### CITY OF ST LOUIS | CLIMATE

**CLIMATE ZONES | USA**

#### ST LOUIS AVERAGE TEMPERATURES

<table>
<thead>
<tr>
<th>Month</th>
<th>Avg High (°F)</th>
<th>Avg Low (°F)</th>
<th>Avg High (°C)</th>
<th>Avg Low (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>40</td>
<td>24</td>
<td>4</td>
<td>-4</td>
</tr>
<tr>
<td>February</td>
<td>45</td>
<td>28</td>
<td>7</td>
<td>-2</td>
</tr>
<tr>
<td>March</td>
<td>55</td>
<td>37</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>April</td>
<td>67</td>
<td>47</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>May</td>
<td>77</td>
<td>57</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>June</td>
<td>85</td>
<td>67</td>
<td>29</td>
<td>19</td>
</tr>
<tr>
<td>July</td>
<td>89</td>
<td>71</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>August</td>
<td>88</td>
<td>70</td>
<td>31</td>
<td>21</td>
</tr>
<tr>
<td>September</td>
<td>81</td>
<td>61</td>
<td>27</td>
<td>16</td>
</tr>
<tr>
<td>October</td>
<td>69</td>
<td>50</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>November</td>
<td>56</td>
<td>39</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>December</td>
<td>43</td>
<td>28</td>
<td>6</td>
<td>-2</td>
</tr>
</tbody>
</table>

**Recorded High (1954):** 115 °F / 46 °C  
**Recorded Low (1873):** -23 °F / -31 °C
**St Louis Founded**
Pierre Laclede Liguest, from France, selected the site of St. Louis as a fur trading post.

**1804 Louisiana Purchase**
St Louis became part of the USA.

**1764 St Louis Founded**
Pierre Laclede Liguest, from France, selected the site of St. Louis as a fur trading post.

**1810s Steamboat Era**
The beginning of this era was a huge factor in the development of St. Louis, particularly spurring the fur and lead industries.

**1820s Population Growth**
largely from German & Irish immigrants.

**1823 Lewis & Clark Expedition**
St Louis gained fame as the departure point.

**1826 City Boundaries Defined**

**1836-70 Population Growth**
St Louis was the nation’s first home rule city.

**1839 Great Depression**
Effected the city's economy until the beginning of WWII in 1939.

**1840-50 Economic Growth**
St Louis continued to grow due to its light manufacturing of clothing, automobile manufacturing, and chemical production.

**1850-90 Suburbanization**
Despite urban renewal projects, the city faced huge population decline as masses moved to the suburbs.

**1861-65 Civil War**
St Louis stayed firmly under Union control.

**1865 Construction of Gateway Arch**
Built as a monument to the westward expansion of the US; at 192 meters, it is the tallest man-made monument in the US.

**1870s Great Depression**
Effected the city's economy until the beginning of WWII in 1939.

**1876 City Boundaries Defined**

**1874 Eads Bridge**
A combined road and railway bridge, it was the longest arch bridge in the world.

**1880-90 Suburbanization**
Despite urban renewal projects, the city faced huge population decline as masses moved to the suburbs.

**1890s Great Depression**
Effected the city's economy until the beginning of WWII in 1939.

**1900 Manufacturing Center**
Due to the city's dominance, access to rail and water transport, and its central location within the nation.

**1904 World's Fair & Olympic Games**
Hosted at Forest Park and the campus of Washington University with more than 20 million visitors.

**1906 Busch Memorial Stadium**
Helped promote the revitalization of the central business district.

**1910s Great Depression**
Effected the city's economy until the beginning of WWII in 1939.

**1910s-20s Population Growth**

**1920-50 Economic Growth**
St Louis continued to grow due to its light manufacturing of clothing, automobile manufacturing, and chemical production.

**1930s Great Depression**
Effected the city's economy until the beginning of WWII in 1939.

**1940s-50s Economic Growth**
St Louis continued to grow due to its light manufacturing of clothing, automobile manufacturing, and chemical production.

**1950s-60s Economic Decline**
St Louis faced huge population decline as masses moved to the suburbs.

**1965 Construction of Gateway Arch**
Built as a monument to the westward expansion of the US; at 192 meters, it is the tallest man-made monument in the US.

**1970s Great Depression**
Effected the city's economy until the beginning of WWII in 1939.

**1980s-90s Economic Decline**
St Louis faced huge population decline as masses moved to the suburbs.

**1990s-2000s Economic Decline**
St Louis faced huge population decline as masses moved to the suburbs.
CITY OF ST LOUIS | CULTURE AND PERCEPTION

GATEWAY ARCH | by Eero Saarinen | 1966

HIGH CRIME RATES | "Most Dangerous City" in USA by FBI data (2004-2010)

MISSISSIPPI PORT | 2nd largest inland port

JAZZ & BLUES CULTURE

LARGE PLANT BASED BIO-SCIENCE INDUSTRY

SPORTS CULTURE | rated "Best Sports City" in 2000 by The Sporting News

FRAGMENTED NEIGHBORHOODS
REGIONAL ANALYSIS | CITY LIMITS vs METROPOLITAN STATISTICAL AREA

CITY LIMITS vs MSA POPULATION
2010 | in millions

ST LOUIS, MISSOURI
2.8 million (MSA)
319,294 (city limits)

CHICAGO, ILLINOIS
9.4 million (MSA)
2.7 million (city limits)

CINCINNATI, OHIO
2.1 million (MSA)
296,043 (city limits)

CLEVELAND, OHIO
2.1 million (MSA)
396,815 (city limits)

COLUMBUS, OHIO
1.8 million (MSA)
787,031 (city limits)

DETROIT, MICHIGAN
4.3 million (MSA)
713,777 (city limits)

INDIANAPOLIS, ILLINOIS
1.8 million (MSA)
820,445 (city limits)

KANSAS CITY, MISSOURI
2.0 million (MSA)
459,787 (city limits)

KANSAS CITY, MISSOURI
2.0 million (MSA)
459,787 (city limits)

LINCOLN, NEBRASKA
865,000 (MSA)
408,958 (city limits)

MILWAUKEE, WISCONSIN
1.6 million (MSA)
594,833 (city limits)

MINNEAPOLIS, MINNESOTA
3.3 million (MSA)
382,578 (city limits)

