The Urban Fabric of the Great Plains

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The Urban Fabric of the Great Plains

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To most Americans the Great Plains region of North America is mysterious place. There are disagreements when defining its limits, and some people just refer to it as the Midwest. The Great Plains has been a place under an ocean, a place under glaciers, and a place on fire. It was once dubbed “the Great American Desert,” but is now known for its agricultural viability. The Great Plains sparks imagination because it is so massive and was one of the final frontiers for Euro-American settlement. The Great Plains is seen as a rural place but the majority of the region’s population lives in urbanized areas. Data from the Census website (census.gov) show that American Great Plains states have urban population majorities, including North Dakota (56% urban), South Dakota (52% urban), Nebraska (70% urban), and Kansas (71% urban). With such a seemingly infinite amount of space and low population density in the region, it is easy for city planners and developers to design cities and infrastructure in a way that can be described as urban or suburban sprawl, a low-density and auto-dependent development method that takes up farmland, rural land, and fragments wildlife habitats.

This paper will look at the urban settlement patterns of the Great Plains in a way that shows both positive and negative aspects of urbanization. First, the epochs of settlement in the American West after the year 1800 will be discussed. This is followed by an in-depth discussion about the historical urbanization of the Great Plains, defining the urban structure of the region, classic city archetypes, different eras of migration, and other reasons these cities came into existence. Later, the city of Lincoln, Nebraska will be used in the case study section as an example of a Great Plains city. The case study will compare the Lincoln of 1885 to the Lincoln of 2010, showing the change in the city’s limit over the past 125 years.

The study will also define the urban growth rate, population change, and how much land has been converted from farmland or rural land to the urbanized zone we call Lincoln. By using Lincoln as an example, the paper will analyze methods for development that help slow city growth in the Great Plains by using economic, political, and public service incentives like impact fees, zoning laws, and utility
allotment for new developments. After identifying the positive and negative aspects of Lincoln’s growth management, the findings will be compared to other cities in the region to assess what other towns and cities do to regulate urban sprawl and development from taking over rural lands, agricultural lands, and wild-life habitats. The best way to analyze urban development in the region is to start from the beginning, with the arrival of Euro-American settlers.

**Settlement of Western U.S. after 1800**

Many geographers and historians have analyzed the settlement of the United States by defining four or five stages of urban development in the context of great migrations of large populations and major advancements in technology. Much of this analysis refers to the Western settlement of the U.S., since the East was previously developed with connection to the European roots of the United States. To settle the American West it took great migrations which were triggered by technological advancements that brought about these epochs of American settlement.

John Borchert’s epochs of American urbanization, which are detailed in his article titled "American Metropolitan Evolution (1967)," are one of the more effective ways to describe the settlement of the Western United States. Borchert’s epochs – there are four in total – are characterized by advancements in transportation technology.

The first epoch is known as the *Sail-Wagon Epoch* (1790 – 1830) where Western pack animals were transferred to the Eastern U.S. creating a network of trails and business connections between the less densely populated West and the developed East (Borchert, 1967). During this epoch, horses and wagons were used for transport, and a major innovation of the era was interchangeable parts for the wagons. Euro-American settlers expanded into the Midwest and the South Piedmont regions during this time.

The second epoch defined by Borchert was the *Iron Horse Epoch* (1830 – 1870). This epoch is characterized by the impact of steam engine technology and the development of steamboats and
regional railroad networks. With the ability for the steamboat to travel upstream on rivers like the Missouri, this epoch sparked the growth of towns and cities along rivers and waterways deeper in U.S. territories, places where people would’ve never thought they could get to by boat. During this epoch the Euro-American settlers expanded into the Great Lakes and jumped to the West Coast regions, and into the Eastern fringes of the Great Plains (Borchert, 1967).

The third epoch Borchert defined is known as the Steel Rail Epoch and lasted from 1870-1920. This epoch was the most influential in setting up the urban system of the Great Plains as it was dominated by the development of long haul railroads and a national railroad network. Some major innovations during this epoch that helped advance U.S. settlement was the use of steel, electricity, and telephones (Borchert, 1967). This epoch is also when large-scale manufacturing in the U.S. flourished, largely because of the connectedness the railways brought amongst the States. The Steel Rail Epoch helped U.S. settlement expand into the High Plains and Mountain West regions.

