Cass County, Missouri

Comprehensive Plan Update 2005

February 1, 2005

Adopted by:

The Board of County Commissioners

The County Planning Board

Janet Burlingame
Cass County Clerk

Deputy Clerks:
Kathy Lambertz
Lisa Francy
Arrin Crust

FILED[3]
MAY 11 2006
Missouri Public
Service Commission

State of Missouri
ss.
County of Cass

I Janet Burlingame, County Clerk within and for Cass County Missouri, do hereby certify that the foregoing **Cass County Comprehensive Plan, Zoning Ordinance, Subdivision Regulations & Procedural Manual dated February 1, 2005**

is a full, true and accurate copy of an instrument of writing, as the same is found in the Records of my Office.

IN WITNESS WHEREOF, I hereunto set my hand and affix my seal at my Office in Harrisonville, Missouri, this 28th day of April, A.D., 2006.

Janet Burlingame County Clerk

(Seal)

Exhibit No. 108
Case No(s). EA-2006-0309
Date 5-3-06 Rptr JC

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EXECUTIVE SUMMARY

Cass County, Missouri has established and maintained a planning and zoning program for land use regulation. The County strives to define land use issues in the context of a countywide community. The County now seeks to influence land use development—in the public interest—by preserving its strengths and strengthening long-standing objectives:

- Balance property rights with community rights;
- Accommodate development while encouraging it to occur in appropriate places; and
- Ensure that urban growth occurs in or near the cities, or—if in rural areas—it pays its own way.

Rural Cass County does not have the needed infrastructure to support urban and suburban growth unless new developments pay their share of added services. Throughout America, suburban and city growth continues to consume rural land. This occurs because it is the natural tendency for people to want to build and buy homes that are brand new, and they are nearly always built on the outer urban fringes, where empty land is available. Also, when rural land owners want to maximize return on their land, non-ag development yields more cash from new homes than from corn.

If the rural areas become denser with new population, which is happening at a rapid pace in rural and suburban fringe areas of area cities, more services are called for. These urban services—street maintenance, snow removal, sheriff and fire protection, ambulance service, building and zoning enforcement, traffic controls, streetlights—all become too much of a burden on county government. It is county government, after all, that these new "rural-suburbanites" expect will provide "urban" services.

The key objectives of the Cass County Plan (**Ref. Chapter 3**) are two-fold:

- Encourage urban-density growth in and near the towns and cities of Cass County—in small lot subdivisions on strict development standards, with or without annexation.
- Encourage rural-density growth in rural-agricultural areas away from cities and major roads on 20-acre lots that are more agriculture-compatible; and denser development down to 1-acre lots if platted in rural residential subdivisions, provided they pay their way for on-site and off-site improvements necessitated by the more dense development.

Unincorporated, rural areas of the County see limited tax revenues to provide infrastructure. The County cannot build and maintain rural roads to serve non-farm development in rural areas unless developers pay their way. Therefore, non-farm residential development along with commercial and industrial developments should contribute to funds to build infrastructure, such as a major road impact fee. Any intense level of residential and non-residential development in the unincorporated county will have to be self supporting in terms of water, sewer, roads, and related infrastructure.

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CHAPTER ONE: COMPREHENSIVE PLAN UPDATE PROCESS

INTRODUCTION

Growth in the unincorporated area of Cass County during the 1990's has been guided by the Cass County 1991 Comprehensive Plan. The primary intent of the county's comprehensive plan was to encourage urban development to locate near incorporated areas and other urban land uses. By and large, the Plan's "Urban Reserve Areas" had little effect.

In 1996-1997 the process of reviewing the county's Comprehensive Plan was begun. Meetings were held with the Planning Board , County Commission and representatives of various cities in the county to review the existing goals, policies and objectives of the Comprehensive Plan and to identify issues that are relevant to the future of the county. The following is a listing of the issues that were identified:

- potential impact of confined feeding operations;
- siting of communication towers;
- minimum lot width/frontage of lots;
- adequacy of existing detention pond standards;
- improvement of road specifications;
- hard surface paving of off-street parking areas including display lots for car sales;
- limiting operation of quarries on certain holidays;
- need to more clearly define and regulate recycling facilities; and
- home occupation standards and the expansion of home based businesses.

Based upon these meetings the existing goals, objectives and policies were revised and new ones drafted. Recommended amendments to the Cass County zoning and subdivision regulations were drafted in order to implement the Comprehensive Plan Update.

In 2002, the Planning Board , County Commission and representatives of cities in the county, along with business interests, met and identified the following key issues:

- eliminate "Urban Area Reserves" in favor of a "Tier System;"
- accommodate urban growth near towns and cities—with or without annexation—where community services can be extended, such as municipal sewers;
- allow 20-acre rural residential tracts countywide;
- small-acre subdivisions should be allowed if they meet design standards and pay their way for on-site improvements necessitated by the more dense development;
- expand the use of special use permits—rather than rezone land—to regulate site development, but exempt religious institutions;
- require through roads to connect with easements and rights-of-way dedications;
- bonds, cash or letters of credit required of rural subdivisions;
- adopt access control standards on major roads;
- required paved local roads in rural subdivisions and adopt impact fees to pay for major roads;
- allow commercial development with access to major roads; and

- increase road setbacks to ensure orderly development.

The 2004 Plan Update implements these objectives, along with the new Cass County Road Impact Fee; and incorporates elements of past Cass County Comprehensive Plans.

2004 MASTER PLAN

As a first class, non-charter county, Cass County now plans for and regulates land use under Missouri state laws R.S.Mo. 64.211, *et. seq.* : *The county planning board shall have power to make, adopt, and may publish an official master plan for the county . . .* These statutes provide the authority for non-charter first class counties to prepare and adopt a "Master Plan" (or comprehensive plan) through the same basic process as before.

The 2004 Master Plan consists of the Land Use Tier Map and the supporting text, both of which must be considered when making land use changes. The Plan must guide the direction of growth, but at the same time be a dynamic tool that accommodates changes in our style of living. The Plan serves as the basis for zoning decisions. If applications for zoning changes are in accordance with the plan they are presumed to be reasonable. If zoning change requests are not in accordance with the Plan, but are perceived as reasonable, the County should review its planning and regulatory documents and amend either the zoning order or the plan.

The Master Plan is the official policy guide for the development of Cass County. As such, the Cass County Master Plan is prepared to meet its stated planning objectives. The Missouri state statutes provide the authority for non-charter first class counties to develop a master plan as follows:
The master plan shall be developed so as to:

- *Conserve the natural resources of the County;*
- *Ensure efficient expenditures of public funds; and*
- *Promote the health, safety, convenience, prosperity, and general welfare of the inhabitants.*

Plan Contents

The statute continues on to say that the plan may include other things, among them a land use plan, studies and recommendations relative to the locations, character and extent of highways . . . and other transportation routes, . . . sewers, parks and recreation facilities, . . . and projects affecting conservation of natural resources. *(Ref.* R.S.Mo. 64.231). .

The Plan for Cass County comprises multiple sections, all of which must be considered to interpret the Plan intent, including:

- Planning Purpose and Land Use Issues;
- Demographics and Existing Conditions, including Economic Trends;
- Major Roadway Plan;
- Roadway Financing Options and Implementation Program; and
- Future Land Use.

- Appendices:
  - Road Impact Fee and Travel Demand Model
  - Code of Conduct
  - Airport Overlay District

Public Benefits

Local government has a broad ability to mitigate the public impact of private development and promote the public welfare. The legitimate right of government to legislate land use for the protection and promotion of the public welfare must be balanced with a property owner's rights to promote the reasonable economic use of his property. The Plan balances the interests of all parties: considering the needs of individual property owners while promoting the good of the community-at-large.

The public also has a right to expect that the public benefits of non-development, or of development with conditions, must be balanced with individual economic interests. Preservation of historic structures or natural resources can be planned for the interests of both the public and individual interests. Inclusion of landscaping, lighting, drainage, buffering, sidewalks, and public spaces may be necessary to ameliorate the impact of a development proposal, and promote the public and private interests. The public also has a right to expect that development decisions will withstand the test of time. Will the development serve not only present but also future public needs?

How the Master Plan is Used

The Master Plan for Cass County is the official policy guide for growth and development in the County and its planning growth area. It includes goals, objectives, and polices that reflect the County's overall direction when planning for growth and infill development. The Plan presents recommendations for how to implement the policies.

The Master Plan is the legal framework on which the zoning and subdivision regulations are enacted and amended by the County Commission on recommendations from the Planning Board. These two land use regulatory ordinances shape the locations, type, quality, and comprehensiveness of the physical development of Cass County. While the Plan outlines recommended modifications to current unified development code regulations in order to implement its recommendations, it should not be viewed as a zoning document.

Successful development and revitalization in Cass County will be achieved by community leaders and concerned citizens who use the Plan as a guide. The Plan builds on years of community planning initiative by Cass County residents and community leaders.

Unincorporated Cass County is a large, diverse community. Planning and zoning policies which are contained in this Plan are formulated around planning analysis that looks ahead even beyond a pre-set time horizon. At the same time, near-term implementation is important. Regulation of land development is one way the Plan is to be implemented. Following are the roles played by key policy makers and administrators, and the relationship of the Plan to regulations.

ZONING ORDER

A zoning order is a legislative tool used for implementing the comprehensive plan. It delineates the boundaries for land use districts to regulate:

- use;
- density of population;
- lot coverage; and
- bulk of structures.

The purpose of the zoning order is to:

- encourage appropriate uses of land;
- maintain and stabilize the value of property;
- reduce fire hazards and improve public safety and safeguard the public health;
- decrease traffic congestion and its accompanying hazards;
- prevent undue concentration of population;
- create a comprehensive and stable pattern of land uses upon which to plan for transportation, water supply, sewerage, schools, parks, public utilities, and other facilities; and
- protect and promote the public health, safety, convenience, comfort and general welfare.

The Cass County Zoning and Subdivision regulations allow 3-acre lot development with on-site septic systems, subject to platting and soil testing. Smaller lots down to 10,000 square feet are allowed if served by a publicly owned central sewer and water system.

SUBDIVISION REGULATIONS

Subdivision regulations are another legislative tool to implement the comprehensive plan by guiding the subdivision and development of land. Subdivision regulations coordinate otherwise unrelated plans as well as govern the internal design of individual sites. The County needs to keep subdivision regulations up to date.

The general purposes of the subdivision regulations are to:

- protect and promote the public health, safety, convenience, comfort and general welfare by requiring a subdivision plat when dividing a parcel of land into more than two lots;
- guide the future growth and development;
- provide for the proper location and width of streets, roads, building lines, open space and recreation and to avoid congestion of population;

- protect and conserve the value of land, buildings and improvements and to minimize conflicts among the uses of land and buildings;

- establish reasonable standards of design for subdivisions in order to further the orderly layout and use of land; and

- ensure that public facilities, including roads, water, sewer and drainage facilities are adequate to serve the needs of proposed subdivisions and improved in a timely manner.

ROLE OF THE PLANNING BOARD

The Planning Board is primarily an advisory body. Under the zoning regulations, a primary duty of the Cass County Planning Board is to hold public hearings where public opinion can be expressed. In this sense, the Planning Board is a sounding board for community attitudes toward development. The Commission is required to adopt a recommendation to the County Commission regarding rezoning of land, special use permits, and changes to the zoning and subdivision regulations. Similarly, by Missouri statutes, in order to implement land use regulations, the Planning Board must adopt a Master Plan for the physical development of the county following a public hearing.

Under the subdivision regulations, the Planning Board is responsible for approving or disapproving both preliminary and final plats. Guidelines to carry out this responsibility are provided by the design standards set out in the regulations.

The Role of the Planning Board is summarized as follows:

- Cause the preparation, development and recommendation for adoption of a Master Plan and subsequent amendments thereto;

- Formulate subdivision regulations and zoning regulations for unincorporated areas of the county, and recommend boundaries of the various districts to the Governing Body, including amendments thereto;

- Conduct public hearings for adoption of a Master Plan, zoning and subdivision regulations, and for subsequent amendments thereto;

- Appoint a Planning Director subject to approval by the Governing Body.

- Consider proposals for public improvements;

- Recommend setback lines on major highways;

- Consider approval of subdivision plats referred by the Planning Director;

- Adopt bylaws as rules for the transaction of its business and keep a public record of its resolutions, transactions, findings and recommendations;

- Upon written request of the legislative body of an incorporated area in which there is no municipal Planning Board , pass upon subdivision plats within the incorporated areas and the plat shall b subject to all rules and regulations of the county planning board and shall not be recorded until it has been approved in the same manner as a subdivision plat in an unincorporated area.

THE COUNTY COMMISSION

The County Commission has responsibility for enacting and amending the zoning and subdivision regulations after consideration of the recommendations of the Planning Board. This responsibility includes amending the zoning regulations or the zoning district map. The role of the County Commission in the subdivision process is to accept or reject dedications of easements, rights-of-way and the public lands, approve financial guarantees or financing mechanisms to ensure construction of all public improvements, and approve engineering drawings.

As opposed to the Planning Board, the County Commission does not have a direct role in regard to the Master Plan. By statute, the development, adoption, and implementation of the Master Plan is the role of the Board. Although the County Commission does not have a direct role, they are impacted by the Board's implementation of the Plan. When recommending action on rezoning of land, special use permits, and changes to the zoning and subdivision regulations, one of the Planning Board's considerations is compatibility and compliance with the Master Plan. For that reason, it is important that the County Commission adopt a resolution of support of the Master Plan showing support for the general goals, objectives and policies adopted for the community.

The Role of the County Commission is summarized as follows:

1. Adopt a resolution of support of the Master Plan.
2. Enact and amend the zoning ordinance and zoning district map after considering the Planning Board's recommendation.
3. Enact and amend the subdivision regulations after holding considering the Planning Board's recommendation. This responsibility does not include approving subdivision plats.

4. Approve special use permit applications following consideration of the Planning Board's recommendations.
5. Accept or reject dedications of easements, rights-of-way, and public lands on subdivision final plats after having been approved by the Planning Board.
6. Approve engineering plans for construction of public improvements.
7. Approve financial guarantees or financing mechanisms to ensure construction of all public improvements within subdivision plats.

8. Appoint itself as the Board of Zoning Adjustment.

THE BOARD OF ZONING ADJUSTMENT

The Board of Zoning Adjustment (BZA) shall be appointed by order of the County Commission, and consist of *"three commissioners of the county commission . . .". (Ref.* R.S.Mo. 64.281). The role of the BZA is primarily a quasi-judicial body rather than an advisory or legislative one. In the case of an appeal, the responsibility of the Board of Zoning Adjustment is to rule on the interpretation of the zoning regulations whenever there is an ambiguous provision or an alleged error. In comparison, variances are granted for unusual physical constraints, and the role of the Board of Zoning Adjustment is to determine if a variance should be granted in a manner which is consistent with the intent of the zoning regulation and fair to the applicant. The Board of Zoning Adjustment is not involved in administering the subdivision regulations.

The Role of the Board of Zoning Adjustment is to serve as a quasi-judicial body rather than a legislative body. Therefore, the chairman "shall administer oaths and compel the attendance of witnesses . . ." (R.S.Mo. 64.281). The BZA is to provide determination in the following Zoning Administration matters only:

- Hear and decide appeals of an administrative decision or interpretation where it is alleged there is error of law in any order, requirement (such as an ambiguous provision), decision, or determination made by an administrative official in the enforcement of the county zoning regulations;

- Hear and decide on all matters referred to it or upon which it is required to pass judgment under the county zoning regulations; and

- The granting of variances for cases of unnecessary hardship or practical difficulty in the way of carrying out the strict letter of such order; as distinguished from merely granting a privilege, so that the intended purpose of the regulations shall be strictly observed, public safety and welfare secured, and substantial justice done.

Unnecessary hardship is generally considered that which prevents a reasonable return on property as demonstrated by evidence of the rate of return on the property as zoned and like

property in the community. **Practical difficulty** is generally considered that which prevents construction of a legal, conforming building on a legal, conforming lot. A rock outcropping on a lot that denies the ability to meet yard setbacks would be an example. The Board of Zoning Adjustment is not involved in administering the subdivision regulations.

ROLE OF THE ZONING ADMINISTRATOR

The responsibility of the Zoning Administrator (or "Zoning Officer" or "Planning Director") is to oversee and conduct the business of planning and zoning in Cass County as set forth in policy adopted by the County Commissioners. The administrator provides leadership to the Planning Board and County Commission regarding local regulatory decisions and serves as custodian of the official zoning map and regulations, providing a copy to the County Clerk.

The Administrator should assist other County departments in areas where he or she can provide expertise. The Administrator should retain an understanding of the division between service provision and enforcement.