OMAHA, NEBRASKA
865,000 (MSA)
408,958 (city limits)

WICHITA, KANSAS
623,000 (MSA)
382,368 (city limits)
REGIONAL ANALYSIS | CITY LIMITS vs METROPOLITAN STATISTICAL AREA

CITY LIMITS

METROPOLITAN STATISTICAL AREA
as defined by us bureau of census

COUNTIES

HIGHWAYS

GREEN

WATER

POPULATION DENSITY
persons / sq mile

MEAN HOUSEHOLD INCOME
in US dollars

HOUSEHOLDS LIVING IN POVERTY
as a percentage of all households
SITE PLAN & LANDMARKS | SCALE 1:5000

- SCOTTRADE CENTER
  home of the St. Louis Blues hockey team
- GATEWAY ARCH
  tallest man-made monument in the USA
- SITE BOUNDARY
  100 x 500 meters
- UNION STATION
  nation's largest station when opened, 1894
- BUSCH STADIUM
  home to the Cardinals' Baseball team
- EADS BRIDGE
  world's longest arch bridge when built, 1874
St Louis was strategically located at the confluence of the Mississippi and Missouri rivers, which together are the 4th longest river system in the world. These rivers are a critical transportation system for the continental United States and St Louis marks the second largest inland port. It is also the northernmost ice-free port on the Mississippi River with no locks to the south. It moves 33 million tons of bulk commodities annually. Consequently, the river is treated more like a highway than a leisure or beauty amenity for the city with very limited waterfront public space.

Downtown St Louis is capped by the Gateway Arch, which is the centerpiece of the Jefferson National Expansion Memorial on the river front. Designed by Eero Saarinen, it is the tallest man-made monument in the United States reaching 630 feet (192 m) tall. The rest of downtown is centered on the Gateway Mall, a linear park which is one block wide, and runs on axis with the Gateway Arch and reaches to the St Louis Union Station. Once the largest train station in the country, Union Station underwent significant transformation once closed into a luxury hotel, restaurant, shop, and event center.

The train tracks cross the Mississippi River on bridges and then sink into a valley, which is depressed 6-10 meters below the rest of the city context. This creates a significant urban void, cutting through the city and dividing the two sides, with very limited and crossing opportunities. St Louis area has six Class I railroads, and it is third in terms of total number of lines, more than 40 going to all parts of North America. There are more than 30 rail yard facilities, handling about 10,000 rail cars per day, with 93 million tons flow in and 34 million tons flow out.

The land area is primarily covered by surface parking lots, spotted with large warehouses and a few high rise buildings. Ameren Energy, one of America’s Fortune 500 companies, occupies 12 buildings near the site. Purina’s headquarters are also located here with a few generic office buildings, gas stations, and a few vacant buildings (including the old St Mary’s Infirmary). This area is extremely automotive dependent, with virtually no green space and poor pedestrian access.

Lafayette Square is a National Historic District which boasts an impressive collection of beautiful Victorian homes and could be described as trendy due to its unique real estate, gardens, fine dining and proximity to downtown. Lafayette Square is one of three neighborhoods "Old Frenchtown" area, which also includes LaCalle Park (to the East and lining the Mississippi River) and Soulard (to the South).
SITE CONDITIONS

TRIANGLE PARK | by Peter Walker | 1999

SHERATON HOTEL | Former Edison Brothers Warehouse | 1929

AMTRAK STATION ENTRANCE | opened in 2008

VIEW TO DOWNTOWN ST LOUIS | from center of bridge

PARKING LOT | for Ameren Energy maintenance vehicles
SITE PLAN | DEMOLITION

EXISTING CONDITION

BUILDINGS TO BE DEMOLISHED | train tracks reorganized

STARTING CONDITION

SITE PLAN | SCALE COMPARISON

DELFt CITY CENTER | The Netherlands

AMSTERDAM SOUTH SQUARE | The Netherlands

WITCHITA FARMERS MARKET SQUARE | Kansas, USA
CASE STUDIES | STATION

SANTIAGO STATION | by herreros arquitectos | Santiago de Compostela, Spain | pop 95,671

OURNSE STATION | by Foster & Partners (competition winner) | Ournse, Spain | pop 108,000

OURNSE STATION | by herreros arquitectos (competition entry) | Ournse, Spain | pop 108,000

OURNSE STATION | by Mangado Architects (competition entry) | Ournse, Spain | pop 108,000

OURNSE STATION | by Zaera-Polo Architecture (competition entry) | Ournse, Spain | pop 108,000

TORONTO STATION | by Zeidler Partnership Architects | Toronto, Canada | pop 2,615,000

BASEL STATION | by Cruz y Ortiz Arquitectos | Basel, Switzerland | pop 107,635

THE HAGUE STATION | by Benthem Crouwel | The Hague, Netherlands | pop 500,000

ROTTERDAM CENTRAL STATION | by Benthem Crouwel | Rotterdam, Netherlands | pop 617,347

*SOLAR PV CELLS = 10,000 m² = 350 MWU/year = electricity consumption of 100 homes
Disco Road Waste Transfer Station
with New SSO Anaerobic Digestion Facility

Source: City of Toronto
Design/Build/Operate Contract
• AECOM Prime Contractor
• Construction Start - February 2011
• Construction Completion – April 2013

Wet BTA Process
Plant Capacity:
• 55,000 MT/yr (base)
• 75,000 MT/yr (maximum)

Facility Design Features
Spill Containment – Stormwater Detention Pond

CASE STUDIES | BRIDGE STRUCTURAL SYSTEMS

CASE STUDIES | ANAEROBIC DIGESTION PLANT

TORONTO'S NEW ANAEROBIC DIGESTION PROCESSING FACILITY
by City of Toronto | Toronto, Canada | pop 2,615,060

<table>
<thead>
<tr>
<th>TORONTO</th>
<th>ST LOUIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>POPULATION: 2,615,060</td>
<td>318,172</td>
</tr>
<tr>
<td>RESIDUE: 16,500 MT/yr</td>
<td>8,250 MT/yr</td>
</tr>
<tr>
<td>DIGESTATE: 28,000 MT/yr</td>
<td>14,000 MT/yr</td>
</tr>
<tr>
<td>GAS PRODUCTION: 8.7 million Nm³/yr</td>
<td>4.3 million Nm³/yr</td>
</tr>
<tr>
<td>WATER USE: minimal</td>
<td>minimal</td>
</tr>
</tbody>
</table>

