprehensive analysis for 2010.

Historical Patterns

The University did not offer on-campus housing for the first 30 years of operation. During that time, students lived in boarding houses lining the campus and along Austin, Guadalupe and North Streets. Sayers Hall, the first women's dorm opened in 1936, and Harris Hall, the first men's dorm, opened in 1938. Both dorms have been demolished, and no capacity information was available, so they were not included in the statistical analysis for this research.

The University continued to build on-campus housing at a steady rate during the 1950s and 1960s. Six dorms were built in the 1950's and seven dorms were built in the 1960s, adding 3035 beds to the campus. After the University took control of the old

SMBA property in the early 1980s, four dorms were constructed or renovated, including the largest dorm on campus, Blanco Hall, with 715 beds.

Dorm construction slowed after the 1980s, but the University purchased several private apartment complexes and constructed Bobcat Village in 2002. In 2010, Texas State began the demolition of Falls Hall, a 394 bed dormitory, and began construction of the North Campus Housing Complex. This 612 bed dormitory has a 2012 estimated completion date.

The first off-campus multi-family complex was the Balcones Apartments located at 401 Fredericksburg. The 39 unit complex was built in 1962 and has been home to countless students. Apartment complexes started out relatively small—in the 1960s the average number of units for an apartment complex was 36, the number increased to 62 units per complex in the 1970s and 1980s, and then jumped to 106 units per complex and 156 units per complex in the 1990s and 2000s, respectively. The trend over the years was to build fewer complexes with more units, more bedrooms per unit and to offer more amenities.

Units in early complexes were generally one or two bedroom apartments, or efficiency apartments. More recent development included complexes with four and five bedroom units, following a model similar to traditional dormitories. Leases are available for individual bedrooms and bathrooms, and tenants share a common living area and kitchen. Several of these types of complexes are currently in the planning or construction phases. The largest complex to date is Copper Beech, a 415 unit, 1238 bedroom complex built in 2010. Historical data for the past seven decades of on-campus and off-campus housing quantities are illustrated in Figure 21.

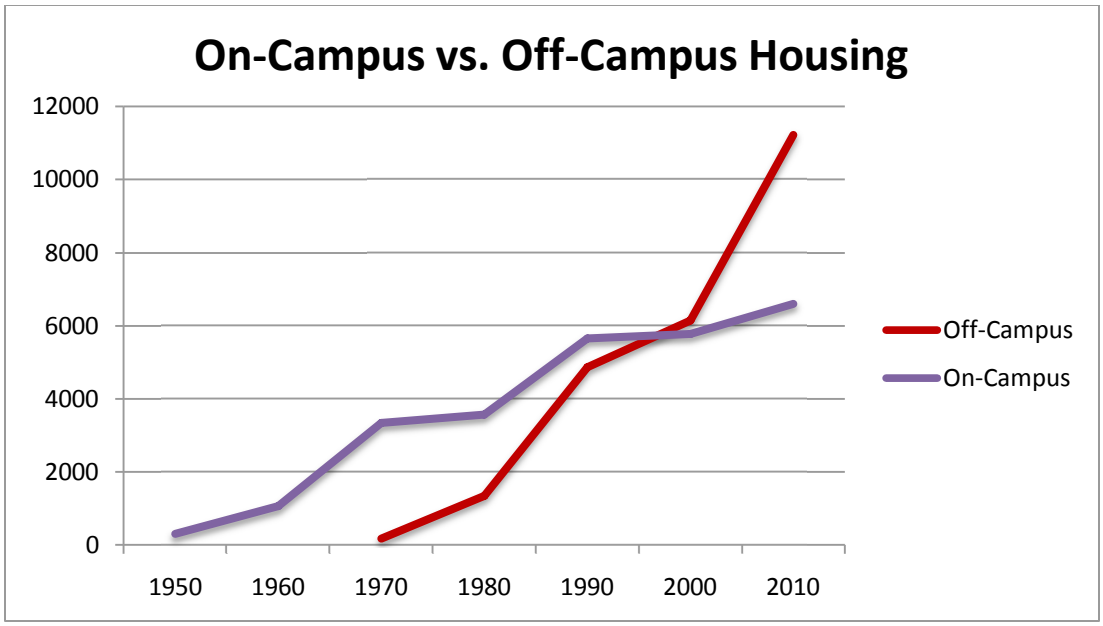


Figure 21: Comparison of On-Campus and Off-Campus Housing

The percentage of students living on campus has remained relatively consistent over time, fluctuating mostly between 20% and 30 %. The highest percentage was 45.9% in 1958, and the lowest was 17.9% in 1950. For the past decade, freshmen have comprised an average of 11% of the total student population (Institutional Research 2010). University housing policy requires only students under the age of 20 with fewer than 30 credit hours to live in on-campus housing. Historically, of the 20% to 30% of the students who live on campus, only 11% are required to. So the University maintains on-campus housing that exceeds their own requirements by 10% to 20%.

The ratio of on-campus housing (beds) to enrollment has also remained consistent over time. The highest ratio (in 1950) was 1 bed to every 5.9 students, and the lowest (in 1960) was 1 bed to every 2.2 students. In 2010 the ratio of on-campus beds to students was 1:4.7.

The historical pattern of the ratio of apartments to students is more erratic. In the 1970s there was one apartment to every 47 students. That ratio dropped to 1:11 in the

1980s, 1:4.6 in the 1990s, 1:3.6 in the 2000s, and in 2010 there was one apartment for every 2.7 students.

To identify the statistical relationship between increasing enrollment and the on-campus and off-campus housing, a simple linear regression was performed on the temporal extent of the data. Once again, the enrollment was the dependent variable and the total acreage was the independent variable. The data were categorized into two temporal datasets, one for the decades 1950–2010, and one for the years 2001-2009. The red markers represent the decades and the blue markers represent the annual data for the last decade in Figure 22 and Figure 23.

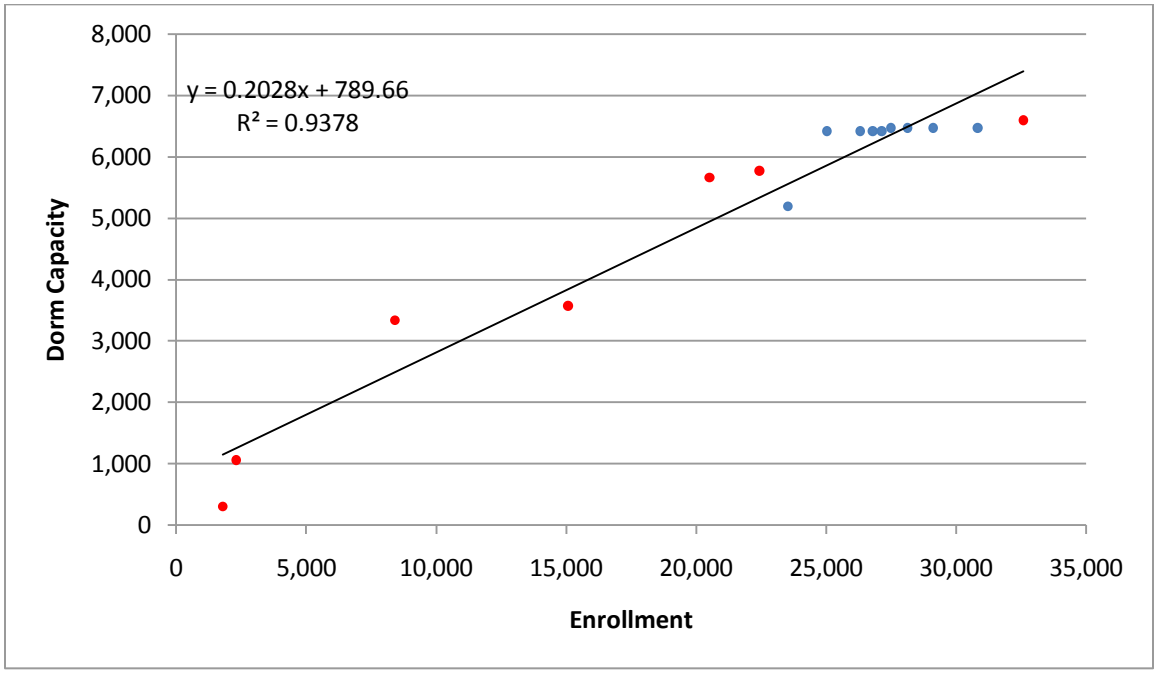


Figure 22: Enrollment Regression Chart: On-Campus Housing

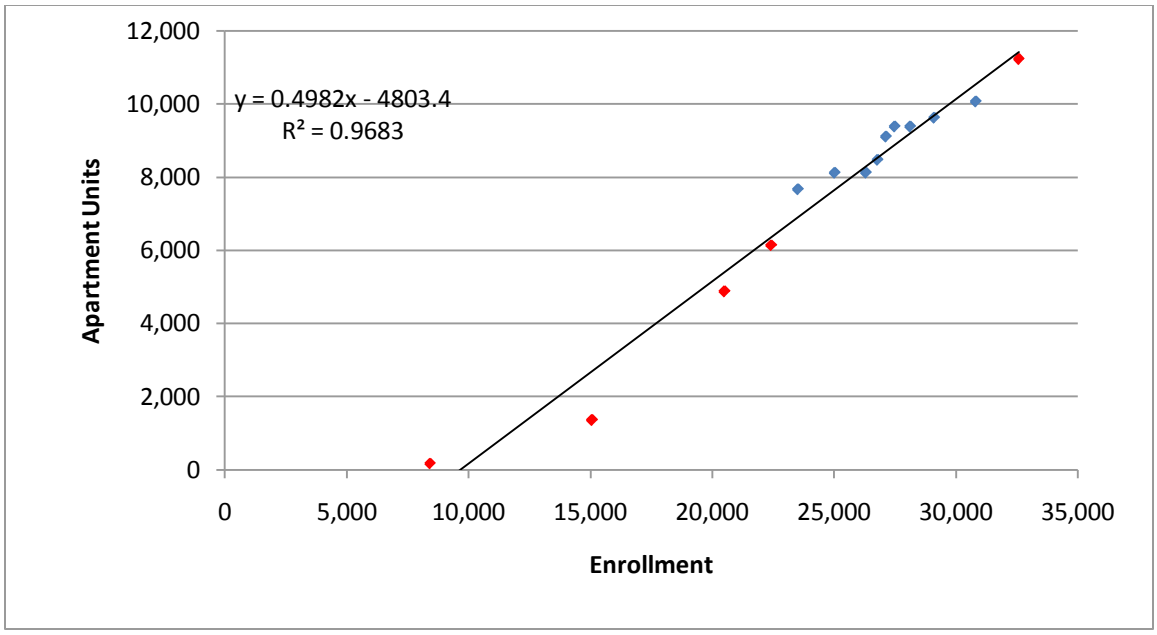


Figure 23: Enrollment Regression Chart: Off-Campus Housing

Not surprisingly, a very strong correlation exists between enrollment and student housing, both on and off campus. Increasing enrollment statistics have long been the impetus for multi-family housing development in San Marcos, culminating into one of the most debated issues facing the current administration.

Student Housing in 2010

The availability of student addresses (for the Fall semester 2010) and precise multi-family housing statistics, made it possible to analyze student housing in greater detail for year 2010. Addresses supplied by the Department of Institutional Research were geocoded by local zip code to determine the regional distribution of the student population. The addresses within the San Marcos City limits were geocoded again by physical address to assess the distribution of students by housing type.

The address file contained 32,572 records and included a field for the students' permanent and local address, city and zip code. The dataset contained 25 records with

bad zip codes and 91 records listing a local address out of state. The local addresses for 5489 students fell outside a 60 mile buffer zone of the San Marcos City Limits (points were geocoded to the centroid of the zip code coverage area, so more or less points could fall within the city limit boundary). Although it is possible that some students may commute more than 60 miles, it is more likely that they did not list their local address correctly.

Zip codes within the buffer zone were consolidated into ten geographic regions: San Marcos, San Marcos Metro, Austin, Austin Metro, Kyle/Buda, Pflugerville/Round Rock/Georgetown, New Braunfels, New Braunfels Metro, San Antonio, and San Antonio Metro (see Figure 24).

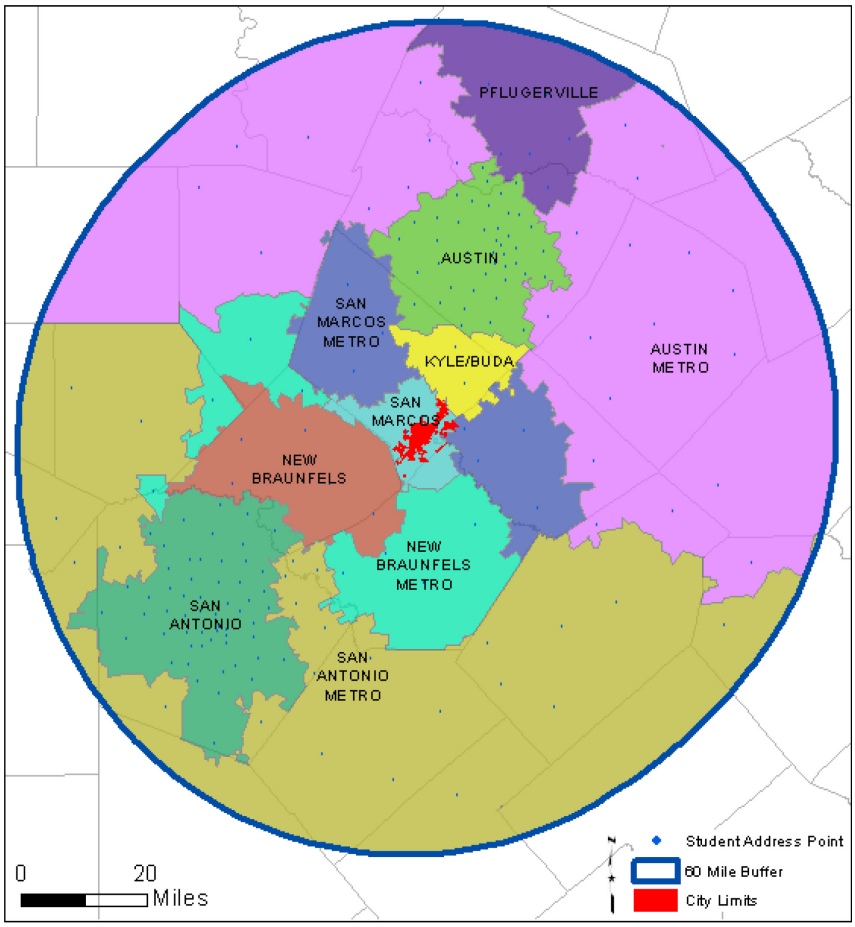


Figure 24: Map of Student Addresses by Zip Code

Excluding the 5,489 addresses that fell outside the 60 mile buffer, Figure 25 shows the number of students in each geographic region within the buffer. Interestingly, only 52% of Texas State students live in the San Marcos zip code area, and 21% commute from Austin – home to the university with the largest enrollment in Texas.