THE BASIS OF DECISION-MAKING

As with other "police powers", the exercise of zoning and subdivision regulations is subject to certain legal limitations. One of the most important of these limitations requires that zoning and subdivision regulations cannot be applied in an "arbitrary or capricious" manner. Decisions regarding zoning and subdivision issues cannot be arrived at through an exercise of favoritism, whim, will or by caprice, without consideration or adjustment with reference to principles, circumstances, or significance.

Procedures for avoiding conflicts of interest—including how to acknowledge and disclose conflicts or appearances of conflicts—are presented in **Appendix B**. They should be referenced when considering conflicts of interest as part of the decision-making process. Also presented are rules for Planning Board members to follow in terms of "informed participation" and ethical principles.

COUNTY/CITY COOPERATION

Cass County intends to enter into interlocal agreements to cooperate with municipalities in the County having adjoining planning jurisdiction in the exercise and performance of planning powers, duties, and functions provided by such municipalities. When two or more of such municipalities by ordinance enter into agreements with the County providing for such joint planning cooperation, there may be established a joint planning committee for the designated joint planning area. Such a joint planning committee may be empowered to provide advice relating to county planning matters for such joining municipalities.

CHAPTER TWO: DEMOGRAPHICS AND EXISTING CONDITIONS

POPULATION

The US Census Bureau's 2000 census brief stated that the Nation's 1990 to 2000 population increase was the largest in American history. The population growth of 32.7 million people between 1990 and 2000 represents the largest census-to-census increase in American history. The previous record increase was 28.0 million people between 1950 and 1960, a gain fueled primarily by the post-World War II baby boom (1946 to 1964). Total decennial population growth declined steadily in the three decades following the 1950s peak before rising again in the 1990s. Population growth varied significantly by region in the 1990s, with higher rates in the West (19.7%) and the South (17.3%) and much lower rates in the Midwest (7.9 %) and the Northeast (5.5%). Meanwhile, despite overall population growth in each of the past five decades, the Midwest's share of total population fell from 29 to 23%.

Cass County has added about 42,600 people in the last three decades, growing from a small County of about 39,500 people in 1970 to more than 82,000 people in 2000. According to the 2000 Census, Cass County' population is 82,092, an increase of 18,284 people (about 29%) from the 1990 Census **(Ref. Table 2.1, Fig. 2.1)**. In comparison, the State of Missouri grew by 9.3% (Source: US Census). The Kansas City Metropolitan Statistical Area (MSA) registered a population increase of 12.2% (184,024 people) over 4% higher than the average growth in the Midwest. These are significant increases compared to the average rate of growth for the Midwest and the Nation as a whole. The Office of Management and Budget (OMB) defines Metropolitan Statistical Areas (MSA) as a large population nucleus, together with adjacent communities having a high degree of social and economic integration with that core.[1]

Table 2.1 Population Growth (1970-2000)

	1970	1980	1990	2000	% Change 70-80	% Change 80-90	% Change 90-00
Cass County, MO	39,451	51,031	63,808	82,092	29.35%	25.04%	28.65%
Warren County, MO	9,700	14,902	19,534	24,525	53.63%	31.08%	25.55%
Clay County, MO	123,327	136,494	153,411	184,006	10.68%	12.39%	19.94%
Clinton County, MO	12,409	15,870	16,595	18,979	27.89%	4.57%	14.37%
Lafayette County, MO	26,495	29,849	31,107	32,960	12.66%	4.21%	5.96%
Miami County, KS	19,197	21,538	23,466	28,351	12.19%	8.95%	20.82%
Kansas City MSA	1,381,461	1,448,780	1,582,780	1,776,062	4.87%	9.25%	12.21%
Missouri	4,655,960	4,906,764	5,117,073	5,595,211	5.39%	4.29%	9.34%
US	201,606,786	224,810,186	248,709,166	281,421,906	11.51%	10.63%	13.15%

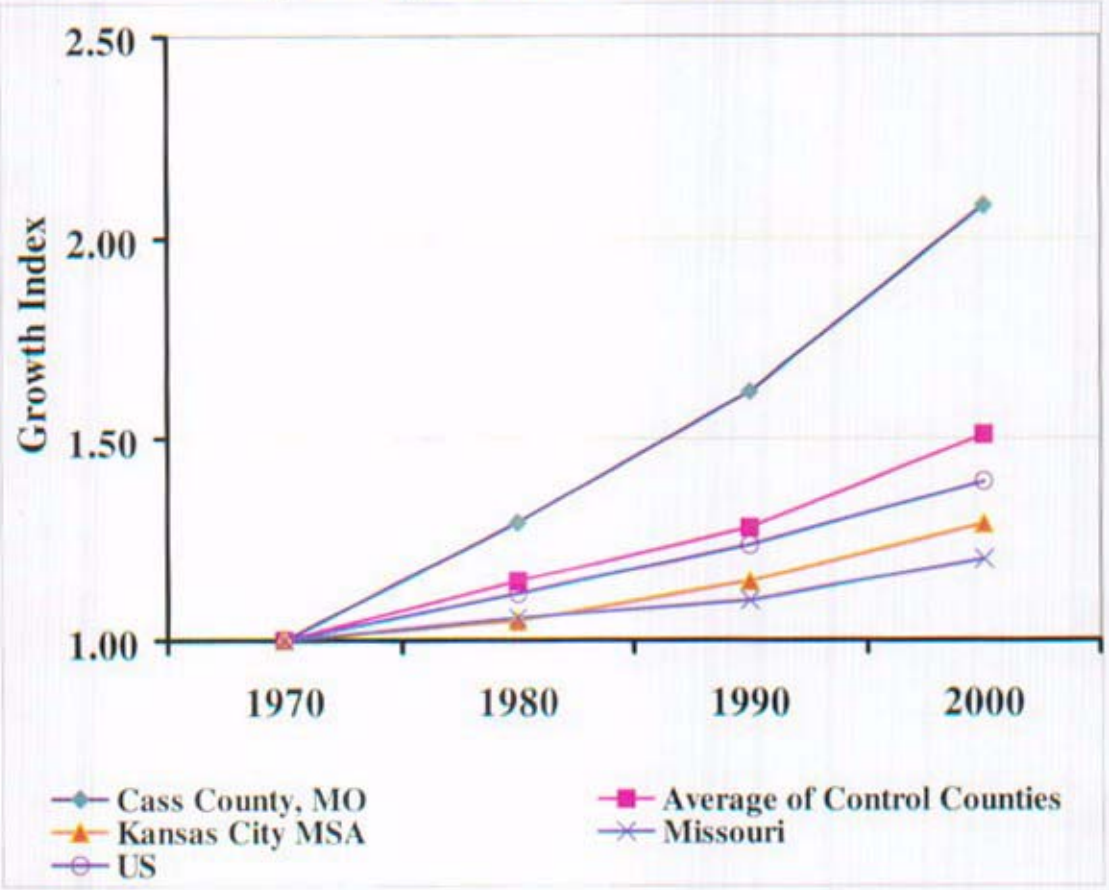
Source: US Census Bureau, BWR

[1] The Kansas City MSA includes 11 counties: Johnson, Kansas; Leavenworth, Kansas; Miami, Kansas; Wyandotte, Kansas; Cass Missouri; Clay, Missouri; Clinton, Missouri; Jackson, Missouri; Lafayette, Missouri; Platte, Missouri; and Ray Missouri.

A comparison with a *"Control Group"* of five similar sized and similar situated counties in the region shows a similar trend in most suburban Counties. The five control counties are Warren County, MO; Clay County, MO; Clinton County, MO; Lafayette County, MO; and, Miami County, KS. In the last decade, with the exception of Lafayette County, MO, which increased in population by about 6%, all other counties in the control set saw substantial increases in population. Miami County increased in population by over 40% and Warren County increased by over 25%.

Growth indices, which are a means of comparison of growth rates of different entities assuming the base population of 1 for each entity, shows that Cass County has grown faster than the average of the control counties, the MSA, the State and the Nation.

Figure 2.1 Population Growth Index (1970-2000)



Source: BWR, US Census Bureau

The cities of Belton, Raymore, Harrisonville and Pleasant Hill are the largest in the County. Between 1990 and 2000, each saw substantial increases in population. The City of Raymore saw the largest increase of over 5,500 people. The City of Belton grew by over 3,500, while Pleasant Hill added over 1,700 and Harrisonville over 1,200 people. The urban population in the County increased by about 14,700 people (34% increase) while the rural population increased by about 3,600 people (17.5% increase). **(Ref. Table 2.2)**

Table 2.2 Population Growth in Cities (1990-2000)

	Number	Percent	Number	Percent	Number	Percent
Cass County	**63,808**	**100**	**82,092**	**100**	**18284**	**28.7**
Archie city	799	1.3	890	1.1	91	11.4
Baldwin Park village	85	0.1	115	0.1	30	35.3
Belton city	18,150	28.4	21,730	26.5	3580	19.7
Cleveland city	506	0.8	592	0.7	86	17
Creighton city	289	0.5	322	0.4	33	11.4
Drexel city	835	1.3	971	1.2	136	16.3
East Lynne city	289	0.5	300	0.4	11	3.8
Freeman city	480	0.8	521	0.6	41	8.5
Garden City city	1,225	1.9	1,500	1.8	275	22.4
Gunn City village	65	0.1	85	0.1	20	30.8
Harrisonville city	7,683	12	8,946	10.9	1263	16.4
Kansas City city	42	0.1	104	0.1	62	147.6
Lake Annette city	157	0.2	163	0.2	6	3.8
Lake Winnebago city	748	1.2	902	1.1	154	20.6
Lee's Summit city	433	0.7	1,180	1.4	747	172.5
Peculiar city	1,777	2.8	2,604	3.2	827	46.5
Pleasant Hill city	3,827	6	5,582	6.8	1755	45.9
Raymore city	5,592	8.8	11,146	13.6	5554	99.3
Strasburg city	124	0.2	136	0.2	12	9.7
West Line village	98	0.2	95	0.1	-3	-3.1
Places total	**43,204**	**67.7**	**57,884**	**70.5**	**14,680**	**34**
Balance of County	**20,604**	**32.3**	**24,208**	**29.5**	**3,604**	**17.5**

Source: US Census Bureau

RACIAL CHARACTERISTICS

Table 2.3 Racial Characteristics in Cass County, MO (1980-2000)

	Total Population	White	Black or African-American	Other Population	Hispanic Origin
1980	51,031	50,140	404	487	404
1990	63,808	62,272	629	907	844
2000	82,092	79,574	1,390	1,128	1,816
absolute change 80-90	12,777	12,132	225	420	440
absolute change 90-00	18,284	17,302	761	221	972
% change 80-90	25.04%	24.20%	55.69%	86.24%	108.91%
% change 90-00	28.65%	27.78%	120.99%	24.37%	115.17%

Source: US Census Bureau, BWR

The racial composition of Cass County has not changed considerably between 1980 and 2000. In 1980 over 98% of the population in the County was white. In 2000 that percentage dropped to

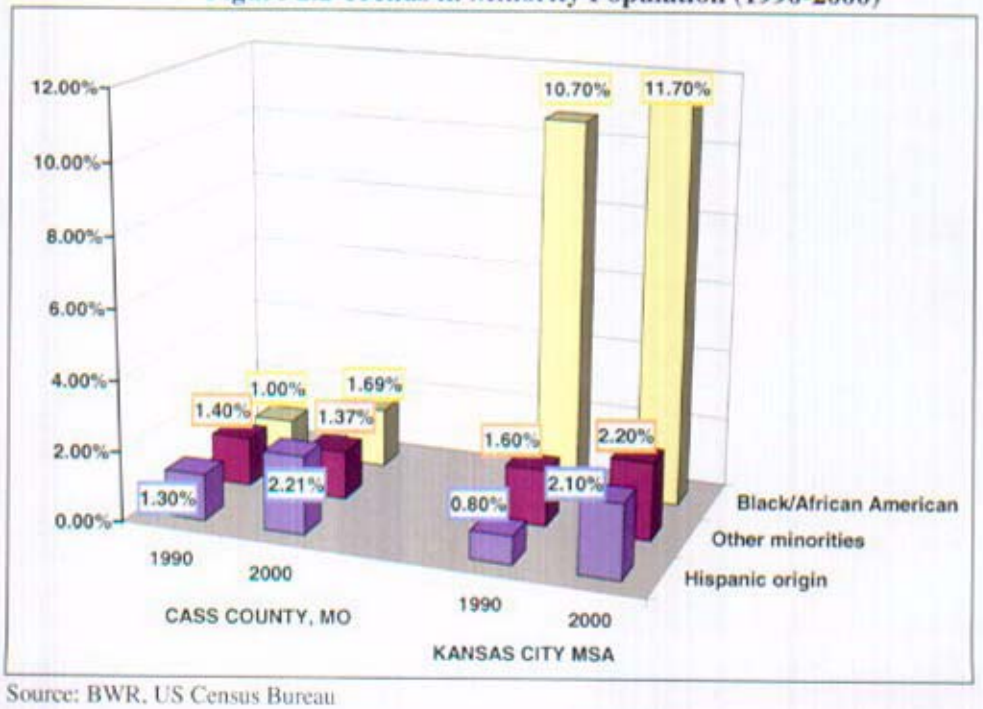
97%. At the same time there was a slight increase in the minority population **(Ref. Table 2.3, Figure 2.2)**. The MSA has a significant minority population but the control counties show trends similar to Cass County.

Table 2.4 Racial Characteristics Comparisons (1980-2000)

		White	Black or African-American	Other Population	Hispanic Origin
1980	Cass County, MO	98.30%	0.80%	0.90%	0.80%
	Average of Control Counties	97.13%	1.71%	1.16%	1.22%
	Kansas City MSA	85.40%	12.50%	2.10%	2.30%
	Missouri	88.40%	10.50%	1.10%	0.40%
	US	83.10%	11.70%	5.20%	6.50%
1990	Cass County, MO	97.60%	1.00%	1.40%	1.30%
	Average of Control Counties	96.62%	1.95%	1.43%	1.82%
	Kansas City MSA	84.50%	12.70%	2.80%	2.90%
	Missouri	87.70%	10.70%	1.60%	0.80%
	US	80.30%	12.00%	7.70%	8.80%
2000	Cass County, MO	96.93%	1.69%	1.37%	2.21%
	Average of Control Counties	93.66%	2.71%	3.63%	2.71%
	Kansas City MSA	82.47%	13.43%	4.11%	5.23%
	Missouri	86.10%	11.70%	2.20%	2.10%
	US	75.14%	12.32%	12.54%	12.56%

Source: US Census, BWR

Figure 2.2 Trends in Minority Population (1990-2000)



Source: BWR, US Census Bureau

MEDIAN AGE

Changes in the median age are important indicators of the shift in composition of the County. They are a quick way of establishing target age groups to plan for. The median age of population in Cass County has traditionally been similar to other metropolitan counties in the area.

Table 2.5: Median Age (1970-2000)

	1970	1980	1990	2000
Cass County, MO	29	29	32.3	35.8
Kansas City MSA	33.00	30	33.1	35.4
Missouri	33.00	30	33.6	36.1
US	31.60	29.2	33.4	35.3

Source: US Census, BWR

POPULATION PROJECTIONS

Five alternative population growth scenarios for Cass County have been presented in Table 2. The first scenario uses linear regression techniques to project the future growth of the County based on its past trends. This method yields an increase in the population by about 12,200 people in the next 10 years and 14,000 people between 2010 and 2020.