Source: AECOM
RIDING the RAILS
THE IMPACTS OF TRANSPORTATION TECHNOLOGY ON THE MIDWEST
Rebekah J. Wagoner
ABSTRACT

The variables of transportation technology, in an urban context, are evidently tied and intertwined with a multitude of other variables. It is virtually impossible, then, to determine the quantitative impact of any single factor on the shape or success of a city or region. However, by analyzing our history through the carefully selected lenses of each variable, we can strive to gain a better understanding of our complex and enigmatic urban history. This report endeavours to do this very experiment, testing the hypothesis that the specific transportation technology of railroads has in fact had a compelling impact on the form and development of the Midwest region, in the United States of America. Therefore, the history of this region has been researched from the perspective of the preceding transportation technologies, the shifts into the era of railroads, as well as the transitions away from rail to the automobile, within the nineteenth and early twentieth century.

RIDING the RAILS
The Impacts of Transportation Technology on the Midwest
November 5th, 2012 | Delft, The Netherlands

By: Rebekah J. Wagoner
wagoner.rj@gmail.com
4184289

All image rights remain with the original authors.
Every attempt has been made to properly attribute images and reference sources.

Architectural History Thesis | AR2A010

Mentor: Dr. Cor Wagenaar
c.wagenaar@tudelft.nl
Faculty of Architecture
Technical University of Delft
The Netherlands

# TABLE OF CONTENTS

1 INTRODUCTION ................................................................................................................... 2  
   THE MIDWEST REGION  
   THE DISCUSSION ON TRANSPORTATION TECHNOLOGY  
   RAILROADS IN THE MIDWEST  

2 BACKGROUND ................................................................................................................... 4  
   NATIONAL CONTEXT  
   PRECURSORS IN TRANSPORTATION TECHNOLOGY  

3 THE IMPACT OF RAIL ....................................................................................................... 6  
   BEGINNINGS OF RAIL  
   RAIL IN THE MIDWEST  
   CINCINNATI  
   ST LOUIS  
   CHICAGO  
   STRUGGLE FOR SUPREMACY  
   IMPACT OF STEEL RAIL  
   CONCLUSIONS OF 19TH CENTURY RAIL  

4 TRANSITIONS TO THE AUTOMOBILE ............................................................................ 13  
   THE STREETCAR  
   PAVED ROADS  
   PRELUDE TO THE AUTOMOBILE  
   THE EARLY AUTOMOBILE  
   THE AUTOMOBILE IN THE MIDWEST  

5 CONCLUSION .................................................................................................................. 17  

6 BIBLIOGRAPHY ............................................................................................................... 19
APPENDIX A | HISTORY THESIS

CHAPTER 1: INTRODUCTION

“No period of our history has surpassed the first half century of industrialization in its rate of change. Never again did the rate of urbanization climb so sharply. Not only did Americans conquer and settle the continent in these 5 decades, but their way of living on the land underwent a complete metamorphosis in which a national system of cities mobilized scattered villages and farms into a network of regional commercial and manufacturing centers. This sudden reorganization of American life, the forcing of a rural society into an urban mold, exacted a terrible toll in everyday life. Nineteenth-century urbanization and industrialization inflicted punishment and suffering on city dwellers and tore at the fabric of society in the same ways that today's neglected cities do. Never were conditions more exploitative and dangerous to human life... Yet cities of every size boomed with the possibility that flowed from new resources, new methods of transportation, new ways of doing business, and new ways of making things.”

THE MIDWEST REGION

The Midwest region, also known as the ‘heartland’ of the United States, is a rather unique condition, geographically, economically and historically. Geographically, it is a hefty chunk out of the northern-center of the United States of America. Additionally, it is land locked on all sides, but the region compensates for its lack of proximity to the sea with an abundance of other resources. For example, the Great Lakes, to the Northeast, constitutes more than twenty percent of the world's fresh water supply and the Missouri-Mississippi River combination, winding north-south through almost the entire region, is the fourth longest river in the world. Historically, the geographic boundaries have grown and blurred with the westward expansion of the United States. The states of Ohio, Indiana, and Illinois sometimes claim to be the “original Midwesterners”, whereas, the central states sometimes question if Ohio and Indiana should even be included. Economically, the region has witnessed city success and growth in unprecedented speed, and likewise, has also seen catastrophic decline and demise. In his book, Cities of the Heartland, Jon C. Teaford describes the Midwest cities as, “wunderkinds of the American family of cities, infant prodigies that astonished travelers from throughout the world with their remarkable precocity.” However, in the 1980s the term “rust belt” surfaced as a descriptive term for the astounding decline of industry and manufacturing that left much of the region damaged and hurting. Certainly, there are innumerable variables that determine the success and shape of a city or region, but the influence of transportation modes and technology has undoubtedly played a tremendous role in the history of the Midwest region.

THE DISCUSSION ON TRANSPORT TECHNOLOGY

The topic of transportation has been widely studied and discussed by urbanists and historians alike, with widely varying degrees of consensus on how critical these developments in transportation technology have been for the actual form and success of the cities or regions. In his book, American Becomes Urban, Eric Monkkonen argues that too many historians and geographers allow the history of transportation far too much weight in shaping our cities, calling this view ‘technological determinism’, and states that, “transportation is far less significant in determining our urban history than people allow”. When discussing these technological determinists, Monkkonen refers to both John R. Borchert and Sam Bass Warner, Jr. Geographer Borchert discusses the relationship between the settlement of the frontier and the technological innovations as being quite independent, yet still preserving that the westward expansion created the market and need for these innovations. Professor Warner addresses the relationship stating that, “transportation and technological change have influenced the urban system principally by creating opportunities for specialization and diversification.” However, Monkkonen does concede that the arguments of the technological determinists are not incorrect, but moreover they do not adequately consider the hefty weight of government policy, at a local, state, and federal level, that has influenced the course of transportation technology. Therefore, it is evident that there are a multitude opinions on the variables that shape our cities. 