The fourth epoch came in the 20th century and is called the Auto-Air-Amenity Epoch and lasted from 1920-1970. During this epoch the world seemed to become a smaller place with advancements in automobile travel and the creation of air travel networks. This epoch also saw the creation of mass media communication with the invention of television. In this epoch the Southwest in the United States was settled (Borchert, 1967). Abiding by the four epochs defined by Borchert, and studying the settlement of the Great Plains, it’s easy to see that his model is applicable to all U.S. regions, and changes in technology do prompt significant changes in geography.

**Cities in the Great Plains**

After reviewing Borchert’s model, it can be seen that most of the urbanization of the Great Plains came at the end of the Iron Horse Epoch (1830-1870) and continued throughout the Steel Rail Epoch (1870-1920). In the Encyclopedia of the Great Plains, geographer Michael Conzen says that “towns and cities in the American and Canadian Great Plains are among the youngest urban foundations
on the continent. Few can trace their urban existence further back than 1860” (2004, 151). Large cities on the Great Plains provide little help in defining the region’s character as an urbanized area because they are so far apart and so few. The only way to explain cities on the Plains is in geographical terms.

**Urban Doughnut Hole**

After taking a look at a map of the most populous cities in the Great Plains it isn’t hard to notice that they are mainly on the edge of the Great Plains’ much debated Eastern border. This positioning of urban centers has led to the Great Plains being called “the hole in the ‘urban’ doughnut of America (Conzen, 2004, 151).” As visible on the map (Figure 1), the large urban centers of the Great Plains are located on the region’s border, and some cities that are affiliated with the Great Plains are not even within the border at all, like Minneapolis and Houston. Part of the reason that cities of the Great Plains are on the edge of the region is because of the movement of population from the East and the market demand there. The larger cities of the Eastern Plains were established as urban-based management centers to help distribute agricultural land to settlers coming from the eastern U.S. and to outfit them, but also to transport agricultural goods and minerals found within the

![Figure 1](image.png)
region back to the East (Mather, 1972). Much of the mineral resources and agricultural wealth comes from deep in the Great Plains, not from near the borders. Therefore urban centers, commonly called Gateway Cities, were established to help transport the goods to the urban markets of the American East and overseas, where there was a huge demand for the agricultural and mineral products that only the Great Plains could satisfy (Conzen, 2004).

In the early days of these towns and cities railroads were an integral part of their growth. Railroads were very prominent and important to the Western expansion of the U.S. and the Great Plains. The decades from the late 1860s to the late 1880s were particularly active railroad building years. The railroads brought settlers who would populate the cities and towns of the Great Plains and live by providing economic and social services to the surrounding agricultural population (Matther, 1972). The railroads also took raw and processed agricultural goods and minerals back to the markets of the American East. Although the reasons mentioned above are historical, explaining the emergence and locations of the urban centers, not much has changed. The cities are still considered distribution centers for the Great Plains’ agricultural and mineral prosperity, but now that is only a portion of their economy. Many of the cities have added multitudes of other economic endeavors to fuel growth economically and geographically.

City archetypes

Another method used to analyze the urbanization and settlement of the Great Plains is the definition of city archetypes within the region. An archetype city is essentially a widespread and representative form of settlement. When towns and cities first started appearing on the Great Plains there was much diversity in the urban roles they performed (Conzen, 2004). Although most people think of “country towns” when they think of the Plains, there are three types of cities that exist clearly in the landscape (Conzen, 2004). These three city archetypes are known as the Gateway City, the Ethnic City, and the Plains Country Town.
1. PLAINS COUNTRY TOWN

The Plains Country Town is the urban structure that is typically thought of when considering cities in the Great Plains. It could also be considered the most important archetype because they are distinctive to the region, and there are so many of them, at least tens of thousands. Plains Country towns are usually very small, small enough to walk from end to end. Most of these towns were set up by railroad companies or land companies and usually named after someone associated with those companies (Conzen, 2004). The towns were created as “central places,” or service centers to help farmers in the region transport their goods and resources to major markets in the East and overseas, and to supply those farmers with their needs, from agricultural machinery to churches and schools. The distribution of goods to these external markets was made possible by the stationing of grain elevators, train depots, and stockyards along the railroad tracks.

Plains Country Towns followed European precedent, particularly French and Spanish, by constructing the town on a grid, with the streets running perpendicular to each other. The use of the grid in Plains Country Towns was strongly influenced by the township and range survey system that was practiced widely after 1796 (Hudson, 1979). The grid system was a pattern of development used in both the biggest cities and smallest towns. Generally, a main street where business districts are located runs either perpendicular to the tracks, known as a “T-town,” or cuts diagonally through the town, highlighting the importance of the railroad for local merchants.