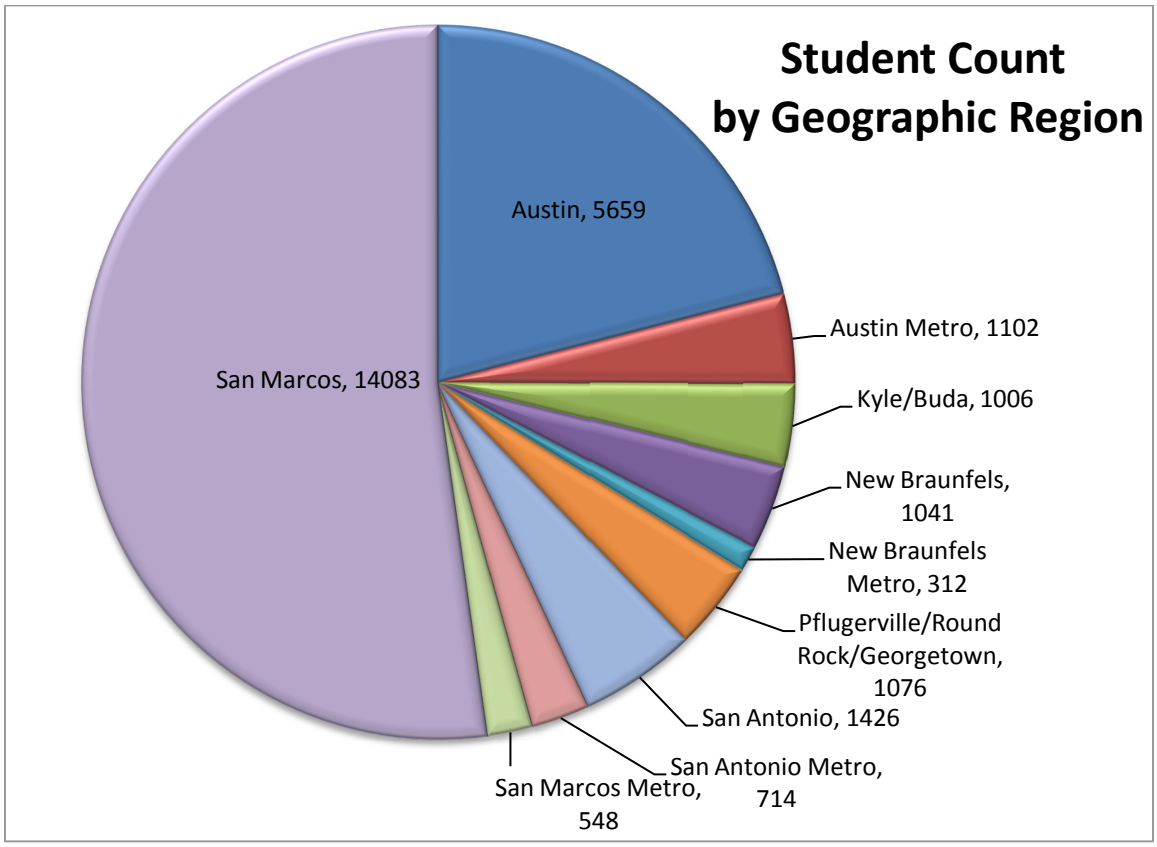


Figure 25: Student Count by Geographic Region

To determine the distribution of students by housing type, several steps were followed: a) geocode the addresses within the San Marcos zip code (78666); b) select the points within the City Limit boundary; c) count the records with on-campus housing addresses; d) analyze the remaining points using the off-campus housing feature class and City zoning designations.

The results show that of the 14,083 addresses in the 78666 zip code, 13,319 students lived inside the City Limits – 5,601 lived in on-campus housing, and 7,718 lived

in off-campus housing. Of those student living in off-campus housing, 5,791 resided in multi-family housing and 1,927 lived in other zoning designations, primarily single-family zoning. Figure 26 illustrates this statistical data by percentage.

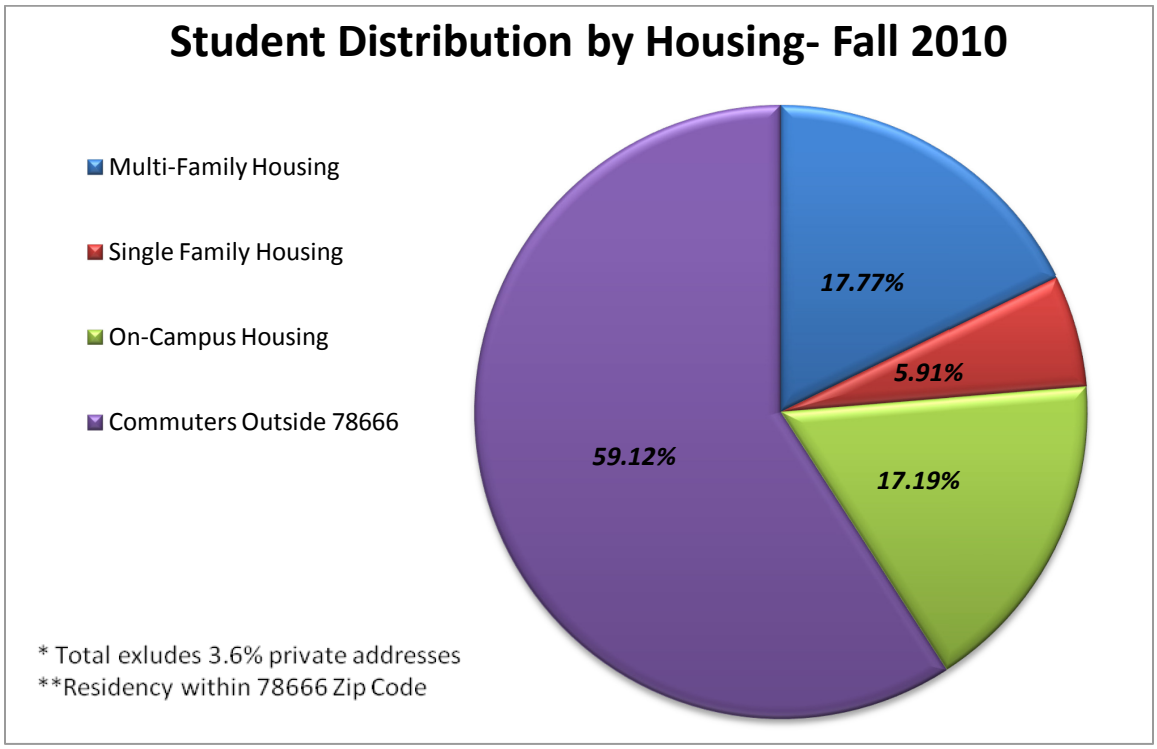


Figure 26: Student Distribution inside San Marcos City Limits—Fall 2010

As of December 31, 2010, there were 11,550 apartment units built or under construction in San Marcos. Only 50.3% of these apartments were leased by students in 2010. It is important to reiterate that the number of units is not the same as capacity. An estimated count of the total number of bedrooms was acquired near the completion of this research (City of San Marcos 2010a). The calculation of students in off-campus, multi-family housing using this figure (25,392), reduces the percentage of students to 22.8%. Although the methodology set the variable for off-campus housing as the number of units per complex, the significant difference between these two figures warranted the inclusion of this statistic into the research.

Geovisualization

The main objectives for the geovisualization were to: 1) display the data dynamically; 2) provide interactive user controls; and 3) allow access to supporting statistical documents. Two separate software platforms were used because each platform had the ability to accomplish some of the objectives, but neither platform was sufficient to accomplish all of them.

Google™ Earth

The key functionality Google™ Earth offers is the ability to display data dynamically and interactively at varying scales. This was particularly useful when viewing the University boundaries and on-campus housing data, since these data were difficult to visualize at a smaller scale.

Google™ Earth's user-friendly interface was another reason this software was used in the research. Data layers toggle on and off within a standard content window, and an interactive time line tool plays, pauses and stops the historical animation. Integrating custom data into the interface was as simple as converting layers to KML format in ESRI ArcGIS and dragging and dropping them onto the 'my spaces' section of the content window.

The limitations of this software platform include its inability to support annotation, to display statistical data, to remove the aerial backdrop, and to open multiple supporting statistical documents. Figure 27 illustrates the Google™ Earth interface.

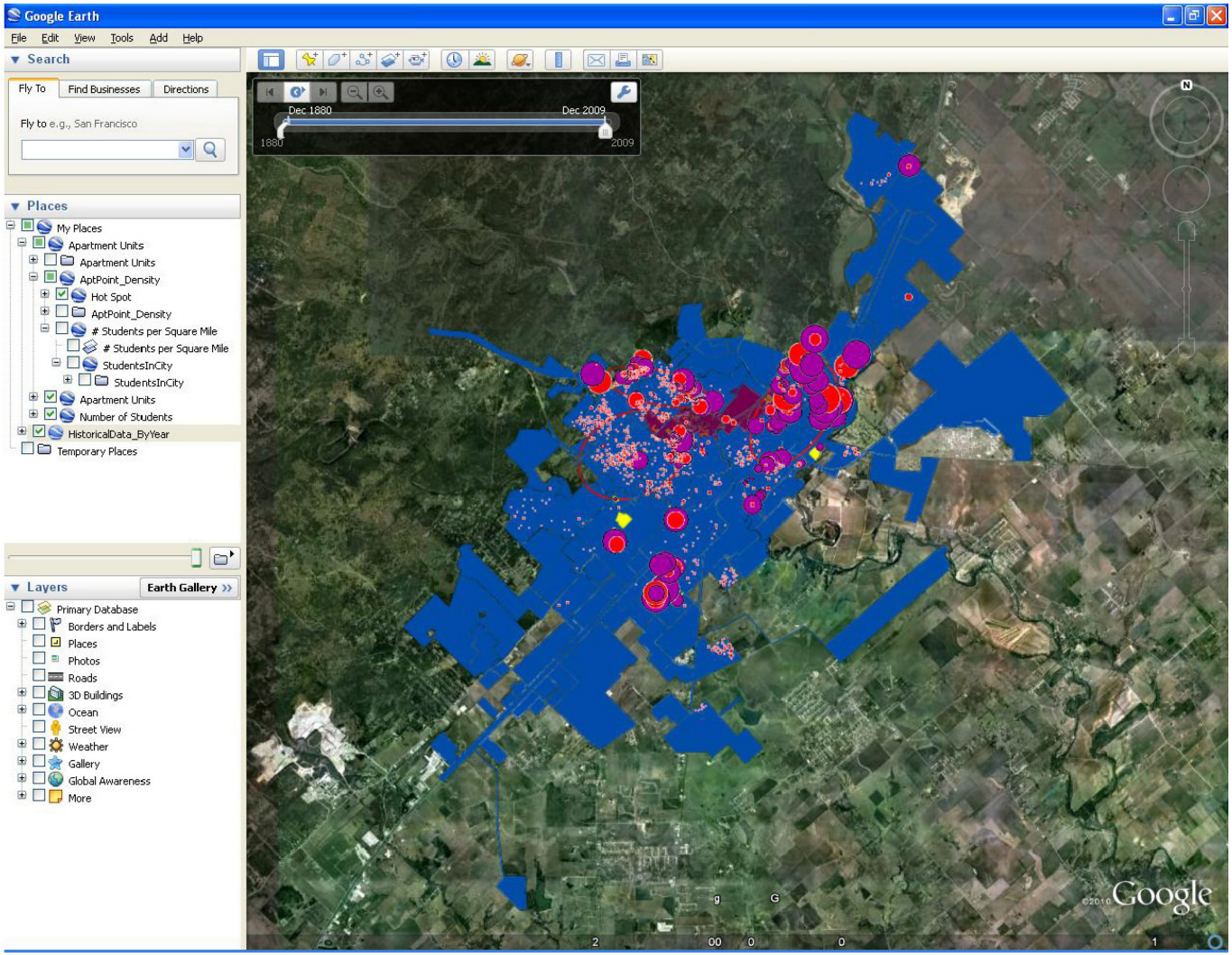


Figure 27: Google™ Earth Geovisualization Interface

Adobe Flash®

The key functionality the Flash animation provides is the integration of the HGIS data and supporting statistical information into one product. The final movie consisted of an animation of the historical boundaries and student housing, supporting statistical charts and maps, and geographic and demographic statistics which were displayed for each year. The statistical data displayed with the maps is listed in Table 8.

Table 8: Statistical Data for Adobe Flash® Animation

Year	City Acreage	Population	University Acreage	Enrollment	On-Campus Housing	Off-Campus Housing
1881	632	741		0		
1899	632	741	11	303		
1910	1136	4071	13	510		
1933	1235	5134	18	2027		
1938	1420	5134	39	1266		
1940	1420	6006	43	1266		
1941	1420	6006	49	1266	141	
1943	1420	6006	68	584	165	
1950	4416	9980	73	1791	306	
1952	4416	9980	73	1791	580	
1957	4416	9980	73	1670	1060	
1963	4545	12713	80	3850	1485	116
1967	4545	12713	80	3850	3341	176
1970	4736	18860	175	8406	3341	290
1974	5498	18860	175	12142	3341	940
1976	5498	18860	175	12142	3571	1195
1980	9031	23420	261	15070	3661	1295
1981	9237	23420	261	15070	3661	1890
1983	10073	23420	261	18314	5456	3311
1985	10272	23420	261	18314	5456	4232
1990	11176	28743	272	20505	5562	5125
1994	11089	28743	272	20505	5773	5149
2000	11796	34733	435	22423	5773	6918
2001	14330	39116	435	23517	5773	7920
2002	16485	42678	435	25025	6421	8371
2003	16122	44050	435	26306	6421	8371

Table 8-cont: Statistical Data for Adobe Flash® Animation

Year	City Acreage	Population	University Acreage	Enrollment	On-Campus Housing	Off-Campus Housing
2004	17508	45156	435	26783	6421	8727
2005	17820	47230	471	27128	6421	9357
2006	17903	48473	471	27485	6469	9390
2007	18427	50373	471	28121	6469	9390
2008	19008	51222	471	29105	6469	9873
2009	19622	53506	478	30813	6469	10317
2010	20567	55891	478	32583	6597	11753

Basic navigation was created to allow the user to control the animation (start and stop only). The movie's playback speed is set when the animation is published and cannot be altered, so enhancements to the interactivity of the Flash movie were added that allow the user to control the timeline with greater flexibility by clicking any particular year. When viewing the animation, the user can clearly see the expansion of the City Limit and the University boundaries, as well as the existing housing for the particular year.

In addition to the map, the main window displays the specific demographic and geographic statistics for that year. Another control was added that allow users to access supporting charts and tables that provide additional analysis of the statistical data. Figure 28 shows the completed Adobe Flash® interface.