RAILROADS IN THE MIDWEST

The rapid implementation of railroads in America coincided with an impressive rate of growth and success within the Midwest region. This report is an investigation into the potential relationship and connection between this transportation technology and the regional growth and form. The rise and fall of the railroads within the Midwest is a complex issue and a comprehensive understanding of this variable in urban form can not be fully grasped without the historical understanding of the preceding and following context. Understanding the condition of the country as a whole, the precursors in transportation technology, and the variables that lead to the decline will all be analyzed in support of this investigation.

Figure 1: Midwest Boundaries within the United States of America
As defined by the US Census. The Midwest includes the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin

Figure 2: Largest Cities of the Midwest (2010)
Data from US Bureau of the Census, the 15 largest cities of the Midwest based on population within the city limits.

6 Jon C. Teaford, ibid, viii.
8 Eric H. Monkkonen, ibid, 159.
10 Sam Bass Warner, Jr., ibid, 60.
11 Eric H. Monkkonen, ibid, 164.
CHAPTER 2: BACKGROUND

NATIONAL CONTEXT

It is important to consider the condition of the country as a whole, and in a global context, when addressing the beginnings of the Midwest region. Throughout the twentieth century, while both America and Europe were experiencing incredible rates of urbanization, the difference was in the amount of brand new cities in the United States. Figure 3 demonstrates the ratio of new cities within Europe and the United States in the late twentieth century, where the term ‘new’ is defined as having fewer than 10,000 occupants in the year 1800. In addition to these new cities, there was not a traditional hierarchy between them. Colonial America was decentralized and rather evenly distributed, and it still looked to London for its metropolis. Often, the coastal cities, such as Boston, New York, and Charleston, had stronger connections with London than with each other. During this time of Colonial America, no single prime city ever emerged as the prominent capital. In fact, throughout the historical development, and even today, there is not a single defining city that represents America, but rather a scattering of competing cities, such as New York City, Washington D.C., and Los Angeles. One Scottish visitor, James Bryce, was particularly struck and troubled by this, “missing urban element...for it accounted for the diffuse, genial plainness of the country”.

These variables, at a national scale, constitute the setting for the beginnings of the Midwest.

PRECURSORS IN TRANSPORTATION TECHNOLOGY

By the year 1818, the National Road was complete and served to connect Baltimore with one of the first Ohio River settlements, called Wheeling. The success of this road is debatable, however, what it did achieve was to create an envy in the rival cities of Baltimore, which were then motivated to begin their own trans-Appalachian transport lines and, thus, beginning the race to settle the interior. Despite westward expansions in the National Road, by the year 1850, “competition from railroads their own trans-Appalachian transport lines and, thus, beginning the race to settle the interior.”

Even in its earliest phases of settlement, the Midwestern region was impacted, perhaps indirectly, by the transportation technology of the simple wagon. As the interior was being settled, the trailhead cities that facilitated that movement, such as Cincinnati, St. Louis, and Chicago, served to supply the wagons and other tools for the long journey. Throughout the century, this industry naturally developed into manufacturing farm wagons, furniture, and other machinery, which foreshadowed the coming era of being the manufacturing capital of the entire United States. The early nineteenth century also saw innovations in adapting the common hand-powered tools into horse-powered machines. By harnessing horsepower, these inventions, however, held much more impact in the economy of agriculture rather than efficiency of transportation.

12 *App. 3: Eric H. Monkkonen, ibid, 74.
13 Eric H. Monkkonen, ibid, 78.
14 “Each linked their agricultural hinterland with London merchants and markets rather than forming a single American network.” Eric H. Monkkonen, ibid, 42.
15 Eric H. Monkkonen, ibid, 1.
16 Richard Sisson, ibid, 147-148.
17 Richard Sisson, ibid, 153.
18 Richard Sisson, ibid, 147-148.
19 Sam Bass Warner, Jr., ibid, 65-68.
21 Richard Sisson, ibid, 152.
22 Sam Bass Warner, Jr., ibid, 65-68.
24 Jon C. Teaford, ibid, 3.
25 Jon C. Teaford, ibid, viii.
APPENDIX A | HISTORY THESIS

CHAPTER 3: THE IMPACT OF RAILROAD

“There could be no doubt that Americans saw both the need for improved transportation - even in a pioneering time and in frontier areas - and the great support such improvement would offer to the economic development of the areas away from the Atlantic coast.”

THE BEGINNINGS OF RAIL

By 1830, the major cities of the Atlantic coast were well established, but with the transportation development of the railroad, these cities were capable of "deepening and concentrating their hinterlands with rail. Thus the railroad tended to... reinforce existing patterns of urban settlement and location.”

RAIL IN THE MIDWEST

According to Figure 3, about 80 percent of the cities in the Midwest were founded during the era of railroads, and with only a few exceptions, all cities in the Midwest were founded during the era of railroads. The first railroads radiated from the port cities of the Atlantic coast, in attempt to improve trade and were often financed by the cities themselves, unlike the state-financed canals. By the 1840s the big cities began financing and promoting the long Western rail lines. Often cities would take the risk of selling bonds specifically to underwrite railroad expansion, because the arrival of the railroad basically guaranteed the city’s economic success and, thus, ability to repay the debt.

<table>
<thead>
<tr>
<th>Year</th>
<th>West</th>
<th>Plains/Mountains</th>
<th>Midwest</th>
<th>East</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1860</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Within the Midwest, the initial phase of railroad development was very localized and often only considered the pairing of two cities, without any long-distance objective. In these early phases of rail transport development, it may be important to note that the passenger business was relatively more important than freight due to its heightened flexibility as well as the novelty, and thus immediate popularity, of this form of transit. The state of Ohio saw the first movements in rail development, but instead of lines stretching westward, almost all lines were oriented north-south, allowing the inland access to the Ohio River and Lake Erie, once again emphasizing the dominance of water transport. In Michigan and Indiana, the railroads began as short inter-city links, eventually expanding outward, and creating radial nodes, highlighting Indianapolis and Detroit in particular. When these state ambitions could no longer be financed, the rail lines were sold to eastern investors, with bigger picture visions of trans-Appalachian railroads, and two critical cities of articulation were established, St. Louis and Chicago. The years between 1840-1850 St. Louis and Chicago entered a fierce rivalry, competing for the primate city status of the Midwest. The role of rail and water transit played a tremendous role in outcome.

