

## **CHAPTER TWO:**

### ***Demographics, Transportation, and Land Use***

#### ***Population Profile***

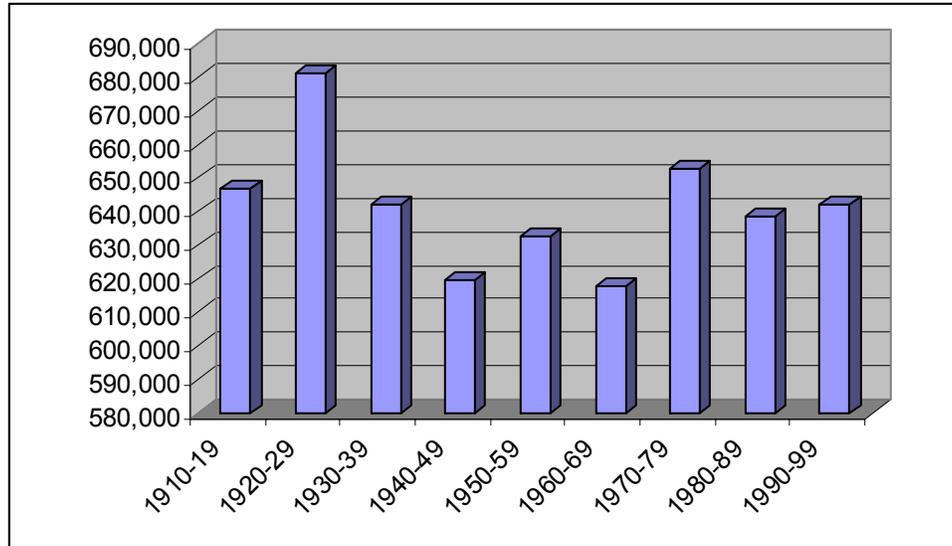
The early 1600s marked the first census conducted on what would become the United States. Shortly after gaining independence Secretary of State Thomas Jefferson conducted the first U.S. census totaling 3.9 million inhabitants. The surveys collected the general statistical information from individuals and establishments to compile the decennial statistics for the country. Since 1790 the census has evolved to gather greater amounts of information providing the statistics needed to understand the trends in society and to plan for growth (U.S. Census Bureau 2004).

#### **Regional Population**

To better appreciate the population characteristics of Cass County it might first help to understand the populace of the North Dakota and the surrounding counties. These statistics will demonstrate the unique characteristics and issues faced by the county.

#### **North Dakota**

The State of North Dakota has experienced both positive and negative growth over the last 90 years, the overall trend however being one of decline (Figure 2.1, Table 2.1). The states highest population was attained in 1930 with a population of 680,845, a figure continually declining since this date. A 5.65% growth rate occurred in 1980, the highest positive growth change over the last 90 years, but population since this point has declined or stagnated. The states average population for the last 90 years is 641,471 with a -0.02% growth rate. The Census 2000 recorded a 0.53% growth rate for North Dakota the lowest of all states, compared to a national average growth of 13.1%.



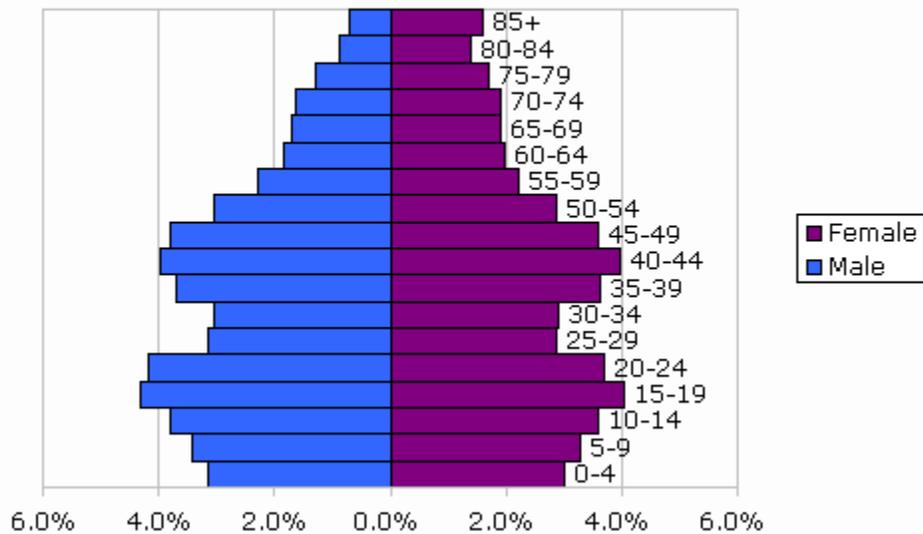
**Figure 2.1.** North Dakota population from 1920 to 2000 (U.S. Bureau of the Census, Decennial Censuses).

Year	Population	Percent Change
1910-19	646,872	
1920-29	680,845	5.25
1930-39	641,935	-5.71
1940-49	619,636	-3.47
1950-59	632,446	2.07
1960-69	617,792	-2.32
1970-79	652,717	5.65
1980-89	638,800	-2.13
1990-99	642,200	0.53
Average	641,471	-0.02

**Table 2.1.** North Dakota total population and change from 1920 to 2000 (U.S. Bureau of the Census, Decennial Censuses).

North Dakota's slow growth rate is more apparent when viewing the 2000 population pyramid, which shows both the age distribution and the male/female ratio. The spectrum for growth pyramids range from top heavy inverted pyramids consisting of an ever growing older population (indicating low birth rates or large out-migration of the young) to a bottom heavy population pyramids having a larger ratio of young to old (often the result of high birth rates or in-migration), with the majority of areas resembling a square indicating slow and sustained growth (CensusScope.org). North Dakota is somewhat unusual in that it appears in transition from more of a bottom heavy to a top heavy population pyramid (Figure 2.2). This trend indicating an aging population, which either has had reduced birth rates or increased out-migration.

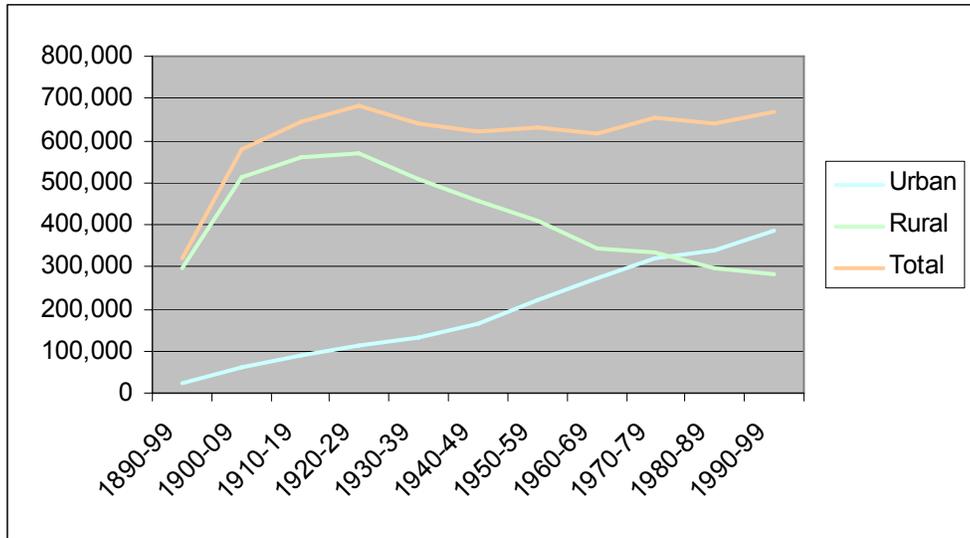
### Age Distribution, 2000



**Figure 2.2.** North Dakota population pyramid (CensusScope.org).

In the case of North Dakota, out-migration is probably the determining factor for the states aging and slow-growth population. The census estimated a natural increase for the state (births-deaths) of 5,028 between April 2000 and July 2003. It was also estimated 2,379 people migrated into the state, while 15,662 migrated out of the state creating a net migration of -13,288. The out-migration leads to a diminished population, but also decreases the birth rates since most of those leaving are of child bearing age.

During the last century North Dakota has evolved from a largely rural population to one having more residents living in an urban setting (Figure 2.3 and Table 2.2). At the turn of the last century, nearly 93% of North Dakotans were classified as rural dwellers. The 20<sup>th</sup> century witnessed a push from rural to urban living and in 2000 nearly 58% of North Dakota residents lived in an urban setting. The 2000 census defines urban as any housing within an urbanized area or urban cluster, including any block or block group having a density greater than 1,000 people sq/mile and those surrounding block groups with a density greater than 500 people sq/mile.



**Figure 2.3.** North Dakota urban vs. rural population from 1900-2000 (U.S. Bureau of the Census, Decennial Censuses).

Year	Urban	Percent Urban	Rural	Percent Rural	Total
1890-99	23,413	7.34%	295,733	92.66%	319,146
1900-09	63,236	10.96%	513,820	89.04%	577,056
1910-19	88,239	13.64%	558,633	86.36%	646,872
1920-29	113,306	16.64%	567,539	83.36%	680,845
1930-39	131,923	20.55%	510,012	79.45%	641,935
1940-49	164,817	26.60%	454,819	73.40%	619,636
1950-59	222,708	35.21%	409,738	64.79%	632,446
1960-69	273,442	44.26%	344,319	55.74%	617,761
1970-79	318,310	48.77%	334,407	51.23%	652,717
1980-89	340,339	53.28%	298,461	46.72%	638,800
1990-99	385,958	57.66%	283,424	42.34%	669,382

**Table 2.2.** North Dakota urban and rural populations and percentages for 1900-2000 (U.S. Bureau of the Census, Decennial Censuses).

In summary, the overall trend of North Dakota's population is one slowly shrinking in size, while growing older in age. The decreased birth rates and the negative net migration only compounds this problem, producing the possibility of a very unstable growth structure consisting of an every aging population.

## Surrounding Counties

Eight counties surround Cass County, five in North Dakota and three to the east of the Red River in Minnesota (Figure 2.4). The five North Dakotan counties have very similar population characteristics of the state. All experienced growth during the first quarter of the 1900s (Figure 2.5), but their populations have been in a state of decline since the 1930s. The average total population loss during the 19<sup>th</sup> century was 2,012 residents, averaging -0.24% decrease (Table 2.3). The three Minnesota counties fared better, with an average growth of over 8,200 residents in the last century. However, closer inspection shows only Clay County, directly to the east of Cass County, experienced growth with its population almost tripling in size over 100 years. Norman and Wilkin both suffered population losses of -50.54% and -11.66% respectively, between the 1900 and 2000 censuses (U.S. Bureau of the Census, Decennial Censuses).