Table 2.6: Population Projections (2000-2020)

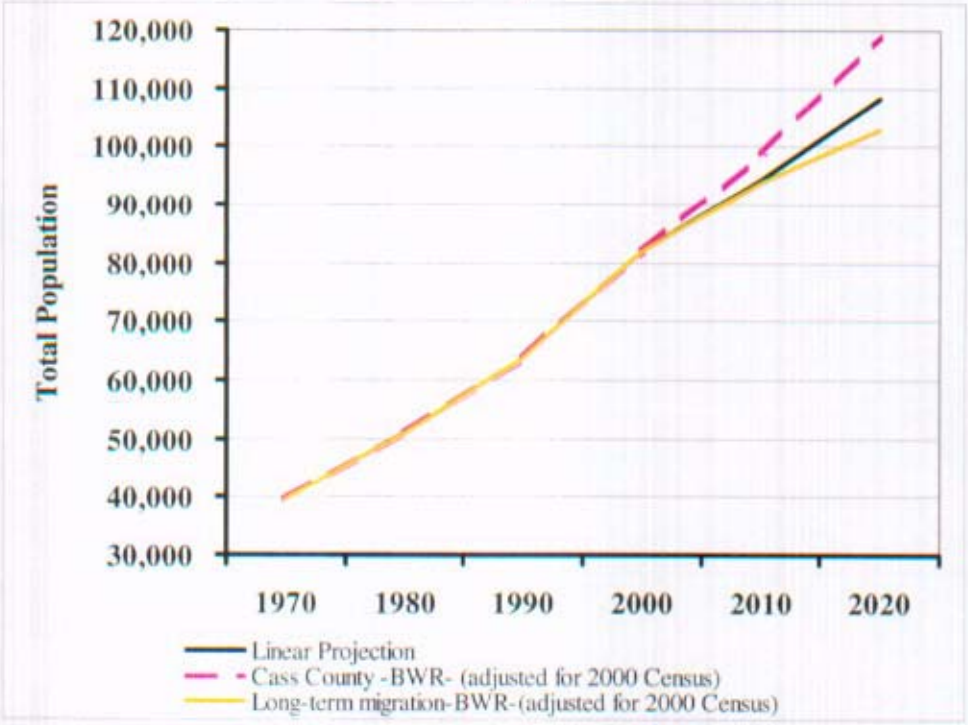
SCENARIO		1970	1980	1990	2000	2010	2020
I	**Using Linear Regression for population 1960 to 2000**						
	Linear Projection	39,451	51,031	63,808	82,092	94,271	108,341
	Growth rate		29.35%	25.04%	28.65%	14.84%	14.93%
MARC Projections							
II	Cass County -BWR- (adjusted for 2000 Census)	39,451	51,031	63,808	82,092	98,775	118,974
	Cass County-MARC-(based on 1990 Census)	39,448	51,029	63,808	81,321	97,847	117,857
	Growth rate				27.45%	20.32%	20.45%
OSEDA Projections							
III	Long-term migration-BWR-(adjusted for 2000 Census)	39,451	51,031	63,808	82,092	93,750	102,933
	Long-term migration scenario-OSEDA-(1990 Census)	39,451	51,031	63,808	76,463	87,322	95,875
	Growth rate				19.83%	14.20%	9.79%
IV	Recent migration-BWR-(adjusted for 2000 Census)	39,451	51,031	63,808	82,092	95,785	106,532
	Recent migration scenario-OSEDA-(1990 Census)	39,451	51,031	63,808	79,104	92,299	102,654
	Growth rate				23.97%	16.68%	11.22%
V	Zero migration-BWR-(adjusted for 2000 Census)	39,451	51,031	63,808	82,092	87,181	91,069
	Zero migration scenario-OSEDA-(1990 Census)	39,448	51,029	63,808	67,914	72,124	75,341
	Growth rate				6.43%	6.20%	4.46%

Source: OSEDA (Missouri Division of Budget and Planning), Mid-America Regional Council (MARC), US Census Bureau, BWR

Mid America Regional Council (MARC) projects population for the Kansas City Metro Area by Counties and areas within the Metro based on the 1990 Census. When adjusted for the 2000 Census Cass County is projected to add about 37,000 people in the next 20 years. The third, fourth and fifth scenarios project the population of Cass County, based on the Missouri Division of Budget and Planning (OSEDA) projections show growth based on long-term, recent and zero migration scenarios. They project growth between 9,000 and 21,000 people in the next twenty years.

While the first scenario is more reflective of the past and current trends in the area and in Cass County, the growth is more likely to slow down in the future. And though the increase in population is still projected to be substantial and one of the highest in the eastern Metro area, it is not expected to be as high as the previous decades. Therefore, while it is unlikely that Cass County will experience the surge of the 70s, it will most likely follow scenario III—the long-term migration scenario.

Figure 2.3: Population Projections (2000-2020)



Source: BWR Corp., Mid America Regional Council, US Census Bureau

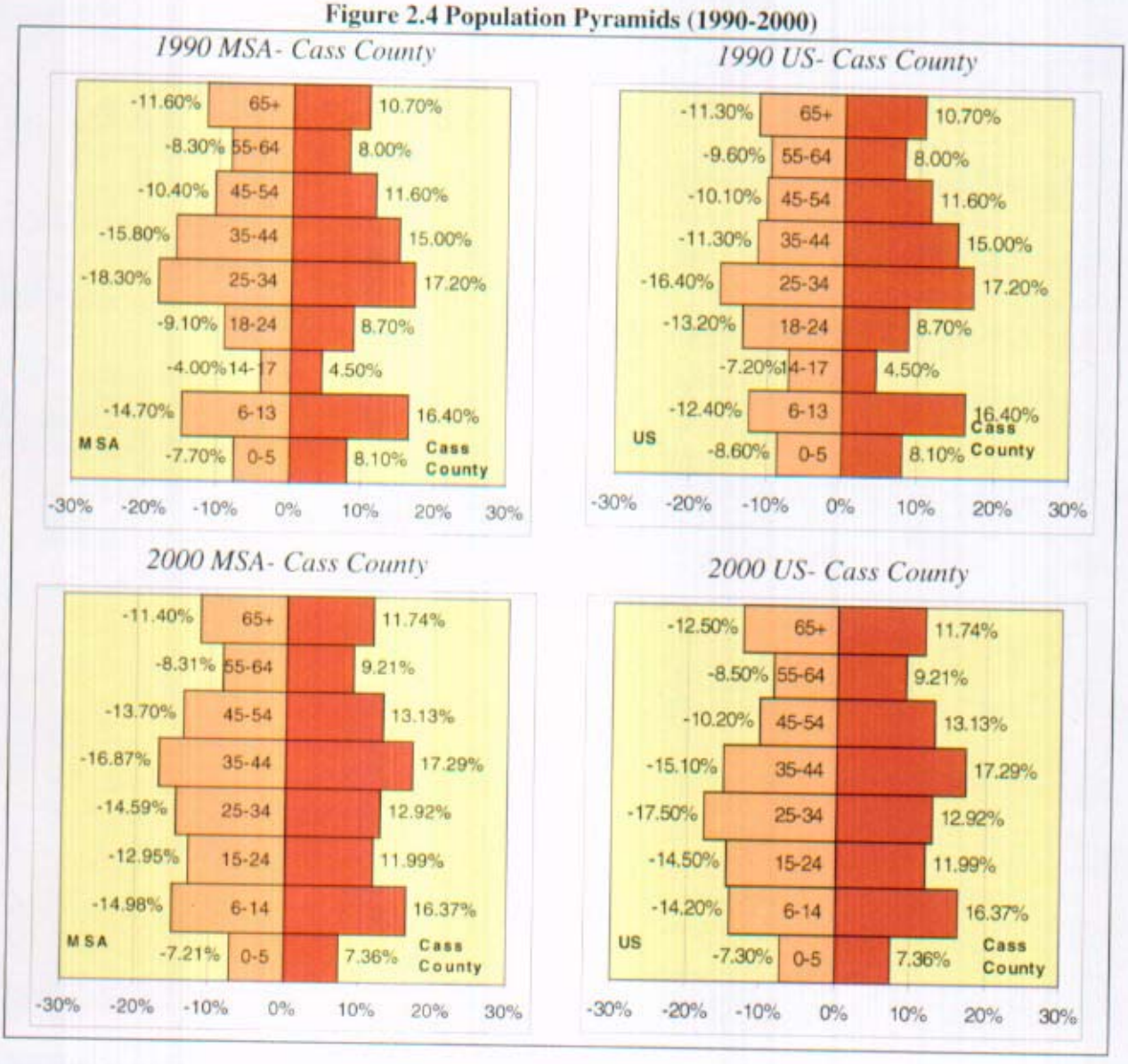
AGE CHARACTERISTICS

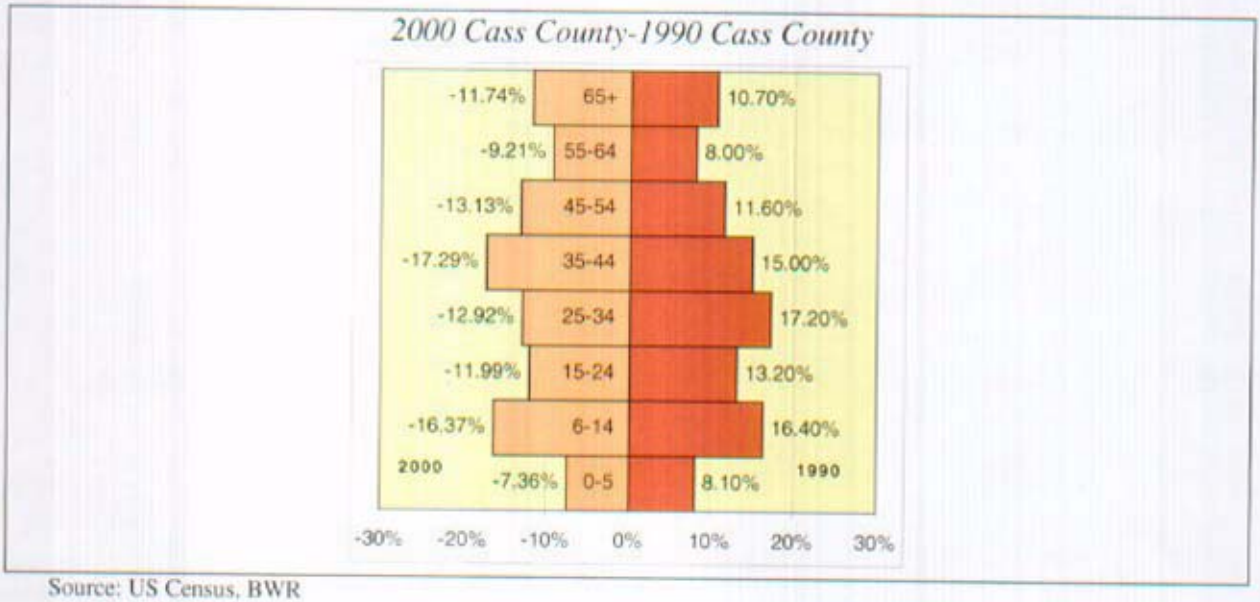
The age distribution of a population is an important feature while analyzing a jurisdiction's demographic situation. **Figure 2.4** uses population pyramids to show the age distribution differences between the County and the regional and national distribution. We have also used the pyramids to show the change in age distribution from 1990 to 2000.

In spite of the significant increase in population there has not been a significant change in the age composition of the population. The County has traditionally had a large young population. A significant number of 35-44 year-olds have moved to the area, indicating a preference for move-up housing in Cass County. This demographic group is young, has stable jobs, has crossed the very mobile stage and is settling down in the County for at least the next 15-20 years. This is also an indication of a good school system and good family-oriented services.

The elderly population has remained relatively stable the County and at ratios similar to the metro area.

Figure 2.4 Population Pyramids (1990-2000)





Source: US Census, BWR

MALE-FEMALE RATIO

The Male-Female ratio in Cass County has changed slightly in the last decade to include a higher percentage of women. The ratio now closely reflects the control counties' average, the MSA and the State.

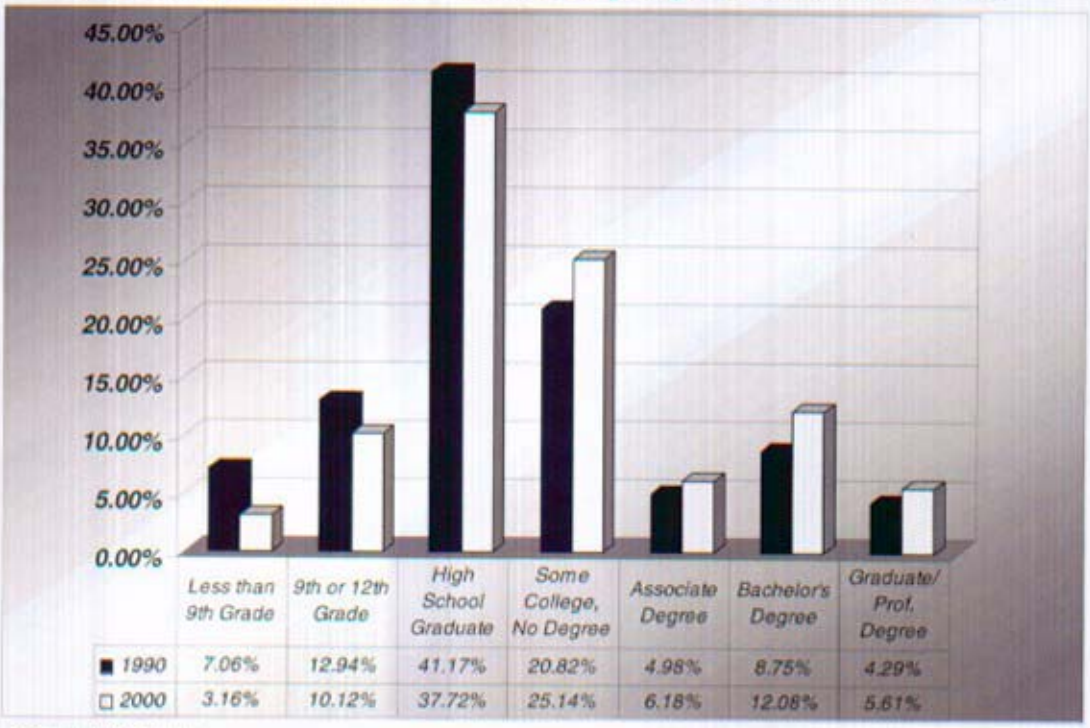
Table 2.7 Male-Female Ratio (1980-2000)

		Males	Females	Change in % from previous Census Males	Females
1980	Cass County, MO	49.40%	50.60%		
	Average of Control Counties	48.77%	51.23%		
	Kansas City MSA	48.20%	51.80%		
	Missouri	48.10%	51.90%		
	US	48.50%	51.50%		
1990	Cass County, MO	48.80%	51.20%	-1.21%	1.19%
	Average of Control Counties	48.55%	51.45%	-0.45%	0.43%
	Kansas City MSA	48.30%	51.70%	0.21%	-0.19%
	Missouri	48.20%	51.80%	0.21%	-0.19%
	US	48.70%	51.30%	0.41%	-0.39%
2000	Cass County, MO	48.20%	51.80%	-1.23%	1.17%
	Average of Control Counties	48.07%	51.93%	-0.98%	0.92%
	Kansas City MSA	48.80%	51.20%	1.03%	-0.96%
	Missouri	48.60%	51.40%	0.83%	-0.77%
	US	49.10%	50.90%	0.82%	-0.78%

Source: US Census, BWR

EDUCATION

Figure 2.5 Educational Attainment of People aged 25 or more (1990-2000)



Source: US Census

Comparison of 1990 and 2000 education statistics for people over the age of 25 shows that education levels in Cass County have substantially improved in the last decade. The percentage of adult population with at least some college experience has increased from 38% to about 50% **(Ref. Figure 2.5.)**

INCOME CHARACTERISTICS

Median household income is the dollar amount that divides the income distribution into two equal groups—half with income above the median and half with income below the median. It provides one measure of the ability of Cass County households to meet the costs of food, clothing, housing, health care, transportation, childcare, and higher education. Retail businesses, shopping centers, builders and developers consider the median household income as a guide to investment into a community.

Per Capita Income is computed by dividing the sum of personal income for a given geographic area by the total population for that area. Personal income is the sum of individual income received from employment, self-employment, investments, and transfer payments for all households for a given area. Per capita income, therefore, is an indication of the quality of labor force available and, wages and salaries disbursed in a given location. These are important indicators for industries and businesses locating to a certain area.

Table 2.8 Income Summary (1980-2000)

		1980	1990	2000	% Change 80-90	% Change 90-00
Median Household Income	Cass County, MO	$19,021	$31,548	$37,934	65.86%	20.24%
	Warren County, MO	$16,309	$29,013	$49,562	77.90%	70.83%
	Clay County, MO	$22,330	$35,270	$41,016	57.95%	16.29%
	Clinton County, MO	$16,324	$26,844	$48,347	64.44%	80.10%
	Lafayette County, MO	$15,656	$24,755	$41,629	58.12%	68.16%
	Miami County, KS	$16,937	$29,392	$38,235	73.54%	30.09%
	Kansas City MSA *	$18,897	$33,551	$46,665	77.55%	39.09%
	Missouri	$15,704	$28,334	$42,405	80.43%	49.66%
Per Capita Income	Cass County, MO	$7,197	$12,930	$19,936	79.66%	54.18%
	Average of Control Counties	$ 7,719	$13,896	$19,845	80.03%	42.81%
	Kansas City MSA	$8,036	$14,845	$21,408	84.73%	44.21%
	Missouri	$ 6,923	$12,818	$21,452	85.15%	67.36%

Source: US Census, BWR

* Kansas City MSA data for 2000 includes only part that is in Missouri

In 2000, the median household income in Cass County was $37,934. It is lower than other counties in the control group. Per capita income, however, is comparable to the average of control counties, the MSA and the State. This indicates well paying jobs but lower labor force participation rates in the County.