CINCINNATI

Founded in 1788, Cincinnati, Ohio, was located at the mouth of the Little Miami and Licking River. The city grew at a sufficient rate into the early nineteenth century. It was then, with the introduction and implementation of the steamboat, that Cincinnati began its climb. Cincinnati was establishing regional and even national prominence in slaughtering, meat-packing and manufacturing. The city was connected to the rest of the nation through the significant steamboat traffic on the Ohio River, and additionally, with the completion of the Miami and Erie Canal, in 1827, which united the Ohio River and the Great Lakes. Due to its economical and geographical strengths, the city naturally attracted the next phase of transportation technology, the railroads. The Little Miami Railroad connected Cincinnati to the Atlantic coast cities as well as the Great Lakes region and experienced
almost immediate financial success.[35] Cincinnati continued its rapid growth through the early nineteenth century, but during this time it fought off a bad reputation of being a rather raucous and uncivilized city. In attempt to combat this image, Cincinnati made extensive efforts to prove its culture and refinement despite its isolated location. Defending its nickname “Queen City”, it boasted in its fine Catholic cathedral, the Burnet House, which was described as the one of the most magnificent hotels of the world, its dedication to science through the building of an observatory that held one of the largest telescopes in the world, and in creating the world’s first professional fire department. With these efforts, the city held supremacy in the West for the first half of the nineteenth century. The Queen City’s position was not rivaled until the rapid growth of St. Louis at the mid-century, which increased its population 373 percent within one decade. [50]

**ST LOUIS**

St Louis was founded in 1764, by Frenchmen Pierre Laclède and his stepson Auguste Chouteau. The city was positioned on a limestone shelf, quite strategically located just south of the confluence of the Missouri River and Mississippi River. These rivers provided critical trade connections south to New Orleans, as well as North to the Great Lakes. Early on, the city viewed itself as a European capital and even the original city structure was developed in a Spanish Colonial style, with three streets parallel to the river. The first efforts of transportation technology, wagons, did physically alter the form of the city, when the Santa Fe Trail and the Oregon Trail shifted the orientation of the city to an east-west axis. The 1830s witnessed a huge migration of Irish and Germans to St. Louis and began a decade of tremendous population growth.[36] In the mid 1840s, a British visitor remarked, “It occupies... the central point, from which the great natural highways of the Union diverged in different directions... [and] it is destined soon to become the greatest internal entrepôt of trade in the country”. [37] And indeed, St. Louis did boom, for from the years 1835 - 1840 the population of St. Louis doubled each year. In 1840, the population of St. Louis was almost four times that of Chicago, but this year marked the beginning of their struggle to hold this status of prominence in the Midwest. [39]

The Mississippi River and the Ohio Rivers both played a major role in the settlement of the Midwest, linking the land locked area to the rest of the world. But the Great Lakes did not provide a similar connection until the opening of the Erie Canal, in 1825, when the potential of the area began to resound with the groans of ruined men and the sobs of the defrauded women, who had entrusted their all to greedy speculators”. [41] By 1850, Chicago was on the rebound and the largest lake city, but its reputation was lacking and thus limiting its rivalry for primate city of the Midwest. Chicago's rise is partly attributed to its location as a collecting and fabricating point for lumber, grain, animals, and other raw materials coming from the west. [43]

**STRUGGLE FOR SUPREMACY**

While Cincinnati did hold supremacy in the Old Northwest throughout the early nineteenth century, its fight to maintain this ranking was relatively short lived. “Like the Queen City, Saint Louis had overcome the commercial isolation of the heartland and brought the continent's interior into economic contact with the world. But nature's gift to Saint Louis was even greater than that bestowed on Cincinnati”. [43] The critical variable of location and St. Louis’ radiating river system gave it a substantial advantage over the other cities competing for the metropolis of the west. While St. Louis seemed to be taking the lead, Cincinnati remained the capital of culture among the cities of the interior, due to their extensive efforts in this field. Additionally, through the mid-century, Cincinnati remained the prominent city in manufacturing as well. Yet, as St. Louis’ population and economy kept accelerating, those margins of difference were slowly closing, until both cities faced unexpected competition from the North.[45]

Within thirty years, the population of Chicago had gone from being almost one quarter of St. Louis’, in 1840, to almost being equal in 1870. The next thirty years, however, Chicago’s population growth exploded, leaving St. Louis in the dust. Figure 7 demonstrates the severity of this population growth.[46] This was due to a large number of factors, one of which was that the economy of St. Louis was wrecked by blockades that occurred during the American Civil War. At the same time, Chicago was identified as a valuable trading center with the undeveloped interior, therefore many rail lines began construction westward to river ports, along the Mississippi. [47] Another critical variable, in this struggle between St. Louis and Chicago for the primacy of the West was their relationship with the railroads. St. Louis was so dependant, and thus far successful, in their water transport that they did not invest as much into the beginnings of rail transit. [48] Chicago, on the other hand, was established a mere two years after the world’s first railroad hub, in Boston, yet within just twenty years rose, indisputably, to fill the role of the Great Junction in the system of railroads. Even referred to as, “the archetype of the railroad city”,[49] eventually, almost no railroad bypassed Chicago. Figure 7 demonstrates the severity of this population growth.
8 is an allegorical representation of the role of the railroad.[50] Wyatt Belcher summarized it by stating that the, "superior transportation facilities of Chicago afford the chief explanation of trade statistics... showing that city's predominance over St. Louis in the leading articles of commerce". Belcher also attributed the outcome to the type of people constituting each city. The business men of Chicago were ambitious and progressive compared to the conservative men of St. Louis who clung to their traditional systems, such as their over-reliance on the rivers.[51] In 1869, the dominance of Chicago was solidified with the opening of the Pacific railroad, connecting Chicago to the Missouri River frontier through a series of standard-gauge rails.[52] Despite this fierce competition, for railroads, immigrants, and business, St. Louis and Chicago were, to a degree, mutually beneficial and grew together as the connections of water and rail strengthened between them.[53]