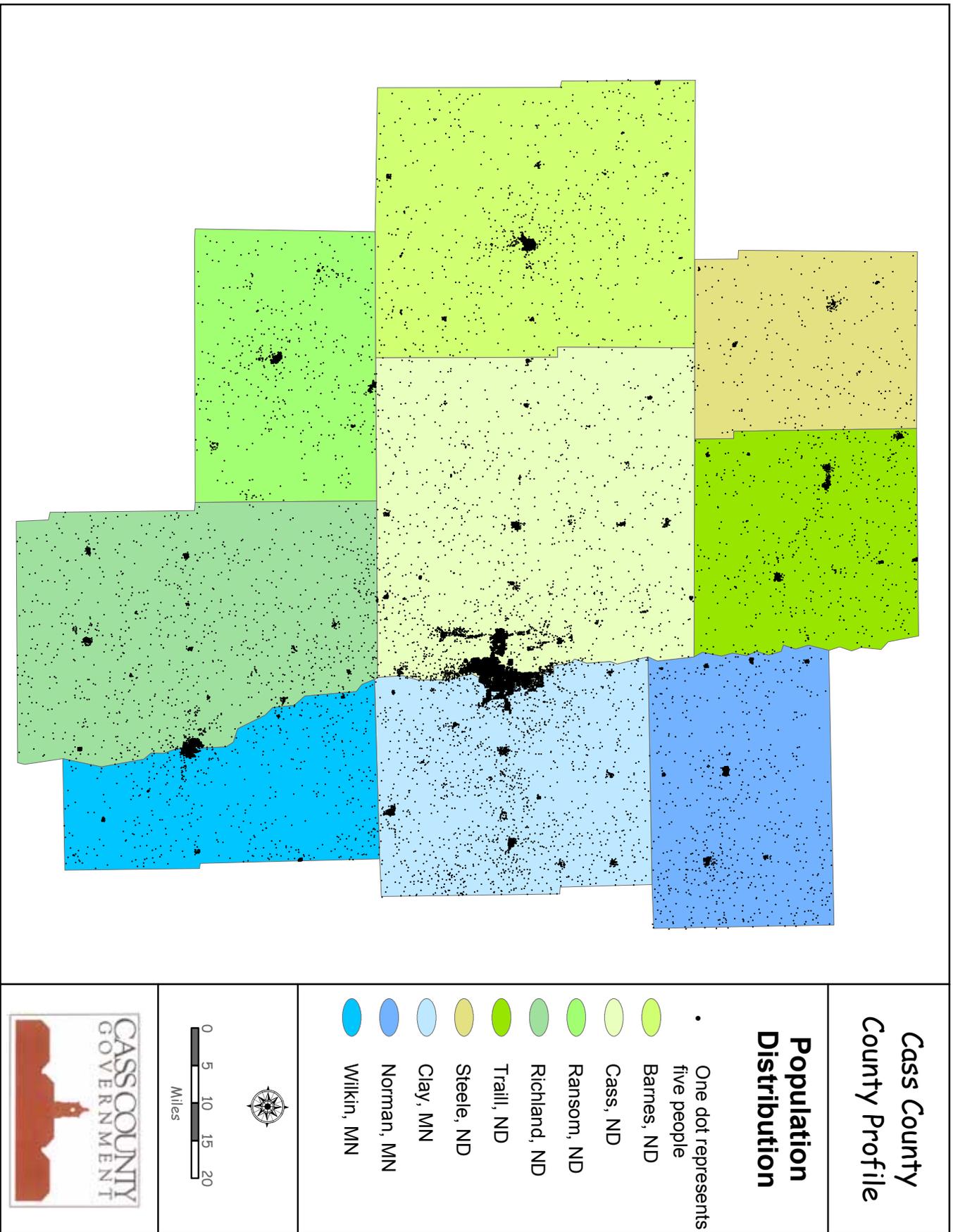


Figure 2.4. Counties surrounding Cass County, North Dakota

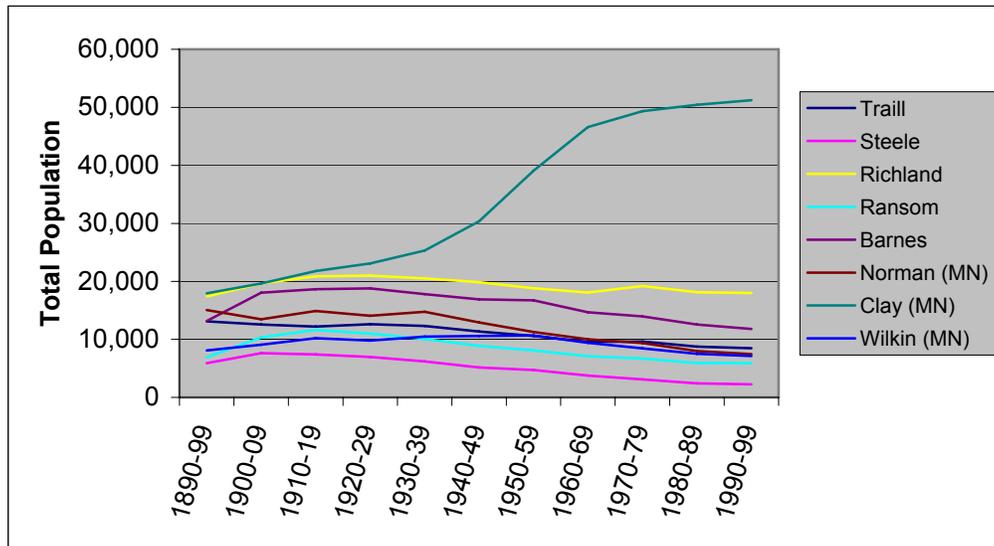


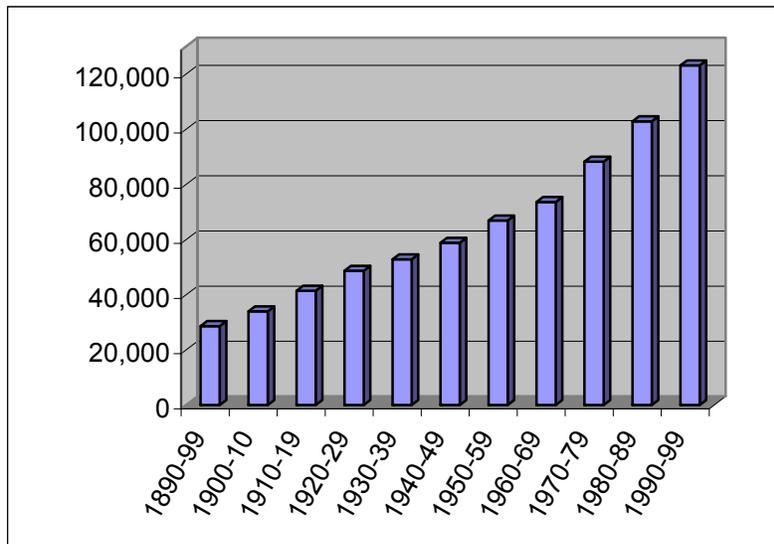
Figure 2.5. Surrounding counties total population from 1900-2000 (U.S. Bureau of the Census, Decennial Censuses).

Year	Traill	Steele	Richland	Ransom	Barnes	Norman (MN)	Clay (MN)	Wilkin (MN)	
1890-99	13107	5888	17387	6919	13159	15045	17942	8080	
1900-09	12545	7616	19659	10345	18066	13446	19640	9063	
1910-19	12210	7401	20887	11618	18678	14880	21780	10187	
1920-29	12600	6972	21008	10983	18804	14061	23120	9791	
1930-39	12300	6193	20519	10061	17814	14746	25337	10475	
1940-49	11359	5145	19865	8876	16884	12909	30363	10567	
1950-59	10583	4719	18824	8078	16719	11253	39080	10650	
1960-69	9571	3749	18089	7102	14669	10008	46585	9389	
1970-79	9624	3106	19207	6698	13960	9379	49327	8454	
1980-89	8752	2420	18148	5921	12545	7975	50422	7516	
1990-99	8477	2258	17998	5890	11775	7442	51229	7138	
Change: 1900-2000	Total	-4630	-3630	611	-1029	-1384	-7603	33287	-942
	Percent	-35.32%	-61.65%	3.51%	-14.87%	-10.52%	-50.54%	185.53%	-11.66%
Change: 1990-2000	Total	-275	-162	-150	-31	-770	-533	807	-378
	Percent	-3.14%	-6.69%	-0.83%	-0.52%	-6.14%	-6.68%	1.60%	-5.03%

Table 2.3. Surrounding counties population change from 1900-2000 (U.S. Bureau of the Census, Decennial Censuses).

## Cass County Historic Population

To accurately envision the future growth and development of Cass County it is beneficial to understand the historical growth patterns of the county. Figure 2.6 displays the county's population growth over the past century. Table 2.4 displays the percent change between the decennial censuses. The county achieved strong growth at the beginning of the 20<sup>th</sup> century, averaging 19.4% growth rate for the first 30 years of the century. Growth then slowed during the middle part of the century until the last third which averaged 18.7% growth (U.S. Census Bureau Decennial Censuses). Unlike North Dakota and the majority of the surrounding counties, Cass County has been able to maintain strong positive growth over the last century. This making the county very atypical of the state in growth and even the entire U.S. which averaged around 13% growth in the 2000 census. As a result, Cass County currently makes up the largest portion of North Dakota's total population (19.17%) and leads the state in population growth from the 1990 census figures (Census 2000).



**Figure 2.6.** Cass County Census Population for the 20<sup>th</sup> century (US Census Bureau).

Year	Population	Percent Change
1890-99	28,625	
1900-10	33,935	18.55
1910-19	41,477	22.22
1920-29	48,735	17.50
1930-39	52,849	8.44
1940-49	58,877	11.41
1950-59	66,947	13.71
1960-69	73,653	10.02
1970-79	88,247	19.81
1980-89	102,874	16.58
1990-99	123,138	19.70

**Table 2.4.** Cass County Census Population for the 20<sup>th</sup> century (US Census Bureau 2004)

Population projections for the county will be discussed in greater detail later in the chapter, but based on the Figure 2.6 it should become apparent that the county should expect continued growth into the future. Proper planning and development will require the county to adjust goals, regulations, and policies in light of the expected growth and the demands and changes it will create.

### Census 2000 Facts and Figures

The 2000 Census compiled an immense amount of data covering many topics. The amount of data available to research and study an area covers numerous subjects, while astonishingly going into great deal. As a result, the following section discusses only the data pertinent to this report, providing the general scope of Cass County's demographics without delving too deep into the details.

Cass County's 2000 population reveals a stable population, both in a nearly equal male to female ratio and also in the ratio of young to old. The 2000 population pyramid (Figure 2.7) shows Cass County's population is more heavily weighed in the pre-retirement age with a smaller percentage of elderly population. However, looking at the 1990 population pyramid reveals some interesting trends (Figure 2.8). First, on a positive level the 0-10 age group has grown slightly since 1990, increasing 1.71%; this is a good sign that more young couples are staying in the area and having children (the average number of children per family has fallen since 1990, so this increase is more likely the result of

additional families then more kids per family). However, it is also noticeable that the county's average age is continuing to rise, the 25-39 years old categories have simply increased one 10-year iteration from the previous census. More disturbing is the trends occurring with college age residents. This age group has historically been the highest in the county, but the numbers never continue beyond this age indicating college students are migrating out of the area following graduation.

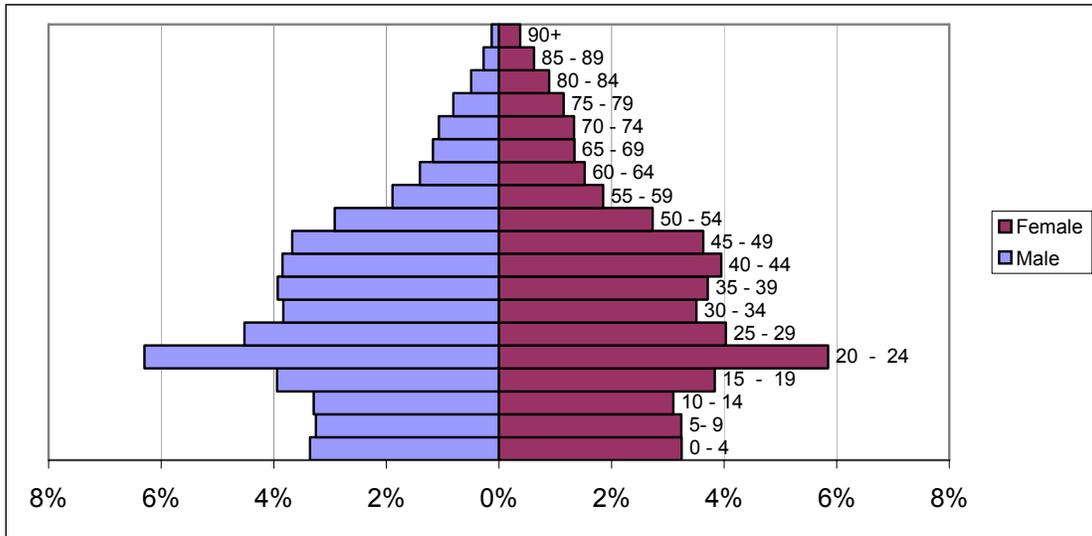


Figure 2.7. Cass County 2000 Census population pyramid (US Census Bureau).