However, the railways that cut

![Image: Images of Western Railroad towns of the Great Plains, Lincoln, NE is considered to be a "T-TOWN." Source: Hudson, 1979, 47.]

Figure 2: Images of Western Railroad towns of the Great Plains, Lincoln, NE is considered to be a “T-TOWN.” Source: Hudson, 1979, 47.
through the towns might not be going directly North/South or East/West, so often times, the grid system was tilted and not in congruence with the cardinal directions (Hudson, 1979). This is why some of today’s Plains Country Towns have diagonal streets, wedge-shaped intersections, and other oddities known as ‘breaks’ in the street patterns (Hudson, 1979).

One pattern of development that didn’t make it across the Atlantic to the Plains was the agricultural village, which was common in Western, Central, and Southern Europe. Because of various laws that opened the public domain to settlement, such as the Homestead Act of 1862, and the use of the township and range survey system, farmsteads on the Plains were very dispersed (Hudson, 1979). Rather than farmers having an agricultural village where they lived and were able to trade and acquire goods/services, they had the Plains Country Town. In the early days of a Plains Country Town, an imposing general store where customers could “one-stop shop” was not the desired option. As far as the town-founders were concerned, a diversity of small scale stores was optimal, so instead there was a collection of smaller buildings scattered on Main Street (Hudson, 1979). Plains Country Towns were mercantile in nature, providing the local population with wholesale and retail businesses, national banks, lumberyards, grocers, photographers, mechanics, boot-makers and so on. Small towns with populations of only 200 might have 50 different services. The existence of all these goods and services in a Plains Country Town was because, as Hudson writes, there was “a nation-wide transportation system [the railways] that linked these staple crop-exporting regions to warehouse and terminal facilities in the major markets” (Hudson, 1979, 105).

Plains Country towns often lived short lives, becoming “obsolete for their intended purpose in some cases within a decade after their founding” (Hudson, 1979, 107). The progress of railway completion, lack of job opportunities, and agricultural mechanization, which reduced the size of hinterland populations, all led to the decline of small towns, a decline that is still ongoing. This is not a unique phenomenon to the Great Plains, towns losing vitality and meaning, but the region definitely
had, as Hudson argues, more “surplus” towns than all other agricultural regions of the country (Hudson, 1979, 115). The main category of towns in the Great Plains is, in fact, ghost towns, and their ranks are continually growing. These towns were set up in light of the future expectations of growth, but thousands failed before they started (Mather, 1972). Those that have survived have done so because they are county seats, or perhaps because of local entrepreneurship. Others have persisted because they are now “dormitory towns,” within commuting range of a large city.

2. ETHNIC TOWNS

Urban centers known as Ethnic towns in the Great Plains contain high concentrations of ethnic settlement. They are all Plains Country towns, but their concentrated ethnic settlement makes them distinctive (Conzen, 2004). With little outside influence and relative isolation, the populations, often immigrants, for example, were able to practice their belief systems without experiencing the oppression they typically faced elsewhere. For example, “exodusters,” or African Americans, seeking refuge from the intolerance of the South in the 1870’s, created Nicodemus, an African American town founded in Graham County, Kansas, in 1879. Conzen writes that “their comparative isolation favored slower national integration, and some groups have resisted assimilation through various habits and attitudes, hence the survival to this day of numerous small but distinctive and self-conscious ethnic enclaves throughout the Plains” (Conzen, 2004, 156). The Great Plains was a good place for oppressed immigrants to establish communities during the last great migrations from Central, Eastern, and Northern Europe in the late nineteenth and early twentieth centuries. Today, many of these towns display their ethnic heritage as something that helps define their urban identity. Good examples of Ethnic towns are O’Neill, Nebraska where Irish heritage is celebrated, and the reconstructed Swedish town of Lindsborg, Kansas.
3. GATEWAY CITIES

Gateway Cities are another city archetype that exists because of the connectedness that the railway systems brought. The main characteristic to notice about Gateway cities is that it is hard to enter the Great Plains without encountering one either by train or superhighway. All heavy traffic to and from the Great Plains flows through Gateway Cities. Gateway cities are basically the entry points of the Great Plains because in their past, and to the extent of even now, they are freight and distribution centers. Much of what distinguishes the Gateway City in modern times is the size and scale of land-uses for freight-handling facilities and warehouse districts, compared to other land-uses within the city (Conzen, 2004). In a Gateway city it is common to find the remnants of old shipping yards, grain elevators, warehouse quarters, and railroad depots that are usually still located near the old downtown areas (Conzen, 2004). Their former uses can often be seen in the fading white lettering on their brick facades.