THE INFLUENCE OF STEEL RAIL

John Borchert claims the first major transportation innovation to largely impact America was the steam engine, but that the second major innovation was steel. Steel rails were commercially developed through the 1860s and by the mid-1870s it was breaking into the world market.[54] Although, the profile of the steel rail was at first over-designed and prohibitively expensive, the introduction of the Bessemer process (the first method for mass-producing steel) coinciding with the introduction of the Bessemer process (the first method for mass-producing steel) coinciding with the end of the American Civil War created the ideal setting for this industry. Some of the first steel rails were imported from England, but by 1865 fabrication had commenced at the North Chicago Rolling Mills. By the year 1870, about 1,100 miles of steel rails had been laid down and after a thorough analysis of their condition, the Journal of the Franklin Institute concluded they were indeed more economical. Railroad companies of all sizes were then motivated to use steel on new tracks as well as replace the existing iron rails. The tipping point was the year 1883, when there was more steel rails than iron rails laid in American soil.[55] In expressing the significance of this material, Sam Bass Warner, Jr. states that, "with the abundance of steels came all the elaboration of engineering that distinguished the times—high-speed rails, massive bridges and viaducts, skyscrapers, battleships, and finally automobiles."[56]

These new rails had direct implications for the transportation revolution of railroads. In 1860, there were eleven different gauges of rail among the norther systems.[57] Figure 9 maps the six most prevalent at the outbreak of the American Civil War in April of 1861[58] A new steel rail aided in the standardization of rail gauge and these new rails allowed heavier locomotives and permitted higher speeds. Therefore, the economic efficiency of long-haul goods dramatically increased. The introduction of refrigerated cars, around 1860, also had a significant impact on the economy and urban form of the region, causing regional specialization in agriculture and a centralization of the packing industry around rail nodes.[59]

CONCLUSION OF 19th CENTURY RAIL

The abundant natural resources of the Midwest played a large role in the pattern of urban development in the Midwest, during the nineteenth century. The states of Ohio, Indiana, and Illinois contained expansive coal fields and there were rich iron ore deposits along Lake Superior. This proximity and affluence in raw material lead to the rise of fabrication of metal products as one of the industrial anchors. The cities of the Old Northwest, the northern states of the Midwest, quickly developed into manufacturing giants largely dependent on heavy industry. Additionally, by this time the rich soil of the area was apparent and the processing of livestock and grain was another predominant industry.[60] These industries owe a tremendous amount of their success to the dense network of rail that served to tie together the vast resources of the hinterland and the hungry markets of the Atlantic coast cities, through the critical nodes of the Midwest.

Figure 8: Illinois Central Railroad Allegorical Representation

This allegorical representation was intended to suggest the role the company meant to play in the settling of American interior on the first of the railroad land grants, which was conferred in 1850. Source: Library of Congress picture.[50]

Figure 9: Track Gauges in North America at the Outbreak of the Civil War, April 1861.[58]

Figure 10: Major Articulation Points and Junction Cities of North American Railroad System (20th Century)[61]
APPENDIX A

CHAPTER 4: TRANSITIONS TO THE AUTOMOBILE

"Thus, from their origins in the early nineteenth century, modern American cities have continuously and aggressively changed their shape. Their edges continue to be a blur, the center continues to dominate as a reference point, as a point of maximum rent, but the centrifugal urge remains primary."

THE STREETCAR

A short era, at the turn of the century, saw the implementation of cable cars, and then electric streetcars, within the cities and sometimes even as interurban connections. This transportation technology had immediate impact on the form of the city, by allowing it to stretch out and instigating the primitive stages of suburbanization. Figure 12 demonstrates a hypothetical city form, impacted by each phase of transportation technology. Prior to the streetcar, the urban dweller walked to work, limiting the relative city size to approximately three miles (based on a maximum commute time of one hour). The implementation of the streetcar permitted the wealthy to move out of the busy, dirty city center and maintain the same commute time to work. The city, thus, grew long fingers radiating from the center and growing narrower with distance.

With a few exceptions, the streetcar in most cities was a luxury for the middle classes and white-collar workers, being far too expensive for the average city dweller. The rail proponents were far more concerned with suburban growth than ideas of mass transit. However, these proponents of the streetcar acquired a bad reputation, eventually becoming the symbol of corruption of the late nineteenth century. This is due to developments "often involving bribes paid by street railroad "rings" to gain monopoly franchises". It is important to recognize the reputation of this transportation technology, because the consequences were a critical variable in ushering in the next era of the automobile. "And more important, the fixed rail system was a mode of transportation that almost everyone was willing to eliminate. For transportation monopoly was considered by reformers to be a major turn-of-the-century urban problem, and the fixed rail transport system epitomized that problem." [73]

BICYCLE

The bicycle is by no means a substantial force in the discussion of transportation technology and its impact on shaping cities. However, that being said, the bicycle is important not in its use, rather, but in its lack of use. At the turn of the century, a bicycle was not considered a practical form of transportation, but rather a fancy toy of the elite. The most important factor in the lack of bicycle usage is the poor condition of the roads, which influenced a movement for good roads. By the time the road quality was sufficient for bicycle use, the cost of the automobile had dropped to an

63 Jon C. Teaford, ibid, 39.
64 Jon C. Teaford, ibid, 59-52.
65 Eric H. Monkkonen, ibid, 81.
66 John R. Borchert, ibid.
67 Carl W. Condit, ibid, introduction.
68 ibid, 159.
69 ibid, 161.
70 ibid, 178.
71 ibid, 180.
72 ibid, 158-181.
73 ibid, 159.
affordable level, for most Americans. The advantages and lure of the automobile dramatically overshadowed the utility of the bicycle and thus the era of bicycles was all but skipped over.

**PAVED ROADS**

An accepted argument on the car-to-road relationship is that the mass production of the Model T car, and following popularity, instigated the government efforts investing in more and better paved roads. However, in his book, America Becomes Urban, Eric H. Monkkonen makes a convincing argument that the movement for paving roads actually preceded the era of the automobile. There was an increase in hard surfaced streets within the years of 1902-1911, but then a strange consistent decline in the rate of hard surfaced roads followed, which supports Monkkonen claim. There was a movement, in the late nineteenth century, which promoted the establishment of hard surface roads and was instigated by urban bicyclists and farmer reformers. In 1892 they published a journal, Good Roads, which targeted the rural farmer. These farmers resisted the efforts of paved roads, because they feared higher taxes and the free rider problem. This publication aimed at showing the potential profit for farmers, by increasing the pulling capacity of horses. Figures 13 and 14 illustrate the terrible condition of roads and thus support Monkkonen's point that it simply was not sensible to buy an automobile until the hard surface roads where well established. Therefore, the movement of road paving was instigated, not by the automobile, but rather by the bicyclist, the wagon user, and especially by city engineers who clearly saw the benefit of longer-wearing surfaces.