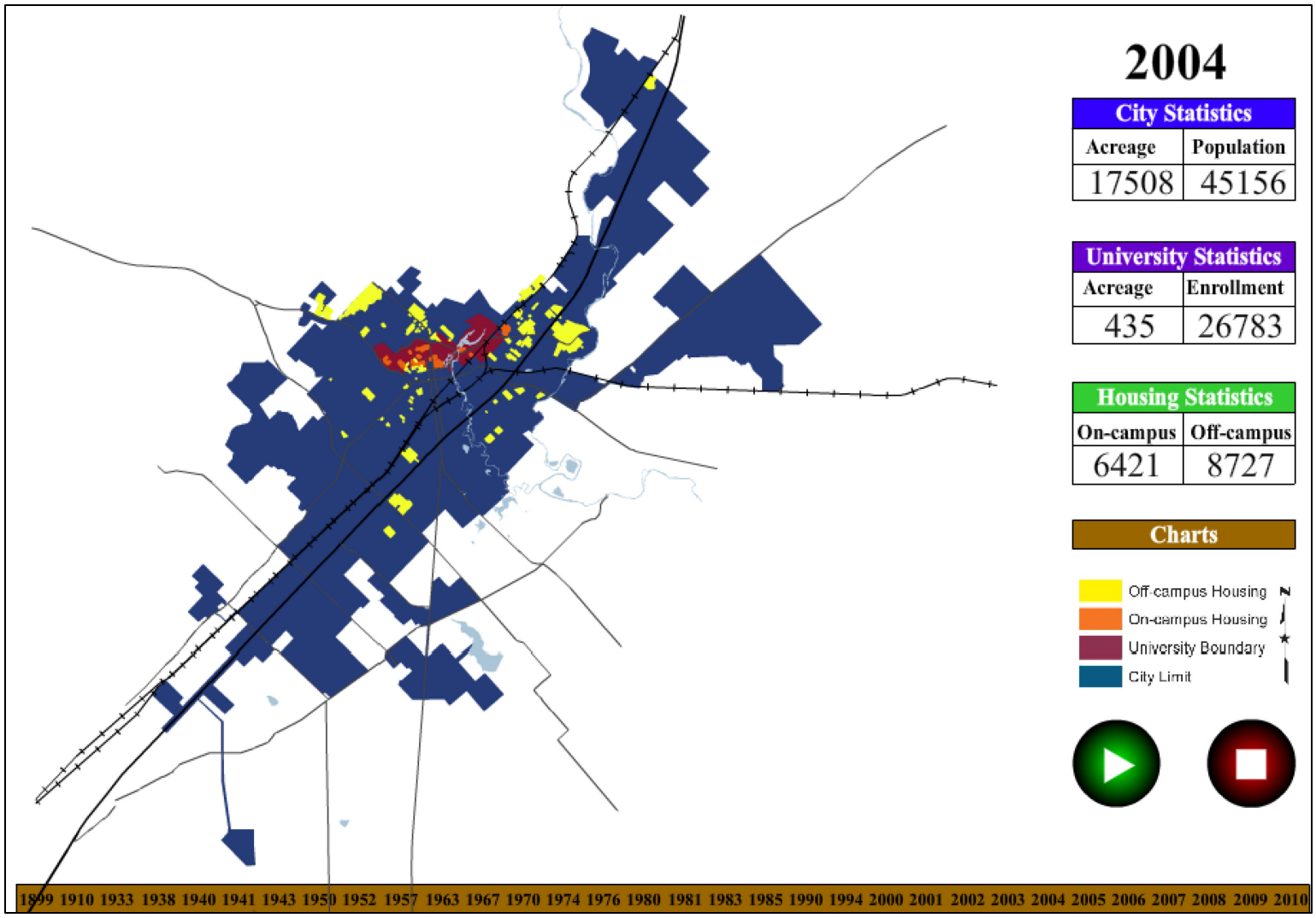


Figure 28: Adobe Flash® Geovisualization Interface

The biggest limitation of this software is the lack of control the user has over the visualization of each map. Static maps are exported from ArcGIS as tiff files and imported into Adobe Flash®--the map scale is set when the map is exported and cannot be adjusted. Therefore, it is not possible to pan around the map or to zoom in and out in order to view geographic details.

From the production perspective, creating this animation was complicated and extremely time consuming. Though less flexible, this product provided the most comprehensive presentation of the data.

Perceptions of Historical GIS as a Planning Tool

The main reason the geovisualizations were created was to present the historical geographic and statistical data to personnel responsible for planning and implementing growth strategies for the San Marcos and Texas State. The panel was shown the Adobe Flash® animation and the Google™ Earth maps, and a semi-structured interview was conducted to assess the usability of the data for planning purposes. Although there was a strong tendency to focus on specific statistical data, an attempt was made to guide the discussion around the following questions:

- Do you feel that a geographic history of the city and the university is a valuable planning tool?
- For what specific purpose could this tool be used?
- Was the presentation well organized and was the data easy to understand?
- Which presentation format was better at displaying the data?
- What did you like/dislike about the presentations?

- What suggestions do you have to improve the presentation of the data?

All of the participants thought that the presentation was very interesting and agreed that the geographic history of the City and the University could be useful as a planning tool. City personnel commented that the older data helped them visualize geographic growth patterns, and the data from the past two decades would be the most beneficial in analysis that could support future master plans.

Specifically, these data could be used to analyze the impact residential (particularly multi-family) growth has had on transportation and the capacity of water and wastewater infrastructure. In addition, the historic data allow for greater appreciation for the scale and scope of growth when predicting future growth. Analysis of growth trends could help determine preferred growth areas, and diversify housing in relation to market demand.

In 2010, the Planning Department introduced Form Based Code to San Marcos. Form-based code is different than traditional land-use planning because the idea is to preserve and protect a local sense of place through maintaining the look of a particular built environment. The goals outlined during the initial phases of the code development were: 1) protect, preserve and enhance key assets, including the San Marcos River, the Court House square and historic neighborhoods, and the physical and cultural connections between the City and Texas State; 2) strengthen connectivity; 3) support more diverse and user-friendly transportation options; 4) align planning with environmental protection priorities; and 5) enhance downtown and neighborhoods (City of San Marcos 2010a).

The Planning Department staff has been working on what they call the Downtown Smart Code for about a year, which was presented to the Planning and Zoning Commission on 29 March 2011.

The draft defines the purpose of the code:

> to promote the health, safety, and general welfare of the City and its citizens, including protection of the environment, conservation of land, energy and natural resources, reduction in vehicular traffic congestion, more efficient use of public funds, health benefits of a pedestrian environment, historic preservation, education and recreation, reduction in sprawl development and improvement of the built environment (City of San Marcos 2011).

Several articles within the code have a relationship to the historical growth of the City: 1) the region should retain its natural infrastructure and visual character; 2) ordinary activities of daily living should occur within walking distance of most dwellings; 3) architecture and landscape design should grow from local climate, topography, history, and building practice; and 4) the preservation and renewal of historic buildings should be facilitated, to affirm the continuity and evolution of society. Architectural standards do not specifically reference historical data, but are written with the intent of preserving the existing sense of the community. Building heights located in the downtown historic district may not exceed three stories.

The historical geographic growth pattern of the University did not elicit comments, possibly because the size of the University made the changes seem less dramatic than the changes in the City boundary. Like the City staff, the University representative did recognize the value of the more recent data for planning purposes.

Current student residency data would be useful in planning patrol districts for both City and University police departments. These data would be beneficial in planning mass transit routes for the University bus system. Bobcat Tram is the bus system

operated for Texas State students, faculty, staff, and visitors. The system provides city wide and on campus routes which are designed to reduce the demand for parking and traffic congestion on campus.

Paul Hamilton in Auxiliary Services explained that routes are currently planned using the ridership rates for each route. A route with low ridership is dropped from the transit plan, and a route with excessive ridership will have additional busses added to that route. Auxiliary Services monitors the construction of new complexes and adds routes or additional buses to accommodate students moving to those complexes, but they do not use current residency locations to plan bus routes (Hamilton 2010). Geocoding student addressed for each fall semester would provide a more scientific methodology for determining optimal transit routes.

The pattern of student residency in San Marcos was interesting to the University representative, but the driving force for planning on-campus housing is freshman enrollment. As stated previously, University's goal regarding on-campus housing is to provide housing to students under the age of 20 with fewer than 30 credit hours, and to students who graduated from high school within the preceding 12 months of the semester of their admission.

The participants agreed that the presentation was well organized and the data were easy to understand. Google™ Earth was more useful for displaying the most recent data and for extracting specific attributes about features, and the Adobe Flash® animation was a better visualization of the entire historical time span. The historical data were interesting and thought provoking, and the presentation as a whole was well organized and well illustrated. The group made no suggestions on ways to improve the presentation.

During the course of discussing the historical data, several additional topics relevant to the subject matter were indentified – primarily regarding economic indicators and the expansion and refinement of current housing data. These topics are discussed as possible further research in Chapter 7.

CHAPTER 6

DISCUSSION

This chapter provides a review of the quantitative and qualitative results analyzed in relation to the historical GIS, geovisualization, and the usability of historical GIS in the planning process. This analysis will ultimately conclude whether the research objectives outlined in Chapter 4 were successfully examined in this study, and will identify solutions to problems identified during this research. Areas of possible future research will be presented in Chapter 7.

As a resident of San Marcos for over 23 years, the historical relationship between the University and the City has always been of personal interest to this researcher. The concept of the American college town and the notion of San Marcos, Texas as a typical American college town provided additional motivation for this research.

The creation of the Historical GIS to support the stated research questions proved to be tedious and extremely time consuming – the creation and consolidation of the data into logical historical periods, and the design and implementation of the animated presentations consumed the lion's share of time. The final geovisualizations effectively and successfully communicated the historical data to key planning personnel for the San Marcos and Texas State. The availability of additional historical maps for the City and the University would have alleviated several problems—the sequence of housing in

relationship to geographic boundaries, and inconsistent time intervals. The timeline could be improved with additional maps and more accurate date information. The initial perception of the University's real estate practices as a source of major conflict with the City and its citizens proved to be false, with the exception of the acquisition of Aquarena Springs. The City was unhappy over the loss of sales tax revenues, but in reality, the Resort was not the popular attraction it had once been, and had been losing income for years. The passage of time and change of personnel and political agendas have eased tensions regarding the Aquarena Springs property.

The University's mission states: "Texas State University-San Marcos is a public, student-centered, doctoral-granting institution dedicated to excellence in serving the educational needs of the diverse population of Texas and the world beyond" (Texas State 2010). The City supports this mission indirectly through the construction and expansion of public infrastructure – electric distribution systems, roads, water and wastewater lines – that serve students, faculty and staff who live off-campus.

The City's population growth does not typically factor into the University's planning strategy. On the flip side, City planning has traditionally been reactive to the geographic expansion and increasing enrollment of the University. Collaboration between the City and the University is a relatively new development; specifically regarding the University's ten year master plan. City planning objectives include staging infrastructure in relation to where the university is and where they are expected grow, and in response to the residential development community and their perception of the need for additional student housing in San Marcos.

Student housing emerged as the biggest issue in this research. The University's primary goal is educational excellence, and although student housing supports that goal, it is a very small part of the big picture. The University exceeds its own obligation for on-campus student housing – providing enough housing for all students who are required to live on-campus.

City administration was very interested in the historical pattern of student housing. The high correlation between enrollment and off-campus housing presents various challenges to the City—primarily planning and constructing infrastructure to support the increasing large number of apartment complexes, and managing the rezoning caseload from lower density zoning to multi-family zoning designations.

The pattern of student housing generated the most discussion among City staff. The ratio of apartments to students and the distribution of student population over the region were the most surprising statistics. The fact that only 52% of Texas State students reside in San Marcos, and 42% of those students live in on-campus housing, raised several issues—what factors influence the distribution pattern of student residency, why is there a perception that San Marcos needs more student housing, and what does the comprehensive picture of all housing within the city limits look like? These questions and others are topics for further research and are discussed in the following section.

The consensus among those who viewed the HGIS presentation was that the geovisualizations were well done, and informative. The historical data were interesting, but only the data for the past two decades provided enough insight into growth patterns to be beneficial in planning for the future. Participants perceived the HGIS as a less valuable planning tool from the University's point of view.

CHAPTER 7

CONCLUSION

The relationship between a university and its host city is extremely complex. This research attempted to examine that relationship from a geographical perspective within the parameters of population, enrollment, student housing, land use, and university real estate practices. The addition of the historical component created a comprehensive dataset that permitted analysis of growth patterns over time.

The usefulness of HGIS in the planning process seems to be limited to the analysis of the recent past. Additional statistical data identified over the course of this research could aid in creating a clearer and more detailed analysis of the relationship between San Marcos and Texas State. Potential research should expand on the knowledge gained from this study.

1. **Analyze the economic impact of the Austin-San Antonio growth corridor on the growth of the City of San Marcos and Texas State University.**

The scope of this research limited the data acquisition to the physical boundaries of the existing San Marcos city limits and the Texas State central campus, and did not consider regional influences. The growth of San Marcos and Texas State is clearly influenced by the explosive growth of this geographic region, and the inclusion of

historical geographic and demographic data would allow for a more thorough assessment of the relationship.

2. **Create a more comprehensive examination of current student housing.**

The pattern of student housing for Texas State raises additional questions that can only be answered will additional data. Where do the 59% of commuting students live and why do they not live in San Marcos? Surveying enrolled students to determine what factors influence their choice for living arrangements would be highly beneficial to the City of San Marcos as well as the development community.

3. **Analyze the pattern of historical student residency.**

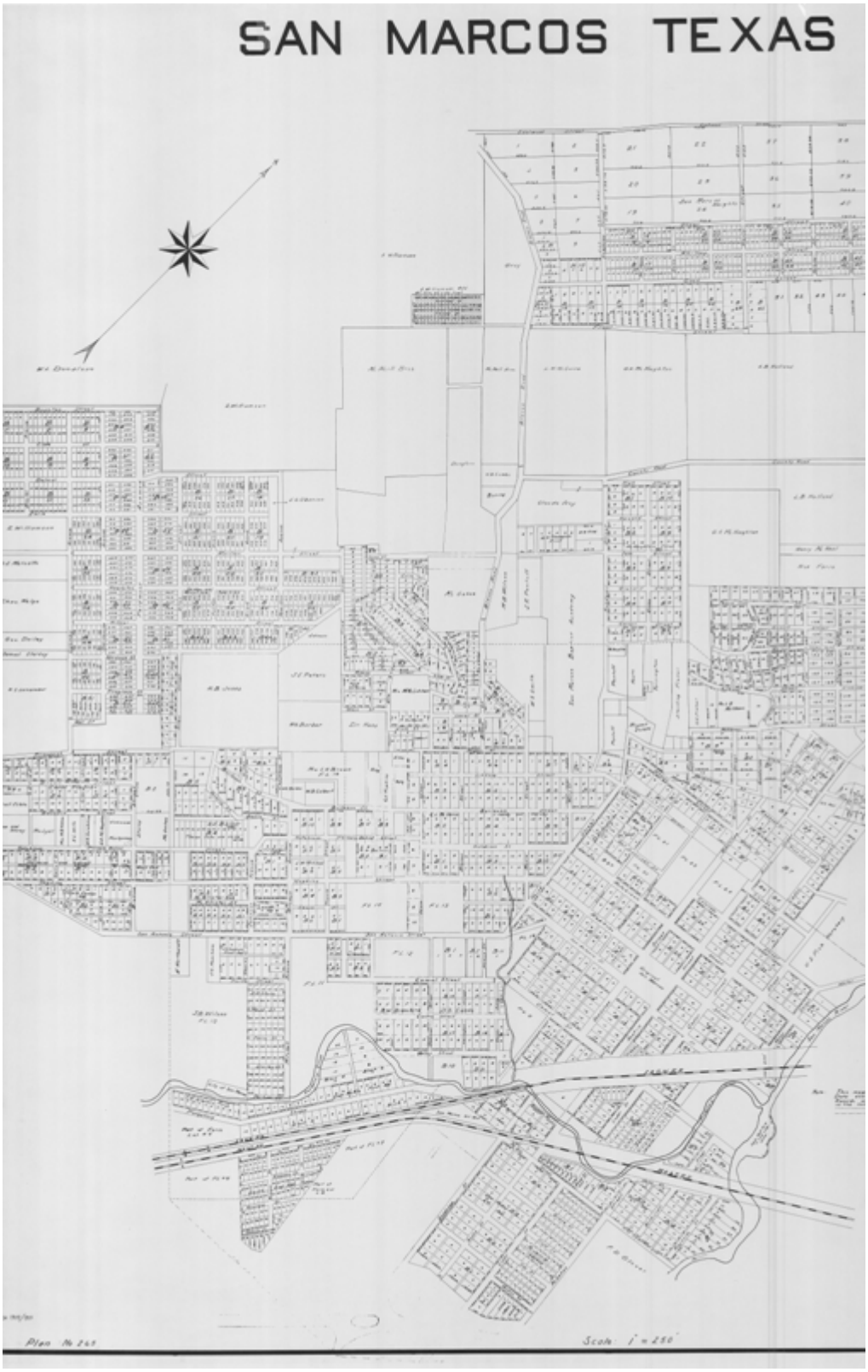
Analysis of data from the 2000 census and 2010 enrollment statistics demonstrated a decreasing student population in San Marcos. An historical assessment of quantitative and qualitative measurements may provide informative data to address this issue.