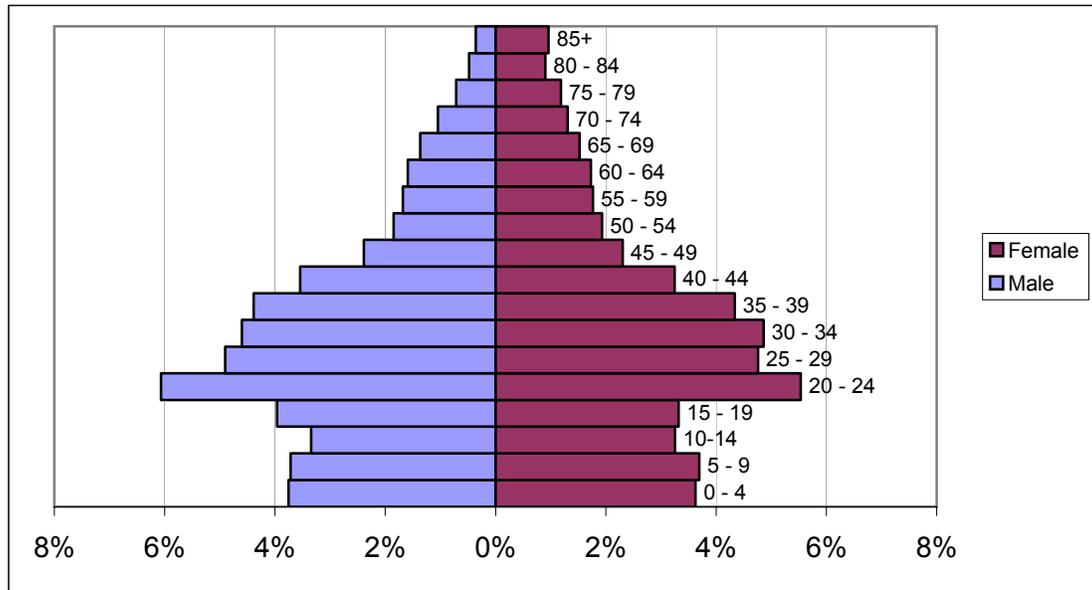


Figure 2.8. Cass County 1990 Census population pyramid (US Census Bureau).

Cass County’s educational attainment is very similar to national and regional averages (Table 2.5). The county has a lower percentage of high school graduates compared to both the state and the nation. However, in respects to the higher education Cass County has higher average number of bachelor degrees attainment, then North Dakota, Minnesota, and the nation. The number of graduate degree attainment is also quite respectable to the surrounding area and national trends.

	<b>U.S.</b>	<b>Minnesota</b>	<b>North Dakota</b>	<b>Cass County</b>
High School	28.6%	28.8%	27.9%	22.9%
Bachelors	15.5%	19.1%	16.5%	23.1%
Graduate	8.9%	8.3%	5.5%	8.2%

**Table 2.5.** High school and high education degree attainment (US Census Bureau).

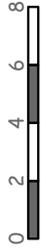
Cass County, like North Dakota and the U.S., has witnessed a shift from a mostly rural to mostly urban population (Figure 2.9). Cass County 86% urban population is roughly 7% greater than then the national average and over 30% higher than North Dakota's average. This greater urban population is also the result of increased in-migration to the county. In the 2000 Census 14.3% of those surveyed indicated they resided in a different state in 1995 and 10.7% resided in a different county in North Dakota. On the national average, only 8.4% surveyed indicated they were previously residing in another state and North Dakota only saw 10% new residents from different states. Of this ever increasing urban population only a very small percentage of Cass County’s residents were born outside the United States (3.2%), the majority of these residents were born in Europe, Asia, and Africa and the vast majority of the county’s ancestry (nearly 80%) are decedents of Germany and Norway.

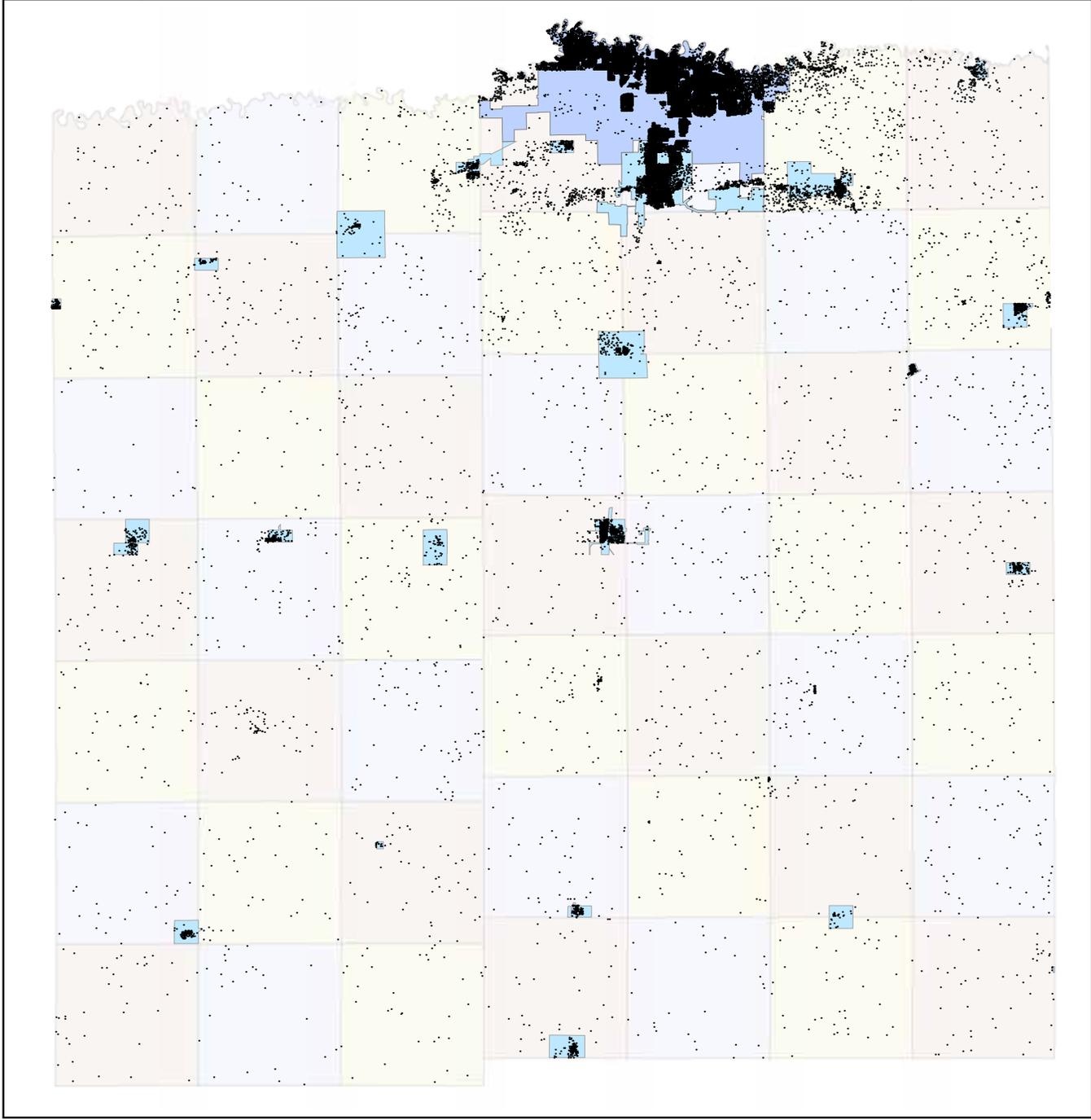
This shift to urban population is also evident in the industries and jobs in the county. The early pioneers settling the Red River Valley quickly discovered the regions rich and fertile soils and began transforming the natural grasslands into prime agricultural lands. The valley has historically had strong ties to agriculturally oriented operations; however Cass County has begun to diversify the industries and workers found in what still is considered the best soils in the world. Only 1.8% of Cass County’s industries are agricultural, compared to 8.2% for the state. The highest numbers are now found in education and health services, finance and real estate, and retail trade. The majority of

citizens in the county would be classified as having “white collar” jobs, the majority being managers and professionals (Table 2.6). The median income for Cass County is \$38,147 and the median family income is \$51,469. The county has higher percentage of residents living below the poverty level (10.1%) compared to the state (8.1%), but the county is roughly two points lower than national levels (US Census Bureau).

<b>OCCUPATION</b>	<b>Total</b>	<b>Percent</b>
Management, professional, and related occupations	23,530	33.4
Service occupations	10,306	14.6
Sales and office occupations	21,680	30.8
Farming, fishing, and forestry occupations	428	0.6
Construction, extraction, and maintenance occupations	5,811	8.2
Production, transportation, and material moving occupations	8,730	12.4

**Table 2.6.** Listed occupation for Cass County residents (US Census Bureau).

<p><b>Cass County County Profile</b></p>	<p><b>Population Distribution</b></p> <ul style="list-style-type: none"> <li>• One dot represents two people</li> <li> City Limit</li> </ul>	  <p>Miles</p>	
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**Figure 2.9.** Cass County's population distribution and density (Census 2000).

## Population Projections

Population projections allow past population trends to be extended into the future, giving a glimpse to possible demographic pictures for an area. However, because population projections depend on extending past trends into the future it creates a methodology perceived as much scientific as it is an art (Fargo-Moorhead Metropolitan Council of Governments; U.S. Bureau of the Census 1977). The following section calculates Cass County's 2010, 2020, and 2030 population projections, more specific projections for the county's incorporated cities and townships are available in third and fourth chapters.

Obviously for planning purposes possessing quantitative information about future demographics of an area allow the necessary steps to be established to account for the anticipated changes. The common solution to provide the data is using projections, often defined as the numerical outcome of a set of assumptions made about future trends, typically with consideration to past trends. However, for these projections to be accurate requires the predicted trends to actually occur. With this in mind, one must realize projections are based solely on past information and trends and any unforeseen changes occurring in the projection period can greatly change the actual outcome (U.S. Bureau of the Census 1977, 3).

Several characteristics of the methodology and study area greatly affect the quality of the projection, while not an exhaustive list these factors include: size, time, methodology, special populations, and policies. Larger areas, larger populations, shorter projection periods, and projections accounting for multiple variables all will likely have less deviation between the projected population and the actual future population (U.S. Bureau of the Census 1977, 4-9).

Keeping the previous information in mind several population projections will be provided using three different periods of historic data to project Cass County's population to 2030. Decennial censuses from 1900 to 2000 were used to calculate the projections, using three periods of time: 1900-2000, 1950-2000, and 1970-2000. Using a greater range of data sets helps to increase the accuracy of the projection as long as the current trends for an

area are reflected over the entire data set. For example, if an area has had high growth over the last 30 years, but before this had slow growth it would not be appropriate to use the population trends including the slow growth period.

Nine different models were used to calculate the population projection for Cass County: linear, exponential, modified exponential, linear regression, exponential regression, modified exponential regression, parabolic regression, gompertz, and logistic. Each period of time (1900-2000, 1950-2000, and 1970-2000) was calculated using each of these nine models. The mean absolute percentage error (MAPE) statistical testing was employed to determine the most accurate model for each of the three time periods by determining if the results were strongly influenced by outliers (Swanson, D.A. *et al.* 2000).

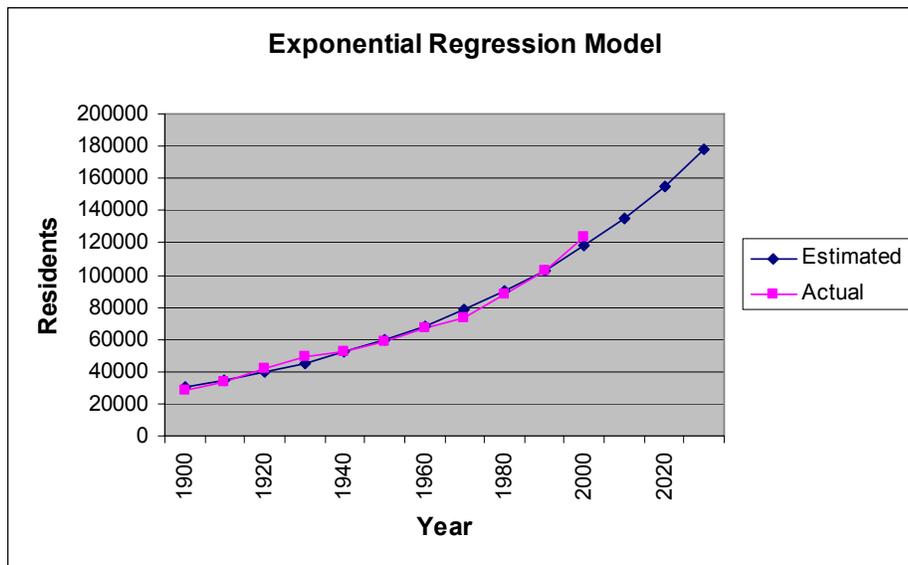
The first projection is based on decennial census data from 1900 to 2000 to calculate the population projection for Cass County to the year 2030. Based on the nine models, exponential regression was the most accurate with a MAPE of 3.24%. This model projected the 2010, 2020, and 2030 populations to be 135,000, 155,000, and 178,000 respectively (Figure 2.10).