Additionally, it is important to note the role of local government in the movement of good roads. It may seem quite natural that the road was considered part of public utilities and thus a huge participant in the orchestration of the movement. The unforeseen ramifications, however, lie in the governments heavy role in promoting an automobile-centered era. "The active role of city government paved the way - often quite literally - for the sprawling cities of the twentieth-century United States."[78]

---

**PRELUDE TO THE AUTOMOBILE**

To understand the remarkable popularity of the automobile, in global comparison, an understanding of the prelude is necessary. In his book Fighting Traffic, The Dawn of the Motor Age in the American City, author Peter D. Norton presents two theories on the origin and early evolution of the automobile in the American city. The first theory is that the car was the natural and popular selection of the urban dweller, an adapted form of the ‘survival of the fittest’ in a rational and logical step in transportation technology. In addition to fulfilling transportation needs, the automobile also represented independence and individualism to the American people, especially as they were emerging from an era of streetcar corruption. Therefore, the people themselves choose this means of transit as a response to consumer preferences and was, thus, willing to simply rebuilt their cities around it. The second theory on the popularity of the automobile was that it resulted from deliberate promotion by corporations and the elite. The argument is that, "The elite promoters of the motor city pulled up the streetcars and planned the deconcentration of urban populations...[and] Mass preferences were relatively unimportant." Coinciding with the elite, the city planners of the day also saw the automobile as a solution, through suburbanization, to the problem of over-crowding and other critical urban issues. The Midwest became a remarkably early example of this mentality with the 1909 Plan of Chicago by Daniel Burnham. This plan essentially called for the reconstruction of the traditional city to be entirely determined by the automobile.[81]

**THE EARLY AUTOMOBILE**

While the automobile certainly existed in the late nineteenth century America, it did not become a reckoning force until approximately the 1920s. In the year 1910, the car was an object of the city, where the urban dweller was at least four times as likely to own an automobile than the rural population. But Henry Ford was quick to capitalize this market with the mass produced Model T, designed specifically to overcome some of the rural constraints, with a high clearance and high-torque engine. Remarkably, within a mere decade the trend in urban-rural automobile ownership had actually reversed. "The automobile had become ubiquitous, no longer to be an urban phenomenon."[82]

Returning to the hypothetical city form, based on transport modes and time of commute, Figure 12 demonstrates the initial effect of the automobile had on the shape of the city. As the streetcar created the star-shape city, there remained undeveloped areas between these fingers of rail suburbs. Therefore, the automobile served to fill in these gaps between the rail lines. This initial effect, then, actually served to make the city, as a whole, more dense. However, the introduction of the motor truck had another effect on the, now quickly, changing city form. With cheaper land on the periphery of the city, and now the easy mobility of the truck, many industries relocated to the edges of the city. This intensified economic activity on the rim of the city is the beginnings of what is called the ‘doughnut’ city.[83] "Recently... the rise of “doughnut” cities... - cities with abandoned inner cores - has reversed all prior expectations of urban shape; rarely before would one have found the city center abandoned"[84]

---

74 Eric H. Monkkonen, ibid, 167-168.
75 Eric H. Monkkonen, ibid, 166-172.
76 Figure 13. 14. Ohio Historical Society. Good Roads, 1 (1892), 239; Minneapolis History Collection, Minneapolis Public Library.
77 Eric H. Monkkonen, ibid, 167-176.
78 Eric H. Monkkonen, ibid, 158.
80 Peter D. Norton, ibid, 10.
81 Peter D. Norton, ibid, 9-11.
82 Eric H. Monkkonen, ibid, 175.
83 Eric H. Monkkonen, ibid, 177-178.
84 Eric H. Monkkonen, ibid, 36.
THE AUTOMOBILE OF THE MIDWEST

In the Midwest, the urban response to the automobile was no different. Thousands of middle-class Midwesterners left behind the pollution and chaos of the city in search of that utopian suburban home. As Figure 15 demonstrates, each of the major cities of the Midwest witnessed consistent growth in the proportion of metropolitan residents living outside of the central-city limits, from 1920-1940. [85]

The era of the automobile also dramatically affected the prevalent agriculture of the Midwest. The tractor significantly changed the amount of land that a farmer could handle by himself. This shift in the labor requirements lead to a reduction in family farm size and aided the already rapid urbanization of the rural Midwest. [86] Likewise, the mechanization in fields of mining and lumbering, also freed Americans to search for new jobs, often, in the cities. This mass of people, arriving in the cities, found jobs in manufacturing, transport, finance, and the servicing of business. [87]

Additionally, there was an evident shift in the role of the Midwestern cities within the region. The large cities diversified, invited the industries of manufacturing, commerce, and finance, and thus spurred their growth. The smaller cities, which often specializing in processing a regionally-specific product or manufacturing a specific good, also prospered. At this time, the Midwest cities prospered at a rate higher than the national average. This is partly due to the fact that the transition was facilitated by their foundation in iron and steam technology, and thus, the skills and tools for making the components of the new age were already present. [88]

During the twentieth century, the popularity of the automobile inherently led to the expansion of highways. The network of highways developed very rapidly and almost immediately truck transportation challenged the railroad network. Urban historian Eric Monkmonen emphasizes that, “prior to World War II, roads, streets, and highways were primarily the responsibility of state and local governments. Federal interest was at a level too modest to be considered meaningful.” [89] So for one of the first times, the Federal government intervened and provided grants for states to build highways that linked major cities. In 1956, the Eisenhower administration presented the Interstate Highway System, which was a massive network of national highway linkages between major cities. At this time, the Midwest cities prospered at a rate higher than the national average. This is partly due to the fact that the transition was facilitated by their foundation in iron and steam technology, and thus, the skills and tools for making the components of the new age were already present. [86]

As the Midwest entered the era of the steam engine, the regions reliance on water networks only increased. The steamboats provided cheap, efficient, and increasingly faster methods of transporting goods and people, a necessary exchange which made the success of the region a formidable option. Even as the railroad entered the scene, it could not compete with the efficiencies of water-based transit, but rather surfaced as a supplementary system that reinforced the trends of the growing port cities.