Overall, this thesis demonstrated that the Historical GIS of two related institutions is of interest to vested City and University personnel. The distant past, though informative, does not factor into current decision making processes. However, historical data from the past ten to twenty years is of great interest to the City administration and planners. This research also presented dynamic geovisualization as a medium for the display of historical data. By creating dynamic interactive displays of geographic information this thesis demonstrated that geovisualization can be a valuable tool for exploratory analysis and planning.

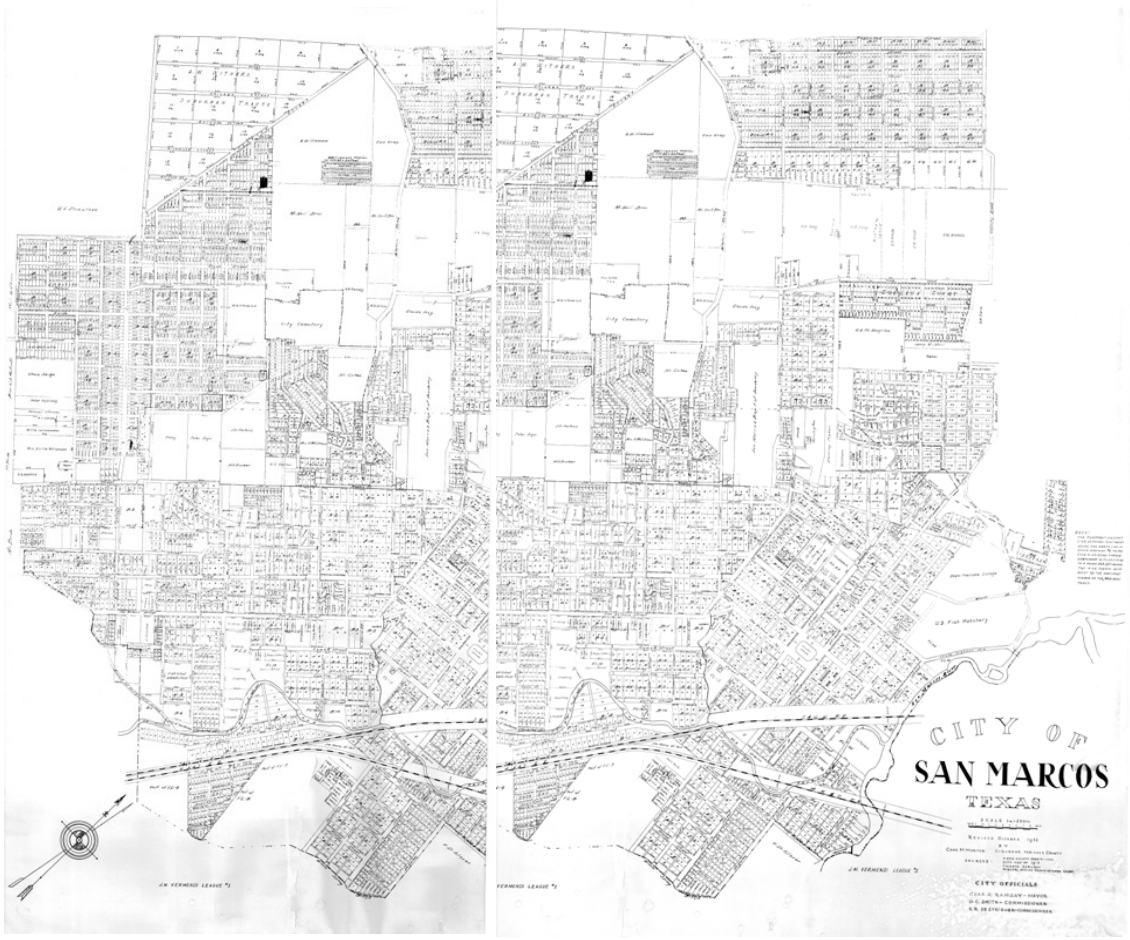
APPENDIX A: HISTORICAL MAPS

San Marcos 1881, General Land Office

San Marcos 1910, City of San Marcos GIS Division

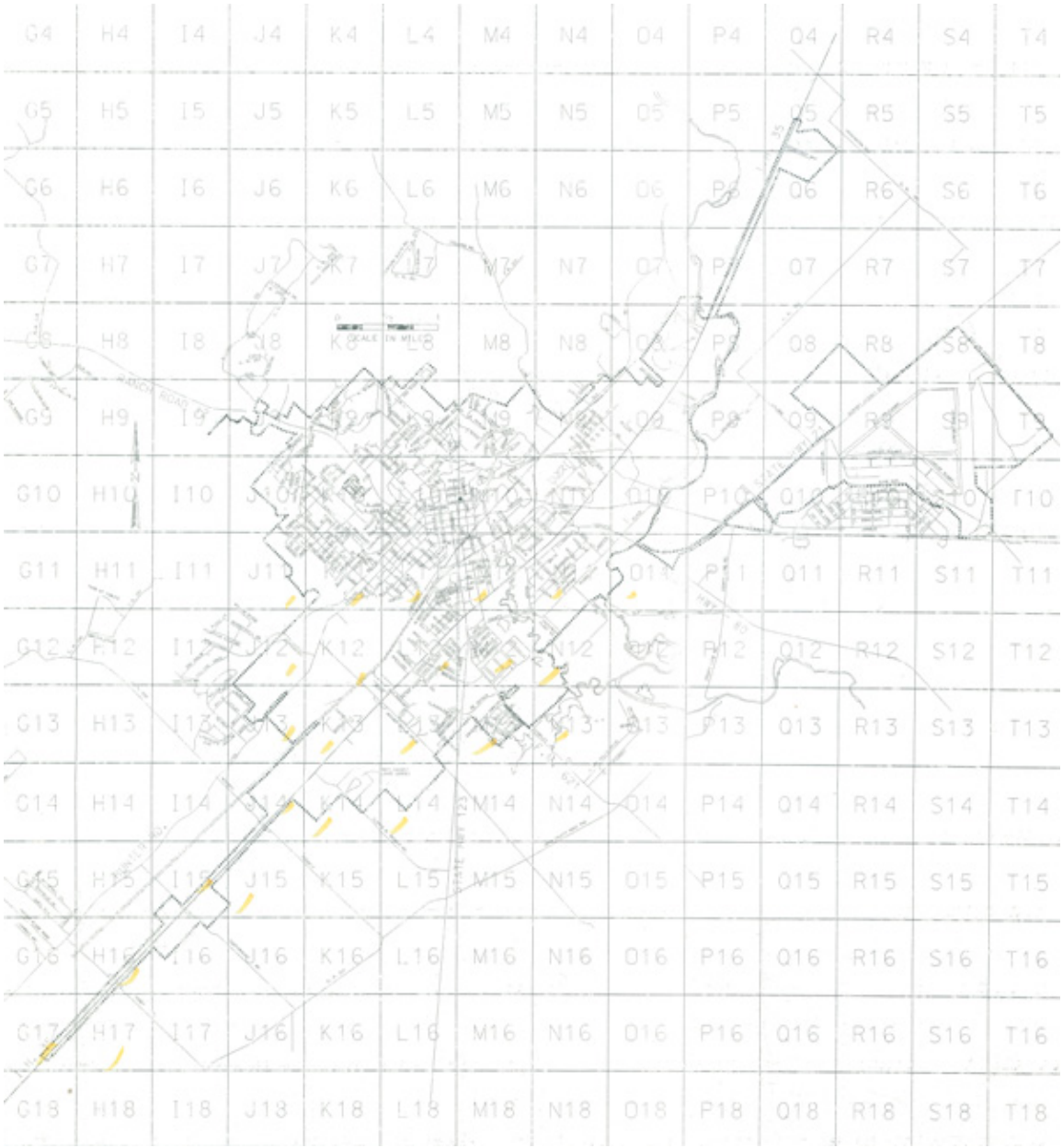


San Marcos 1933, City of San Marcos GIS Division



San Marcos 1950, City of San Marcos GIS Division

San Marcos 1974, City of San Marcos GIS Division



Deed for Southwest Texas State Normal School 1899, Hays County Records

aforesaid, by the City Council of the City of San Marcos, do convey, donate, grant, and give to the State of Texas to have and to hold forever, the "Chautauqua Hill" grounds described in said preamble and resolution, with all buildings and improvements appurtenant to the same, said lands being conveyed and donated by the city of San Marcos, for the uses, purposes, and considerations set forth in said Act of the ~~Legisla~~ Legislature, and in the preamble and resolution passed by the City Council of the City of San Marcos, and a certified copy of which is made a part hereof; and so far as it is in the power of the said City to do so, the City of San Marcos Warrants that it has a good title to said property, and will defend the same for the State, against all lawful claimants of the same. In Testimony of all which, witness my hand as Mayor of the city of San Marcos, attested by the City Secretary, and seal of the city ~~of San Marcos~~, this the 16th day of October, A.D. 1899.

(L.S.)

Hammett Hardy Mayor
of the City of San Marcos Texas

Attest:
W.P. Donalson
Secretary of the City Council
of the City of San Marcos, Tex.

The State of Texas
County of Hays

Before me, W.P. Donalson, a Notary Public in and for said County and State, on this day personally appeared Hammett Hardy, Mayor of the City of San Marcos, Texas, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same, in the capacity of Mayor, aforesaid, for the purposes and considerations therein expressed.

Given under my hand and seal of office this the 16th day of October, A.D. 1899.

(L.S.)

W.P. Donalson, Notary Public
Hays County, Texas.

Exhibit "A"

"Whereas, the 26th Legislature of the State of Texas passed "an act to provide for the establishment, maintenance and government of a State Normal School, to be located at San Marcos, Hays County, Texas and to be known as "The South West Texas Normal School", which act was approved the 10th day of May, A.D. 1899, and is Chapter 103 of the acts of the said Legislature; which said provides, among other things that, there shall be established at San Marcos, Hays County, Texas, and on the plat of land containing about eleven acres, and known as "Chautauqua Hill" a State Normal School, to be known as The South West Texas Normal School; provided that the City of San Marcos, and the citizens thereof, shall, without charge or cost to the State, and within sixty days after this act takes effect, convey, or cause to be conveyed to the State of Texas a good and perfect title in and to the aforesaid eleven acres of land, known as the "Chautauqua Hill", with all buildings and improvements incident thereunto; And whereas, the city of San Marcos is now the lawful owner of all the plats of land included in what is known as "Chautauqua Hill" and the land described in said act; And whereas said several tracts of land are described as follows to wit:- First tract. Beginning at the South east corner of a tract of land sold by W.D. Wood to J.W. Nance; thence North 8 West, with the east line of said Nance tract, to its north east corner, - thence in a westerly course, with the north line of said Nance tract to its north west corner, and corner in the east boundary line of the Coffield addition to the town of San Marcos. - thence North 8 West with said east boundary line, to the north or North west boundary line of the Veramendi league no. 1, corner in said line; thence with said line north 60 east, crossing the first branch, to the corner of J.L. Aquine tract; thence down said branch with the meanders of the north bank, to the line of the United States Fish Hatchery grounds. - thence with the north boundary line of said grounds ~~-----~~ South 76½ West, to the place of beginning. and the tract of land included in the aforesaid boundaries is estimated at eleven acres, more or less, and which tract of land is all enclosed by what is known as the Chautauqua fence, except a small portion on the branch, at the east end of the tract, which is outside of the ~~-----~~ fence. With this exception the fence marks the boundaries of this tract. Second tract. - Consists of lots five (5), six (6) and a part of four (4), in block no. nine (9), of the H.G. Coffield addition to the town of San Marcos. -
Third tract. Consists of lots nos. thirteen (13) fourteen (14) and a part of twelve (12), in block no. four (4) in ~~addition~~ the H.G. Coffield addition to the town of San Marcos, and is what was once known as the Mackin property, sold by W.D. Wood to Mackin; all of said lands lying in Hays County, Texas, and in the corporate limits of the city of San Marcos; - Therefore be it resolved by the City Council of the City of San Marcos, that in consideration of the great local benefit and advantage that the location, establishment and successful operation of said Normal School will be to the City of San Marcos, and the citizens individually, and the great advantage and convenience to the people of Southwest and west Texas, and in the full confidence and trust that the State will make the necessary appropriations, and put said school in successful operation in a reasonable time, the city of San Marcos does hereby convey, donate and give to the State of Texas, for the considerations, uses and purposes, aforesaid, the said tracts of land herein described comprising Chautauqua Hill, with all the buildings on same, and improvements incident thereunto, to have and to hold forever; and in order to put this donation of said lands in proper form by way of deed, the Mayor of the City of San Marcos, Hammett Hardy, as Mayor, for the considerations and purposes herein specified, is authorized, empowered and required to execute a deed to the State of Texas, for and on behalf of the City of San Marcos, to said lands, tender and deliver same, (or cause same to be done) to the Governor and Attorney General of the State of Texas, for their inspection and approval, as is provided for in said act; and the ~~said~~ City does here, as far as it has power to do, authorize the Mayor, in said deed, to make warranty of title to said lands so to be deeded by him."

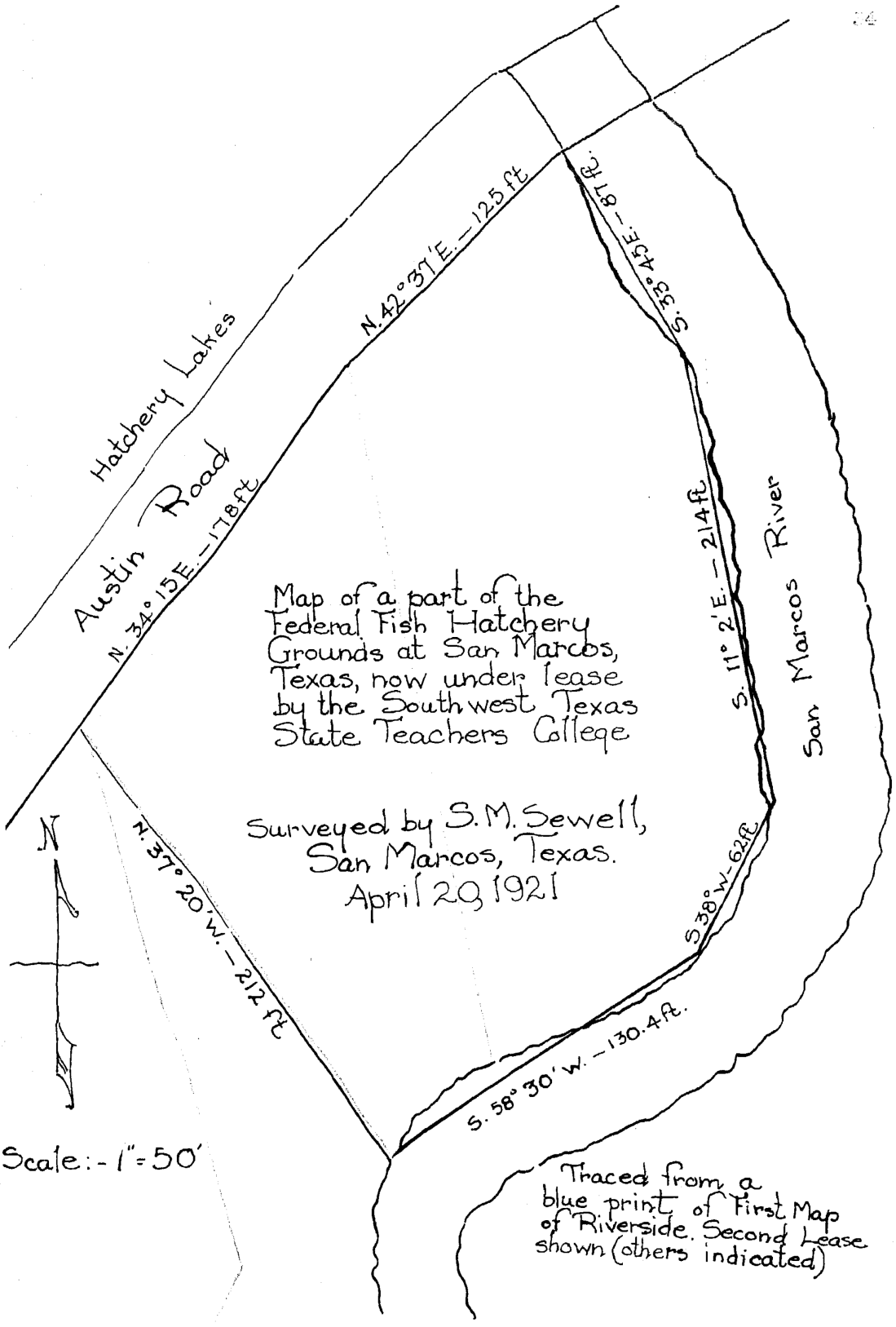
"Approved Oct. 16th. 1899.