An example of this is the downtown area of Omaha, NE (or Winnipeg, and Kansas City) where these warehouse remnants have been transformed into nightclubs, bars, and condominiums, to entertain tourists and locals. Since globalized economies have been established, and since manufacturing has moved to highways (and cheaper land) at the edge of the cities, the Gateway city has had to find other ways to stay relevant. Each Gateway city has new roles in the globalized economy, for example Omaha’s insurance industry, but the fact remains, their long involvement with long-distance distribution and storage of Plains’ products has made them “the eye of the needle through which all Great Plains activity was threaded” (Conzen, 2004, 155).

Urban life in early settlement of the Great Plains

Much like John Borchert’s model for defining the epochs of urbanization in the United States there has been a model created specifically for the Great Plains. In this model, titled “Periods of Urban Life” from Conzen’s essay in the Encyclopedia of the Great Plains (2004), there are four phases. These phases span from the 1850’s to the present and are used to define the physical landscapes and social
and commercial interactions of the region at a specified time in its urban history. The “Periods of Urban Life” in the Great Plains are similar to Borchert’s model, because definitions for the periods were derived from modes of transportation which inherently affected the geographical experience of the region, most notably by allowing people to get to the region safely and quickly.

The first towns on the Plains came during the ‘river and droving regime’ (Conzen, 2004, 152). This phase was during the 1850s to the 1870s, before the railroad period. As Euro-American settlers made their way up the Missouri river using steamboats to organize territories, many river towns began to appear on the west banks of Kansas and Nebraska (Conzen, 2004). Urbanism along rivers continued as steamboats supplied military forts on the frontier, helped ranchers market their cattle, helped supply the first farm settlements, and controlled the overland freight trade prior to the railroads. All this led to more towns appearing along Plains rivers (mainly the Missouri) because the first people wanted to settle close to the river for easy access to goods, services, and other necessities (Mather, 1972). These towns were also important for the wagon trains that were heading west, because most people could get to Missouri River towns like Kansas City and Omaha by steamboat. They then set out on the dangerous journey through the western frontier along the Santa Fe and Oregon trails (Mather, 1972). These river towns, the earliest signs of true urbanization in the Great Plains, created a narrow zone with urban centers along the Missouri River, and if it weren’t for the railroads of the late 1860’s, development in the Great Plains would have slowed because of the lack of overland transportation. Some notable towns and cities established during this phase were Nebraska City, Omaha, Bellevue, Yankton, and Vermillion. Their subsequent success or failure would hinge on their ability to attract a railroad.

The second phase of urban life on the Plains was ‘railroad colonization’ from the 1870’s to the 1920’s. Railroads of this time spearheaded an unprecedented wave of urban and rural settlement across the Great Plains from the 1870s well into the 20th century (Conzen, 2004). In this phase the locations of towns and cities were determined by railroad companies trying to develop a system of cities
along the rail lines. Towns were purposely set up and spaced out along the railroads every ten miles or so to maximize traffic flow and control the supply of urban equipment like grain elevators, stockyards, coal and lumberyards, banks, and hotels, many of which were financed by wealthy businessmen in mid-western cities like Minneapolis and Chicago (Conzen, 2004). This is the period when locations of towns in the Great Plains became easily definable, especially in the growth of the gateway cities, these distributors of Great Plains resources and materials to other regions.

The third phase of urban life in the Great Plains is called ‘early-twentieth-century modernity, which lasted from the 1920s to the 1950s, and is the last time new towns would be added to the region (Conzen, 2004, 152). During this phase farms became larger and more mechanized, leaving less need for labor. With less need for labor on the farms many of the workers and farmers moved to nearby towns and cities for work. Some towns failed as population thinned in their trade areas. This phase also saw modernity arrive in the region by the appearance of electricity, automobiles, modern hospitals, movies, radio, and college education, all of which greatly influenced life in the Great Plains (Conzen, 2004). During this third phase of urban life on the Plains the dichotomy of growth between small town and big city became noticeable by the concentration of retailing and many other services in fewer, larger places (Conzen, 2004). The important thing to remember about this phase, before getting into phase four is that fewer and larger farms maintained by machines and other methods of large agriculture, prompted people to move from the rural areas into cities and towns.