HOUSING

The housing market in Cass County has altered significantly in the last decade. The total housing units increased by 7,340 units, a 30% increase. The control counties on an average added to their housing stock by about 20%. The MSA saw an increase of about 12% and Missouri's housing stock increased by about 11%.

Occupancy rates increased across the board with Cass County' rates going up by about 32% and that of the control counties going up by about 21%. These were significant compared to the modest increases in the MSA and the State. Owner occupancy in Cass County increased by about 4% and renter occupancy decreased by about 2.7%. The control counties experienced similar trends.

The median housing value in Cass County has increased substantially—from $57,447 to $104,200—in the last decade. This 81.4% increase was much higher than the MSA and State averages of about 50%. Housing values in Cass County are comparable to the counties in the control set and the MSA. Mortgage rates and rental rates are also comparable to the counties in the control set. Rental rates increased by 35%.

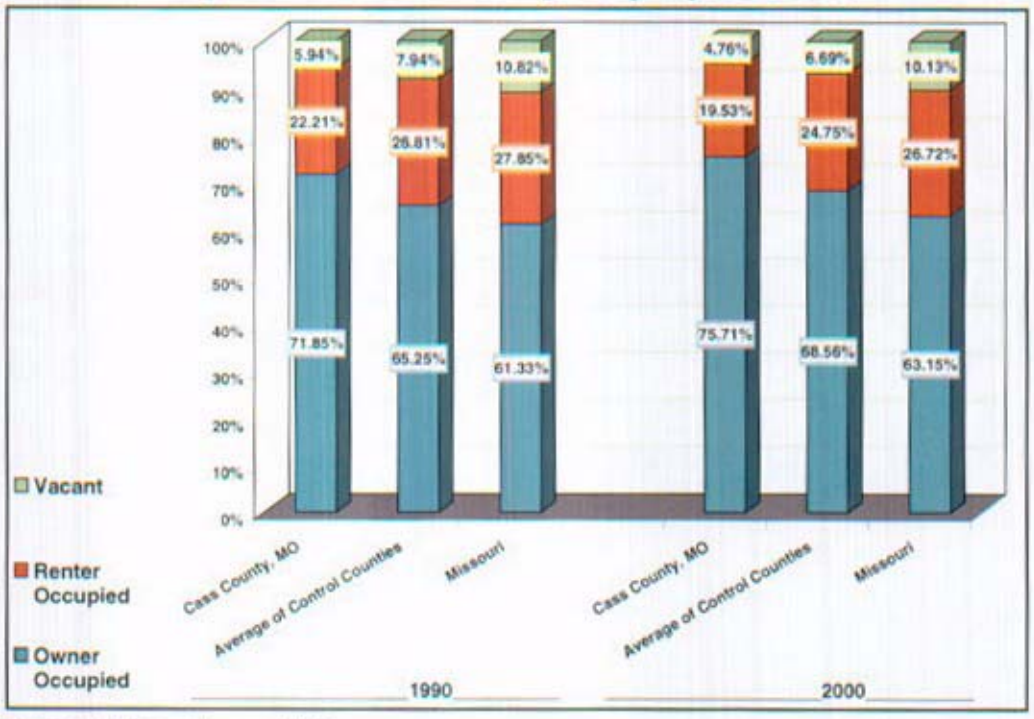
Data from the National Association of Realtors (**Ref. Table 2.11**) indicates that the areas along the major Highways—Highway 71 and 291—have higher priced and older homes. These statistics indicate high suburbanization and a strong housing market in the County.

Table 2.9: Housing Units Characteristics (1990-2000)

		Total Housing Units	Occupied Units	Owner Occupied	Renter Occupied	Vacant
Cass County, MO	1990	24,337	22,892	71.85%	22.21%	5.94%
	2000	31,677	30,168	75.71%	19.53%	4.76%
	% Change	30.16%	31.78%	3.86%	-2.68%	-1.17%
Average of Control Counties	1990	20,038	18,446	65.25%	26.81%	7.94%
	2000	23,969	22,366	68.56%	24.75%	6.69%
	% Change	19.62%	21.25%	3.31%	-2.06%	-1.26%
Kansas City MSA	1990	663,910	608,459	60.10%	31.55%	8.35%
	2000	740,884	694,468	63.69%	30.05%	6.26%
	% Change	11.59%	14.14%	3.59%	-1.50%	-2.09%
Missouri	1990	2,199,129	1,961,206	61.33%	27.85%	10.82%
	2000	2,442,017	2,194,594	63.15%	26.72%	10.13%
	% Change	11.04%	11.90%	1.82%	-1.13%	-0.69%

Source: US Census Bureau, BWR

Figure 2.6: Trends in Housing Occupancy (1990-2000)



Source: US Census Bureau, BWR

Table 2.10: Housing Values (1990-2000)

		Average Household Size	Median Housing Value	Median Monthly Mortgage	Median Monthly Rent
Cass County, MO	1990	2.80	57,447	629	401
	2000	2.69	104,200	934	543
	% Change		81.4%	48.5%	35.4%
Warren County, MO	1990	2.80	58,626	600	353
	2000	2.64	108,600	858	466
	% Change		85.2%	43.0%	32.0%
Clay County, MO	1990	2.60	59,223	665	428
	2000	2.50	104,900	975	576
	% Change		77.1%	46.6%	34.6%
Clinton County, MO	1990	2.70	52,010	575	318
	2000	2.59	86,400	801	442
	% Change		66.1%	39.3%	39.0%
Lafayette County, MO	1990	2.60	51,846	562	310
	2000	2.55	74,400	753	426
	% Change		43.5%	34.0%	37.4%
Miami County, KS	1990	2.80	52,983	599	331
	2000	2.66	106,300	959	499
	% Change		100.6%	60.1%	50.8%
Kansas City MSA	1990	2.60	61,478	684	424
	2000*	2.46	92,400	914	546
	% Change		50.3%	33.6%	28.8%
Missouri	1990	2.60	59,810	622	375
	2000	2.48	89,900	861	484
	% Change		50.3%	38.4%	29.1%

Source: US Census Bureau, BWR

* 2000 data for Kansas City MSA includes part of the MSA in Missouri only.

Table 2.11: Average Housing Trends by Zip code (2000)

	64012	64083	64034	64080	64090	64734	64078
Average Home Price	$152,768	$161,216	$172,690	$127,779	$95,200	$236,922	$124,220
Average Age of Housing	24 yrs.	9 yrs.	12 yrs.	22 yrs.	N/A	35 yrs.	16 yrs.
Average Sq.ft.	1832	1959	1979	1889	1125	2219	1903
Average price/sq.ft.	$83.39	$82.29	$87.26	$67.64	$84.62	$106.77	$65.28
	64746	**64701**	**64743**	**64747**	**64742**	**64725**	**64739**
Average Home Price	$111,815	$125,007	$71,412	$138,839	$134,286	$134,456	$115,610
Average Age of Housing	28 yrs.	27 yrs.	48 yrs.	23 yrs.	22 yrs.	31 yrs.	27 yrs.
Average Sq.ft.	2007	1812	1171	1623	1882	1596	1481
Average price/sq.ft.	$55.71	$68.99	$60.98	$85.54	$71.35	$84.25	$78.06

Source: National Association of Realtors, BWR

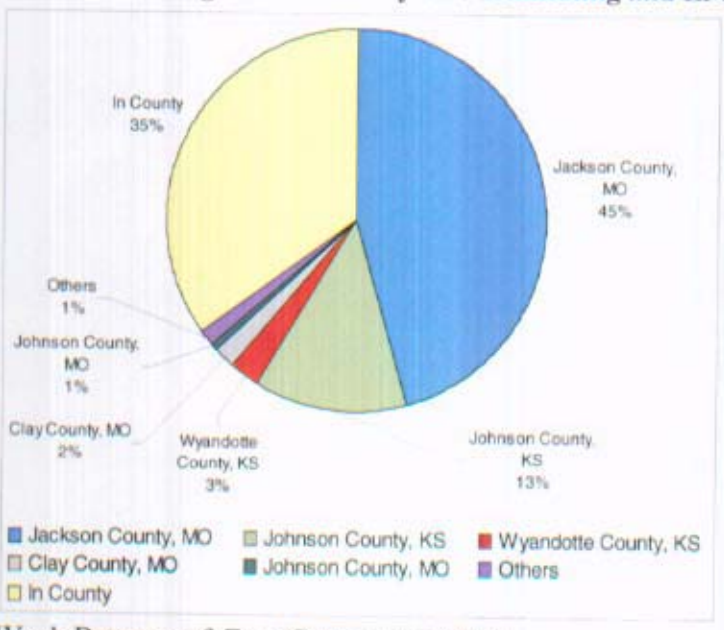
COMMUTING PATTERNS

Figure 2.7 shows the out-commuting and in-commuting patterns in 1990. These numbers are expected to increase by a significant amount in the 2000 Census, because of major population shifts that have occurred in the last decade. The 1990 figures are, however, still relevant to show trends and patterns.

The 1990 out-commuting patterns of the County show that about 65% of Cass County residents work in other Counties. Among the workers who commute to other Counties, about 14,000 commute to Jackson County, MO; 4,000 to Johnson County, KS and 770 to Wyandotte County, KS.

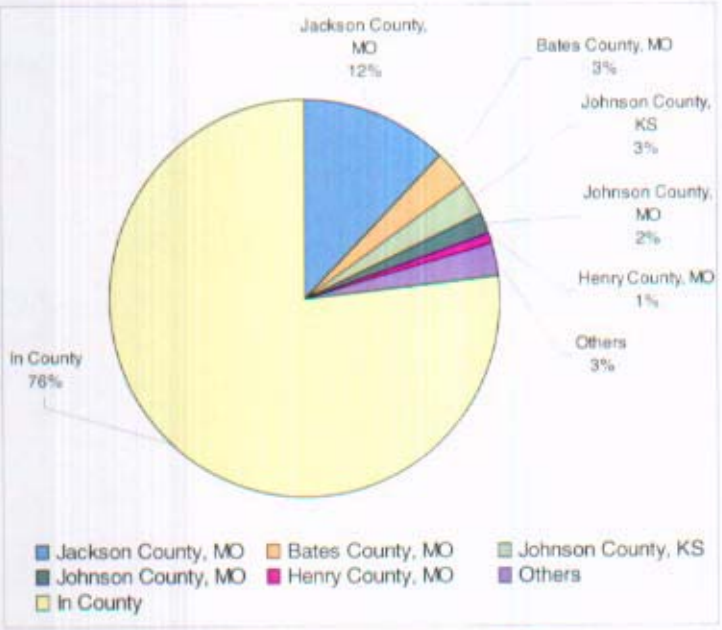
The In-commuting patterns show that about 23% of the County's workers commute from outside the County. About 1,700 come from Jackson County, MO; 420 from Bates County, MO and 380 from Johnson County, KS.

Figure 2.7: County Out-commuting and In-commuting Patterns (1990)



County	Workers	Percent
Jackson County, MO	13,904	45.40%
Johnson County, KS	4,055	13.20%
Wyandotte County, KS	771	2.50%
Clay County, MO	531	1.70%
Johnson County, MO	203	0.70%
Others	426	1.30%
In County	10,724	35.0%
Total	30,614	100%

Work Patterns of Cass County Residents



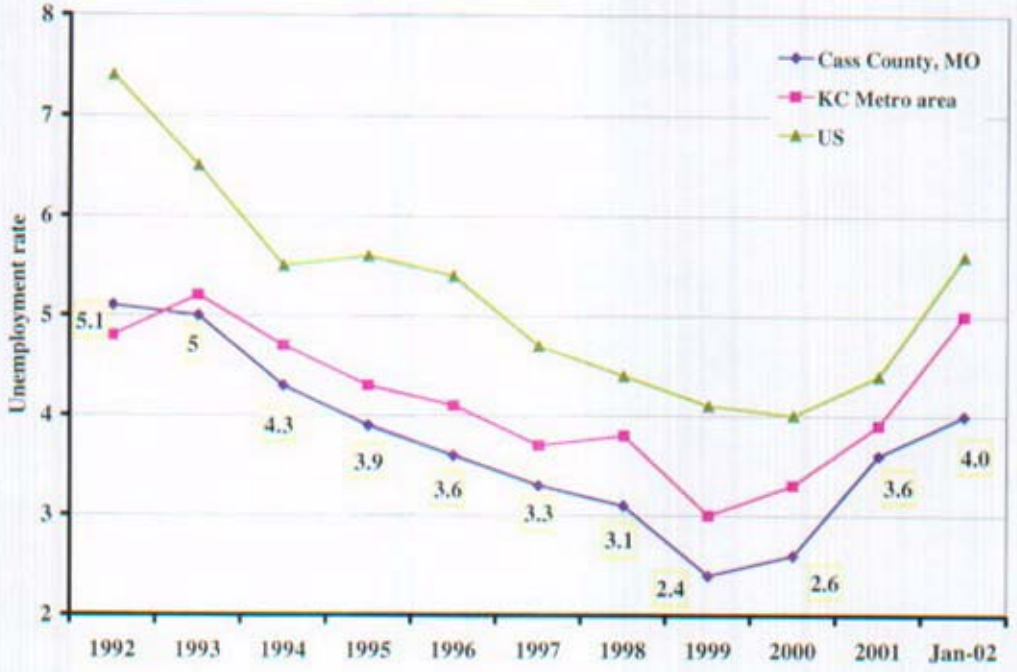
County	Workers	Percent
Jackson County, MO	1,715	12.30%
Bates County, MO	422	3.00%
Johnson County, KS	387	2.80%
Johnson County, MO	243	1.70%
Henry County, MO	113	0.80%
Others	380	2.80%
In County	10,724	76.7%
Total	13,984	100%

Residence Patterns of Cass County Workers
Source: US Census Bureau, BWR

UNEMPLOYMENT RATE

Unemployment rate in the County has traditionally been lower than the average in the metro area and lower than the National average. As of January 2002, the unemployment rate in the County was 4.0%.

Figure 2.8: Unemployment Characteristics (1991-2001)



Source: Bureau of Labor Statistics, BWR
Note: Data for County and the State is seasonally adjusted, while that for the Nation is not seasonally adjusted.

EMPLOYMENT CHARACTERISTICS

The services sector is the largest sector in Cass County economy employing over 7,000 people in 1999. The sector had grown by over 45% in the last decade. However, the military and construction sectors have been the fastest growing sectors in the County increasing by 130% and 79% respectively. Transportation sector, wholesale trade and government sectors experienced over 58% increases between 1990 and 1999. Retail trade increased by about 52%. **(Ref. Table 2.12)**

Table 2.12: Total Full and Part-time Employees by Major Industry

DESCRIPTION	1990	% OF TOTAL	1999	% OF TOTAL	NET CHANGE	PERCENT CHANGE
Total full- & part-time employment	20,491	100.0	29,706	100.0	9,215	44.97%
- Farm employment	1,958	9.6	1,834	6.2	(124)	-6.33%
- Nonfarm employment	18,533	90.4	27,872	93.8	9,339	50.39%
--- *Private employment*	15,789	77.1	23,493	79.1	7,704	48.79%
----- Ag.serv.,for.,fish., and other 3/	408	2.0	605	2.0	197	48.28%
----- Mining	102	0.5	156	0.5	54	52.94%
----- Construction	2,051	10.0	3,668	12.4	1,617	78.84%
----- Manufacturing	1,381	6.7	1,504	5.1	123	8.91%
-----Transportation and public utilities	791	3.9	1,252	4.2	461	58.28%
----- Wholesale trade	486	2.4	777	2.6	291	59.88%
----- Retail trace	4,152	20.3	6,320	21.3	2,168	52.22%
----- Finance, insurance and real estate	1,521	7.4	2,087	7.0	566	37.21%
----- Services	4,897	23.9	7,124	24.0	2,227	45.48%
--- *Government and government enterprise*	2,744	13.4	4,379	14.7	1,635	59.58%
----- Federal, civilian	165	0.8	255	0.9	90	54.55%
----- Military	367	1.8	842	2.8	475	129.43%
----- State and local	2,212	10.8	3,282	11.1	1,070	48.37%

Source: Bureau of Economic Analysis, BWR

CHAPTER THREE: FUTURE LAND USE AND POLICY

LAND USE TIERS

The Land Use Tier system was developed to help evaluate proposed residential and commercial development across Cass County. The tier boundaries were laid out utilizing several factors while providing ample area to accommodate 20 years of growth:

- Natural barriers—primarily ridgelines—which result in drainage flows to creeks and rivers in major basins and sub-basins, particularly in recognition of water quality in rivers and streams;
- Man-made improvements, such as highways and major roads, sanitary sewer systems, (both current and future improvements) and related urban systems that support non-agricultural growth; and
- Political boundaries, primarily at the edges of the cities in Cass County.