(Signed) H. Hardy Mayor".

The State of Texas
City of San Marcos

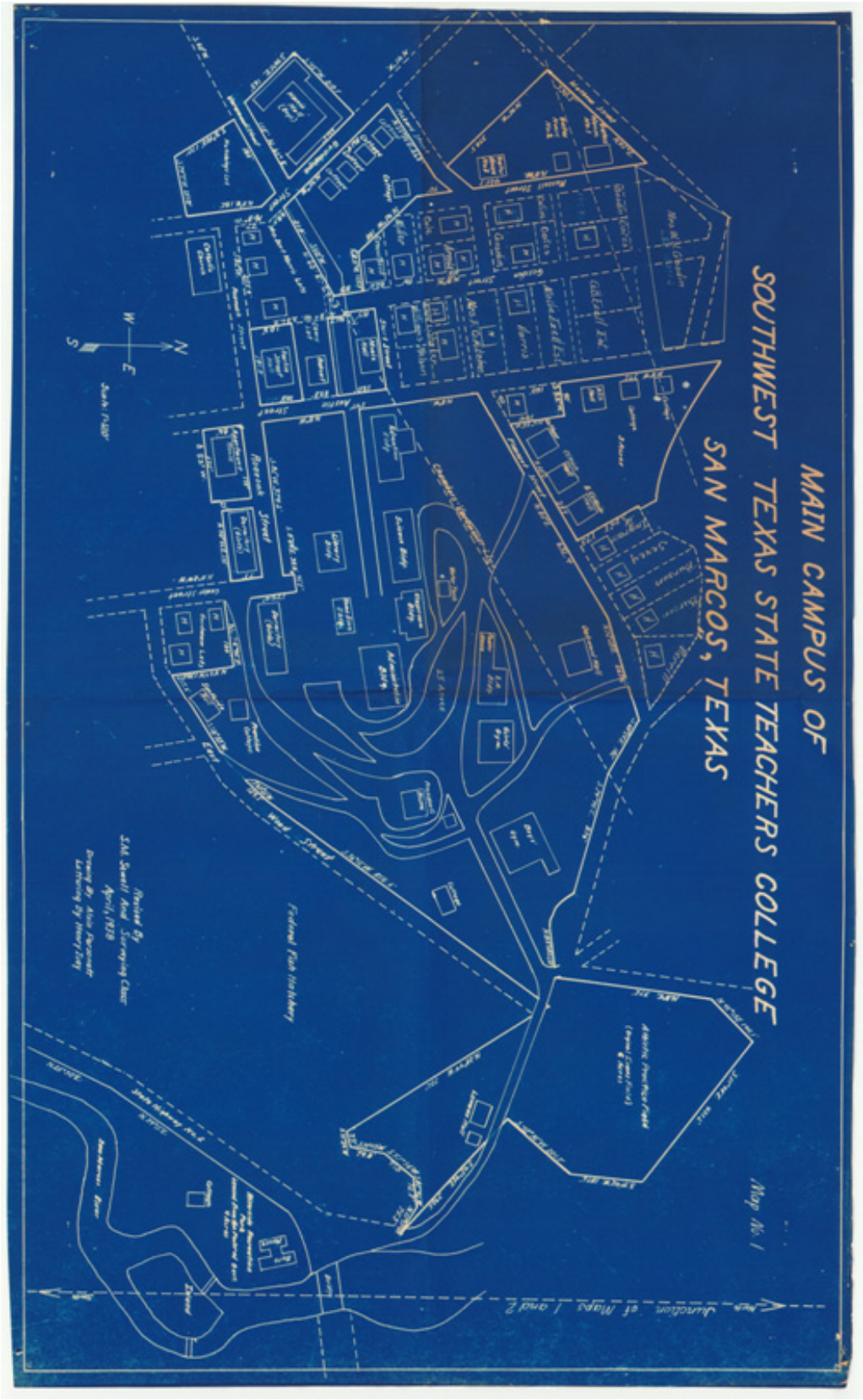
I, W.P. Donalson, Secretary of the City Council of the City of San Marcos, do hereby certify that the above and foregoing is a true and correct copy of the Preamble and Resolution passed by the City Council of the City of San Marcos, on the 16th. day of October A.D. 1899, and approved the same day by the Mayor of said City, in relation to the donation of the Chautauqua Hill

Riverside Park 1921, Texas State GIS

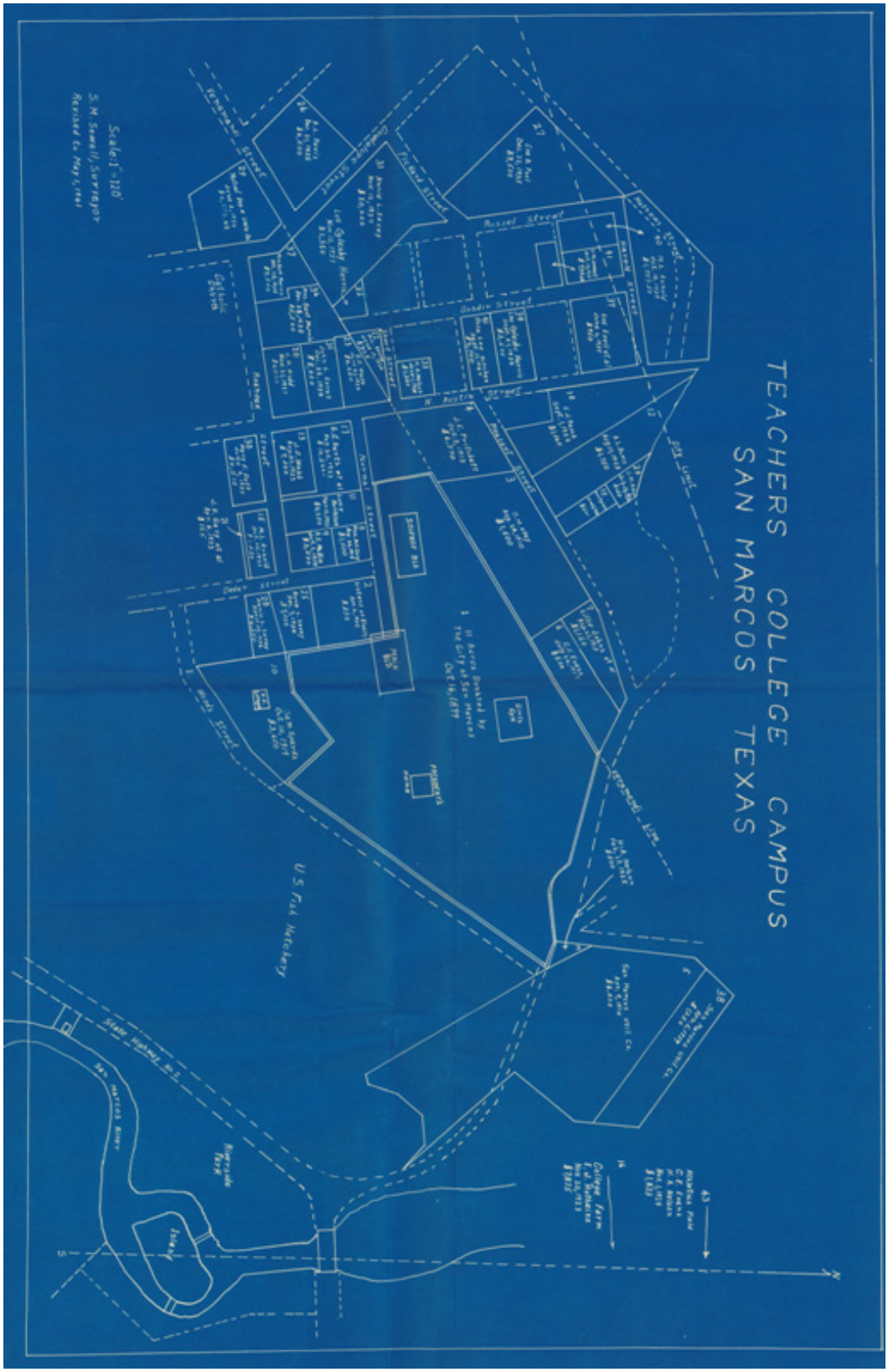


S

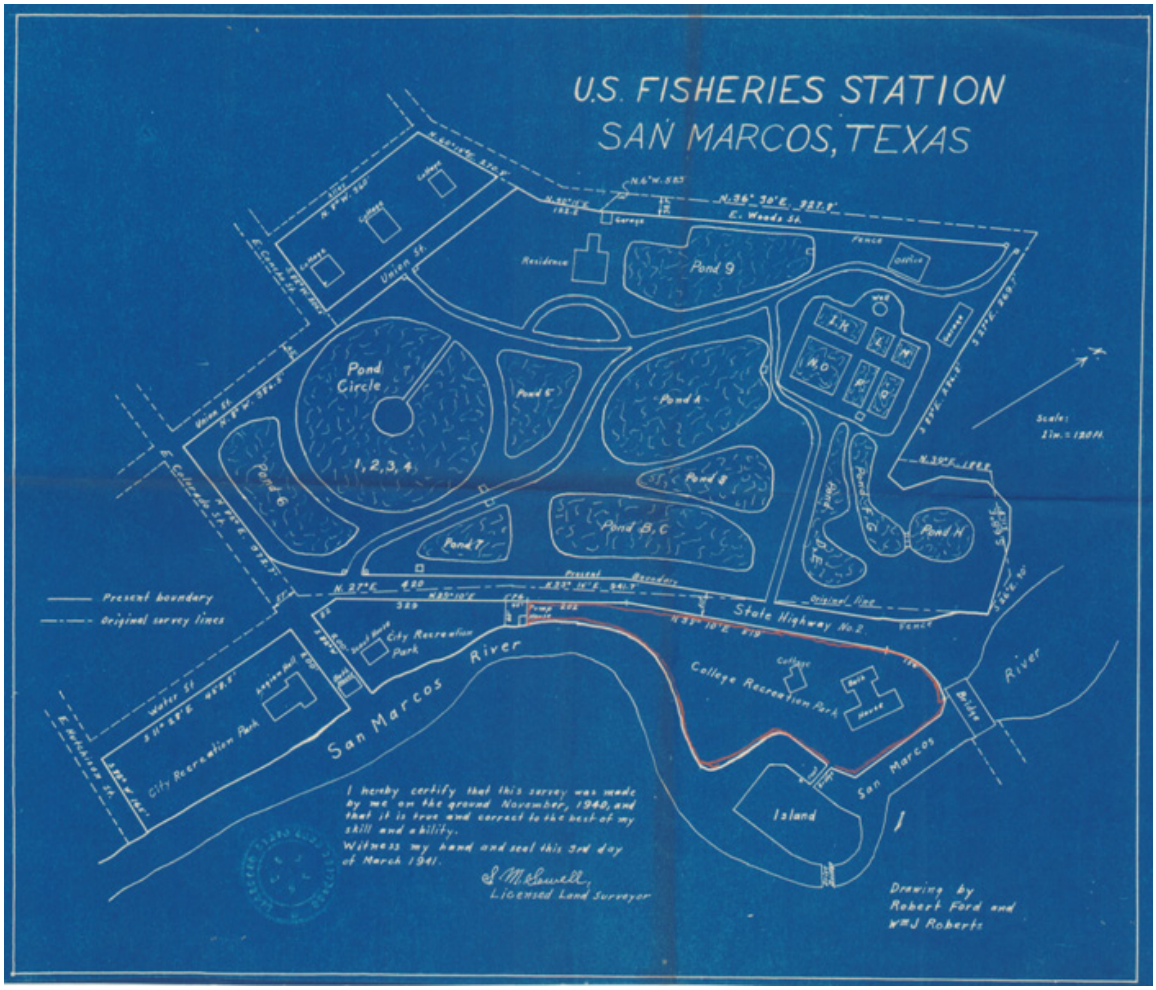
Southwest Texas State Teachers College 1938, Texas State GIS