The fourth phase of urban life on the Plains, called ‘the era of urban polarization and retreat,’ is presently in effect and has been since the 1950s (Conzen, 2004). This phase has seen urbanization at an unprecedented rate in the region’s larger cities, while at the same time many smaller towns are losing a majority of their populations. This means there is a movement from the smaller urban areas to the larger ones in response to job markets, living standards, and in part because of the concentration of retail and other services mentioned in the ‘modernity’ phase. The small-towners have been discouraged
by job losses and limited social and economic opportunities, so they migrate to the nearby mid-sized
cities (Conzen, 2004). Young people are a large component of this migration, and with them goes the
reproductive capacity of rural areas. Conzen also says that this phase brought competition amongst
Great Plains cities to stay relevant on the national urban scene, chasing growth for their own sake by
giving tax incentives to industries, for example. The eerie thing about the ‘polarization and retreat’
phase is it has the region urbanizing at an unprecedented rate in the larger cities, but losing the small
urban populations to the larger ones. The hole in the doughnut just keeps getting larger.

Case Study: Lincoln, Nebraska, USA

There are thirty-one cities in and around the Great Plains with present-day populations over
100,000. Most of these urban centers can be considered Gateway Cities because of their locations on
the outer rim of the Plains border. Lincoln, Nebraska is one of these cities. Lincoln is the capital of
Nebraska and the state’s second most populous city, with a 2010 U.S. Census population of 258,379.
The life of the city started around 1859 and has evolved into the modern age as a Gateway City of the
Great Plains. Lincoln is also a large scale example of Hudson’s ‘T-town.’ The city has grown rapidly over
the one and a half centuries, and continues to grow.

Lincoln, NE Historical Biography

In 1859, settlers in Nebraska Territory gathered near the banks of Salt Creek and founded the
hamlet known as Lancaster (Mutunayagam, 2004). They settled the area to take advantage of nearby
salt deposits, hoping to grow Lancaster into a manufacturing center. Lancaster was named the county
seat in 1866, and by 1867, when Nebraska became the 37th state, it was named as the new capital.
Lancaster was renamed Lincoln in honor of the late President Abraham Lincoln, which was controversial
because some settlers were sympathetic to the South, who had just lost the Civil War.

Through the years of 1866 and 1867 the then governor David Butler and two commissioners
appointed by the legislature selected important sites for city functions (Nebraska State Gazeteer &
The city started like most other Plains cities using the grid layout. On the grid Gov. Butler and his surveyors reserved 12 acre plots each for a state house, a university, and a city park (Nebraska State Gazeteer & Business Directory, 1879). They also reserved smaller plots for the Lancaster County Courthouse, city hall, a market, state historical and library association, 7 plots for public schools, and 3 plots for religious denominations (Nebraska State Gazeteer & Business Directory, 1879).

The first building erected from these plans was the state house, which cost $500,000 and was still under construction at the time publication of the Nebraska State Gazeteer & Business Directory of 1879. The University was another early building to appear in Lincoln. Education at the University was free, minus textbooks, and it originally had only one building with four levels and 48 rooms. The faculty, the museum, and library were on the first floor; music, classrooms, examinations, and a chapel on the second floor; more classrooms and areas for college societies to meet on the third floor; and two gymnasiums on the uppermost level (Gazeteer, 1879). Some other important buildings from the days of Lincoln in 1879 were the first high school, Lincoln High; the insane asylum that was burnt down by an inmate and quickly rebuilt; the post-office; a city jail with twelve cells; a brand new opera house that was the pride of the young city; a commercial hotel known as the Douglas house; two national banks; and a state penitentiary 3 miles south of town (Gazeteer, 1879). In 1879 there were 9,000 residents and a little over 500 businesses and services in Lincoln, NE.

Lincoln grew rapidly from a population of 9,000 in 1879 to a population of 55,000 by 1889. Over that ten years span the goods and services spectrum in Lincoln went from about 500 businesses in 1879 to 12,000 businesses in 1889. Therefore, the person to business ratio in 1879 was one business to every eighteen people (1:18), while in 1889 there was one business for every 4.6 persons (1:4.6) (Nebraska State Gazeteer & Business Directory, 1889). This ratio of population to business in the late part of the 19th century can be explained by the progress of the railways during this time. Although there were
enough goods and services to serve the city, many other settlers and travelers came through Lincoln because it was served by four railroads. By 1894 the population had increased to 60,000, and the number of businesses increased to about 18,000. That is a ratio of nearly one business to every three people, or 1:3.333. (Nebraska State Gazeteer & Business Directory, 1894). The increase in population as well as the increase in goods and services by 1894 show the city of Lincoln was growing very rapidly.