The second projection using census data from 1950 to 2000 projected the county's 2030 population to be 200,000 with a MAPE of 1.08%. This projection used the population trends from a shorter period of time and exhibited a smaller associated error and larger projected populations than the projection using data from 1900 to 2000 (Figure 2.11).

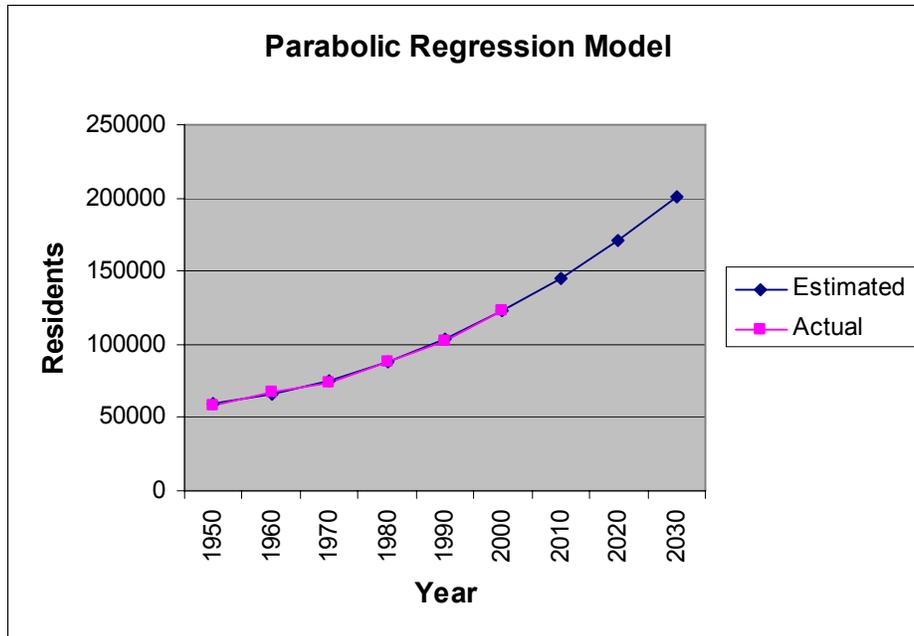
The final projection used the smallest set of data, but is a set which most accurately resembles Cass County's recent growth pattern. Examining Cass County's historical growth (Table 2.4) illustrates the county's growth has not been constant, but has followed a parabola or "U" shaped pattern of higher growth in the first part of the century, slower growth during the middle portion, and then increased growth again occurring in the last 30 years. Based on this pattern, the final projection uses only the population trends from last 30 years and projects the populations for 2010 at 146,000 residents, 2020 at 173,000

residents and found the highest 2030 population of the three tests with 205,000, but more importantly had the lowest associated error of 0.45% using an exponential model (Figure 2.12).

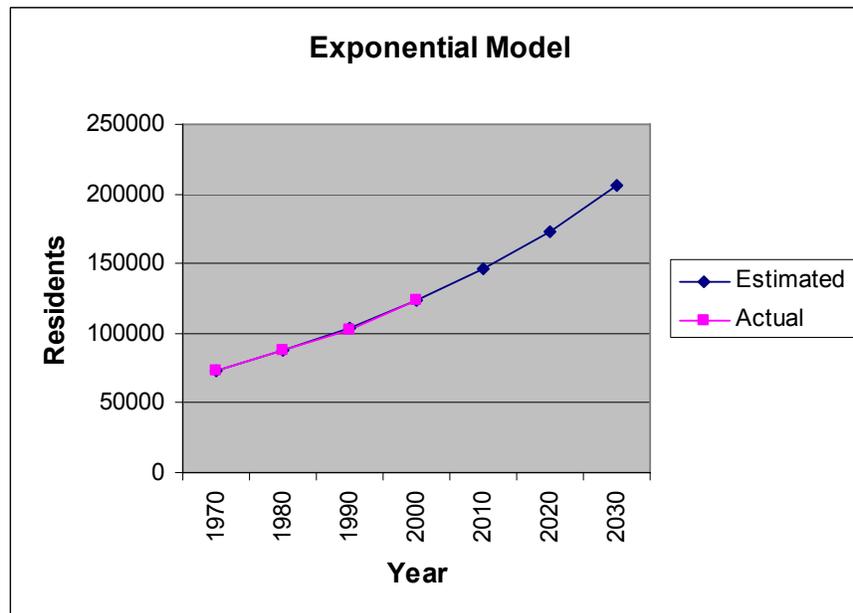
These projections were very closely duplicated in the 2003 report by the Bureau of Reclamation. The report used demographic modeling to project population figures for counties and cities in the Red River Valley, this cohort-component method used population, births, deaths, and net migration variables to project the population. This “estimate of most likely future population” for Cass County found a 2010 population of 147,500, 2020 population of 174,500, and 2030 population of 203,200 (Bureau of Reclamation 2003).



**Figure 2.10.** Population projection using decennial data from 1900-2000.



**Figure 2.11.** Population projection using decennial data from 1950-2000.



**Figure 2.12.** Population projection using decennial data from 1970-2000.

## ***Transportation***

### **Mass Transit**

The Metropolitan Area Transit System, MAT, is the public bus system serving Fargo, West Fargo, and Moorhead, Minnesota. The metro area's first public transportation began in the 1870s with horse drawn coaches; these were replaced with electric trolley cars during the first half of the 20<sup>th</sup> century. Bus service began in 1926 and in 1971 tax dollars were allocated to transit. The Fargo-Moorhead Council of Governments began management of the metro areas transit in 1984, marking the beginning of MAT. Fargo and Moorhead have since reclaimed independent control of their transit systems, but coordination and cooperation continues with the MAT system (MatBUS 2004).

The MAT provides 21 fixed routes throughout Fargo, West Fargo and Moorhead along with Paratransit service providing door to door service for those individuals unable to readily use the fixed routes. MAT has approximately 55 drivers operating 15 buses in Fargo and 12 in Moorhead on fixed routes along with eight paratransit vehicles. Fargo's ridership in 2003 was 617,027, a 38% percent increase from 2000 and even when the NDSU routes are disregarded the ridership has still increased 20%. Relating to this, MAT has recently started the U-Pass allowing students from the metro area colleges to ride any MAT bus for free. The universities pay a set fee for the service with the students benefiting from economical and convenient transportation and the cities on a whole benefiting from reduced traffic congestion and parking shortages (MatBUS 2004).

The Fargo Senior Commission also provides bus service throughout Cass County. This service focuses on transit for the elderly and disabled via one 26 passenger bus outfitted with a wheelchair lift. The bus follows a fixed route and time schedule, splitting the county into north and south routes, providing transportation to Fargo for Tower City, Buffalo, Page, Hunter, Gardner, Harwood, Casselton, Davenport, Kindred, and Leonard . The service is provided eight times monthly with an estimated annual ridership of 2,600.

## Railroads

Three railroad companies provide freight service to Cass County: Burlington Northern Santa Fe (BNSF), Red River Valley & Western, and Canadian Pacific (Figure 2.13). Burlington Northern Santa Fe operates lines in the northern half of the county, while Red River Valley & Western operates tracks in the southern half and Canadian Pacific has a short amount of tracks in the very southwest corner of the county.

Burlington Northern Santa Fe has the most miles of track in the county, 230 miles, with all the lines converging into the Fargo area. Red River Valley & Western currently uses 60 miles of abandoned BNSF's rail lines providing continued rail service in southern portions of the county.

One of the main uses of these rail lines is the transportation of agricultural products from the farm to different regional and national markets. Currently there are 20 different elevators throughout the county, some locations having multiple elevators for a total of 31 different elevators (Table 2.7)

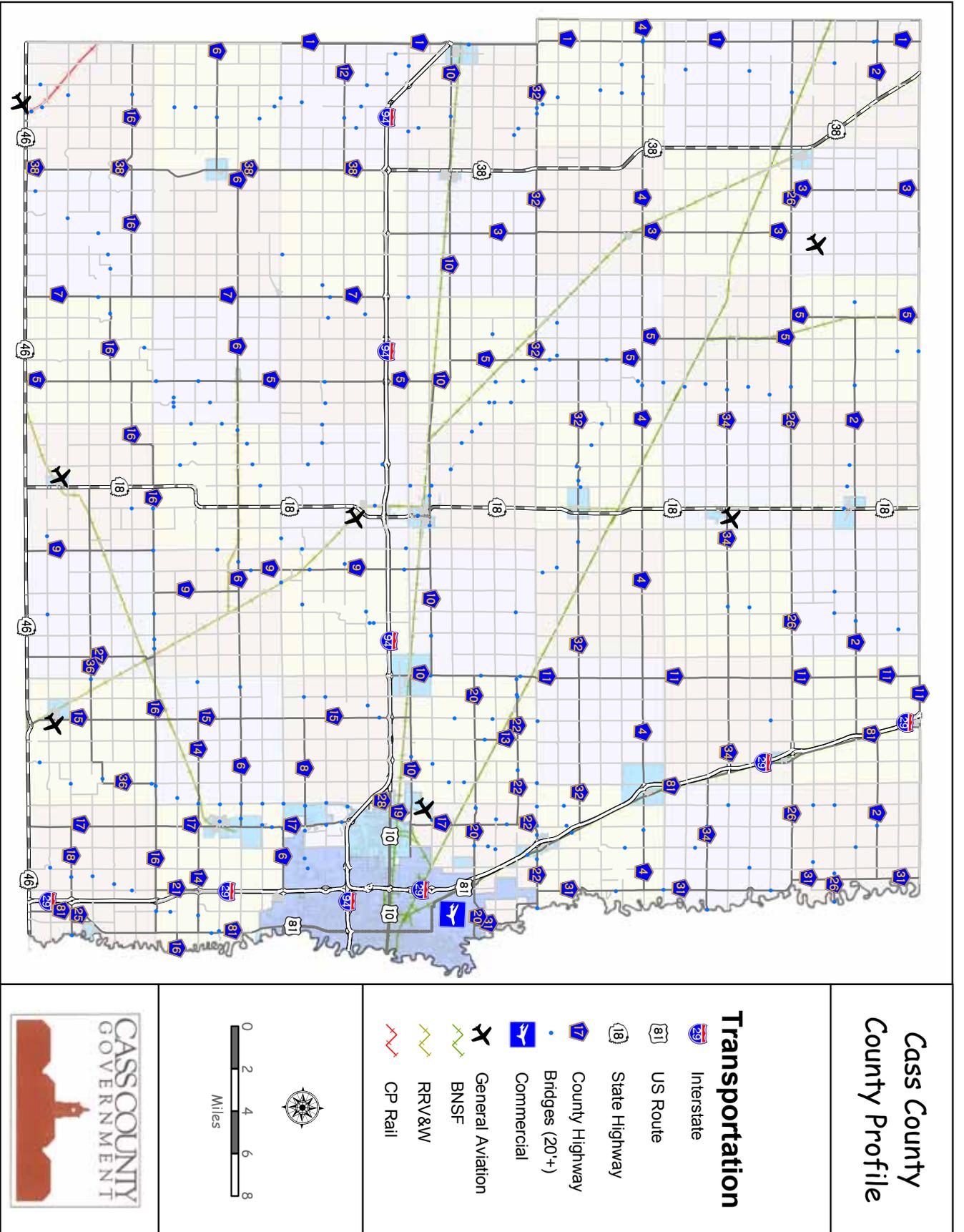


Figure 2.13. Cass County's transportation system.