Southwest Texas State Teachers College 1941, Texas State GIS

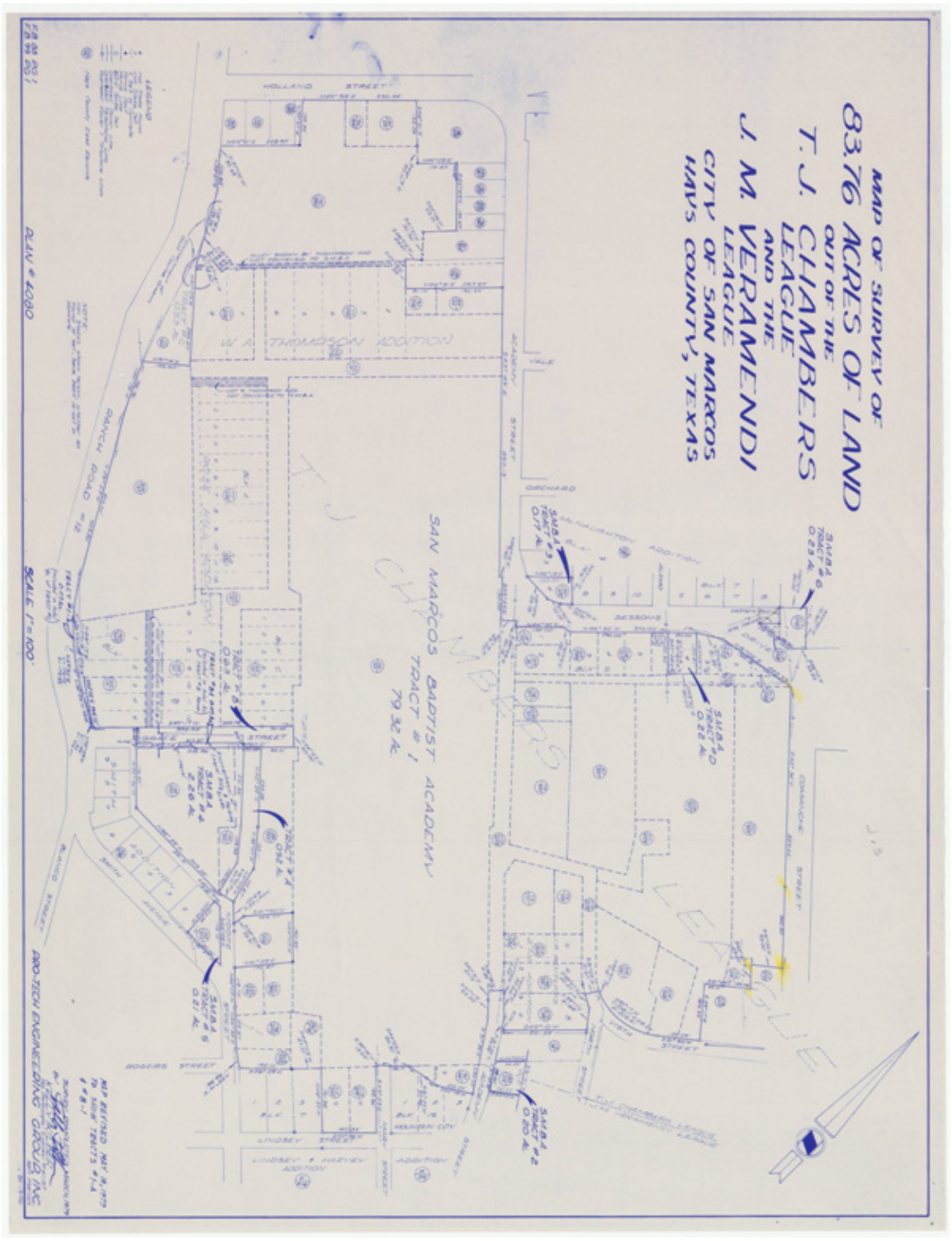


U.S. Fisheries Station 1941, Texas State GIS



Southwest Texas State University 1967, Texas State GIS

San Marcos Baptist Academy 1979, Texas State GIS



APPENDIX B: HISTORICAL GIS FEATURE TABLES

Yearly Snapshot Feature

Feature Name	Feature Type	Display Date	Data Source*	Acreage	Statistics
City of San Marcos	City Limit	1/1/1881	1	632	1232
City of San Marcos	City Limit	1/1/1910	2	1136	4071
City of San Marcos	City Limit	1/1/1933	3	1235	5134
City of San Marcos	City Limit	1/1/1935	4	1420	5134
City of San Marcos	City Limit	1/1/1950	5	4416	9980
City of San Marcos	City Limit	1/1/1963	6	4545	12713
City of San Marcos	City Limit	1/1/1970	6	4736	18860
City of San Marcos	City Limit	1/1/1974	7	5498	18860
City of San Marcos	City Limit	1/1/1979	8	5696	18860
City of San Marcos	City Limit	1/1/1980	8	9031	23420
City of San Marcos	City Limit	1/1/1981	8	9237	23420
City of San Marcos	City Limit	1/1/1983	8	1007	23420
City of San Marcos	City Limit	1/1/1984	8	1014	23420
City of San Marcos	City Limit	1/1/1985	8	1027	23420
City of San Marcos	City Limit	1/1/1986	8	1082	23420
City of San Marcos	City Limit	1/1/1988	8	1101	23420
City of San Marcos	City Limit	1/1/1989	8	1112	23420
City of San Marcos	City Limit	1/1/1990	8	1117	28743
City of San Marcos	City Limit	1/1/1991	8	1121	28743
City of San Marcos	City Limit	1/1/1992	8	1107	28743
City of San Marcos	City Limit	1/1/1993	8	1106	28743
City of San Marcos	City Limit	1/1/1994	8	1108	28743
City of San Marcos	City Limit	1/1/1998	8	1134	28743
City of San Marcos	City Limit	1/1/1999	8	1157	2873
City of San Marcos	City Limit	1/1/2000	8	1179	34733
City of San Marcos	City Limit	1/1/2001	8	1433	39116
City of San Marcos	City Limit	1/1/2002	8	1648	42678
City of San Marcos	City Limit	1/1/2003	8	1612	44050
City of San Marcos	City Limit	1/1/2004	8	1750	45156
City of San Marcos	City Limit	1/1/2005	8	1782	47230
City of San Marcos	City Limit	1/1/2006	8	1790	48473
City of San Marcos	City Limit	1/1/2007	8	1842	50373

Feature Name	Feature Type	Display Date	Data Source*	Acreage	Statistics
City of San Marcos	City Limit	1/1/2008	8	1900	51222
City of San Marcos	City Limit	1/1/2009	8	1962	53506
City of San Marcos	City Limit	1/1/2010	8	957	55891
SWTSNS	University Boundary	1/1/1899	9	13	0
SWTSNC	University Boundary	1/1/1903	10	13	303
SWTSTC	University Boundary	1/1/1920	10	18	974
SWTSTC	University Boundary	1/1/1938	11	39	2027
SWTSTC	University Boundary	1/1/1940	12	43	1266
SWTSTC	University Boundary	1/1/1941	13	46	1266
SWTSC	University Boundary	1/1/1950	14	73	1791
SWTSC	University Boundary	1/1/1960	14	80	2309
SWTSU	University Boundary	1/1/1967	15	175	2309
SWTSU	University Boundary	1/1/1976	16	181	8406
SWTSU	University Boundary	1/1/1980	17	292	15070
TSU-SM	University Boundary	1/1/1990	18	304	20505
TSU-SM	University Boundary	1/1/2000	19	436	22423
TSU-SM	University Boundary	1/1/2005	19	471	27128
TSU-SM	University Boundary	1/1/2009	19	478	32583
TSU-SM	University Boundary	1/1/2010	19	478	32583

*Data Source

1	http://www.lib.utexas.edu/maps/historical/historic_tex_cities.html
2	Hays County Deed Records
3	Hays County Deed Records, Revised by Chas. Morton – Surveyor
4	Hays County Deed Records, Revised by Chas. Morton – Surveyor plus annexations
5	City of San Marcos Survey – T.A. Breeze Licensed Surveyor
6	City of San Marcos Survey – T.A. Breeze Licensed Surveyor plus annexations
7	Byrn and Associates
8	Byrn and Associates plus Annexations
9	Hays County Records
10	TSU-SM Sewell Surey 1941
11	TSU-SM Survey by S.M.Sewell
12	TSU-SM Day P. McNeel Survey
13	TSU-SM Day Sewell Survey 1941
14	TSU-SM Day Sewell Survey 1941, property file
15	TSU-SM Surveyor unknown
16	TSU-SM Master Plan
17	TSU-SM 1967 plus SMBA
18	TSU-SM 1967 plus property file
19	TSU-SM GIS Dept

Off-Campus Housing Feature

NAME	ADDRESS	NO UNITS	YEAR
Balcones Apts	401 N. Fredericksburg	41	1962
Les Chateaux	1000 N. LBJ Dr.	77	1963
Versailles	810 N. LBJ Dr.	20	1965
Stonegate	1204 N. LBJ Dr.	26	1965
Woodstone Apts	1706 N IH 35	14	1967
Meadows	222 Ramsey St.	114	1970
Hayden Place	518 Linda Dr.	104	1970
Lindsey Oaks Apts.	435 N. Comanche	24	1971
No Name	530/536 Hopkins	10	1971
Herndon House	613 San Antonio St	24	1971
Treehouse	800 N. LBJ Dr.	141	1971
Sundance Apts	400 Linda Dr.	32	1971
Courtyard Apts	130 Jackson Ln.	30	1972
Shalamar Apts	1640 Aquarena Springs Dr.	162	1972
Colony	1631 Aquarena Springs	88	1973
Polo Club Apts	410 North St.	20	1973
Sunray Apts	1249 N. LBJ Dr.	20	1974
Palm Square	1360 Thorpe Ln.	91	1975
Alexis Square	1253 N LBJ Dr	8	1976
Verandah	1805 IH-35 S	156	1976
Chestnut Place Apts	1021 Chestnut St.	20	1978
Executive Townhomes	317 Craddock Ave	61	1978
	908 N LBJ	4	1979
Twin Seville	906 N. LBJ Dr.	8	1979
Springtown Villa	503 Springtown Way	60	1979
Netherlands	1690 Hoffeinz	8	1980
No Name	210 Pat Garrison	8	1981
Hill Country Apts	1230 N. LBJ Dr.	124	1981
No Name	118 Ladybird Ln.	4	1981
	119 SMITH LN	6	1981
	1223 HOPKINS	8	1981
Village Square Apts.	315 MILL ST	8	1981
	Ladybird Ln	4	1981
	Ladybird Ln	4	1981
	Ladybird Ln	4	1981
	Ladybird Ln	4	1981
No Name	1008 Faris St.	4	1981
	107 First ST	4	1981

NAME	ADDRESS	NO UNITS	YEAR
Summer Hills	1226 N LBJ Dr	4	1981
Bent Tree Garden	1013 Chestnut St.	20	1981
	Ladybird Ln	4	1981
	Ladybird Ln	4	1981
	Ladybird Ln	4	1981
No Name	1006 Faris St.	4	1981
	Ladybird Ln	4	1981
	Ladybird Ln	4	1981
LBJ Apts	1229 N. LBJ Dr.	10	1981
Timbers	900 Peques St.	157	1981
Avalon Apts	1703 N IH 35	136	1981
Quail Run Townhomes	1522 Ranch Road 12	18	1981
Oaks Apts	1224 N. LBJ Dr.	32	1981
Remington Townhomes	142 Windmill	33	1982
Windmill Duplexes plat	100-126 Windmill	14	1982
Highcrest Apts	1518 Ranch Road 12	130	1982
Windgate Condos	430 LINDSEY	12	1982
Autumn Chase I	1606 IH-35 N	116	1982
Pecan Creek Condos	412 W. San Antonio	56	1982
Post Rd 4-plex	Post Rd	4	1982
Bracewood Fourplexes	605-A Bracewood Cr	132	1982
Windmill Townhomes	109 Windmill	32	1982
Campus Colony	600 N. Comanche	21	1982
Fenway Loop Apts	101-111 Fenway Lp	24	1983
TAROD-PHILLIPS	ANDRA LANE	18	1983
SPRINGTOWN CONDOS	1202 THORPELN	76	1983
	402 N FREDERICKSBURG	17	1983
MILL ST APTS	1602	10	1983
Post Rd 4-plex	Post Rd	4	1983
Stadium View	100 Warden Ln	70	1983
Post Rd 4-plex	Post Rd	4	1983
Post Rd 4-plex	Post Rd	4	1983
Post Rd 4-plex	Post Rd	4	1983
Post Rd 4-plex	Post Rd	4	1983
	Craddock	4	1983
Post Rd 4-plex	Post Rd	4	1983
Townhood	520 Linda Dr.	176	1983
Post Rd 4-plex	Post Rd	4	1983
	Craddock	4	1983
Cedars of San Marcos	1101 Leah Ave.	168	1983

NAME	ADDRESS	NO UNITS	YEAR
Post Rd 4-plex	Post Rd	4	1983
	Craddock	4	1983
	Craddock	4	1983
	Craddock	4	1983
	Craddock	4	1983
	Craddock	4	1983
Post Rd 4-plex	Post Rd	4	1983
Post Rd 4-plex	Post Rd	4	1983
	Craddock	4	1983
Mill Street Townhomes	1645-1661 Mill St	32	1983
Merriweather Apts	201, 203, 205 S. Mitchell St	16	1983
Hughson Duplexes		68	1983
	1005 N LBJ DR	12	1984
	1221 HOPKINS ST	8	1984
Colony Square Condos	705 River Rd.	120	1984
Graystone Apts.	1109 San Marcos Pkwy.	64	1984
Centre St. Villas	736 Centre St	5	1984
Alpha Omicron Pi	401 N. Comanche	16	1984
Carlyle	418 Comanche	10	1984
Englebrook Apts	200 Robbie Ln.	102	1984
Mosscliff	1637 Post Rd.	60	1984
Heritage Square Apts	100 Jackman St	14	1985
Westfield Apts	112 West Ave.	136	1985
Post Rd 4-plex	Post Rd	4	1985
	Uhland	4	1985
	Uhland	4	1985
Summit Apts	1348 Thorpe Ln.	112	1985
Langtry	205 Craddock Ave	55	1985
Village Green	117 Seguin St.	125	1985
Clarewood	1400 Clarewood	142	1986
Autumn Chase II	1606 IH-35 N	142	1986
Elms Apts	420 North St.	16	1986
Post Road Place	1629 Post Rd.	54	1987
Village on the River	1805 Aquarena Springs Dr.	268	1987
Bishop's Corner	1409 Bishop St.	11	1987
Springwest Apts	1623 Aquarena Springs Dr.	78	1987
Crest Dr Duplexes		24	1988
Zeta Tau Alpha	102 Mosscliff Cir	40	1988
No Name	323 Hutchison	4	1990
Cherry Hill	213, 215, 217 Ramsey St.	24	1992

NAME	ADDRESS	NO UNITS	YEAR
Country Oaks	1951 Aquarena Springs Dr	160	1995
No Name	712 Peques St.	6	1996
No Name	1216 MLK Dr	5	1997
Palazzo	1011 Wonder World Dr.	152	1997
River Oaks Villas	1900 Aquarena Springs Dr.	200	1997
River View Acres	1478-1492 River Rd.	32	1997
Post Oak Apts	1617 Post Rd.	56	1997
Sagewood Duplexes		140	1998
Sterling University Apts.	109 West Ave.	152	1998
The Edge	1740 Ranch Road 12	173	1999
Parkhill	1001 Leah Ave	168	1999
Asbury Place	1350 Wonder World Dr	64	2000
Hillside Ranch Apts.	1350 N. LBJ Dr.	199	2000
Zone	1975 Aquarena Springs Dr	258	2000
Hutchison Street Condos	545 Hutchison St	6	2000
Villas at Willow Springs	1506 S IH 35	220	2001
University Club	1441 Leah Dr	110	2001
Champion's Crossing	345 Champions Blvd	156	2001
	427 Lindsey	6	2001
Metropolitan	121 Craddock Ave	106	2001
Mystic River	765 River Rd	38	2001
Dakota Ranch	1818 Ranch Road 12	188	2001
Bishop's Square	109 Craddock Ave	134	2001
River Place Apts	755 River Rd	44	2001
Exchange II	1610 N IH 35	288	2002
Burleson Sixplex	410 Burleson St	6	2002
1111 N LBJ Apts	1111 N LBJ Dr	9	2002
Palazzo II	1011 Wonder World Dr	148	2002
State Bank Bld Apts	100 N Guadalupe	4	2003
Outpost	1647 Post Rd	162	2004
	519 W HUTCHISON	4	2004
Villagio	1850 Aquarena Springs	180	2004
Kappa Alpha Order	602 Academy St.	4	2004
AB Rogers Bldg	202 N LBJ Dr	12	2005
Savanah Club	250 S Stagecoach	180	2005
Exchange II	1101 E River Ridge Pkwy	240	2005
Sanctuary Lofts	350 North St	204	2005
Cabana Beach	1250 Sadler	276	2006
Vantage	1350 Sadler Dr	240	2008
Encino Pointe	1800 Post Rd	252	2009

NAME	ADDRESS	NO UNITS	YEAR
The Grove at San Marcos	1150 E River Ridge Pkwy	192	2009
Lindsey Lofts	214 E San Antonio	14	2010
Blanco Park	1650 River Rd	186	2010
Purgatory Creek Apts	1951 Hunter Rd	286	2010
Logan Ridge Apartments	225 Ramsay	42	2010
CopperBeech	1701	415	2010
Aspen Heights	201 Telluride St	213	2010