However, as new development and infrastructure are built, tier boundaries must be reevaluated so that these improvements are taken into consideration when new proposals are revised.

Urban Service Tiers

Urban density is encouraged where "Urban Residential" growth can be served cost-effectively by city services or by a community system of shared water and sanitary sewers, built to standards that are compatible with the neighboring city—with or without annexation. They are shown on the "Land Use Tier Map" around established urban areas where the cities have indicated an ability to extend utilities. Policies for development under County control are as follows:

Zoning: The County encourages urban-density zoning classifications, including commercial and industrial zoning where designated on the Land Use Tiers Map as Commercial or Planned Mixed-Use.

Roads: Paved hard surfaced roads for subdivisions.

Waste Water Treatment: Provided through a community system built to county standards, compatible with city standards. Individual on-site septic systems should not be allowed in cases where city services are provided, planned for, or may be cost-effectively extended in a timely manner. In other cases, individual on-site septic systems may be allowed provided, however, that easements are dedicated for future sanitary sewer trunk mains and road rights-of-way alignments are indicated for future major streets, as demonstrated and provided by the developer at the request of the County.

Multi-Use Tiers

These are areas near towns and cities and along paved highways and thoroughfare roads where non-agricultural development, such as commercial and industrial uses, and residential development that is denser than 20-acre lots, is encouraged. Large-scale development is allowed, including commercial and industrial zoning, provided there are provisions for direct access to paved roads.

Zoning: The County encourages commercial and industrial zoning classifications where major thoroughfare roads serve sites.

Roads: Paved hard surfaced roads for subdivisions.

Waste Water Treatment: Provided through a community system built to county standards, compatible with city standards if within a city service area (generally within 1 ½ miles of a city). Individual on-site septic systems should not be allowed in cases where city services are provided, planned for, or may be cost-effectively extended in a timely manner. In other cases, individual on-site septic systems may be allowed provided, however, that easements are dedicated for future sanitary sewer trunk mains and road rights-of-way alignments are indicated for future major streets, as demonstrated and provided by the developer at the request of the County.

Rural Density Tiers

Rural density is encouraged on 20-acre lots and larger; while more dense development (as small as 1-acre lots if platted in rural residential subdivisions) is allowed depending on standards set by the County for various on-site waste water discharge systems, subject to approval by the County health department.

Zoning: The County encourages agricultural zoning and allows agriculture-residential density on 20-acre lots, while permitting large-lot 1-acre development in rural residential subdivisions on strict standards.

Roads: Hard surfaced paved roads on-site within subdivisions.

Waste Water Systems: On-site discharge systems on 1-acre lots or larger (in platted rural subdivisions), depending on standards set by the County for various on-site waste water systems, subject to approval by the County health department; also, central sewer districts with alternative system designs, subject to approval by the County health department.

Agricultural Preservation Tiers

Ag-density (larger than 40-acre lots) would be restricted to where floodplain, bottomland. Residences would be allowed only at agricultural densities on levee-protected bottomlands.

Zoning: The County allows agricultural zoning only. Commercial and industrial zoning would not be allowed.

Roads: Private drives, or public roads if improved to standards of the County.

Waste Water Systems: On-site septic systems allowed for development at Ag-densities (larger than 40-acre lots).

PLANNING POLICY AND THE LAND USE TIER SYSTEM
Adequate Public Facilities

It is the policy of Cass County that land proposed for urban development—in the higher-density residential districts, and the non-residential districts—should be served by public facilities and services which are adequate to support this more intense, non-agricultural development. The intent is that land should not be approved for development unless and until adequate public facilities exist or provision has been made for the following essential public facilities:

- water service,
- wastewater treatment and disposal,
- stormwater management,
- electrical service,
- telecommunications service,
- public safety, and
- major thoroughfare public roads.

Proposed public improvements should conform to and be properly related to this Master Plan and applicable capital improvements plans of the county and of the neighboring city if the proposed development is in an Urban Service Tier, or if within a city service area (generally within 1 ½ miles of a city) and inside a Mixed Use Tier. Generally, adequate facilities for urban development that can be served by a community system should be evaluated by the following criteria:

Water. All habitable buildings and buildable lots should be connected to a public water system which is capable of providing water for health and emergency purposes, including adequate fire protection as required in the County Subdivision Regulations.

Wastewater. All habitable buildings and buildable lots should be served by an approved means of wastewater collection and treatment as required in the County Subdivision Regulations.

Stormwater Management. Drainage improvements should accommodate potential runoff from the entire upstream drainage area and should be designed to prevent increases in downstream flooding. The County may require the use of control methods such as retention or detention, and/or the construction of off-site drainage improvements to mitigate the impacts of the proposed development, pursuant to the County Subdivision Regulations; and may require compliance with NPDES Phase II criteria for best management practices in the northern urban sectors of the county. The stream buffer requirements may be imposed toward this end, as described in this chapter.

Streets. Proposed streets should provide a safe, convenient and functional system for vehicular, pedestrian and bicycle circulation, should be properly related to the Master Plan, and should be appropriate for the particular traffic characteristics of each proposed development. Adequate street capacity should be provided as required in the County Subdivision Regulations.

Phasing. The County may require the phasing of development or improvements in order to maintain current levels of service for existing public services and facilities or for other reasons based upon maintaining the health, safety and general welfare of the County's inhabitants.

Extension Policies. All public improvements and required easements should be extended through the parcel on which new development is proposed. Streets, water lines, wastewater systems, drainage facilities, electric lines and telecommunications lines should be constructed through new development to promote the logical extension of public infrastructure. The County may require the applicant of a subdivision to extend off-site improvements to reach the subdivision or oversize required public facilities to serve anticipated future development as a condition of plat approval.

Easements/Rights-of-Way. Except as otherwise provided in these regulations, an applicant for a development approval should ensure that adequate on-site and off-site easements are provided for future roadways, water, wastewater and other public utilities.

Public Safety. The ability of the county sheriff to police urban-density development must be carefully evaluated before commitments are made to urban densities.

Urban Service Tiers

The urban growth areas within the County should be (a) contiguous or in close proximity to existing municipal boundaries and should encompass the likely sites of higher density residential growth in the future; (b) reasonably compact yet sufficiently large to accommodate that growth; and (c) located where neighboring municipalities can extend public utilities to urban-density development.

The Cass County Urban Service Tier is representative of those areas within Cass County that exhibit the following characteristics:

- Have been identified by the neighboring town or city as an area for extension of future municipal utility services,
- located along highways, major arterials and intersections, and
- to be developed for residential, industrial and commercial purposes—with or without annexation.

Multi-Use Tiers

The Multi-Use Tier is representative of development areas within Cass County that exhibit the following characteristics:

- positioned as transition areas from urban to rural densities,
- located along rural highways, major arterials and intersections, or close enough to such major roads to provide access for more intense levels of non-agricultural traffic, and
- predominately developed for a mix of land uses: residential, industrial and commercial purposes.

Rural Density Tiers
The Rural Density Tiers are in areas that historically have remained agricultural. As a result, the Rural Density Tier has the least density and is characterized by farmland and low-density residential development, or for higher-density residential development on strict standards where development pays its way.

Agricultural Preservation Tiers
These tiers are the flood plain areas of Cass County where only 40-acre density development would be allowed, subject to flood plain regulations, in addition to agricultural uses (**Ref. Natural Features Map**). The Land Use Tier Plan with its attention to floodplain lands and other sensitive lands would be particularly useful in deciding where to allow development and where to set aside land as open space. Protection of natural features and adverse impacts of uncontrolled growth would be the future direction—as well as the driving force—in the design criteria of any future development into this area. Rural areas include territory that is not within urban growth or planned growth areas and is to be preserved as agricultural lands, forests, recreational areas, and wildlife management areas within flood plains.

PLANNING POLICY AND ZONING

The Plan calls for the county to update its zoning regulations to differentiate among residential, commercial, and industrial land uses and development densities.

Urban Residential: Minimum lot size of 7,500 square feet if on community waste water system; 1-acre lots if platted in a subdivision served by on-site systems, depending on standards set by the County for various on-site waste water discharge systems, subject to approval by the County health department.

Rural Residential: Minimum lot size of 20-acres encouraged, or as small as 1-acre lots if platted in a rural residential subdivision, subject to standards set by the County for various on-site waste water discharge systems and approval by the County health department.

Agriculture Preservation Residential (in Flood Plain): Minimum lot size of 40-acres, no maximum.

LAND USE TIER PLAN MAP—SEE NEXT PAGE

The tier map boundaries were laid out utilizing several factors while providing ample area to accommodate 20 years of growth:

- Natural barriers, such as major drainage basins and sub-basins;
- Man-made improvements, such as highways and major roads; and
- Political boundaries.

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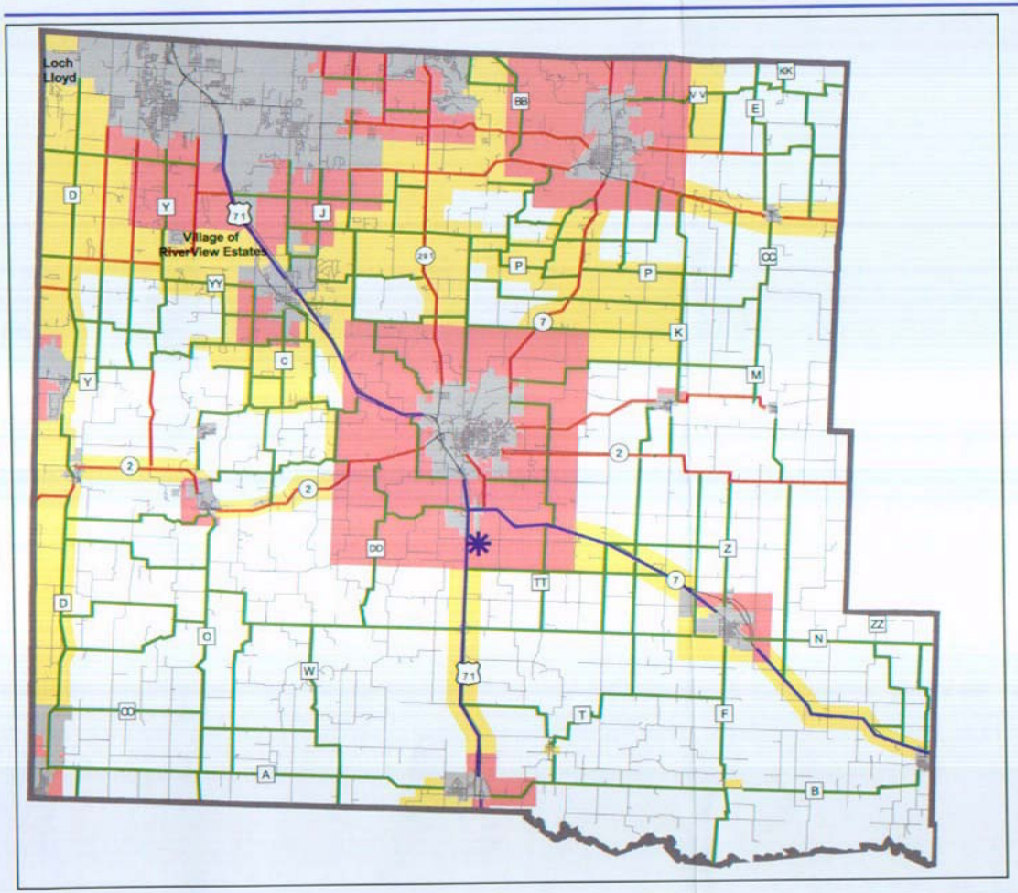
Cass County, Missouri



Land Use Tiers

LEGEND

- US Highway
- Arterials
- Collectors
- Other Roads
- Incorporated Cities
- Urban Service Tier
- Multi-Use Tier
- Rural Density Tier
- County Boundary
- Airport Overlay District

N

0.8 0 0.8 1.6 2.4 3.2 4 Miles

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PLANNING POLICY AND PUBLIC IMPROVEMENTS

Zoning and Subdivision Regulation Updates

The County shall update its zoning and subdivision regulations to require the following:

- Rezoning of more than single lots or lot splits shall be contingent on replatting.
- Soil test results shall be supplied by the applicant prior to rezoning or, if replatting is required, prior to preliminary platting.
- Public improvements shall be completed within a prescribed time period as specified in the payment and performance bond (such as two years from the initiation of development permitting); and a maintenance bond shall be required for a prescribed time period for each local street improvement project.
- Local street improvements shall be made as follows:

  Urban Residential: New local streets, improved and dedicated to the County, shall be paved (asphalt or concrete) to county standards and—upon dedication to the public—maintained by the County.

  Agriculture Residential: Local streets in rural areas may be gravel for subdivisions at agricultural-residential densities of 20-acre lots or larger, in which case they shall be privately owned and maintained. If dedicated to the public, they must be brought up to county street improvement standards.

Road Impact Fees

Major Thoroughfare Road improvements shall be financed as follows:

Off-site Improvements: A road impact fee shall be paid for improvements to major thoroughfare roads. The fee charged on new development will be reasonably related to the needs created by the development (its impact) on the County's road system and the benefits conferred upon that development through the use of the fee that is collected. Road impact fee service areas will be designated to ensure that developers pay their fair share and that fees are being distributed to the appropriate area of impact. The service area would identify the principal area from which the proposed development would attract traffic that would impact roads within the identified planning area. Using the Roadway Classification map provided in the Development Plan—as well as the Traffic Demand Model developed in the Plan Update—the County will designate road impact fee "Service Areas." The areas will be created with boundaries that are equidistant from roadways requiring improvements.

Waste Water Improvement Options

Waste water system improvements shall be planned as follows:

Community sewers (city or water district sewer systems) are required for development in Urban Service Tiers if the adjacent city or water district is prepared to extend public utilities. All community systems must be approved by the County health department and built to County standards. On-site waste water discharge systems must be built to County standards set by the County for various designs, subject to approval by the County health department.

Storm Water Management Requirements

Storm water management regulations must be implemented for portions of Cass County to comply with the National Pollutant Discharge Elimination System (NPDES) Phase II storm water program. Cass County is required to obtain permit coverage and implement a storm water management program for municipal separate storm sewer systems within the boundaries of the county's urbanized area as defined by the Census Bureau. The Big Creek, Mount Pleasant, and Raymore townships are classified within the Kansas City urbanized area and must obtain a permit comply with NPDES storm water regulations.

Under the Missouri Clean Water Law and the Missouri Code of State Regulations, activities that require permitting include small municipal separate storm sewer systems and land disturbance. A **land disturbance permit** requires the development and implementation of a Storm Water Pollution Prevention Plan that includes erosion and sediment controls, controls on waste at the site, self-inspection and monitoring, and reporting efforts. Developers/landowners developing or disturbing more than one (1) acre and less than five (5) acres of land within Missouri are required to apply for an NPDES storm permit for small construction activity.

Storm water management best management practices (BMPs) are used to prevent or control the discharge of pollutants into receiving water bodies. The first step in water quality management is to implement BMPs to maintain or reduce the amount of runoff generated within a watershed by maintaining watershed hydrology and cover. Treatment is then applied to the remaining runoff to remove some of the pollutant load. Storm water management for site development may include structural facilities and/or non-structural solutions. As such, Cass County regulations address the following:

Preserve and Promote Natural Hydrology of Site

The maintenance or reduction of the amount of runoff generated within a site is the first step in water quality management. As such, the County's subdivision regulations must address the use of site design to preserve and promote the natural hydrology of the site in order to adequately control resulting storm water runoff.

Provide Buffer Zones along Sensitive Water Bodies

Buffer zones shall be used to physically protect sensitive water bodies in the county, such as a stream, lake, or wetland from future disturbance or encroachment. A buffer zone is an area along a shoreline, wetland, or stream where development is restricted or prohibited. A properly designed buffer zone can provide storm water management and act as a right-of-way during floods, sustaining the integrity of stream ecosystems and habitats. Buffer zones types include: water pollution hazard setbacks (areas that separate a potential pollution hazard from a waterway); vegetated buffers (natural areas that exist to divide land uses or provide landscape relief); and engineered buffers (areas specifically designed to treat storm water such as storm water depression, grass filter area, and forested strip).