<b>Elevator</b>	<b>City</b>	<b>Railroad</b>	<b>Size (Rail Cars)</b>	<b>Capacity (Buschels)</b>
ADM Benson-Quinn	Page	BNSF	50	766,000
ADM Edible Bean Specialties, Inc.	Casselton	BNSF	0	712,916
AGP Grain Ltd.	Casselton	RRVW	56	645,000
Anderson Seed Co. Inc.	Durbin	RRVW	50	368,000
Arthur Companies Inc.	Arthur	BNSF	25	1,069,000
Arthur Companies Inc.	Ayr	BNSF	99	1,400,000
Buffalo Farm Supply Inc.	Buffalo	BNSF	54	288,000
Buffalo Grain Co., LLC	Buffalo	BNSF	54	211,000
Busch Agricultural Resources Inc.	Amenia	BNSF	50	412,000
Busch Agricultural Resources Inc.	Grandin	BNSF	26	536,000
Busch Agricultural Resources Inc.	West Fargo	BNSF	39	2,035,000
Cenex Harvest States Co-Ops	Harwood	BNSF	10	204,000
Cenex Harvest States Co-Ops	Horace	RRVW	54	438,000
Cenex Harvest States Co-Ops	Kindred	RRVW	100	1,469,000
Cenex Harvest States Co-Ops	West Fargo	BNSF	54	977,000
Chaffee-Lynchburg Farmers	Lynchberg	RRVW	27	950,000
Chaffee-Lynchburg Farmers	Leonard	RRVW	50	1,072,000
Dahlgren & Co. Inc.	Fargo	BNSF	0	550,000
Embden Grain Co.	Embden	RRVW	10	583,000
Evergreen Grain Co.	Tower City	None	0	297,000
Harvest States Sunflower	Grandin	BNSF	27	3,058,500
Hunter Grain Co.	Gardner	BNSF	0	434,000
Hunter Grain Co.	Hunter	BNSF	54	1,462,000
Lockhart Elevator Co.	Grandin	BNSF	0	75,000
Peterson Farms Seed Inc.	Harwood	BNSF	1	173,000
Prosper Farmers Cooperative	Prosper	BNSF	54	1,125,000
Red River Commodities Inc.	Fargo	BNSF	0	1,746,000
Roman Meal Milling Co. Inc.	Fargo	BNSF	1	188,600
SB&B Foods Inc.	Casselton	RRVW	1	50,000
Unity Seed Co.	Casselton	RRVW	1	100,000
Valley Grain Service	Casselton	RRVW	1	150,000

**Table 2.7.** Size and location of Cass County’s elevators (UGPTI).

## Aviation

Cass County has seven general aviation public airports and one commercial airport along with numerous private airports (Figure 2.13). The seven general aviation airports are located in Page, Arthur, Casselton, West Fargo, Kindred, Leonard, and Enderlin. The county’s only commercial airport, Hector International, is located in Fargo (North Dakota Aeronautics Commission 2003).

The West Fargo Utility Airport located north of the city is the busiest airport in its category in North Dakota. The airport is owned by the city and operated under an independent airport authority. The airport currently has one runway with 10 hangers and a pilot-controlled airfield lighting system as its only navigational aid (City of West Fargo 2000).

Hector International Airport serves as a primary commercial airport for southeastern North Dakota, northeastern South Dakota, and western Minnesota. The airport is located in the northern portion of Fargo and was established in 1931 with a donation of land by Martin Hector. A passenger terminal was opened in 1986 providing boarding to the all-jet fleet serving the airport using three runways. The number of passengers increased 18.4% between 1990 and 2000, with 234,667 passengers flying into the airport in 2000. Total cargo in tons in 2000 was 54,740, a nearly 600% increase from 1993. The airport authority has projected the number of passengers, tons of cargo, and number of based aircraft will continue to grow over the next 20 years (Fargo Airport Authority 2002).

### Road Network

Cass County’s road network includes roads of varying sizes, functions, and conditions built and maintained by several agencies totaling approximately 4,200 miles of roads (Table 2.8, Figure 2.13). The county also has over 500 bridges throughout the county with 262 bridges 20 feet in length or longer, of these nearly 83% of the bridges are considered functionally adequate (Figure 1.20). These roads and bridges combine to supply the internal and external transportation links for people, goods, and services.

<b>Jurisdiction</b>	<b>Total Miles</b>	<b>Percent</b>
Interstate	219.35	5.2%
State	134.97	3.2%
County	661.62	15.8%
Township	2598.26	62%
Municipality	526.72	12.6%

**Table 2.8.** Break down of Cass County’s road network.

## Federal and State

The county's major transportation needs are provided by the Federal Interstate Highways providing east-west as well as north-south routes via Interstate 29 and 94 (Figure 2.13). The intersection of the two highways in Fargo provides citizens and travelers easy access to the metro area and its convenient link to the national road grid makes the area appealing as a distribution point for goods produced in the area. The 130 miles of State Highways provides residents of the county and region high quality transportation routes. These routes provide residents, travelers, and businesses easy access to various regional trade centers.

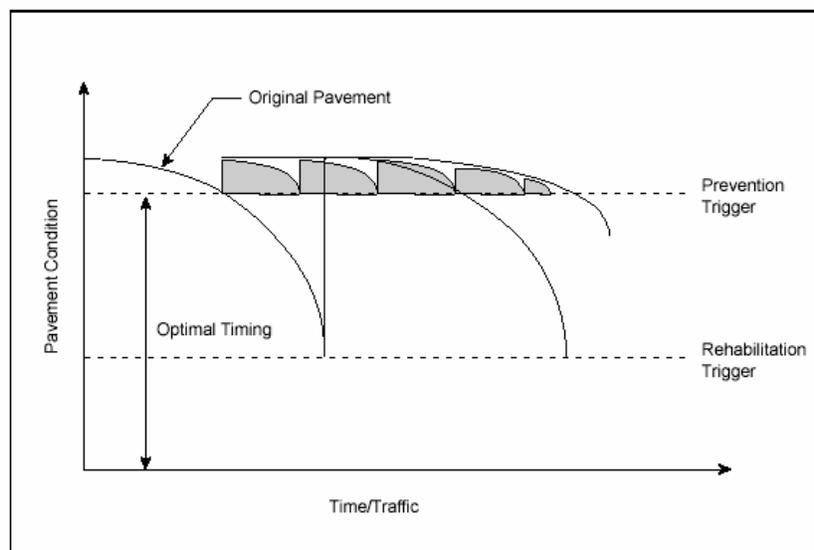
## County Roads

There are over 650 miles of county roads covering the 1,700 square mile area (Figure 2.13). Nearly half (321 miles) are hard surface, consisting mainly asphalt roads with a limited amount of concrete roads, with the other 327 miles remaining gravel. These bridges and roads provide the necessary transportation network needed for farm to market transport and for residents traveling to work, school, shopping and recreation.

The Cass County Highway Department's mission is to provide and maintain an efficient, safe, environmentally sensitive, and cost effective county transportation system to effectively meet citizen's needs for personal mobility and movement of goods consistent with the importance of transportation. The highway department employs 30 full time workers and approximately a dozen seasonal workers to meet maintenance, construction, and design needs of the county road network.

The county highway department has several sources of funding to meet its budgetary needs. The county has the ability to use special assessment districts, but to date has not exercised this option and relied only on a 10 mill levy of county taxes and state and federal funding. Limited funding and protecting the county's current infrastructure investment has prompted the county to use a pavement preservation protocol in determining the timing for maintenance and rehabilitation of county roads.

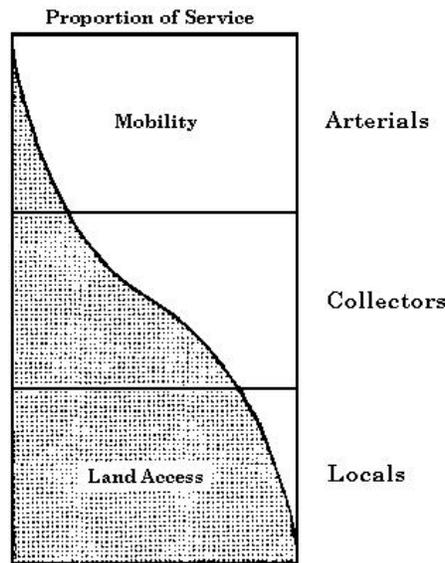
This philosophy is a change from the traditional reactive maintenance approach to one proactively addressing issues in road conditions while they are still structurally sound. A traditional rehabilitative approach allows the original pavement to deteriorate to a point of fair to poor condition for ride and structural quality. By this point, however, the structural integrity has been stressed to a level requiring more extensive and costly repairs to restore the road quality. Pavement preservation follows a proactive approach aimed at protecting and extending the initial investment and minimizing the disruption caused by major construction projects through use of timely applications of surface treatments (Figure 2.14). A variety of low-cost and frequently applied techniques and application are available depending on the situation, all protecting the existing structural capacity. The end result is a longer lasting road, requiring less extensive maintenance and investment (Davies and Sorenson 2000).



**Figure 2.14.** The results of effective and timely surface applications on pavement conditions and service life.

The main downside of using preventive maintenance faced by Cass County is a reduction in the amount of funding available for the construction of new roads. Under this philosophy, maintaining the current investment has the highest priority, as a result funding initially is allocated for preservation projects leaving little left for new construction of hard surface roads or expanding existing hard surface roads.

In order to meet the Highway Departments mission of safe and efficient roads requires proper planning of road locations and access points. This is most critical in those areas surrounding the Fargo Metro area because of increased traffic needs and to establish a suitable road network for areas that will one day be urbanized. The metro area uses a hierarchical road network to safely and efficiently distribute the traffic needs of the city's citizens. This system uses an inverse relationship between level of service and land access. The large roads limited access to the surrounding land allows traffic to flow more easily and at greater speeds, where as the local roads mainly provide access to land and as a result their mobility is reduced (Figure 2.15). Table 2.9 provides the general information and definitions for the five road types found in an urban functional classification system.



**Figure 2.15.** Relationship between land access and mobility for the functional classes (FHWA 1989).

<b>Urban Functional Classification System</b>	
<b>Interstate and Freeways</b>	
Interstates and freeways are similar to major arterials in their characteristics with one major exception. Access to adjacent land is prohibited, and vehicle access is limited to specifically designated entrances and exits. The focus of this system is to provide the maximum level of mobility.	
Level of Service (LOS)	This system, ideally, should function at a minimum level-of-service (LOS) providing a stable traffic flow and average running speeds of 55 m.p.h.
Access	Access is allowed only at specifically designated points of entrance and exit. These points of access will be major public streets. Direct access to adjacent land is prohibited on the freeway system.
<b>Major Arterials</b>	
Definition	The system of streets where traffic movement is the primary function.
Character	Major arterials serve the major centers of activity of the urbanized area, the highest traffic volume corridors, the longest trips and the highest proportion of vehicles to the length of road. Trips on this system may be either inter or intra-regional in nature.
Level of Service (LOS)	This system, ideally, should function at a minimum LOS characterized by stable traffic flow and average running speeds equaling 45 m.p.h.
Access	Access should be allowed only at intersections with other public streets, or major driveways carrying volumes approximating intersection streets.
<b>Minor Arterials</b>	
Definition	The system of streets where traffic movement is the primary function, but land access is a secondary function and less controlled than for major arterials.
Character	Minor arterials interconnect with and enhance the major arterial system. This system carries travel of moderate length at a lower level of service than major arterials. Travel is strictly intra-regional in nature. More emphasis is placed on land access with a corresponding drop in travel mobility.
Level of Service (LOS)	This system, ideally, should function at a minimum LOS characterized by stable traffic flow and average running speeds equaling 45 m.p.h.
Access	Ideally, access will be confined to intersecting public streets, major driveways carrying volumes approximating volumes on intersecting streets, and some driveways carrying lower volumes on an individually evaluated basis.
<b>Collectors</b>	
Definition	The system of streets where traffic mobility and land access are of equal importance.
Character	This system provides a bridge between the arterial systems and local streets. Traffic from local streets is collected and transferred to the arterial system.
Level of Service (LOS)	Ideally, this system should function at an LOS providing a stable traffic flow at average running speeds equaling 35 m.p.h. This should be possible even with land access being of equal importance to mobility. In addition, traffic flow may be affected by signals and stop signs at intersections with collectors and arterials.
Access	Land access and travel mobility equally important.
<b>Local Streets</b>	
Definition	The system of streets where land access is the primary function.
Character	This system primarily provides access to individual property and provides service over relatively short distances.
Level of Service (LOS)	This system offers the lowest level of mobility with speeds generally equaling 25 m.ph.
Access	Land access is the greatest focus on this network of roads.

**Table 2.9.** General characteristics of the FHWA urban classification system (MORPC 2004).

Historically, the section and quarter section lines develop into major and minor arterial as rural areas become urbanized. However, until these areas fully develop the section lines often function more as collectors and local streets, providing the access to the rural farmsteads and subdivisions. The problem faced by the county and the cities absorbing these rural areas is transitioning from a rural to an urban transportation network. While, the collector and local streets are naturally created during the platting and subdivision process the arterials roads require more long term planning so the section and quarter section lines can be transformed into the higher service roads required by urban environments. This long term planning consists of corridor preservation of the section and quarter section lines, limiting access to these roads, and striving to make rural development compatible with the future road system to reduce the disruption to the development as it urbanizes. Neglecting corridor preservation for future roads can cause costly land acquisition for the tax payers and can severely prevent the ability to build the ideal road network.