On-Campus Housing Feature

NAME	NUM_BEDS	YEAR	DEMO	DISPLAY DATE
Sayers Hall				1/1/1936
Harris Hall				1/1/1938
Laurel Hall	141	1941		1/1/1941
Riverside Apts	4	1943		1/1/1943
Riverside Apts	4	1943		1/1/1943
Riverside Apts	4	1943		1/1/1943
Riverside Apts	4	1943	1982	1/1/1943
Riverside Apts	4	1943	1982	1/1/1943
Riverside Apts	4	1943	1982	1/1/1943
Brogdon	141	1947		1/1/1947
Burleson Hall	66	1951		1/1/1951
Honrnsby Hall	66	1951		1/1/1951
Retama Hall	142	1952		1/1/1952
Arnold Hall	225	1957		1/1/1957
Barreta	92	1957		1/1/1957
Smith Hall	163	1957		1/1/1957
Lantana Hall	239	1961		1/1/1961
Elliott Hall A	186	1962		1/1/1962
Butler Hall	238	1965		1/1/1965
Falls Hall	394	1966	2010	1/1/1966
Jackson Hall	419	1967		1/1/1967
Tower	434	1967		1/1/1967
Sterry Hall	371	1967		1/1/1967
College Inn	230	1975		1/1/1975
San Saba Hall	90	1980		1/1/1980
Blanco Hall	715	1982		1/1/1982
San Jacinto Hall	469	1982		1/1/1982
Bexar Hall	202	1982		1/1/1982
San Marcos Hall	409	1982		1/1/1982
Comanche Hills	218	1986		1/1/1986

NAME	NUM_BEDS	YEAR	DEMO	DISPLAY DATE
Clear Springs Apartments	111	1994		1/1/1994
Bobcat Village Apts	648	2002		1/1/2002
Campus Colony	48	2006		1/1/2006
North Campus Housing Complex	612	2010		1/1/2010

APPENDIX C: ADOBE FLASH® DOCUMENTS

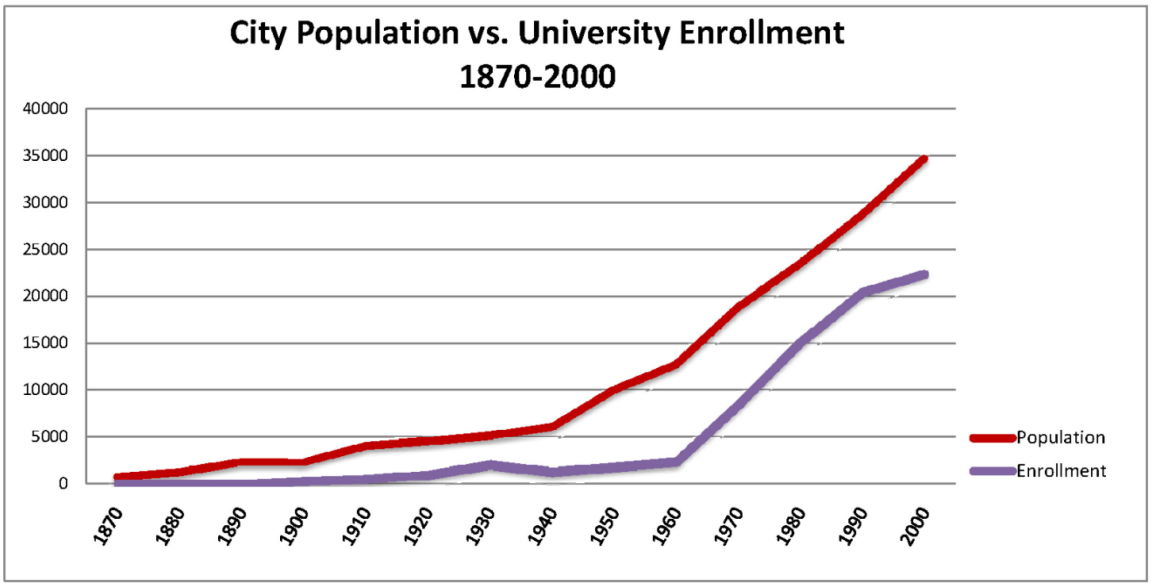
Statistical Data Table

Year	City Acreage	Population	University Acreage	Enrollment	On-Campus Housing	Off-Campus Housing	University Name
1881	632	741		0			SWTSNS
1899	632	741	11	303			SWTSNS
1910	1136	4071	13	510			SWTSNC
1933	1235	5134	18	2027			SWTSTC
1938	1420	5134	39	1266			SWTSTC
1940	1420	6006	43	1266			SWTSTC
1941	1420	6006	49	1266	141		SWTSTC
1943	1420	6006	68	584	165		SWTSTC
1950	4416	9980	73	1791	306		SWTSTC
1952	4416	9980	73	1791	580		SWTSTC
1957	4416	9980	73	1670	1060		SWTSTC
1963	4545	12713	80	3850	1485	116	SWTSC
1967	4545	12713	80	3850	3341	176	SWTSC
1970	4736	18860	175	8406	3341	290	SWTSU
1974	5498	18860	175	12142	3341	940	SWTSU
1976	5498	18860	175	12142	3571	1195	SWTSU
1980	9031	23420	261	15070	3661	1295	SWTSU
1981	9237	23420	261	15070	3661	1890	SWTSU
1983	10073	23420	261	18314	5456	3311	SWTSU
1985	10272	23420	261	18314	5456	4232	SWTSU
1990	11176	28743	272	20505	5562	5125	SWTSU
1994	11089	28743	272	20505	5773	5149	SWTSU
2000	11796	34733	435	22423	5773	6918	SWTSU
2001	14330	39116	435	23517	5773	7920	SWTSU
2002	16485	42678	435	25025	6421	8371	SWTSU
2003	16122	44050	435	26306	6421	8371	TSU - SM
2004	17508	45156	435	26783	6421	8727	TSU - SM
2005	17820	47230	471	27128	6421	9357	TSU - SM
2006	17903	48473	471	27485	6469	9390	TSU - SM
2007	18427	50373	471	28121	6469	9390	TSU - SM
2008	19008	51222	471	29105	6469	9873	TSU - SM
2009	19622	53506	478	30813	6469	10317	TSU - SM
2010	20567	55891	478	32583	6597	11753	TSU - SM

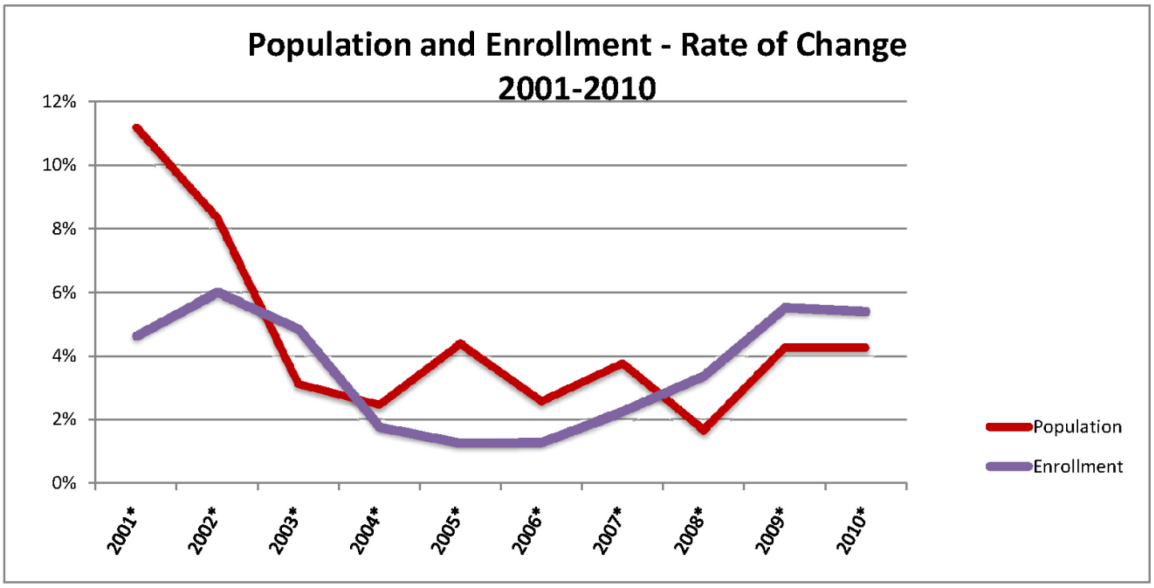
Consolidation Matrix

	1881	1899	1910	1933	1938	1940	1941	1943	1950	1952	1957
City Limit	1881	1881	1910	1933	1935	1935	1935	1935	1950	1950	1950
University Boundary	-	1899	1903	1920	1938	1940	1941	1941	1950	1950	1957
On-Campus Housing	-	-	-	-	-	-	1941	≤1943	≤1947	≤1952	≤1957
Off-campus Housing	-	-	-	-	-	-	-				
Enrollment	-	-	1910	1920	1930	1930	1940	1940	1950	1950	1950
Population	1880	1880	1910	1930	1930	1930	1940	1940	1950	1950	1950
	1963	**1967**	**1970**	**1974**	**1976**	**1980**	**1981**	**1983**	**1985**	**1990**	**1994**
City Limit	1963	1963	1970	1974	1974	1980	1981	1983	1985	1990	1994
University Boundary	1960	1967	1967	1967	1976	1980	1980	1980	1980	1990	1990
On-Campus Housing	≤1963	≤1967	≤1967	≤1974	≤1976	≤1980	≤1981	≤1983	≤1985	≤1990	≤1994
Off-campus Housing	≤1963	≤1967	≤1967	≤1974	≤1976	≤1980	≤1981	≤1983	≤1985	≤1990	≤1994
Enrollment	1960	1960	1970	1970	1970	1980	1980	1980	1980	1990	1990
Population	1960	1960	1970	1970	1970	1980	1980	1980	1980	1990	1990
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
City Limit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
University Boundary	2000	2000	2000	2000	2000	2005	2005	2005	2005	2009	2010
On-Campus Housing	≤2000	≤2001	≤2002	≤2003	≤2004	≤2005	≤2006	≤2007	≤2008	≤2009	≤2010
Off-campus Housing	≤2000	≤2001	≤2002	≤2003	≤2004	≤2005	≤2006	≤2007	≤2008	≤2009	≤2010
Enrollment	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Population	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010

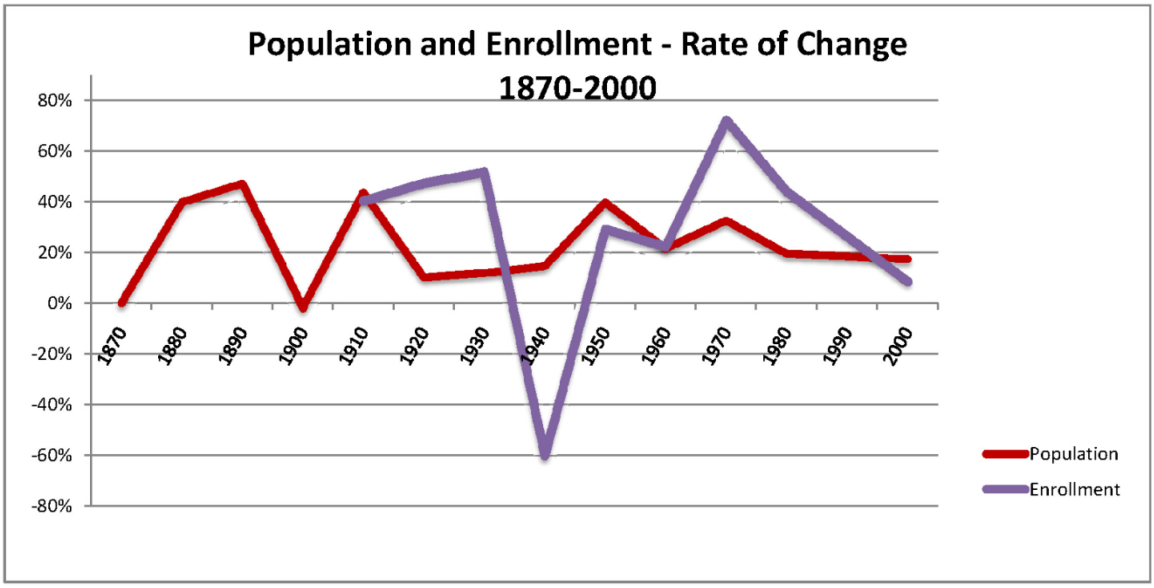
Population and Enrollment 1870-2000



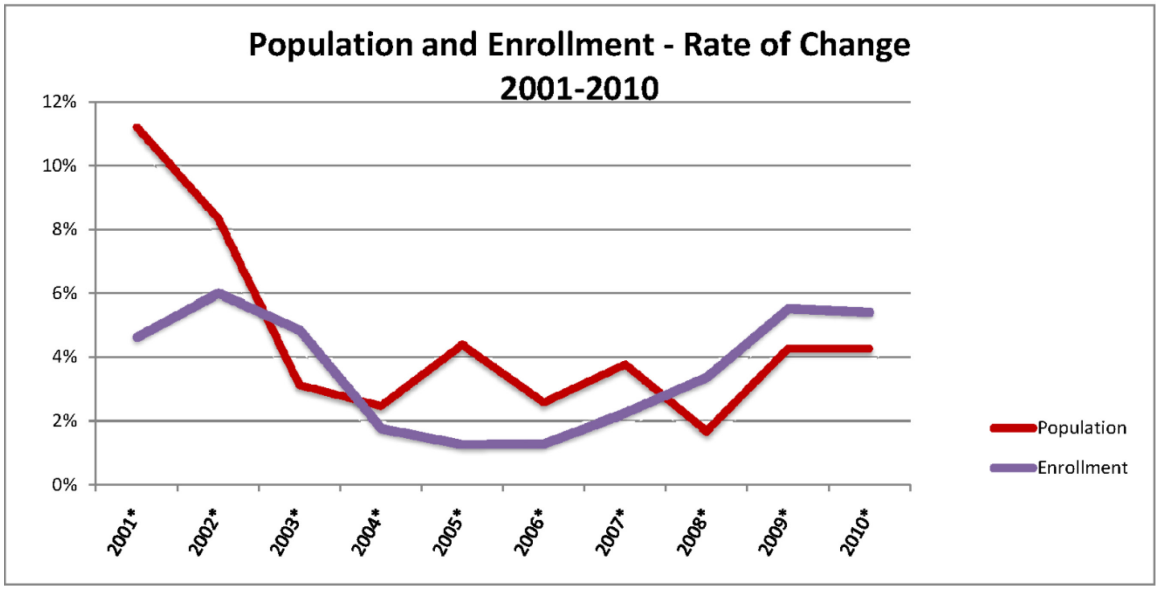
Population and Enrollment 2001-2010



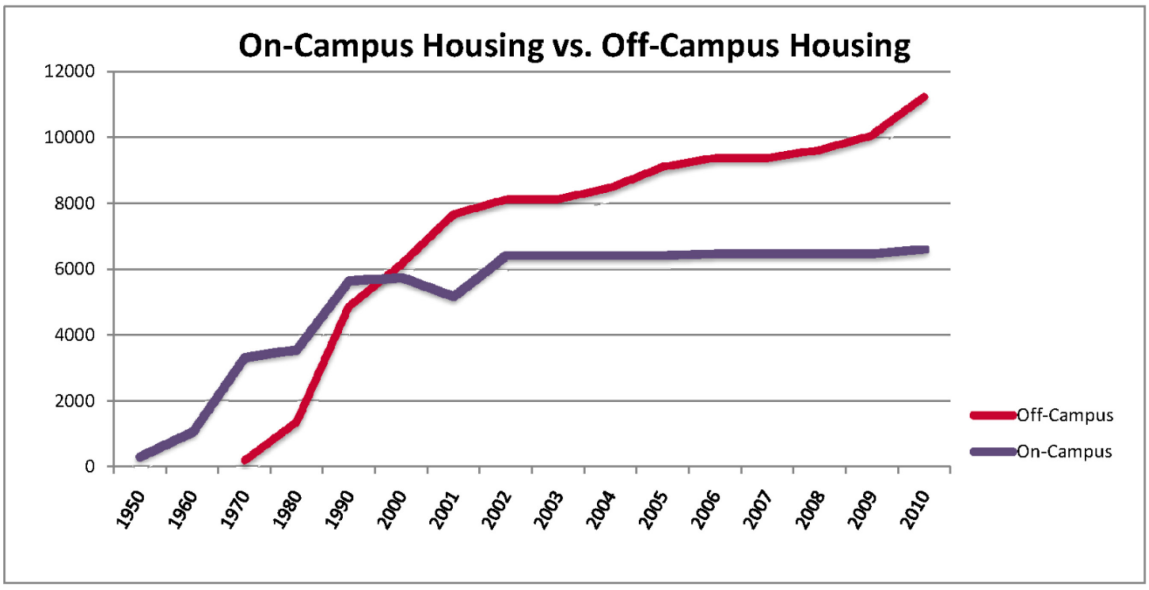
Population and Enrollment Rate of Change 1870-2000