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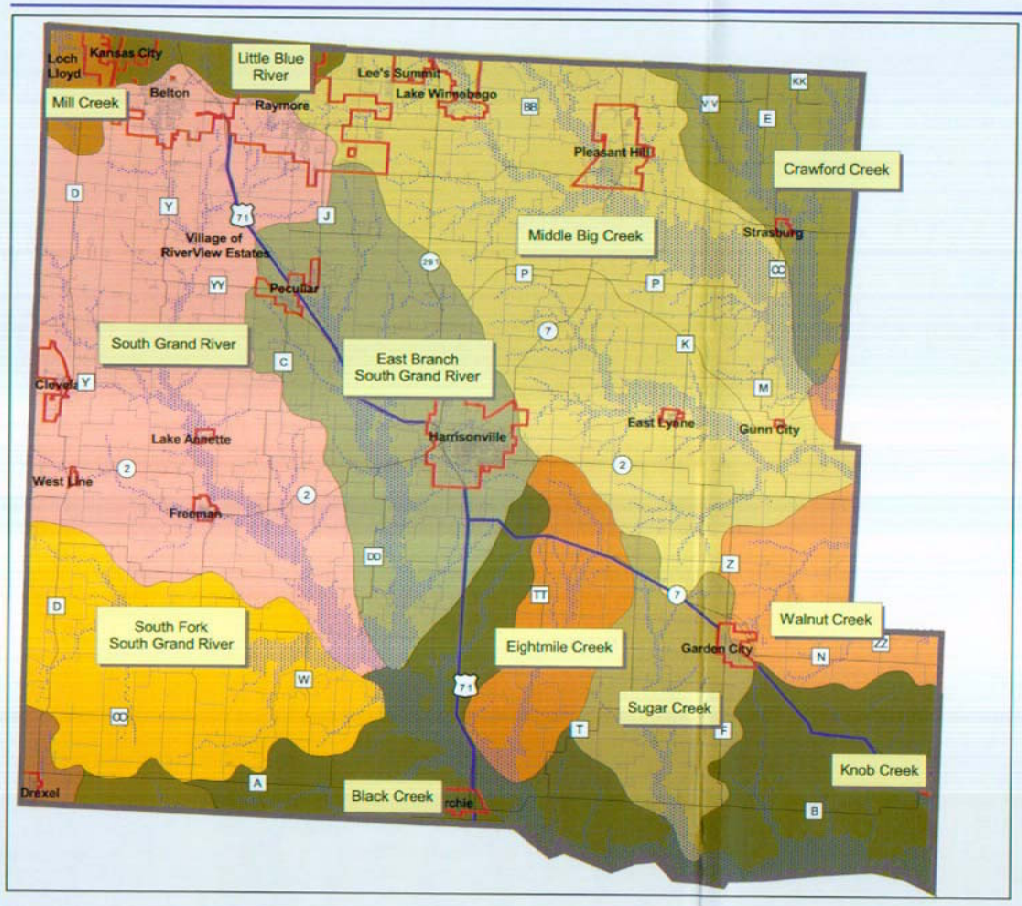
Cass County, Missouri



Drainage Sub-basins Map

LEGEND

- US Highway
- Major Roads
- Other Roads
- 100-Year Floodplain
- Incorporated Cities
- County Boundary

N

1 0 1 2 3 4 5 Miles

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Implement Erosion and Sediment Control Practices
Erosion and sediment control practices must be implemented to prevent or minimize erosion on construction sites and control the amount of sediment leaving the sites. Such controls may be accomplished by the following: stabilizing exposed soils (temporary or permanent seeding, sodding, and mulching); installing perimeter controls to intercept and detain small amounts of sediment from leaving the construction site (silt fences, straw bale barriers); and using sediment trapping devices to intercept and detain small amounts of sediments from leaving the construction site (check dams, straw bales, diversions, grass lined channels, inlet structure protection, outlet stabilization structures, sediment basins).

Provide Water Quality Treatment of Runoff
The treatment of storm water runoff is accomplished by the use of structural best management practices designed to infiltrate and reduce the amount of runoff, or to filter and detain runoff to reduce discharge velocities and remove pollutants. Such practices include: detention (on-site storm water detention is the storage of excess runoff before its entry into a principal drainage system such as wet ponds, wetlands, and dry basins); filtration (engineering filtration systems at or near the source of runoff routes the most contaminated "first flush" of rainfall through an engineered natural filter such as grass lined channel, try swales, sand filters, or bioretention); and infiltration (such as infiltration basins or trenches which capture a volume of storm water runoff, retain it, and infiltrate that volume of water into the ground).

Implement Good Housekeeping Practices
Building materials and other construction site wastes must be properly managed and disposed of to reduce the risk of pollution from materials such as surplus or refuse building materials or hazardous wastes. Practices to help reduce the potential for storm water runoff contamination include: trash disposal and recycling; proper material handling; and spill prevention and cleanup plans.

Floodplain Management Regulation Updates
The Cass County zoning regulations apply to all unincorporated areas of Cass County identified on the Flood Insurance Rate Maps (FIRM) or Floodway Maps as promulgated by the Federal Emergency Management Agency (FEMA) and determined to be within the FW and FF districts as defined in this Zoning Development Code. The County has updated these regulations to shall enforce the floodplain regulations to meet provisions of 44 CFR Part 60, §60.3.(d) relating to floodplain management criteria for flood-prone areas. Notwithstanding any other provisions of 44 CFR Part 60, §60.3.(d), the County may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the county first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of the code of federal regulations, and receives the approval of the FEMA Administrator. For details, the full the floodplain regulations should be consulted as interpreted and enforced by the County Zoning Official.

Stream Buffer Requirements
As part of an overall urban watershed protection strategy, stream buffer requirements that are in rural residential subdivisions where Phase II stormwater permitting requirements do not apply, shall be designed as follows:

Stream buffer Requirements
Headwater streams are often severely degraded by urbanization. As a consequence, many communities have adopted stream buffer requirements as part of an overall urban watershed protection strategy. Urban stream buffers are an integral element of any local stream protection program. By adopting some of these rather simple performance criteria, communities can make their stream buffers more than just a line on a map. Better design and planning also ensure that communities realize the full environmental and social benefits of stream buffers. Recommendation in this section are from the APA, PAS Memo of August 2000.

The ability of a particular buffer to actually realize its many benefits depends to a large extent on how well the buffer is planned or designed. In general, a minimum base width of at least 100 feet is recommended to provide adequate stream protection. In most regions of the country, this requirement translates to a buffer that is perhaps three to five mature trees wide on each side of the channel

Three-zone Buffer System
Effective urban stream buffers divide the total buffer width into three zones:

- Streamside;
- Middle core; and
- Outer zone.

Each zone performs a different function and has a different width, vegetative target and management scheme.

The **streamside zone** protects the physical and ecological integrity of the stream ecosystem. The vegetative target is mature riparian forest that can provide shade, leaf litter, woody debris, and erosion protection to the stream. The minimum width is 25 feet from each stream bank—about the distance of one or two mature trees from their streambank. Land use is highly restricted, limited to stormwater channels, footpaths, and a few utility or roadway crossings.

The **middle core zone** extends from the outward boundary of the streamside zone and varies in width depending on stream order, the extent of the 100-year (or one percent) floodplain, any adjacent steep slopes, and protected wetland areas. Its functions are to protect key stream components and provide further distance between upland development and the stream. The vegetative target for this zone is also mature forest, but some clearing may be allowed for stormwater management, access and recreational uses. A wider range of activities and uses are allowed within this zone, such as bike paths and

stormwater best management practices (BMPs). The minimum width of the middle core is about 50 feet, but it is often expanded based on stream order, slope, or the presence of critical habitats (see Buffer Expansion and Contraction).

The **outer zone** is the buffer's buffer, an additional 25-foot setback from the outward edge of the middle core zone to the nearest permanent structure. In many instances, this zone is within a residential backyard. The vegetative target for the outer zone is usually turf or lawn, although the property owner is encouraged to plant trees and shrubs. Few uses are restricted in this zone. Gardening, compost piles, yard wastes, and other common residential activities are promoted within the zone. The only major restrictions are no septic systems and no new permanent structures.

Buffer Crossings

Two major goals of a stream buffer network are:

- To maintain an unbroken corridor of riparian forest; and
- The upstream and downstream passage of fish in the stream channel.

Some provision must be made for linear forms of development that must cross the stream or the buffer, such as roads, bridges, fairways, underground utilities, enclosed storm drains or outfall channels. Some performance criteria could include:

- Crossing width: define a minimum width for maintenance access.
- Crossing angle: direct right angles are preferred, because they require less buffer clearing than oblique crossing angles.
- Crossing frequency: allow only one road crossing within each subdivision, and permit no more than one fairway crossing for every 1,000 feet of buffer.
- Crossing elevation: have all direct outfall channels (the places where effluent is discharged into receiving waters) discharge at the invert elevation, or the lowest point of the stream channel.

Using buffers for stormwater treatment. The outer and middle zone of the stream buffer may be used as a grass/forest filter strip under limited circumstances. For example, the buffer cannot treat more than 75 feet of overland flow from impervious areas and 150 feet from pervious areas, such as backyards or rooftops. The designer should compute the maximum runoff velocity for both the six-month and two-year storms from each overland flow path, based on the slope, soil and vegetative cover. If the calculations indicate that velocities will be erosive under either condition (greater than three feet per second (fps) for a six-month storm, five fps for a two-year storm), the allowable length of contributing flow should be reduced.

When the buffer receives flow directly from an impervious area, the designer should include curb cuts or spacers so that runoff can spread evenly over the filter strip.

The stream buffer can be accepted as a stormwater filtering system if basic maintenance can be assured, such as routine mowing of the grass filter and annual removal of accumulated sediments at the edge of the impervious areas and the grass filter. The existence of an enforceable maintenance agreement that allows for public maintenance inspection is also helpful.

Location of stormwater ponds and wetlands within buffer. A particularly difficult management issue involves locating stormwater ponds and wetland in relation to the buffer. Several arguments can be made for locating ponds and wetlands within the buffer or on the steam itself. Constructing ponds on or near the stream allows the greatest possible drainage area to be treated at one topographic point. Also, ponds and wetlands require the dry weather flow of a stream to maintain water levels and prevent nuisance conditions. Lastly, ponds and wetlands add a greater diversity of habitat types and structure and can add to the total buffer width in some cases.

Given the effectiveness of stormwater ponds and wetlands in removing pollutants, one should not completely prohibit their use within the buffer.

Plan Review and Construction

The limits and uses of stream buffer systems should be well defined during each stage of the development process, from initial plan review through construction. The following steps are helpful during the planning stage:

- Require that the buffer be delineated on preliminary and final concept plans;
- Verify the stream delineation in the field;
- Check that buffer expansions are computed and mapped properly;
- Check suitability of use of buffer for stormwater treatment;
- Ensure other best management practices (BMPs) are properly integrated in the buffer; and
- Examine any buffer crossings for problems.

Buffer Flexibility

The courts have generally found that buffer ordinances avoid the taking issue, by proving that buffer strips provide compelling public safety, welfare, and environmental benefits to the community to justify restriction of land use. In order to limit the hardship on developments the following planning methods can be utilized to mitigate any negative impacts associated with the creation of stream buffer strips.

Buffer averaging. Here a community provides some flexibility in the buffer width, permitting the buffer to become narrower at some points along the stream as long as the average width meets the minimum requirement.

Density compensation. This scheme grants a developer credit for additional density elsewhere on the site to compensate for developable land lost to the buffer. Developable

land is defined as the buffer area remaining after the 100-year floodplain, wetland and steep slope areas have been subtracted. Credits are granted when more than five percent of developable land is consumed, using the approach shown in Table 1. The density credit is accommodated by allowing greater flexibility in setbacks, frontage distances, or minimum lot sizes. Cluster development also allows the developer to recover lots that are taken out of production due to buffers and other requirements.

Conservation easements. Landowners should be afforded the option of protecting lands within the buffer with a perpetual conservation easement.

Variances. The buffer ordinance should have provisions that enable an existing property owner to be granted a variance, if the owner can demonstrate severe economic hardship or unique circumstances make it impossible to meet some or all buffer requirement.

Table 3.1 Example of the Use of Density Credits

(To compensate developers for excessive land consumption by buffers.)

Percentage of Site Lost to Buffers	Density Credit*
1 to 10%	1.0
11 to 20%	1.1
21 to 30%	1.2
31 to 40%	1.3
41 to 50%	1.4
51 to 60%**	1.5
61 to 70%**	1.6
71 to 80%**	1.7
81 to 90%**	1.8
91 to 99%**	1.9

Adapted form Burns, 1992.
*Additional dwelling units allowed over base density (1.0)
**Credit may be transferred to a different parcel

WIND ENERGY CONVERSION SYSTEMS (WECS)

The county seeks to ensure a regulatory means of facilitating wind energy development by protecting the Wind Energy Conversion Systems (WECS) that may be improved in the unincorporated county. Such interests include: unobstructed wind flow; and at the same time provide a regulatory response to the demands of neighbors and the general public whose interests may be detrimentally affected by wind turbine operation. The County should adopt an Overlay District for WECS that require submittals to the Cass County Planning Board for a Wind Energy Conversion System plan approval. A WECS Development Plan would to be submitted to:

- Provide details of the WECS;

- Provide information so individuals may gain an understanding of the WECS;
- Provide a basis for public discussion and informed comment on the WECS;
- Identify significant environmental, social, and economic effects related to the WECS; and,
- Provide a background on which decision makers will consider the project.

NATURAL FEATURES MAP—SEE NEXT PAGE

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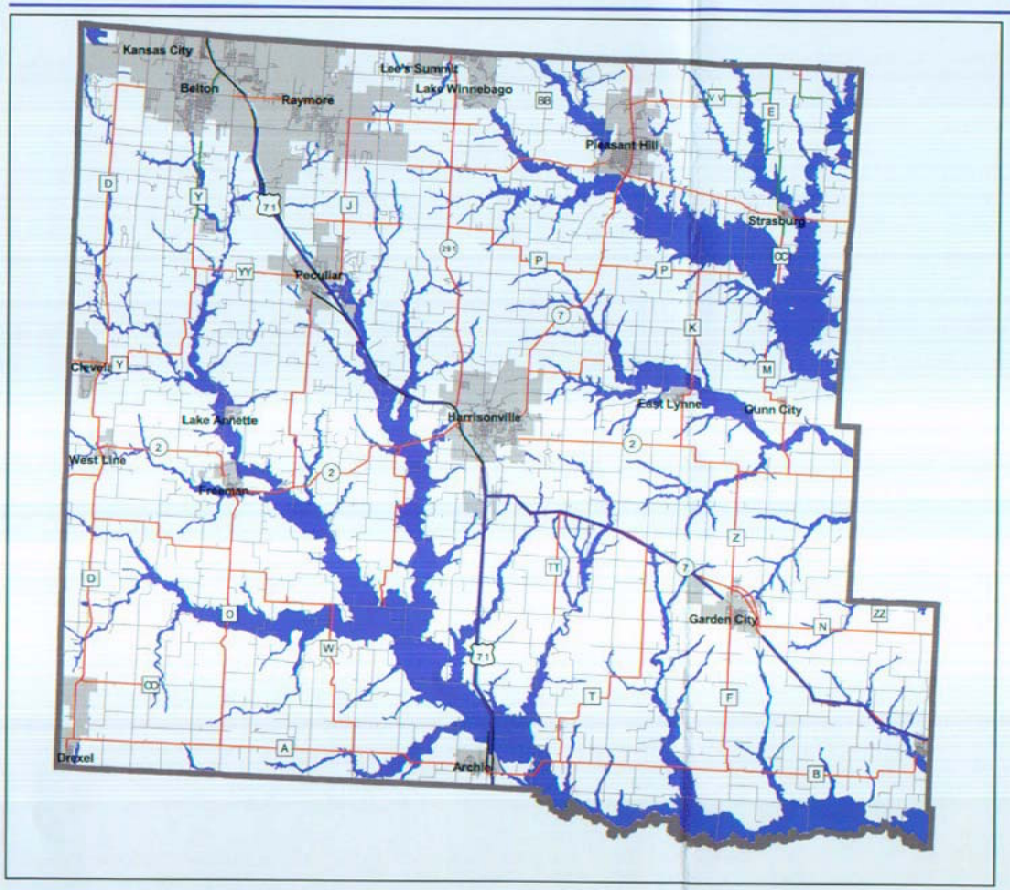

Natural Features Map

LEGEND

- US Highway
- Major Roads
- Other Roads
- 100-Year Floodplain
- Incorporated Cities
- County Boundary

N

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GOALS, OBJECTIVES AND POLICIES FROM PRIOR PLANS

The following set of goals, objectives and policies is reproduced here for reference to show continuity in the planning work process of Cass County. They represent a history of planning policy during the past decade, and as such a link with the past and to the future of planning in the County. As the land use goals of Cass County are updated in an on-going planning process, the Planning Board must work to articulate the specific objectives and policies for the development of the each urban rural area of unincorporated county; and add new policies as needed.