### Township and Municipality

Most township and municipality roads are characterized as having the lowest mobility service but provide the greatest access to land and property. Township roads comprise the largest portion of the county's road network and provide the final stage of transportation between the larger federal, state, and county roads and the rural communities, lands, farms, and homes (Figure 2.13). The vast majority of these roads remain gravel and are usually only paved when upgraded to county roads or adopted by municipalities. The 530 miles of municipality owned roads meet the small scale transportation needs found within the county's cities. The bulk of these roads are paved, with the highest percentage of paved roads found in the larger communities and metro area.

## **Land Use**

Cass County contains over 1,131,000 acres (1,767 miles<sup>2</sup>) of total land area, covering a nearly square area roughly 44 miles wide by 42 miles high. The county has over 52,000 parcels of land totaling 1,124,000 acres. Four general land use categories will be used to classify land use in the county, listed in ascending order of urbanization: agricultural, rural non-farm, small city, and metropolitan area (Table 2.10, Figure 2.16).

<b>Land use</b>	<b>Acres</b>	<b>Percent</b>	<b>Parcels</b>	<b>Mean Parcel Size Acres</b>
Agriculture	1,047,104	93.1	11,779	88.89
Rural-Non-farm	35,564	3.2	2,678	16.51
Residential	31,595	2.8	2,451	12.89
Commercial	2,760	0.2	167	16.5
Mix	1,209	0.1	60	20.16
Small Cities	14,377	1.3	5,554	2.58
Metropolitan Area	27,706	2.5	32,527	0.85
<b>Total</b>	<b>1,124,753</b>	<b>100.0</b>	<b>52,538</b>	<b>21.4</b>

**Table 2.10.** Total acreage, parcels, and average parcel size for Cass County's land use.

# Cass County County Profile

## Land Use

- Metro
- Small City
- Non-farm Residential
- Non farm Mix
- Non-farm Commercial
- Agriculture

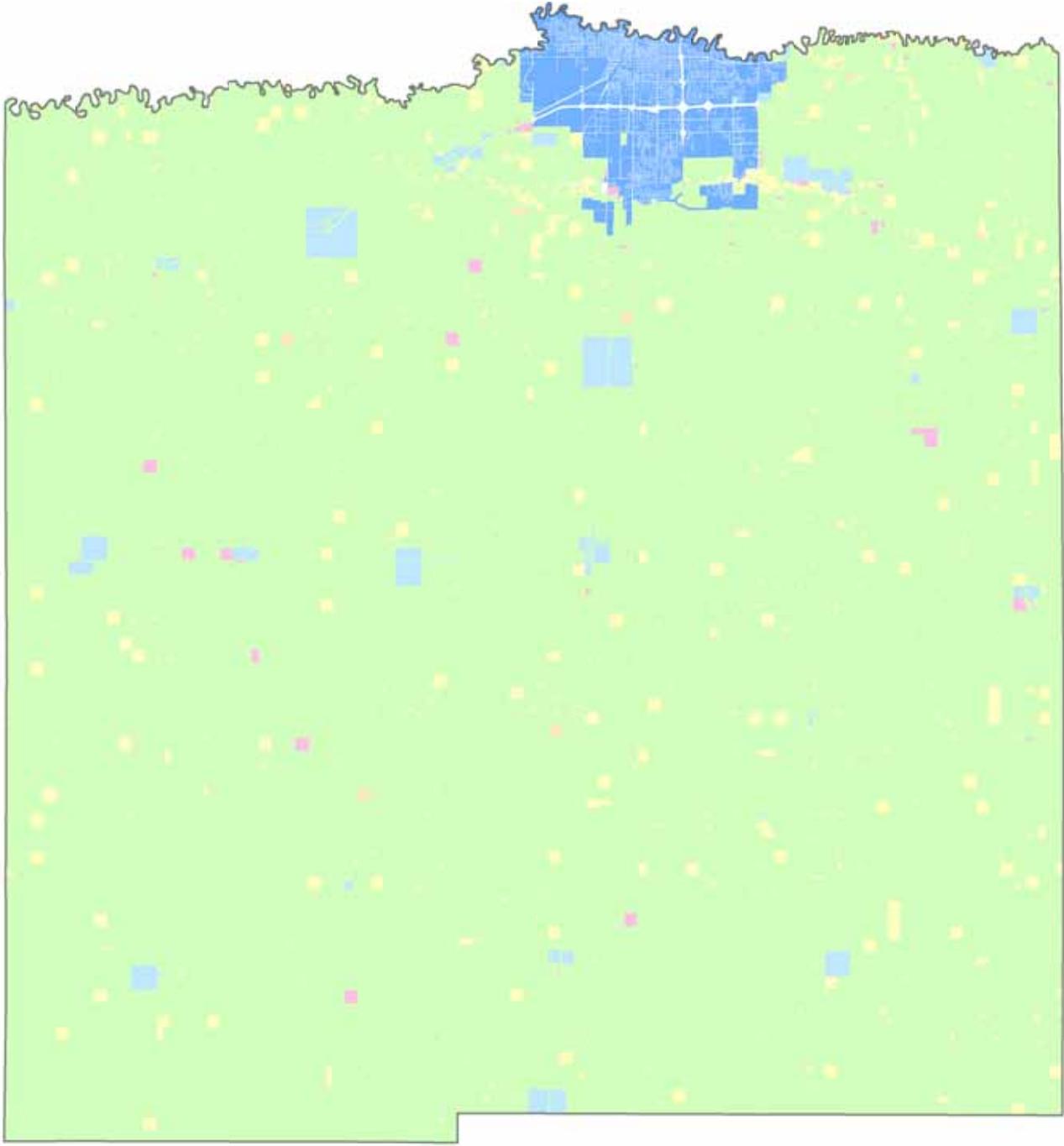
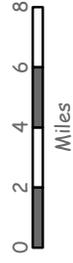


Figure 2.16. Cass County's land use area and location

## Agriculture

Cass County began as a center for bonanza farming in the late 19<sup>th</sup> century because of the areas rich soils (Figure 2.17) deposited from Glacial Lake Agassiz. The majority of land in the county is still used for crop production, specifically soybeans, wheat, and barley, yet farms have dramatically changed from the first settlers. The introduction of new farming technologies and equipment allows larger pieces of land to be farmed more efficiently. These changes have reduced the number of farms in the county, but the average size of farm has nearly tripled since 1890, from 403 to over 1,100 acres (Table 2.11).

	1987	1992	1997	Total Difference	Percent Difference
Total Farms	1,183	1,004	919	-264	-22.3%
Farmland (acres)	1,058,821	1,070,528	1,067,667	-8,846	-0.01%
Average Size (acres)	895	1,066	1,162	+267	+129.4%

**Table 2.11.** Cass County's inverse relationship between number and size of farms (U.S. Department of Agriculture 1997).

Agricultural land use (and vacant land) has and continues to be the predominate use in Cass County, despite the loss of agriculture lands over the years. For the purposes of this discussion agricultural lands are any parcels having no residential or commercial structure value and outside of all incorporated city limits. Using these criteria, the county has 1,047,104 acres of agricultural lands made up of nearly 12,000 parcels; the 1997 Census of Agriculture calculated 1.067 millions acres of agriculture land in the county. The number of farms in the county has continually declined, while the average size of farms continues to increase (Table 2.11). The types of commodities harvested continue to fluctuate over the years (Table 2.12), while most livestock figures have declined (Table 2.13) (U.S. Department of Agriculture 1997).

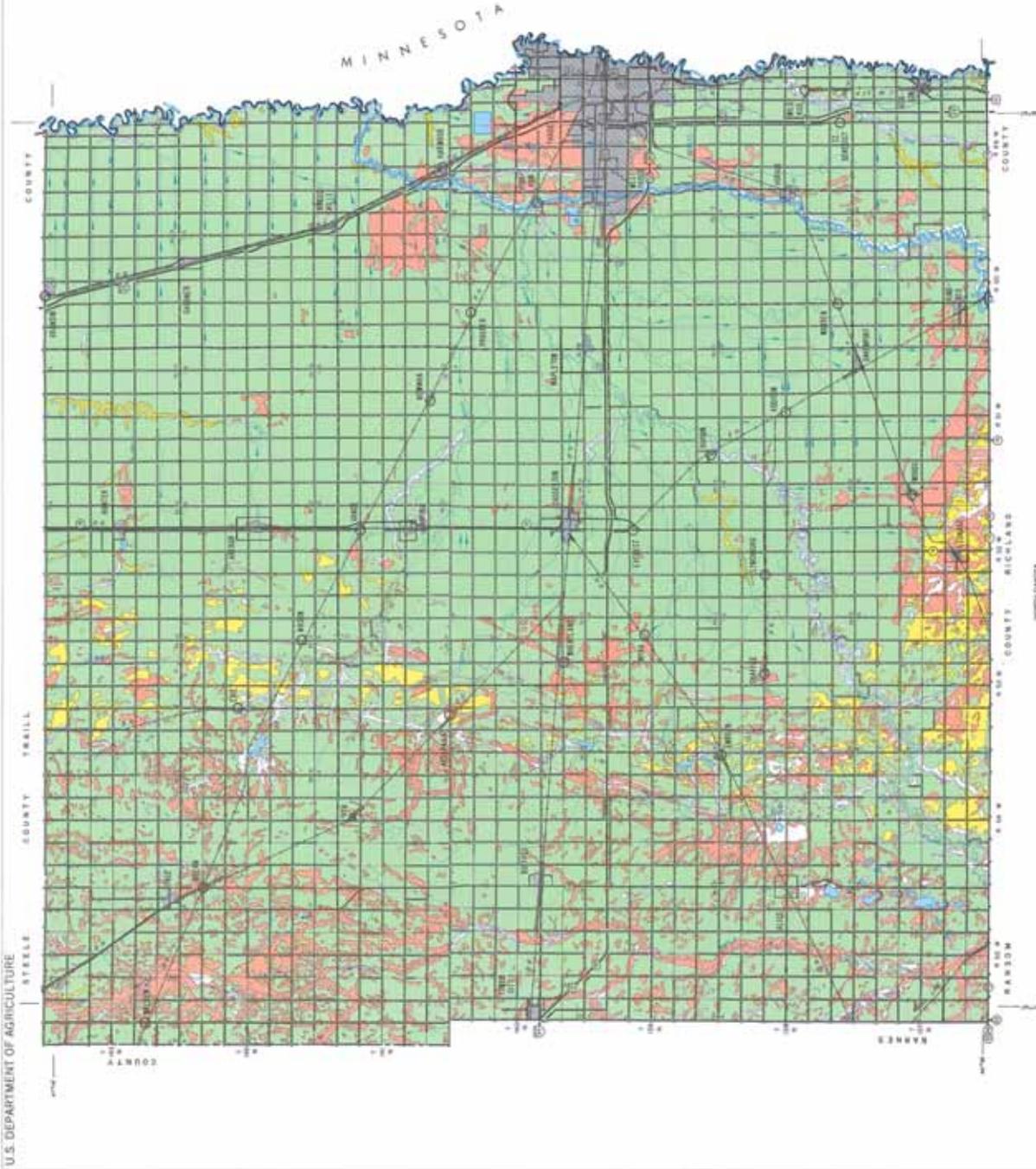


Figure 2.17. Location of Cass County's important farmland (Soil Conservation Service).