There was only one railroad in Lincoln in 1870, but by 1900 there were seven (Mutunayagam, 2004). There were many reasons Lincoln grew at a rapid rate, besides being the center for governmental functions: from the 1870s to 1900 Lincoln was home to carriage and wagon factories, shipping posts, foundries, machine shops, flour mills, maintenance shops for railroads, national banks, meatpacking plants, agricultural processing plants, hotels, brick and tile makers, canning factories, a shoe factory, printing industries, the first of many insurance companies, and the university (Gazeteer 1879, 1889, 1894). In the latter portion of the 1890s Lincoln and the United States as a whole experienced a deep depression. The population continued to increase, but the rate at which it did slowed down. Ever since the 1890’s depression the population has increased during every decade. In fact, in 2011, Lincoln has the second lowest unemployment rate in the country, which reflects a diverse economy that creates jobs and an attractive living environment.

Lincoln is the capital of the state of Nebraska, as well as the county seat for Lancaster County. The present day city of Lincoln has a 2010 Census population of 258,379. Just ten years before the population of Lincoln was 209,192, so nearly 50,000 people have been added in only ten years. Over the previous three decades Lincoln’s population grew at an annual rate of 1.6 percent. Lincoln is a major administrative city because it is the center for state government activity, as well as being home to the University of Nebraska-Lincoln. Lincoln also has Nebraska Wesleyan University and Union College which provide for more administrative jobs and help give the city an identity as a university town. Adding to the administrative jobs in Lincoln, there is a mix of manufacturing, transportation, trade, commerce,
insurance, health, entertainment, and other services that help characterize Lincoln’s diverse economy (Mutunayagam, 2004).

**Lancaster MSA (Lancaster County) and Present Day Land-use**

Metropolitan Statistical Areas (MSA) are defined by the Office of Management and Budget (OMB) for use by Federal statistical agencies in collecting, analyzing, and publishing Federal Statistics (Census 2010). A Metropolitan Statistical Area is defined as an urban center with a population of 50,000 or more plus the surrounding urban and suburban areas, generally following county boundaries. The Census Bureau also defines an “urbanized area” as a municipal city of 50,000 or more plus the Census blocks that meet urban density and character criteria of that city. “Urbanized areas” do not follow county boundaries. This means that Lincoln and the rest of Lancaster County make up the Lancaster County MSA, and Lincoln is the “urbanized area” within the Lancaster MSA.

The basic demarcations of Metropolitan Statistical Areas (MSA), based on metropolitan status and character, are as follows. The core “urbanized area” of a MSA is a central city county that contains a central city municipality with a population over 50,000 plus the rest of the county, or it can be an agglomerated county population of over 100,000, which needs to also be an incorporated city. Lancaster County MSA fills the first criteria for defining a MSA by having a central city -- Lincoln, with a population over 50,000. In the year 2000 MSAs covered 20% of U.S. land area, but MSAs are defined by county boundaries. Therefore, much of the land area in a MSA is non-urban. As of 2010 the OMB defined 367 MSAs in the United States, one being Lancaster (Census 2010). According to the 2000 Census 79% of the United States population lived in “urbanized areas.” From that same 2000 Census, only 2.6% of U.S. land area was classified as an “urbanized area.” This means that 79% of the total U.S. population lived on 2.6% of the total land area (Census Statistics 2000).
Land-use as Percent of Total Land Area (Table 1)

<table>
<thead>
<tr>
<th>Land-use Type</th>
<th>Lincoln City</th>
<th>Lancaster MSA (Lancaster Co.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Developed</td>
<td>69.2%</td>
<td>37.2%</td>
</tr>
<tr>
<td>Undeveloped</td>
<td>30.8%</td>
<td>62.8%</td>
</tr>
</tbody>
</table>

Land-use types for Developed Land in Lancaster MSA (Table 2)

<table>
<thead>
<tr>
<th>Land-use Type</th>
<th>Lincoln City</th>
<th>Lancaster MSA (Lancaster Co.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>43.4%</td>
<td>43.1%</td>
</tr>
<tr>
<td>Commercial</td>
<td>5.9%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Industrial</td>
<td>5.8%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Transport (Railroad, Air)</td>
<td>4.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Streets</td>
<td>26.3%</td>
<td>25.9%</td>
</tr>
<tr>
<td>Public/semi-public</td>
<td>6.8%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Parks</td>
<td>7.6%</td>
<td>10.8%</td>
</tr>
</tbody>
</table>

Tables 1 & 2: Stats and figures from the lectures of Dr. J. Clark Archer, 2011

Showing Lincoln’s Growth over 125 year period

From the statistics from Tables 1 & 2, it can be seen that much of the land in the Lancaster MSA is undeveloped. However, the goal of this thesis is to discover how quickly a city in the Great Plains can grow in a short lifetime. To show how quickly the “urbanized area” of Lincoln grew, a timeline needs to be defined. The first survey of Lincoln was done in 1859, when surveyors laid out the city plans.