General Development and Land Use Relationships

GOAL: TO PROVIDE THE OPPORTUNITY FOR DEVELOPMENT OF URBAN, SUBURBAN AND RURAL LAND USES WHILE PROVIDING FOR THE APPROPRIATE LOCATION AND RELATIONSHIP AMONG THESE THREE LAND USES.

OBJECTIVE G1
Manage the location and design of new subdivisions and developments in order to minimize initial and future public and private costs.

POLICY G1.1
New urban development should be encouraged to locate in and around incorporated communities where municipal services and public facilities are already present. These new developments should be encouraged to connect to such services.

POLICY G1.2
New urban development should be encouraged to be contiguous to existing development to avoid the inefficient "leap-frog" pattern of growth.

2004 POLICY G1.3
Rural development within the unincorporated portion of the County should be encouraged to occur within Urban Service Areas and where urban services can be cost-effectively extended or planned.

POLICY G1.4
Urban subdivisions shall have direct access to a paved collector or arterial road.

OBJECTIVE G2.
Encourage Agricultural compatibility with urbanizing areas.

POLICY G2.1
Residential, commercial or industrial land uses should be encouraged to develop in areas where they are not likely to interfere with or become a nuisance to normal farming operations.

POLICY G2.2
Uses such as commercial or industrial land uses should not be permitted in rural areas if they are likely to interfere with or become a nuisance to normal farming operations.

POLICY G2.3
The bulk storage of agricultural chemicals or petroleum products which are flammable or toxic should not be allowed adjacent to residential areas nor shall residential development be allowed adjacent to existing storage facilities.

POLICY G2.4
Uses such as commercial feedlots which create sustained periods of noise, dust and odor should not be allowed to locate adjacent to urban areas.

OBJECTIVE G3
Restrict development to areas with few environmental hazards and minimize the loss of natural resources due to urbanization.

POLICY G3.1
New developments should be encouraged to locate in areas which are relatively free of environmental problems relating to soil, slope, bedrock and water table. Proposed development should be reviewed by the appropriate staff or consultants to identify site-specific environmental problems.

2004 POLICY G3.2
Residential development should not be allowed within the 100-year flood plain. Under no circumstances should development be allowed in the floodway or that area which includes the center of the channel of a creek, stream or river and that area which carries the majority of the flood waters during a flood.

POLICY G3.3
New development should be encouraged to be located so as to avoid disturbing significant natural resources including prime agricultural land and where natural resources may be utilized by public utilities.

2004 POLICY G3.4
Increased storm water runoff attributed to new development should not adversely affect downstream properties or structures, and Phase II NPDES stormwater best management practices should be followed in urbanizing areas.

POLICY G3.5
The County should be granted drainage easements for all major drainage ways.

Residential

GOAL: TO ENSURE DECENT AND AFFORDABLE HOUSING AND TO ALLOW FOR A WIDE RANGE OF HOUSING TYPES.

OBJECTIVE R1

Encourage the construction of housing subdivisions according to reasonable design and development standards.

POLICY R1.1
Enforce development regulations through routine and consistent inspection.

POLICY R1.2
Encourage development of residential units located within close proximity of incorporated areas to meet city design standards.

Commercial

GOAL: TO PROVIDE SUFFICIENT OPPORTUNITY FOR COMMERCIAL DEVELOPMENT AT APPROPRIATE LOCATIONS.

OBJECTIVE C1
Encourage the development of the majority of commercial establishments within the urban and urbanizing areas of *Cass County*.

POLICY C1.1
Encourage the development of retail businesses in the urban and urbanizing areas of the County.

POLICY C1.2
Allow for retail facilities in those areas of the County not served by retail centers only when sufficient market area populations are present or planned.

POLICY C1.3
Office development should be encouraged to locate in the urban and urbanizing areas of the County.

OBJECTIVE C2
Control strip commercial development.

POLICY C2.1
Strip commercial development should be limited to those uses directly serving the motoring public such as motels, service stations and restaurants.

POLICY C2.2
Strip commercial development should be limited to specifically identified areas on the plan and should be provided vehicular access via frontage roads wherever possible.

POLICY C2.3
Those areas containing large commercial land uses should be located on major arterial streets with careful access controls and sufficient buffers from any adjacent residential uses.

Industrial

GOAL: TO PROVIDE SUFFICIENT OPPORTUNITIES FOR INDUSTRIAL DEVELOPMENT AT LOCATIONS WITH SUITABLE ACCESS AND ADEQUATE MUNICIPAL SERVICES.

OBJECTIVE I1
Industrial development should be located so as to maximize efficient usage of the municipal services necessary for this type of development.

POLICY I1.1
Industrial sites should have access to arterial roads, preferably those leading directly to major highways.

POLICY I1.2
Industrial development should be located or designed so as to be afforded adequate water and sewer services and police and fire protection.

POLICY I1.3
Industrial development should be located so as to minimize the negative impact on the environment and on other less intensive uses.

POLICY I1.4
New industrial uses should be separated or buffered from surrounding non-industrial uses. Heavy industrial uses should be located away from existing or projected residential growth areas and opposite the prevailing winds.

POLICY I1.5
Future industrial uses should not be allowed in areas where substantial, long-term environmental damage is likely to occur.

POLICY I1.6
Industrial uses such as salvage yards should be located and screened so as to minimize their visual impact on the County landscape.

POLICY I1.7
Area of potential industrial land should be reserved and discouraged from being developed as residential.

POLICY I1.8
Industrial uses, other than those of an agricultural nature or operations which need to be in remote locations, should be encouraged to locate within existing cities.

Public and Semi-Public

GOAL: TO PROVIDE ADEQUATE GOVERNMENTAL, INSTITUTIONAL, EDUCATIONAL AND CIVIC FACILITIES IN APPROPRIATE LOCATIONS THROUGHOUT THE COUNTY.

OBJECTIVE P1
Encourage County-wide coordination in locating governmental, religious, educational and civic facilities.

POLICY P1.1
Public facilities such as governmental offices should be located so as to maximize their accessibility.

POLICY P1.2
Public facilities such as City, County and State maintenance yards should be located in industrial areas which contain similar types of users.

Municipal Services

GOAL: TO ENSURE THAT RESIDENTS ARE ADEQUATELY SUPPLIED BY MUNICIPAL SERVICES OR RURAL SERVICE DISTRICTS.

OBJECTIVE M1
Encourage Countywide coordination and cooperation regarding resources, supply, facilities and distribution of utility services.

POLICY M1.1
Encourage watershed protection.

2004 POLICY M1.2
Establish overlay districts to promote direct coordination between cities and the County where the public interest should be protected through closer cooperation.

Transportation

GOAL: TO PROVIDE AN EASY, SAFE AND EFFICIENT VEHICULAR FLOW WITHIN AND THROUGH THE UNINCORPORATED COUNTY AREAS.

OBJECTIVE T1
Provide a thoroughfare system which allows safe and efficient travel from one place to another.

POLICY T1.1
Major roads should link all employment, shopping and educational centers.

POLICY T1.2
Right-of-way and improved roadway surfaces should be sufficiently wide and of sufficient strength to accommodate anticipated future traffic loads.

POLICY T1.3
Direct access onto major thoroughfares should be carefully controlled by limiting the number of curb cuts and by the use of frontage roads for adjacent commercial and residential land uses.

POLICY T1.4
Curb cuts on major thoroughfare roads should be spaced in such a way that traffic is not impeded.

POLICY T1.5
Major new developments should not be approved until their impact on the surrounding road system is evaluated and it is confirmed that design capacities will be exceeded.

2004 POLICY T1.6
Major road improvement should be financed in part through impact fees imposed at the time of subdivision platting to compensate the public for the impact on the surrounding road system and the diminution of road capacities from new development.

CHAPTER FOUR: MAJOR ROADWAY PLAN

ROADWAY STANDARDS

Design standards are established to provide the level of service that it is intended for each roadway classification. Many of these design standards are set forth in the Cass County Subdivision Regulations and by the Standard Specifications and Design Criteria of the Kansas City Metropolitan Chapter of the American Public Works Association. Tables 4.2 and 4.3 identify the material options for each roadway classification. Table 4.4 provides further standards, including right-of-way, cul-de-sac, sight distance and sidewalk requirements for each roadway classification (also, **Ref. Major Thoroughfare Plan Map**).

Freeway and Expressways: The Missouri Highway and Transportation Department (MoDOT) is the entity responsible for construction and maintenance of freeways and expressways within Cass County. Therefore, all freeways and expressways should be constructed in accordance with the specifications of MoDOT (Option A in Table 4.2).

Rural Parkway: A parkway should be constructed in accordance with specifications of MoDOT for expressways, with landscaping added in the grass landscape median and the outer right-of-way buffer landscape areas.

Five-Lane Primary Arterial Roadways: A five-lane primary arterial roadway section includes two 12-foot through lanes in each direction with a 12-foot to 16-foot center two-way left turn lane located between the through lanes. The surface of a five-lane arterial roadway should be paved and constructed in compliance with Option C in Table 4.2.

Traffic volumes on primary arterial roadways can range as high as 42,000 vehicles per day. Excessive curb cuts and mid-block turning movements, however, can reduce the capacity of this type of roadway. A center turn lane is appropriate because of frequent entrances into higher traffic generation land uses such as business parks and retail centers. A median can be constructed in locations where left-turns are prohibited. On-street parking should be prohibited.

Two-Lane Minor Arterial Roadways: A two-lane minor arterial roadway section includes two 12-foot through lanes. Two-lane minor arterial roadways should be paved and constructed in accordance with Option C in Table 4.2.

The traffic volume for a two-lane minor arterial roadway should range between 4,000 and 19,000 vehicles per day. Two-lane minor arterial roadways are appropriate for carrying traffic through primarily residential land uses without directly accessing any of the properties and for carrying traffic through agricultural land uses with minimal direct access to agricultural properties. Left turnbays should be provided at major intersections and at all signalized intersections.

Two-Lane Collector Roadways: This type of street is appropriate for collecting traffic in a residential neighborhood. Because traffic volumes may range between 1,500 and 4,000 vehicles

per day, properties abutting the collector may not be as desirable as those abutting only a local street. Parking and private access to the collector roadway should be discouraged. If needed, parking should be allowed on one side only.

The width of a collector roadway should accommodate two 12-foot lanes. In rural areas, a right-of-way of 60 to 80 feet should be provided to allow for ditches to be constructed within the right-of-way. In Urban Service Areas where curb and gutters are provided with an enclosed storm sewer system, a right-of-way of 60 feet is appropriate.

The roadway surface should be constructed of either Option B, D, or E in Table 4.

Local Roadways: *All other roadways in the county not previously described are classified as* local streets. The ideal traffic volume for local streets is less than 1,000 vehicles per day. Local streets should provide direct access to private property, and generally on-street parking is not permitted. Recommended street widths are 28 feet within a 60 foot right-of-way.

TABLE 4.1: CASS COUNTY ROADWAY CLASSIFICATIONS

Roadway Name	Location	Roadway Classification
2 Highway	From west county limit, through Freeman and Harrisonville to east county line	Primary Arterial
175th Street	Between 291 Hwy and Pleasant Hill	Minor Arterial/Collector
203rd Street	Between School Rd. and Jefferson Parkway	Minor Arterial/Collector
213th Street	Between CC Hwy and Dillon Rd.	Minor Arterial/Collector
243rd Street	Between East Lynne and Gunn City	Minor Arterial/Collector
249th Street	Between Harper Rd. And 251st St.	Minor Arterial/Collector
251st Street	Between 249th St. and U.S. Hwy 71	Minor Arterial/Collector
253rd Street	Between Lake Annette Rd. and Harper Rd.	Minor Arterial/Collector
291 Highway	Between north county limit and Harrisonville	Primary Arterial
307th Street	Between W Hwy and Garden City	Minor Arterial/Collector
58 Highway	Between Raymore and east county limit	Primary Arterial
7 Highway	Between U.S. Hwy 71 and Creighton	Expressway
7 Highway	From north county limit, through Pleasant Hill to Harrisonville	Primary Arterial
A Highway	Between Drexel and Archie	Minor Arterial/Collector
B Highway	Between Archie and Creighton	Minor Arterial/Collector

Roadway Name	Location	Roadway Classification
BB Highway	Between north county limit and 58 Hwy	Minor Arterial/Collector
C Highway	Between Peculiar and 2 Hwy	Minor Arterial/Collector
CC Highway	Between Strasburg and 213th St.	Minor Arterial/Collector
Cleveland Avenue	Between Belton and Y Hwy	Minor Arterial/Collector
Country Club Drive	Between Pleasant Hill and east county limit	Minor Arterial/Collector
D Highway (Holmes Road)	From Belton through Cleveland to Drexel	Minor Arterial/Collector
DD Highway	Between 2 Hwy and 307th St	Minor Arterial/Collector
Dillon Road	Between 213th St. and M Hwy	Minor Arterial/Collector
E Highway	Between north county limit and Strasburg	Minor Arterial/Collector
EE Highway	East of 7 Hwy	Minor Arterial/Collector
F Highway	Between Garden City and Dayton	Minor Arterial/Collector
Groh Road	Between Y Hwy and 2 Hwy	Minor Arterial/Collector
Harper Road	Between Peculiar and 249th St.	Minor Arterial/Collector
Hoover Road	Between P Hwy and 58 Hwy	Minor Arterial/Collector
Hubach Hill Road	Between Raymore and 291 Hwy	Minor Arterial/Collector
J Highway	Between Raymore and Peculiar	Minor Arterial/Collector
Jefferson Parkway	Between 203rd St. and Harrisonville	Minor Arterial/Collector
K Highway	Between P Hwy and 2 Hwy	Minor Arterial/Collector
KK Highway	Between north county limit and Osborne Rd.	Minor Arterial/Collector
Kurtzweil Road	Between north county limit and Raymore	Minor Arterial/Collector
Lake Annette Road	Between 2 Hwy and 253rd St	Minor Arterial/Collector
M Highway	Between Dillon Rd. and 2 Hwy	Minor Arterial/Collector
Mullen Road	Between Belton and YY Hwy	Minor Arterial/Collector
N Highway	Between Garden City and east county limit	Minor Arterial/Collector
O Highway	Between Freeman and south county limit	Minor Arterial/Collector

Roadway Name	Location	Roadway Classification
O'Bannon Road	Between 2 Highway and 7 Highway	Minor Arterial/Collector
OO Highway	Between D Hwy and O Hwy	Minor Arterial/Collector
Orient Cemetery Road	Between 2 Hwy and East Lynne	Minor Arterial/Collector
Osborne Road	Between KK Hwy and east county limit	Minor Arterial/Collector
P Highway	Between Jefferson Parkway and Hoover Rd.	Minor Arterial/Collector
Pollard Road	Between Dayton and south county limit	Minor Arterial/Collector
Prairie Lane Road	Between north county limit and 203rd St	Minor Arterial/Collector
Prospect Avenue	Between Belton and Y Hwy	Minor Arterial/Collector
School Road	Between Raymore and Peculiar	Minor Arterial/Collector
Stark Road	Between 251st St and 263rd St	Minor Arterial/Collector
Sycamore Grove Road	Between 2 Hwy and 7 Hwy	Minor Arterial/Collector
T Highway	Between 7 Hwy and B Hwy	Minor Arterial/Collector
TT Highway	Between 7 Hwy and 307th St	Minor Arterial/Collector
U.S. Highway 71	Between Harrisonville and south county limit	Expressway
U.S. Highway 71	Between Raymore and Harrisonville	Freeway
VV Highway	Between Pleasant Hill and E Hwy	Minor Arterial/Collector
W Highway	Between O Hwy and south county limit	Minor Arterial/Collector
W Highway	Between D Hwy and O Hwy	Minor Arterial/Collector
Ward Road	Between north county limit and 58 Hwy	Minor/Arterial/Collector
Y Highway	Between Belton and Cleveland	Minor Arterial/Collector
YY Highway	Between Y Hwy and Peculiar	Minor Arterial/Collector
Z Highway	Between 2 Hwy and Garden City	Minor Arterial/Collector

The type of roadway surface that a local street should have will be determined by the County upon final platting.