<b>Harvested commodities (acres)</b>	<b>1987</b>	<b>1992</b>	<b>1997</b>
Corn, Grain, or seed	66,454	82,088	69,562
Corn, silage, or green chop	3,274	3,400	2,991
Wheat	300,861	410,602	405,205
Barley	158,202	110,384	50,737
Oats	4,177	3,774	1,443
Sunflower seed	36,032	57,704	42,881
Hay-alfalfa	14,514	14,022	12,507

**Table 2.12.** Total acreage of harvested commodities in Cass County (U.S. Department of Agriculture 1997).

<b>Livestock inventory (number)</b>	<b>1987</b>	<b>1992</b>	<b>1997</b>
Cattle and calves	26,512	20,822	18,476
Beef cows	7,332	6,358	6,599
Milk cows	900	672	500
Hogs and pigs	23,236	32,963	13,380
Sheep and lambs	7,985	7,604	1,789
Broilers and chickens (sold)	1,196	575	1,325

**Table 2.13.** Total number of livestock in Cass County (U.S. Department of Agriculture 1997).

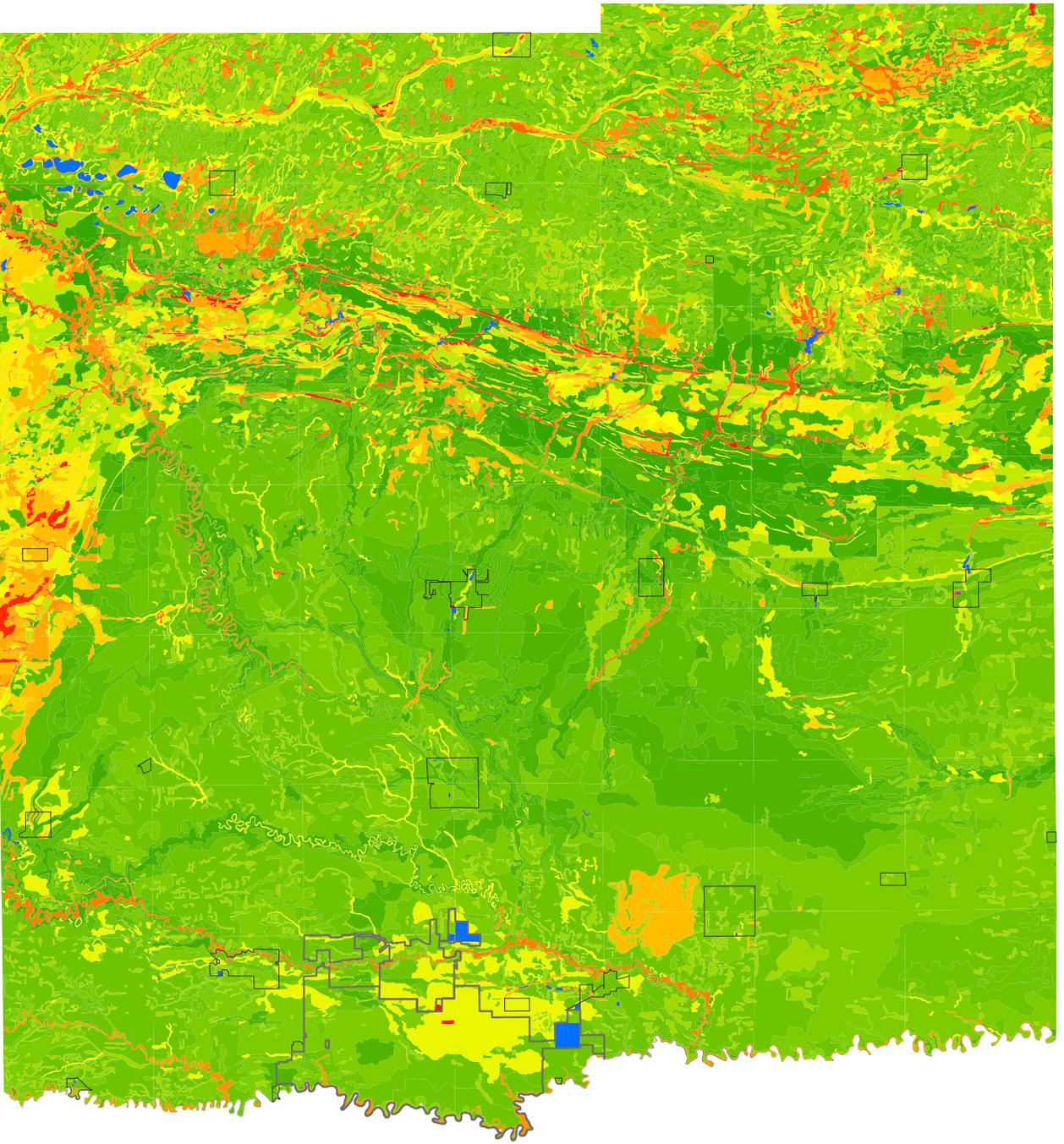
The productivity of the Red River Valley’s soils (Figure 2.18) results in these lands having generally higher values than land outside the valley, but the value has varied over the years as result crop prices and interest rates. Land values surrounding the Fargo/West Fargo metro area have greatly been affected by encroaching development; making subdividing and development of farm land much more profitable than farming. This premature development can result in accelerated development and land use conflicts (Figure 2.19). Ideally, development should progress outward from the urban fringe, but these premature/leap frog developments create gaps between the urbanized city and the new developments. The land found between the urban fringe and the new development will likely continue to be used for agriculture, the result is islands of residential development surrounded by agricultural farmland. Large and loud equipment, chemical spraying, long work hours, dust, odors, increased truck traffic, and other normal farming practices can all cause problems or frustrations for the residents living in these developments. Farmers are also impacted with the increased traffic on what was “rural” roads making the movement of their equipment and product more difficult, trespassing, increased vandalism to equipment and buildings, damage to crops from horses, bikes, people, and motorized vehicles, damage to crops, drain tiles, and ditches from the storm

water run off generated by the developments, needing to change or modify chemical application, nuisance complaints from residents, and increased pressures to sell land to developers. The efficiency of farming is also reduced by the number of these leap frog developments. As farm size has increased over the years so has farm equipment size, these leap frog developments reduce the large tracts of land and also make accessing surrounding lands more difficult, making it the equivalent of mowing a residential lawn with an industrial golf course tractor. In light of this, orderly development restricting leap frog and premature development and promoting smart growth development out from the urban fringe reduces these land use conflicts and also gives the outlying land owners a better time line of future land use changes.

### Farm and Ranch Subdivision Surveys

Cass County mailed 150 surveys (Appendix B) with a labeled post paid envelope to establish if farmers and ranchers were negatively impacted by the introduction of rural subdivisions. These targeted surveys were sent to parcels with 20+ acres, within 0.75 miles of all unincorporated 10+ lot subdivisions in Mapleton, Stanley, Pleasant, Harwood, Reed, Raymond, and Barnes townships. These surveys excluded all property having any commercial or residential structures to limit the responses to only farmers and ranchers. The surveys attempted to gauge agricultural landowners' feelings and sentiments towards rural subdivisions and how their introduction has impacted them.

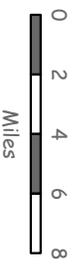
Fifty-two surveys were completed and returned by farm owners/operators, producing a respectable response rate of 34%. The lower response rate could be attributed to the surveys being mailed during the spring planting season and as the result of the surveys mailed to the land owners and not the actual farm operators, resulting in some surveys not reaching the intended recipients. The most frequent complaints about the subdivisions were trash or litter on farmland, crop trampling, and vandalism or theft of property or equipment. Of the respondents owning land both near and far from subdivisions, 55% felt these problems were more common with land near subdivisions. Thirty-four percent of respondents felt the subdivision has created more problems and issues, compared to only 12% who indicated the subdivision has made a better experience.



**Cass County  
County Profile**

**Farmland  
Productivity**

- Farmland Productivity
- 0 - 20
  - 21 - 40
  - 41 - 60
  - 61 - 80
  - 81 - 100
  - Water



**Figure 2.18.** Productivity of Cass County's soils (USDA).

# FARMING ON THE EDGE

## Sprawling Development Threatens America's Best Farmland

### North Dakota

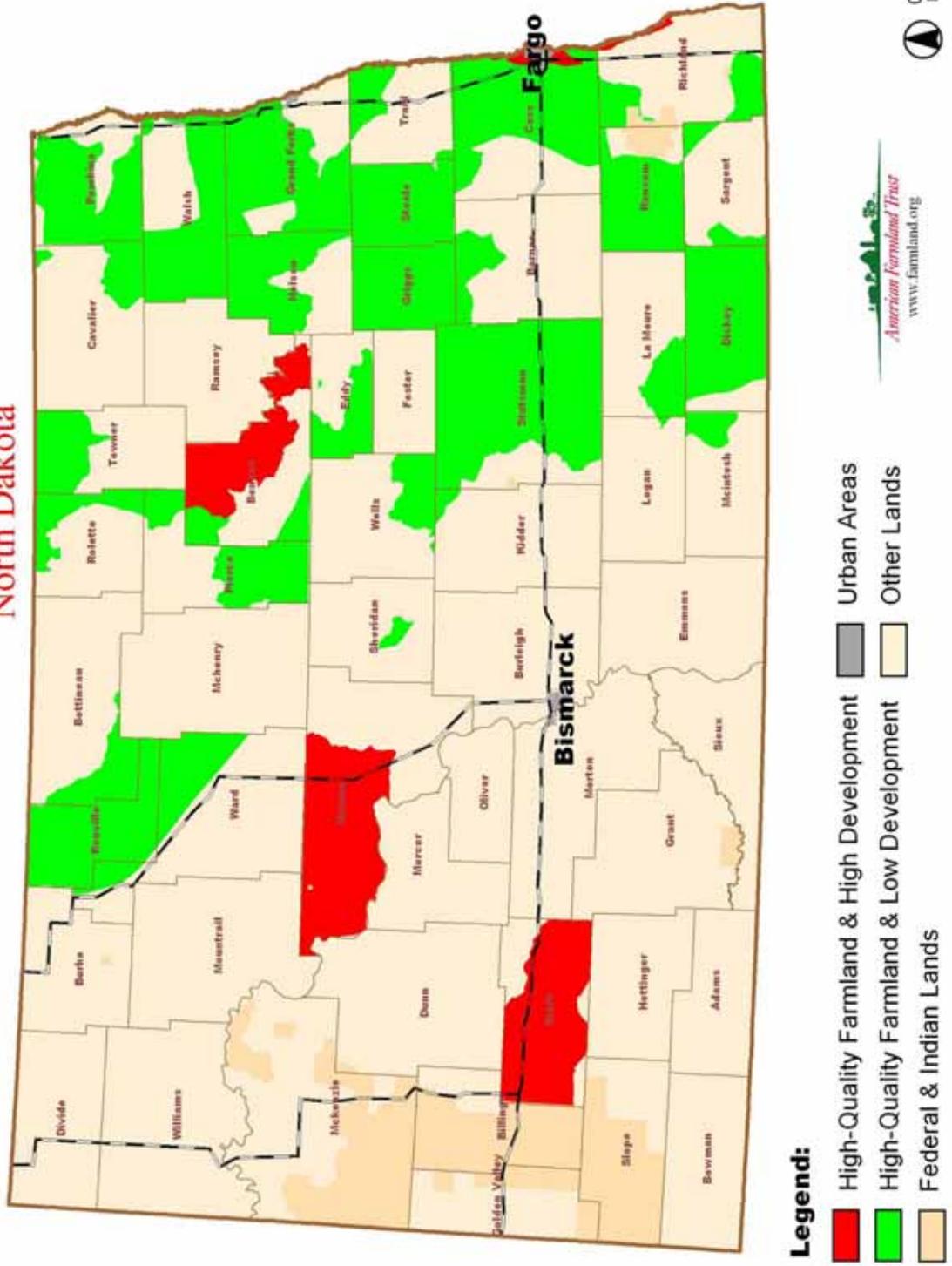


Figure 2.19. Location of farmland impacted by sprawling development (American Farmland Trust).

## Rural Non-Farm

Rural non-farm is Cass County's second largest land use with over 35,000 acres. Rural non farm is defined as all parcels outside of all incorporated city limits, which have a residential or commercial structure. While Cass County is the most urbanized of all North Dakota counties, it is also the only county to have an increased number of rural residents between the 1990 and 2000 U.S. Census. The county has witnessed this trend in rural households which usually consist of large lots with limited urban services. The rural areas relatively cheaper lands and looser ordinances allow developers to create large lots which would not be feasible within the metro area and the lower taxes and cheaper land also allow new home owners the luxury of large lots with low density.

## Subdivision Services

These type of rural non-farm leap frog developments cause land use conflicts (previously outlined in the agriculture land use section), but also their lack of adequate services can create dissatisfaction and increased costs for the residents. The large rural subdivisions often cater to residents moving from the metro area, but seldom include the same amenities found within the municipalities; gravel roads, open ditches, on-site septic systems, and private wells are often commonplace in these developments. The growing share of these transplanted urban residents maintain attitudes about their new neighborhoods based on their previous established experiences living in an urban area. The result is they quickly become frustrated by the potholes, dust, dirt, and mud from the gravel roads, the standing water in the ditches, the quality and quantity of their well water, and the effectiveness of their on-site sewer system.