Assuming population and infrastructure would take time to get there, a map created after that date was needed. Historic maps from the years 1885, 1936, and 1982 of Lancaster County (Figures 3, 4, and 5 respectively, 17) were obtained from the Nebraska State Historical Society. To get the maps into digital form they were scanned onto a computer and saved as .tif files, a format that allows for manipulation in ArcGIS 10. Once the .tif files were imported to ArcMap they were geo-referenced to the same map projection as a Census 2010 data layer of Lancaster County, meaning that the maps from 1885, 1936,
and 1982 had the same coordinates as the map from 2010. Once the maps had the same projection, the Editor tool in ArcGIS 10 was used to make new shapefiles (files used for analysis of GIS layers) that showed the city limits from 1885, 1936, and 1982 (Figures 6, 7, and 8 respectively, 18). To show the city limits using the Editor tool, the borders of each year’s city limit were traced and mapped into new polygons, and to be sure the border was accurate the limits were compared to other maps with Lincoln city limits from the same years. Once the shapefiles were created they were modified to show the area of the city by selecting a new projection that gave the area of each city in square miles. Although these areas were identified and measured, there is room for error, so each area for each year will be considered to be estimations of the total urban area calculated by ArcGIS. The areas and populations for the respective years are shown in Table 3.
The City of Lincoln, Nebraska (Table 3)

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (≈)</th>
<th>Area (square miles (≈))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1885</td>
<td>13,000</td>
<td>4</td>
</tr>
<tr>
<td>1936</td>
<td>78,000</td>
<td>25</td>
</tr>
<tr>
<td>1982</td>
<td>173,000</td>
<td>59</td>
</tr>
<tr>
<td>2010</td>
<td>259,000</td>
<td>77</td>
</tr>
</tbody>
</table>

*Area of Lancaster County ≈ 847 miles$^2$

Table 3: Populations from Census State Data Center, areas estimated using ArcGIS 10

Figure 6: Lincoln city limits from 1885, made using ArcGIS 10

Figure 7: Lincoln city limits from 1936, made using ArcGIS 10
Currently Lincoln’s area is about 77 square miles (shown in Figure 8) and like any city with aspirations it intends to keep on growing. In this section of the paper the methods that the City of Lincoln uses to control its urban and fringe growth will be assessed and defined.

The growth of Lincoln, as compared to other Great Plains cities like Houston and Omaha, has been managed in a relatively sustainable way. Many cities on the Great Plains have become victims of suburban sprawl, but Lincoln has not allowed sprawl to burgeon. One of the main methods Lincoln uses
to keep its fringe growth under control is through allocation of city services and their availability (Archer, 2011). Developers looking to build new housing developments seek undeveloped lots where nothing has been built before. This way there is no previous urban development, so developers are able to buy the land cheaply and maximize their profits. In order to stop developers from creating residential neighborhoods on the urban fringe, also known as suburban sprawl, the city of Lincoln has limited areas where utilities and other city services can be distributed. This means that developers do not want to create neighborhoods that aren’t within the borders of the utility range because the development won’t receive the same services as the rest of the city.

The city of Lincoln also controls urban growth by using zoning laws. The zoning ordinance for Lincoln was adopted in 1924 (DeKalb, 2011). By adopting the zoning ordinance, Lincoln was able to designate permitted uses of land based on mapped-out zones that separate one land-use from another. Zoning laws regulate the use of land where buildings or structures are put, but they may also regulate building height, lot coverage, and similar characteristics. Shortly after Lincoln’s 1924 zoning ordinance came into effect, Lincoln was granted a three-mile zoning jurisdiction, meaning there is essentially a three-mile radius around Lincoln’s city limit where Lincoln’s planning department is able to administer zone locations (DeKalb, 2011). The three-mile zoning jurisdiction helps Lincoln control suburban sprawl and urban growth simply because they are able to zone the areas around the outside of the city limits, further containing growth on the urban fringe.