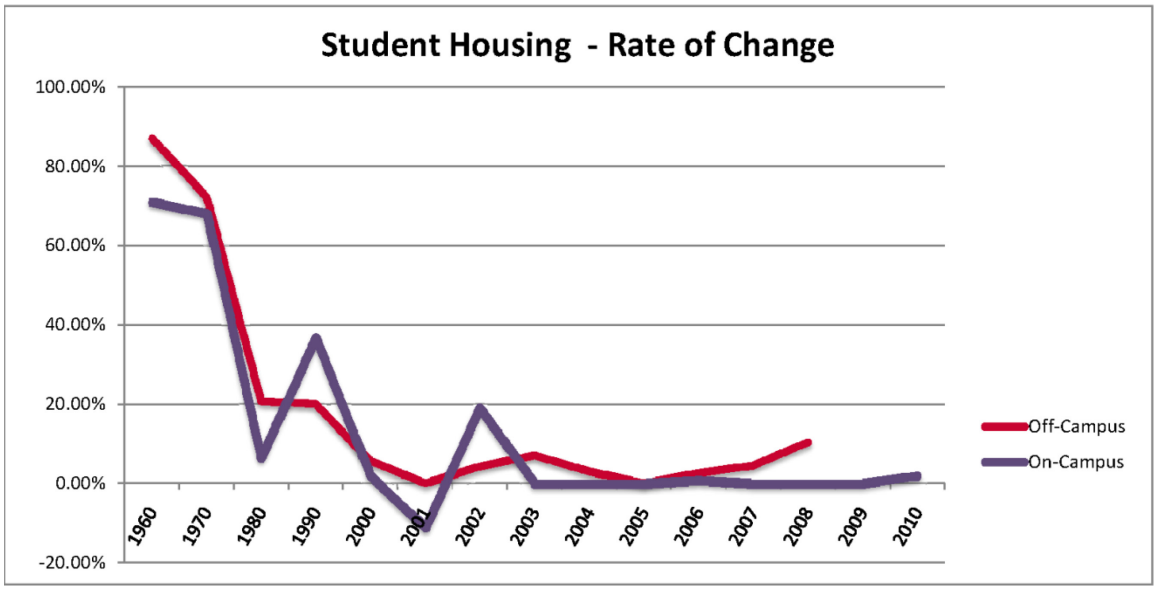
Population and Enrollment Rate of Change 2001-2010



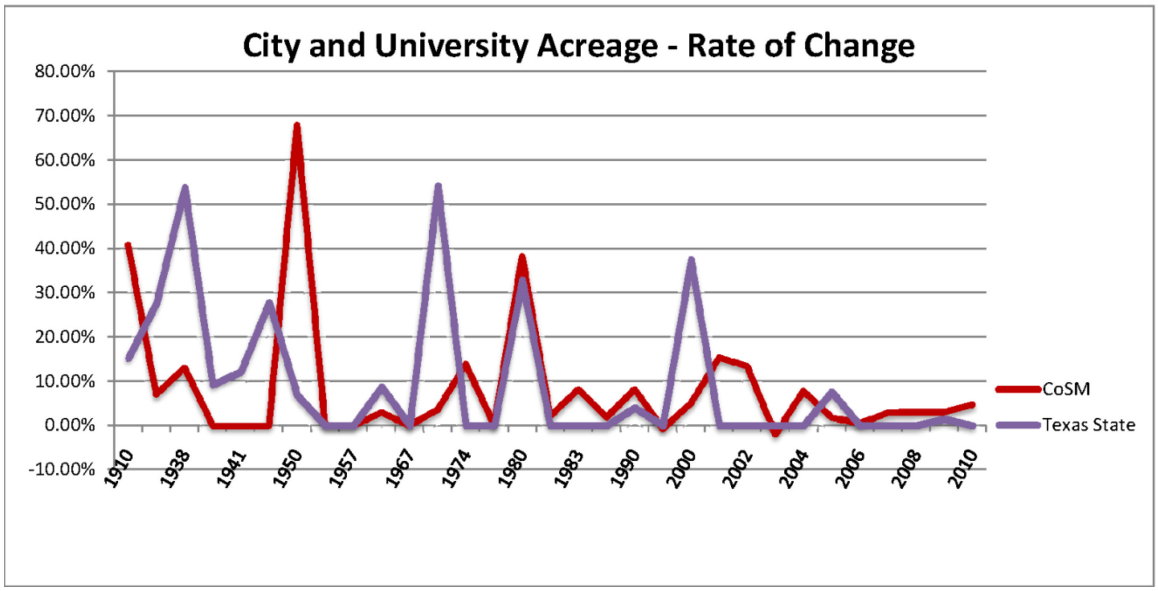
On-Campus and Off-Campus Housing



Student Housing Rate of Change



Acreage Rate of Change



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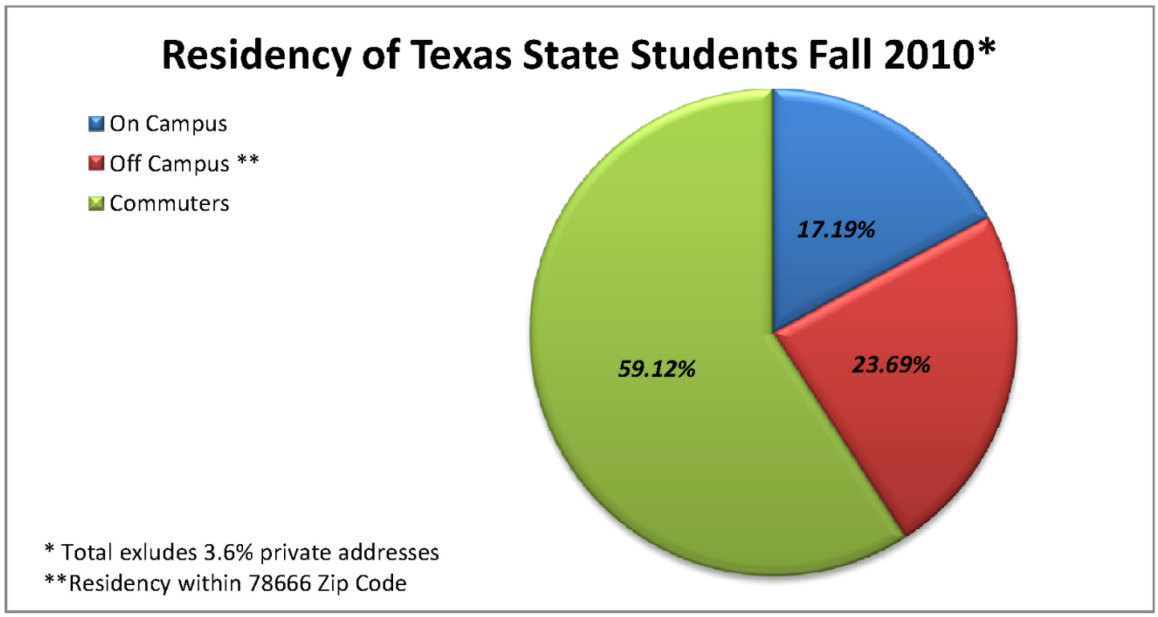
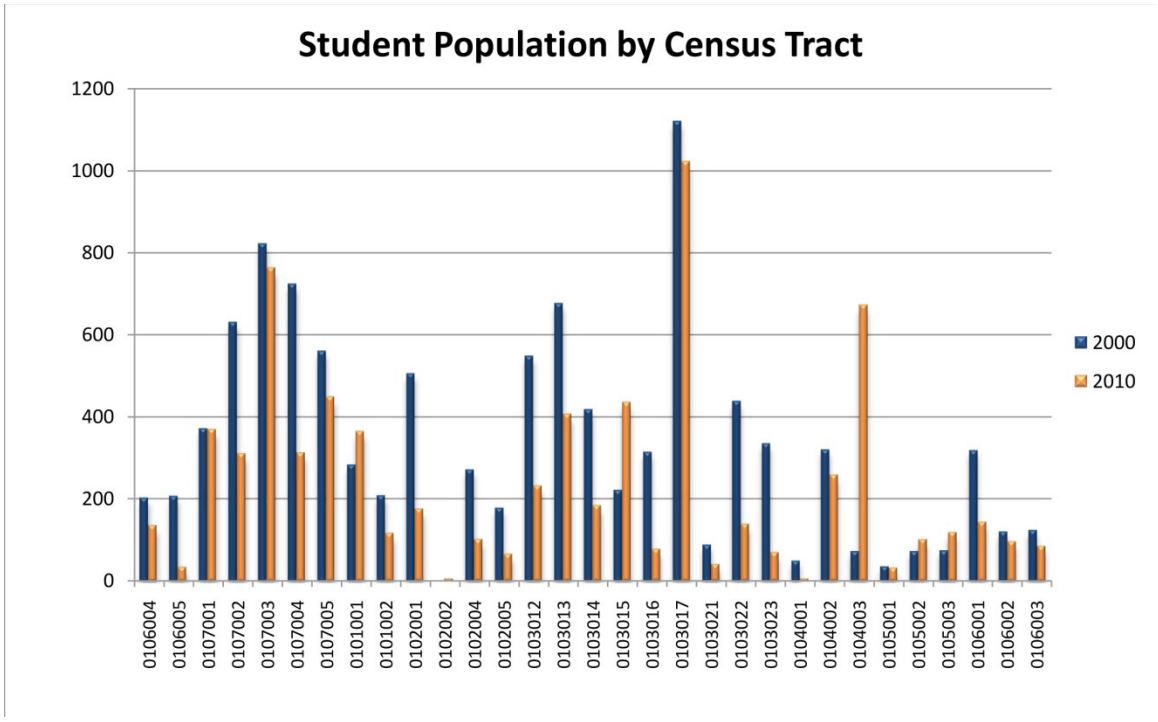
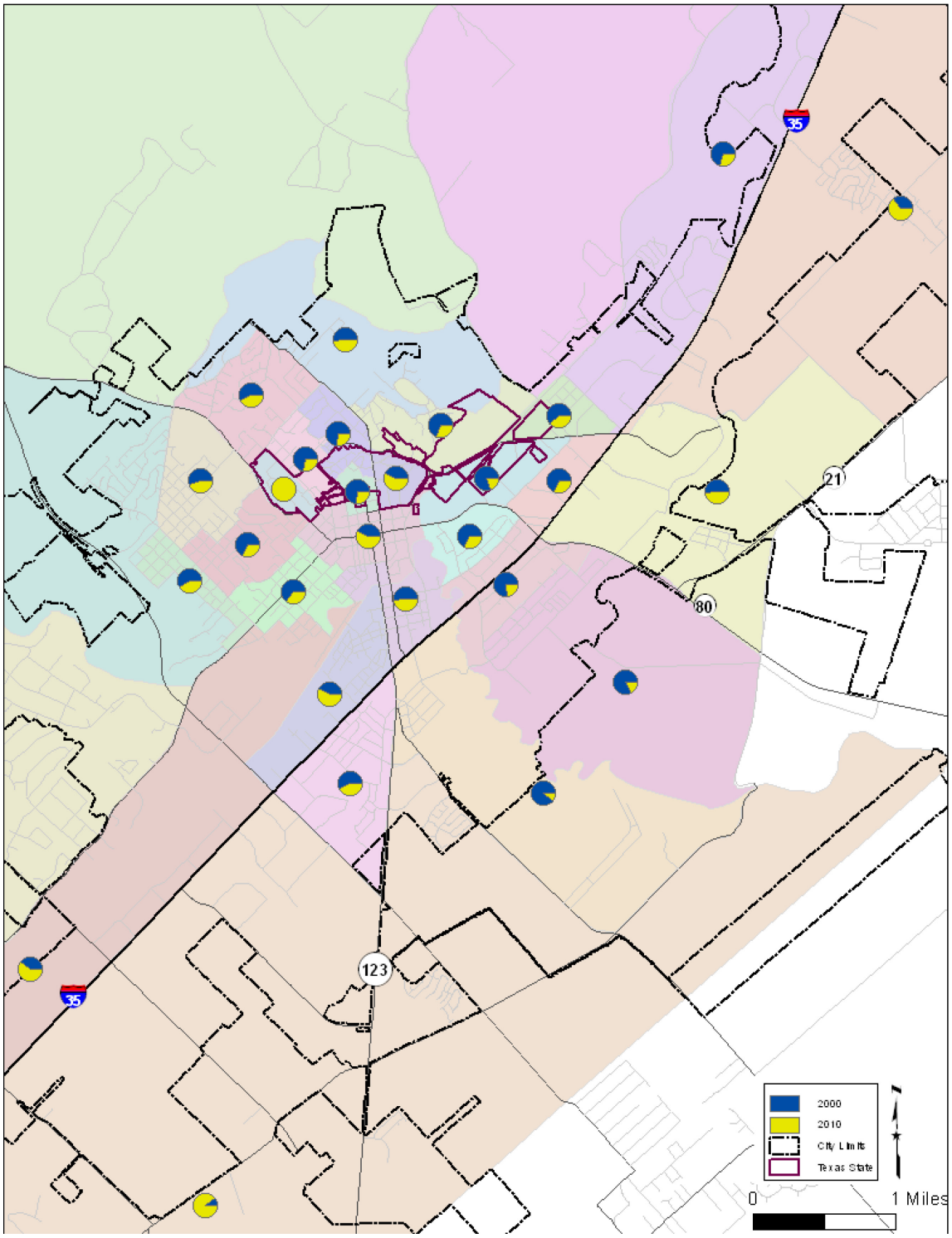


Student Population 2000 and 2010



Student Population Map 2000 and 2010



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VITA

Joan Amanda Inman was born in Albuquerque, New Mexico on September 25, 1959, the daughter of John and Elaine Inman. She graduated from Eastwood High School in El Paso, Texas in 1977, she then moved to Lubbock, Texas to begin her undergraduate degree at Texas Tech University (TTU). After completing two years of study at TTU, she concluded her undergraduate education, earning a Bachelor of Science in Home Economics at the University of Texas at Austin in 1984.

Miss Inman married Len Hickey on April 23, 1988 and moved to San Marcos, Texas where she was employed by the McCoy Corporation as an Advertising Assistant. In 1993, she began working for the City of San Marcos—as a Purchasing Technician, then as the Electric Distribution Technician, and then as the GIS Coordinator for the Department of Environment and Engineering. In 2002, Mrs. Hickey was promoted to GIS Services Manager for the City of San Marcos. Concurrently, she entered the Graduate College of Texas State University-San Marcos in August, 2005.

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