Often unbeknownst to these owners is the reality that their subdivision roads are often the property of their homeowners association, making the property owners responsible for the costs of maintaining the roads until they are annexed into a city. These owners feel it should be the county's or township' responsibility to maintain or rebuild the roads to urban standards, not realizing their lower taxes equate to fewer services provide by the county. Investigating taxes of three comparable homes located in City of Fargo (Table

2.14), and City of West Fargo (Table 2.15), and Barnes Township (Table 2.16) shows the disparities between the taxes paid for by rural resident, especially those paid for road maintenance and improvements. The result of lower taxes collected and the county's priority to maintain the current county roads leaves little possibility for maintenance or reconstruction of roads in these rural subdivisions. In the cases where the township do own and maintain the roads their undersized funding does not allow the same level of service found in urban areas. The end result for the residents is either waiting until the properties are annexed into a city and pay the special assessments, create their own assessment district to pay for road improvements, or live with the roads as-is.

<b>OakCreek-Fargo</b>	
<b>Assessed value</b>	<b>\$249,000.00</b>
County (Minus roads/bridges)	\$613.47
County Roads and Bridges	\$114.85
Vector Control District	\$11.21
Soil Conservation District	\$4.59
Garrison Diversion Conservancy District	\$11.21
State Medical School	\$11.21
Fargo School District	\$3,587.85
Southeast Cass Water Resource District	\$56.03
City of Fargo	\$674.99
Fargo Park District	\$366.74
City of Fargo Specials	\$2,351.74
Drains	\$22.41
<b>Total</b>	<b>\$7,826.29</b>
<b>Specials break down</b>	
Paving	\$1,269.13
Signals	\$60.91
Water main	\$205.38
Sewer	\$117.03

**Table 2.14.** Taxes paid on a \$249,000 home in OakCreek Subdivision-Fargo.

<b>Charleswood-West Fargo</b>	
<b>Assessed value</b>	<b>\$249,100.00</b>
County (Minus roads/bridges)	\$613.75
County Roads and Bridges	\$114.90
Weed Control District	\$26.34
Vector Control District	\$11.21
Soil Conservation District	\$4.60
Garrison Diversion Conservancy District	\$11.21
State Medical School	\$11.21
West Fargo School District #6	\$2,847.56
Southeast Cass Water Resource District	\$56.05
City of West Fargo	\$947.58
West Fargo Park District	\$296.50
City of West Fargo Specials	\$1,960.50
Drains	\$278.45
<b>Total</b>	<b>\$7,179.86</b>
<b>Specials break down</b>	
Paving	\$520.24
Signals	\$74.97
Sewer and Water	\$493.68
Storm Sewer	\$72.62

Table 2.15. Taxes paid on a \$240,100 home in Charleswood-West Fargo.

<b>McMahon Estates-Barnes</b>	
<b>Assessed value</b>	<b>250,000.00</b>
County (Minus roads/bridges)	615.94
County Roads and Bridges	115.31
County Park District	11.25
Weed Control District	26.44
Vector Control District	11.25
Soil Conservation District	4.61
Garrison Diversion Conservancy District	11.25
State Medical School	11.25
West Fargo School District #6	2,857.73
Southeast Cass Water Resource District	56.25
Barnes	131.96
Drains	395.79
<b>Total</b>	<b>4,249.03</b>

Table 2.16. Taxes paid on a \$250,000 home in McMahon Estates Subdivision-Barnes Township.

The lack of slope in the Red River Valley also makes it difficult to achieve proper drainage with use of open ditches. To meet the county standards for slope and ditch grade can require deep and wide ditches. This can make yard maintenance difficult, as well as create an unappealing feature within a subdivision. Proper drainage requires accurate surveying and construction of the ditches, deviating from this can quickly create drainage problems for the residents resulting in standing water. Improper installation of culverts and landscaping and infrequent ditch maintenance by individual lot owners can create drainage issues for the entire subdivision; fixing these problems can not only be costly, but difficult for the entire subdivision to agree to and pay for these costs.

The use of on-site septic systems and private wells can provide initial access to water and sanitary waste disposal, but their use in large subdivisions can create long term problems for the residents. On-site septic systems are only expected to last 20-30 years when properly installed and maintained. Several previous large subdivisions initially using on-site septic systems were required to install a central sewer system following the rapid failure of their septic systems. Similarly, the use of private wells can provide access to potable water, but this water source might not always be the best long term option. The amount of ground water in Cass County is quite limited; using private wells can result in issues with the quality and quantity of water. Expensive and unexpected costs occur when these wells no longer produce adequate water, requiring home owners to pay for the installation of a central water system. The use of both on-site septic and private wells might be sufficient for small-scale rural developments, but the long term use of these systems for large rural development can create dissatisfaction by residents accustomed to urban services, create hardships when they no longer adequately meet the needs of the subdivision, as well as often providing only a short-term solution.

Developments using on-site septic and private wells require the use of large lots needed for the drain fields and wells. However, if the development decides to retrofit the subdivision for urban service these large lots now dramatically increase the costs to the owners by the need to run greater lengths of water and sewer mains through the subdivision. In the cases where the developments are annexed their properly functioning

private sewer and water system is often prematurely replaced with public services. Both scenarios result in large expenses for homeowners when urban services are brought into a rural subdivision previously using private sewer and water systems.

### Rural Subdivision Surveys

Cass County mailed 918 surveys to residents of rural subdivisions in the spring of 2004 to gauge their likes and dislikes about their subdivision. These surveys were employed to help determine if the services provided to previously established rural subdivisions were meeting the needs of the county citizens and what changes would improve rural subdivisions.

The surveys (Appendix C) were sent to all properties having a residential structure located in a 10+ lot subdivisions in the unincorporated areas of Mapleton, Stanley, Pleasant, Harwood, Reed, Raymond, and Barnes townships. These criteria resulted in 56 eligible subdivisions, accounting for 91.8% of the county's 10+ lot subdivisions, 92.7% of the county's targeted audience, and 80% of all rural subdivisions residents. This anonymous survey asked recipients to disclose information about their previous residence, the characteristics of their subdivision, urban-type services they miss, their dislikes of the subdivision, and rating of the roads, ditches, and subdivision.

The county received back 568 completed surveys resulting in over a 60% return rate and considering the survey was sent to a high percentage (92.7%) of the targeted audience the county feels confident the results of the survey accurately represents the targeted audience (546 respondents would be required to achieve a 4% confidence value at 99% confidence level). The complete results of the survey can be found in Appendix C, but the most interesting results will be summarized within this section. Roughly 83% of the respondents indicated they previously lived in the FM metro area and the majority of respondents previously residing outside of Cass County lived in a city larger than 15,000 people. While these residents now live in a rural subdivision they will likely maintain attitudes about their new neighborhoods based on their previous established experiences

while living within an urban area. Those residents with paved subdivision are significantly more satisfied with their roads, 87% indicating their roads are good, 11% neutral about roads, and only 1% dissatisfied. In comparison, 43% of residents with gravel roads indicated they were good, 40% were neutral, and 16% indicating the roads were bad. More than 70% of respondents prefer paved roads with 76% indicating they would still prefer paved roads even if meant an increase in their personal expenses. Fifty percent of respondents with open ditches indicated they were good, 38% were neutral, and 11% indicated the ditches were bad.

### Impact on County Roads

Despite that Cass County does not pay for or maintain the roads within subdivisions, the county is still impacted by the increased traffic on the county road network generated by these subdivisions. The Upper Great Plains Transportation Institute located at NDSU collaborated on an article, *Rural road financing strategies two new model applied to N.D. counties*, which investigated possible strategies to fund rural roads and bridges for North Dakota counties. Using the average daily traffic (ADT) counts of the county roads and the cost/benefit ratio the report determined an average daily traffic count of 400 should be the threshold used by Cass County to determine when a gravel road should start to be considered for conversion to hard surface (Bitzan *et al.* 1992).

The following hypothetical example illustrates the revenue and transportation costs generated by a rural subdivision using Bitzan *et al.* 1992 findings and county data using the following assumption: the subdivision is located in Stanley township and uses 2003 mill levies for the entire period, the average Cass County gravel road averages 100 ADT, the average household in Cass County generates 10 trips per household based on the national average, converting one mile of gravel road to hard surface averages \$500,000, average hard surface road will need to be overlaid every 20 years, and projected taxes, construction costs, and assessed values ignore inflation rates. Based on these assumptions an average gravel road would only require 30 new homes to increase the ADT from 100 to the 400 ADT thresholds for hard surface conversion. If each of the 30 homes averaged \$250,000 in total assessed value they each would annually generate

\$115.31 for the county road and bridge fund for a total of \$3,459.30. Using this example, a new 30 unit subdivision on a gravel road which increases ADT to 400 would generate \$69,186 for the county road and bridge fund over the 20 year life of the asphalt road, but would require an investment by the county to pave one mile of \$500,000, for a total shortfall of \$430,814. The homes in this subdivision would have to average over \$1.5 million for the generated taxes to pay for the paving of the road. This type of scenario doesn't just apply to paving gravel roads, but also the addition of turn lanes into subdivisions, traffic signals, and widening of existing roads.

There are several solutions to this problem: first, increase taxes to generate more money for the road and bridge fund; second create special assessment districts to pay for the improvements; or finally, require developers to install and pay for needed upgrades to the road system. Increasing taxes would be a solution, but raises the questions why the entire county should pay for road improvements for such a small population benefiting from the project. The county has the ability to create special assessment districts which would tax those benefiting from road improvements, but has chosen not to use this option. The final option would require subdivisions to pay for the needed upgraded to the public road system resulting from the new development. Using this solution, each subdivision potentially increasing the ADT to a specified threshold would require a transportation plan to study the impacts the subdivision would have on the transportation system. The recommendations of the traffic study report and the resulting upgrades would be paid for by the developer to gain approval of the subdivision. For example, if the report recommends a turn lane be installed into the subdivision the costs for building the turn lane would be the responsibility of the developer. The benefits of using this are costs for improvements are paid for by those benefiting the most and the costs would likely be added to the lot prices allowing prospective buyers to budget in the cost initially instead of at a latter point, which is the case of special assessments.

Cass County has witnessed an increase in rural non farm land uses and should expect this trend to continue. The draws for prospective buyers are lower taxes, lower densities, and larger lots then developments found within Fargo/West Fargo. The lower taxes, cheaper

land, and looser restrictions allow developers to develop land more cheaply. The resulting problem is subdivisions lacking urban services while at the same time straining the county and public road network. Requiring large subdivisions to be built to urban standards and pay need infrastructure upgrades would result in more satisfied residents and improvements paid for by those benefiting and necessitating the upgrades.

## Metropolitan Area

The metropolitan area is defined as all parcels within the incorporated limits of Fargo and West Fargo. The cities of Fargo and West Fargo account for 85% of Cass County's population, while their area only accounts for 2.5% of the total area, making it the third largest land use. The metropolitan area has the most number of parcels and the smallest average parcel size 0.85 acres.

These two cities have seen some of the highest growth in county, region, and state. Fargo's population grew by 22% between 1990 and 2000 to 90,599 and West Fargo's population increased by over 17% for the same period to 14,940 residents.

Annexation is good method to determine growth as well as overall change from agriculture to developed land. According to the Fargo Planning Department the City of Fargo has annexed approximately 550 acres a year, which is over  $\frac{3}{4}$  of a square mile a year. The City of West Fargo has annexed on average approximately 402 acres each year since 2000, which over a half square mile per year. The 2003 Bureau of Reclamation report projected Fargo and West Fargo's 2030 population to be 152,700 and 25,400, respectively, an increase of over 72,000 residents (Bureau of Reclamation 2003).

## Small Cities

The final land use, small cities, are all parcels within incorporated limits of Cass County's cities, excluding Fargo and West Fargo. These 25 cities account for the smallest area of land use and for 7% of the county's total population. Over half (14) of these

cities experienced growth in the 2000 census, averaging over 16% increase, while the other 11 on average decreased over 11%.

Some of the fastest growth rates in Cass County's cities are those surrounding the Fargo/West Fargo metro area which serve as bedroom communities for residents who choose to live outside of the metro area, but commute into the cities for work. Horace, Reiles Acres, and Casselton have all experienced high growth over the last 10 years, respectively growing 27.7%, 17.3%, and 13.7% and increasing housing units by 30.5%, 22.2%, and 10% (U.S. Census Bureau).