Another interesting method Lincoln uses to contain its growth is by “build through” models. This is a zoning ordinance that applies to all land outside the city limits but still within the three-mile zoning jurisdiction (DeKalb, 2011). A “build through” model is when an acreage lot has its house on 1/3 of the lot, while the other 2/3 of the lot is known as a shadow plat. Shadow plats are basically undeveloped sections of the acreage that are being saved for when the city limits do reach the acreage.
So in other words, one acreage lot really has three housing lots on it. The other shadow plats won’t become lots until the acreage is within the city limits.

**The Future of Lincoln’s Urban Growth**

Aside from all the current methods Lincoln uses to control growth, there is a comprehensive city growth plan that city planners use to predict where the community sees itself in 30 years. The 2040 comprehensive growth plan highlights key elements of a flourishing community by taking into account community vision, the economy, business and commerce, environmental resources, residential areas, utilities, transportation, information technology, parks and recreation, historic and cultural resources, education, financial resources, and plan realization (DeKalb, 2011).

To create the 2040 comprehensive growth plan for Lancaster County, officials needed to make some assumptions. The plan predicts an annual growth rate of 1.2% between 2010 and 2040 in the county (DeKalb, 2011). The county is also predicted to add 126,000 people to the county population to have a total of 413,000 people by 2040 (DeKalb, 2011). By the year 2040 the city of Lincoln is supposed to hold 90% of the county population, while small towns (4%) and rural population (6%) make up the rest. Like many of the Great Plains urban zones, Lancaster County is predicted to have an aging population by the year 2040, and will have an average household size of 2.35 persons. Planners predict that about 26 new square miles will be needed to build upon including 18 million square feet for occupied commercial use and 2.3 square miles of industrial use (DeKalb, 2011). The comprehensive plan of 2040 is also meant to be within Lancaster County’s budget, giving it the description of a fiscally constrained plan that doesn’t waste the county’s money.

For every new comprehensive plan there are different tiers defined that show the urban growth scenario. Plan A for the 2040 comprehensive plan is called multi-directional scenario, where 26.01 square miles would be added in locations all around the city (DeKalb, 2011). Plan B is called Stevens
Creek scenario and would add 26.21 square miles of development and most of the growth to the East side of Lincoln, nearly connecting Waverly to Lincoln (DeKalb, 2011). Plan C is known as the compact urban growth scenario that would only add 13.91 square miles of development to the county and would spread the new developed areas all around the urban-rural fringe of Lincoln (DeKalb, 2011). Plans A, B, and C are not final, and the notation of the multi-directional scenario as Plan A does not mean that Plan A is the favorite potential plan. It was simply given the letter A for easy referencing. Planners and developers for the county will later decide which plan will work best to accommodate the projected growth. The best plan to reduce Lincoln’s future growth would be the Plan C, because it only adds 14 square miles in the next 30 years and consensus among the planners is that Plan C is the scenario that they would like to see become real.

**Lessons from Lancaster County MSA**

In the Great Plains it is easy for cities to develop in way that resembles suburban sprawl, adding suburbs and annexing smaller towns as they grow. A good example of this, unfortunately, is Omaha. Lincoln and the rest of Lancaster County work hard at preventing uncontrolled urban growth currently, as well as thinking hard about the future of the city. It is important to manage urban growth because many cities in the region do not practice controlled growth. The worst growth control for a city in, or near, the Great Plains is Houston, Texas (Archer, 2011). Houston is the biggest city in the nation as far as land area is concerned, and there are no land use controls. Having no land use controls has made Houston the biggest city areally, not only in the Great Plains, but in the whole United States.

Many cities in the Great Plains can learn ways to control growth from Lancaster County and the City of Lincoln. The methods Lincoln uses are very simple and cost-effective ways to help the city develop while preserving its identity. All of the sprawl and urban growth seen throughout the Plains make all the cities seem the same, with the same stores and large housing developments strewn about
making it hard to tell what city you’re even in. By controlling growth and staying compact, as well as by preserving green space, Lincoln is able to harness a better sense of self than the most of the Plains cities.

Cities in the Great Plains should all adopt development policies that control urban-rural fringe growth to save farmland, other rural land, and habitats for wildlife that once prevailed in the region. Simple practices that Lincoln uses like limiting the range of city services, creating zoning ordinances for land-use, and having a comprehensive city plan to depict the future all work well at controlling the urban growth and saving rural lands from being developed.

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