In conclusion, the Midwest was indeed dramatically shaped and formed by forces of transportation technology. The wagon, steam engine, steel rails, and automobile all had varying degrees of impact on the spatial form and development of the Midwest. Reflecting on the earliest settlement of the Midwest territory, it is obviously apparent that the most critical factor was indeed water. The geographical location of a Midwest city was entirely dependant on its proximity to waterways. The system of rivers, lakes, and eventually canals, were the corridors of lifelines, connecting these budding new cities with the Atlantic coast cities, which contained all the ingredients for success. As the Midwest entered the era of the steam engine, the regions reliance on water networks only increased. The steamboats provided cheap, efficient, and increasingly faster methods of transporting goods and people, a necessary exchange which made the success of the region a formidable option. Even as the railroad entered the scene, it could not compete with the efficiencies of water-based transit, but rather surfaced as a supplementary system that reinforced the trends of the growing port cities.

As the locomotive underwent technical advances and the rails improved durability, the railroad began to make its mark on the Midwest landscape. As stated, the prominent port cities were already established and the railroad networks began radiating out from each one, and thus reinforcing the existing pattern of urban development. The Midwest, however, was particularly adapted for the implementation of the railroad, for a number of reasons. First, once the Appalachian barrier had been breached, the Midwest was topographically remarkably flat, and thus, easily accommodated the process of laying tracks. Secondly, the Midwest offered vast amounts of essentially free open space. While the urbanized region of the Northeast was also implementing the railroad as they worked to connect cities, but presumably, faced continual problems in the acquisition of physical space for the railroad. Conversely, the Midwest offered abundant space and the newness of the cities often made it easy to plan for the implementation and expansion of the railroad network. Additionally, the Midwest had an alternative reason for expanding their rails. While the railroad lines did aid in connecting cities, they were primarily concerned with reaching out into the vast openness to capitalize on the rich resources, inherent to this particular region. The third reason for rail success was that the Midwest offered exceptionally rich resources that were not present in the developed Northeast. There was abundant lumber, the soil was fertile for agriculture and livestock, there were expansive coal fields, and rich iron ore deposits, just to name a few. These resources are truly the key factor that triggered the explosive success of the railroad throughout the Midwest. Instead of benefiting through simply a supplemental form of intercity connections, the Midwest cities gained significant competitive advantage by the supplement of raw and processed goods. As the rail networks expanded and increased efficiency, the success of the cities grew in direct proportion. However, it is interesting to note that the systems of railroads never displaced the transportation technology of the steamboat and paramount waterways. Rather, the two systems grew in a symbiotic relationship, with the radial rails stretching into the hinterlands and tapping the rich resources while the waterways providing the low-cost, efficient transport corridors connecting the cities to the markets of the Atlantic coast cities and Europe. Ultimately, the transportation technology of the railroad did make an especially noticeable impact on the development of the Midwest. While, the geographical location of the cities was predetermined by prior factors, the railroad technology fit like a glove to the Midwest and the economic ramifications solidified its success in the national and even international market.

The adaptation of the railroad, on a city scale, took the form of a network of cable cars and then the electric streetcar. This logical step in transit technology made little impact on the development of the

85 Figure 15: Rebekah Wagone, data from Jon C. Teaford, ibid, 205.
86 John R. Borchers, ibid, 5.
87 Sam Bass Warner, Jr., ibid, 86.
88 Monkkonen, ibid, 168-169.
89 Richard Sisson, ibid, 153-154.
90 Richard Sisson, ibid, 155.
91 Richard Sisson, ibid, 155.
region, but rather impacted the city form. Ushering in the earliest movement of suburbanization, the streetcar allowed the wealthy to move further form the city center while maintaining a similar commuting time. As the automobile began to enter the scene of the American city, a corrupt reputation of the streetcar led to its relatively easy and widely approved termination. The automobile offered unprecedented freedom and individualism. Weather the movement was chosen by the masses or augmented by corporations and the elite, the fact remains that the popularity of the automobile was explosive. The urban ramifications of the automobile are truly infinite and still being grappled with by today's architects and urban planners. On a city scale, the movement of suburbanization erupted, the traditional relationship of the urban dweller to their built environment was obliterated, and the process of rebuilding our cities around the automobile commenced without a second thought. On the regional scale, the movement of urbanization was synchronously taking off. Reinforced by the recent developments in mechanization and automation, many previously labor-intensive jobs were eliminated and that population flocked to the booming cities to find new jobs. So in conclusion, the urban response to the era of the automobile was a simultaneous shift from rural to urban and from urban to suburban, thus resulting in a remarkably absent hierarch of density and decisively unsustainable urban pattern.

The automobile was welcomed with the same vigor as the railroad, but ultimately met with very different results. Just as the railroad was particularly fitted to the geographic and economical climate of the Midwest, the impact of the automobile nestled its way into the history of the Midwest by means of the existing industry infrastructure. Because of the abundant resources and the booming nodes of rail and shipping transport, the Midwest had developed a reputation and economic backbone of manufacturing. The skills and tools were already there and the popularity of the automobile provided the market to instigate a shift in the manufacturing. The Midwest became the heart of auto manufacturing, which initially augmented the growth of the region. However, with the advent of the car also came the highway systems. The Federal government played a hefty role in the policy and implementation of a national system of highways. One of the unforeseen consequences of this transition in transportation technology, was the freedom it granted, not only citizens, but entire companies and corporations. The industries that were once so perfectly suited to the Midwest now had the freedom to relocate virtually anywhere, due to the expansive and efficient system of truck transportation on highways. Naturally, these industries sought out geographic locations with the lowest cost of land, low labor costs, and low taxes. At this time the, now very developed, regions of the South and West offered these attractive factors and the Midwest began to lose its competitive advantage of the region.

Although these variables of transportation technology are tangled into a multitude of other factors, the process of looking at the urban history from the perspective of these innovations and changes reveals particular insight into the development and formation of the Midwest region.

### Bibliography


Easley Hamilton, “History of St. Louis” (lecture, Washington University, St. Louis, MO, October 14, 2012).


Joseph N. Bales, *The Annals of Chicago - A Lecture Delivered before the Chicago Lyceum, January 21, 1840 (Fergus Historical Series, No. 1, Chicago, 1876)*.