TABLE 4.2: ROADWAY MATERIAL OPTIONS

Option	Material Description
A	Must meet specifications of the Missouri Department of Transportation (MoDOT).
B	Six (6) inches of Portland cement concrete over a six-inch compacted subgrade 95 percent of standard maximum density.
C	Two (2) inches of Type 3 asphaltic concrete, 10 inches of Type 1 asphaltic concrete base course and a six (6) inch compacted subgrade 95 percent of standard maximum density.
D	Two (2) inches of Type 3 asphaltic concrete with six (6) inches of Type 1 asphaltic concrete base course and a six (6) inch compacted subgrade 95 percent of standard maximum density.
E	Three (3) inches of Type 3 asphaltic concrete with a five (5) inch stabilized aggregate base and a six (6) inch compacted subgrade 95 percent of standard maximum density.

Source: Standard Specifications & Design Criteria, Kansas City Metro Chapter, American Public Works Association.

TABLE 4.3: ROADWAY MATERIAL STANDARDS

Roadway Classification	Roadway Material Options					
	A	B	C	D	E	F
Freeway and Expressway	◆					
Five-Lane Primary Arterial			◆			
Two-Lane Minor Arterial			◆			
Two-Lane Collector		◆		◆	◆	
Local		◆		◆	◆	

Source: Standard Specifications& Design Criteria, Kansas City Metro Chapter, American Public Works Association and the Federal Highway Administration.

TABLE 4.4: RECOMMENDED STREET DESIGN STANDARDS

	Arterial		Collector	Local	
	5-Lane (Major)	2-Lane (Minor)	2-Lane	2-Lane	Cul-de-sac Bulb
Right-of-Way Width	100 feet	80 feet	60-80 feet[1]	60 feet[2]	50 feet Radius
Roadway Width	65 feet[3]	36 feet[3]	24 feet[3]	24 feet[3]	N/A
Minimum Radii of Turnaround	N/A	N/A	N/A	N/A	39 feet
Shoulder Width (Each Side)[4]	8 feet	8 feet	8 feet	4 feet	4 feet
Roadway Surface Type	Paved	Paved	Paved	Varies	Varies
Design Volume (VPD) Range	10,000-42,000	4,000-10,000	1,000-4,000	Less Than 1,000	N/A
Design Speed (MPH)[5]	60	50-60	35	30	N/A
Maximum Gradient	5%	7%	6%	10%	10%
Minimum Gradient[6]	1%	1%	1%	1%	1%
Minimum Radii of Horizontal Curves	1091 feet	700 feet	300 feet	185 feet	N/A
Minimum Sight Distance on Vertical Curves	475 feet	325 feet	200 feet	150 feet	N/A

Source: Cass County Subdivision Regulations; and Standard Specifications and Design Criteria, Kansas City Metropolitan Chapter of the American Public Works Association.

Notes:

(1) The right-of-way width for a collector street with an enclosed storm water system shall be 60 feet.
(2) The right-of-way width for a local street with an enclosed storm water system shall be 50 feet.
(3) Added Right of Way shall be dedicated when adding a (2) foot curb and gutter on each side.
(4) Shoulders shall not be required on roadways with a curb and gutter. If curb and gutter are not constructed, ditches shall be constructed on each side of the roadway surface with a minimum two (2) to one (1) slope.
(5) Design speed criteria for horizontal and vertical alignment should meet the requirements of the current edition of "A Policy of Geometric Design of Highways and Streets," AASHTO.
(6) Absolute minimum grade of 0.50 percent requires approval by County Engineer.

ACCESS CONTROL

Local access control policies, along with projected traffic volumes, affect specific design characteristics associated with each functional classification. For example, higher traffic volumes, such as those exceeding 10,000 vehicles per day, warrant construction of a four or five-

lane arterial street to effectively move traffic. Conversely, traffic volumes between 4,000 and 10,000 vehicles per day can be accommodated by a two-lane arterial street that has turnbays, good signal and intersection spacing, and private driveway access control. In many cases, a well built two-lane arterial street can function as well as a four-lane street at just over half the cost.

Adopting an access control policy in Cass County will maintain existing capacity by controlling access to arterial and collector roadways while improve traffic flow as new development occurs. Constructing intersection improvements, turnbays, medians, and/or providing traffic signal timing is a method to increase street capacity. Conversely, adding cross streets, driveways, traffic signals, and other stop controls can decrease street capacity.

Specific access control guidelines are listed below for public street intersection spacing, driveway spacing, and corner clearance.

Intersection Spacing. Adequate distance between intersections is essential for the safe and efficient flow of traffic. Appropriately spaced intersections provide through-motorists an opportunity to respond to traffic entering the street from a side street. Table 7 shows the minimum standards for spacing intersections, determined by through-traffic speed.

TABLE 4.5: MINIMUM INTERSECTION SPACING STANDARDS

Through-Traffic Speed	Minimum Intersection Spacing
30 mph	210 feet
35 mph	300 feet
40 mph	420 feet
45+ mph	550 feet

Source: Institute of Transportation Engineers

Driveway Spacing. Like a street, private driveways create an intersection with a public street. Conflicts and potential congestion occur at all intersections - public and private. Methods to reduce conflict include:

- Separating the conflicts by reducing the number of driveways and intersections;
- Limiting certain maneuvers such as left turns; and
- Separating conflicts by providing turn lanes.

No access drives should be located within the operations area of an intersection. Driver conflicts need to be spaced in order to eliminate overlaps between through traffic and right turns.

It is recommended that driveway locations, at a minimum, should comply with the corner clearance criteria indicated in Figure 1 on the following page. Proper spacing of driveways

permits adequate storage and stacking of automobiles on the public street. This distance may have to be increased in cases with high volumes to ensure that driveways do not interfere with the operation of turning lanes at intersections.

The number of driveways accessing undivided arterial roadways should be minimized. The following standards were developed by the City of Overland Park, Kansas, and are based on AASHTO and the Institute of Transportation Engineers (ITE) guidelines. Cass County should adopt its own standards by using the guidelines listed in Table 8.

TABLE 4.6: SUGGESTED MAXIMUM DRIVEWAY GUIDELINES*

Maximum Number of Driveways	Driveway Spacing	
	Undivided Arterial Streets Length of Lot Frontage	Divided Arterial Streets Length of Lot Frontage
1	0-399 feet	0-529 feet
2	400 - 899 feet	530 - 1199 feet
3	900-1,399 feet	1200 - 1859 feet
4	1,400-1,899 feet[1]	1860 - 2525 feet[2]

Source: City of Overland Park Planning Board Resolution No PC-59.

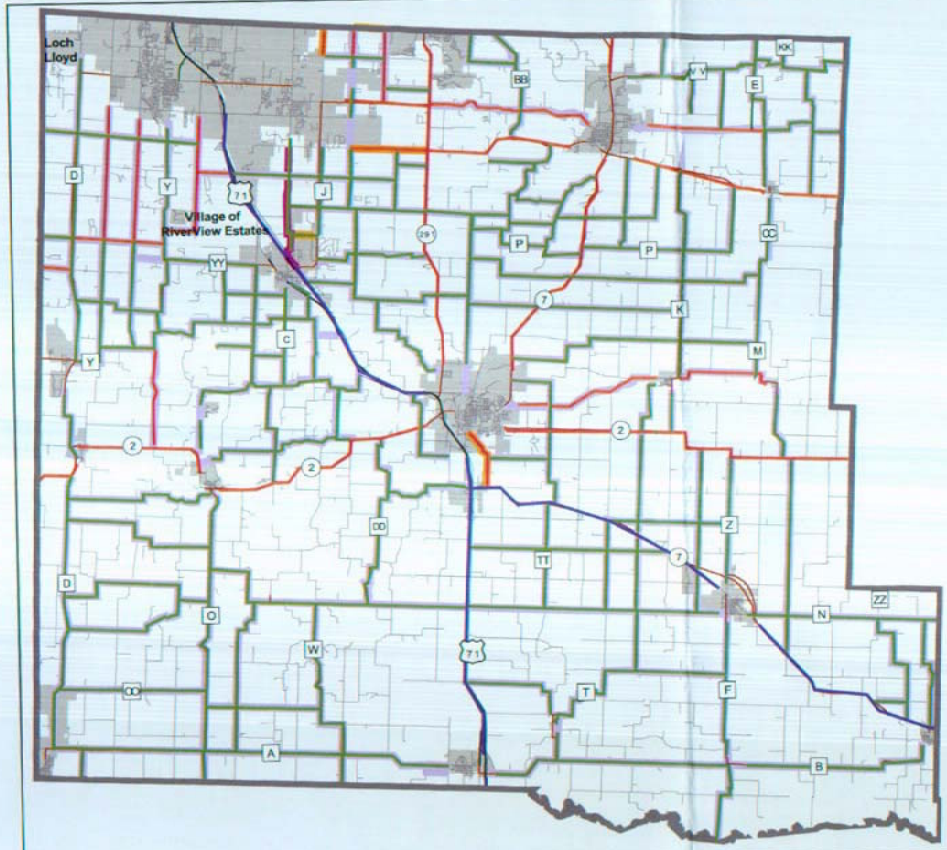
Notes:
* Cass County should consider adopting local minimum separation standards for driveways on arterial streets.
[1] For each 500 feet above 1899 feet, one additional driveway is permitted.
[2] For each 665 feet above 2525 feet, one additional driveway is permitted.

Corner Clearance. Specific minimum corner clearance guidelines are listed in Figure 1. These guidelines can be used to regulate new commercial developments which often are located along arterial or collector streets.

MAJOR THOROUGHFARE PLAN MAP—NEXT PAGE

COMPREHENSIVE PLAN UPDATE - 2005

Cass County, Missouri



Major Thoroughfare Plan

LEGEND

- US Highway
- Arterials
- Collectors
- Other Roads

Scheduled Road Improvements

- Chip and Seal to Asphalt
- Gravel to Asphalt
- Gravel to Chip and Seal

- Incorporated Cities
- County Boundary

N

1 0 1 2 3 4 5 Miles

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KANSAS CITY, MISSOURI 64114-2021
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JANUARY 2004

LAYOUT - Development Patterns

2002145/gis/cass county.apr

CHAPTER FIVE: ROADWAY FINANCING OPTIONS

CURRENT ROADWAY FINANCING

Roadway improvements in unincorporated Cass County are financed from both state and local funding sources that include:

- Automobile Sales Tax;
- Capital Improvement Sales Tax;
- CART;
- Real Estate Tax; and
- Vehicle Fee.

Automobile Sales Tax: When an automobile is purchased in Cass County, a portion of the sales tax on the purchase price provides funding for roadway improvements in unincorporated Cass County. The sales tax rate on automobile purchases in Cass County is 4.75 percent. The State of Missouri retains 50 percent of the sales taxes collected in the county. The county receives 10 percent of the remaining 50 percent after the State collects their share. This equates to 0.2375 percent of the sale price of the vehicle.

Capital Improvement Sales Tax: In 1996 a county-wide 1/4 cent capital improvement sales tax was approved by voters for 10 years. Funds generated by this sales tax are earmarked for specific roadway rehabilitation projects. The County Commission has adopted a five year Capital Improvement Program (CIP) which identifies the projects that are to be financed by this sales tax. These projects include improving the surface of existing roadways from gravel to chip and seal; from chip and seal to an asphalt overlay; from dirt to gravel ; and from gravel to an asphalt overlay. The roadway rehabilitation projects that are to be undertaken between 1997 and 2001 are depicted on the Cass County Road Rehabilitation Plan map.

CART: The County Access Road Tax (CART) is collected and distributed by the State of Missouri. Counties in Missouri receive 10 percent of all fuel tax collected. The proportional share of the 10 percent that Cass County receives is based on the number of roadway miles in the unincorporated portion of the county as a percentage of the total county roadway miles in Missouri. The classification of a county, such as first or second class, does not determine the amount distributed to the county.

Real Estate Tax: Roadway improvements in unincorporated Cass county are also financed by a real estate property tax. The amount of tax collected is based upon the total assessed valuation in the County. The real estate tax rate is $0.18 per $100 of assessed valuation.

Vehicle Fee: When vehicles are licensed in Cass County, a percentage of the license fee also pays for roadway improvements in the unincorporated portion of the County. The licensing fee is based on state statutes and is calculated in the same manner as the automobile sales tax.

ADDITIONAL FINANCING MECHANISMS

The current financing sources provide a foundation for funding roadway improvements. However, additional financing tools are necessary to implement the recommended roadway improvements discussed above. These tools can be identified by the source of the financing. Primarily, there is public financing, which includes local, state and federal taxes and programs, such as those that are currently in place; and private financing, such as contributions from or impositions upon the individual developer who creates a development and generates traffic in the county.

The following is a summary of certain financing options that may be available to Cass County for funding major road improvements. The term "major road improvements" is defined for purposes of this study as construction, reconstruction or major maintenance (milling and overlay) of arterial streets, including parkways (divided arterials), and a limited number of existing streets that are classified as collector roads but function as arterial streets. It cannot be over emphasized that the options summarized in this section merely represent a list of possible financing tools. The in-depth research required to determine whether or not each of these tools is a legally viable option for the county has not yet been performed by the consultants. It is likely that the financing strategy ultimately selected will incorporate several of these options. Some of the options may be mutually exclusive and some of the options may be of limited utility. In addition, some mechanisms are designed to fund improvements to serve demand created by new development while others are designed to fund improvements associated with existing roadway deficiencies.

All potential options are listed for the county's information, and the consultant team will fully investigate the authority of the county to impose a particular option if the county desires to fully investigate that option. In order to avoid attaching any significance to the placement of options in the report, the options have been listed in alphabetical order.

♦ Capital Improvements Sales Tax ♦ County Special Road and Bridge Tax ♦ Excise Tax ♦ General Obligation Bonds ♦ Government Programs ♦ Neighborhood Improvement Districts ♦ Right-of-Way Exactions	♦ Road Impact fees ♦ Special Road District ♦ Tax Increment Financing ♦ Transportation Corporations ♦ Transportation Development Districts ♦ Federal Highway Administration Programs

Capital Improvements Sales Tax. Missouri statutes authorize counties to impose a sales tax of up to one-half percent on all retail sales in the county for the purpose of funding capital improvements, including operation and maintenance. The sales tax must be authorized by the County Commission and approved by a simple majority of the voters in an election. The funds

collected from this tax must be deposited in a special trust fund and may be used solely for the purpose designated in the vote which is approved by the citizens of the County.

County Special Road and Bridge Tax. Missouri statutes authorize a county commission in a county which has not adopted an alternative form of government to levy a tax in addition to other taxes which does not exceed thirty-five cents on each one hundred dollars of assessed valuation to be deposited in the county's "Special Road and Bridge Fund." The money collected in this fund may be used for road and bridge purposes only. Where any such tax is collected from any property located in a special road district, four-fifths of the tax is credited to the special road district. In Cass County, a minimum of 25% of the tax collected pursuant to the Road and Bridge Tax authority from properties located within a municipality must be spent for "repair and improvement of existing roads, streets and bridges" within that municipality. The Hancock Amendment to the Missouri Constitution requires that a majority of the citizens of the County approve this form of tax.

Excise Tax. An excise tax is a method of raising revenue by levying a tax on a particular activity. An excise tax has been defined as a tax that is measured by the amount of business done, income received, or by the extent to which a privilege may have been enjoyed or exercised by the taxpayer, irrespective of the nature or value of the taxpayer's assets or investments in business. It is different than a property tax, which is a tax on the assessed value of property. An excise tax is not subject to the benefit or nexus requirements of a fee imposed pursuant to a county's police power, such as a road user (see below). This means that there need not be a rough proportionality between the tax imposed and the demand for public services created by the activity upon which the tax is imposed, such as a new development and the resultant demand for new road, water, sewer, park or other public facilities that the development creates.

An excise tax's purpose is to raise revenue, not to pay for costs created by the activity upon which the tax is imposed. Unlike a road impact fee, the funds collected from an excise tax need not be "earmarked" for a particular purpose, such as road improvements. The funds collected from an excise tax are simply placed in the County's general fund for use for any valid public purpose. While "earmarking" of funds is unnecessary, from a practical standpoint, the County can state that the purpose of the excise tax is to provide for road improvements. This could be done in a number of different ways, including action through the adoption of an ordinance or less formally through the adoption of a resolution. An excise tax could not be imposed unless approved by a majority of those voting at an election on the question. There is no legal limit on the rate of an excise tax that could be imposed.

It has not been definitively determined, under Missouri law, that an excise tax is available to counties such as Cass County. Research has not uncovered any specific authority for the County to impose an excise tax, but has uncovered limitations in the Missouri Constitution and Statutes which may prohibit an excise tax. At the County's direction, the consultant team could research further the County's ability to impose an excise tax for road financing.

General Obligation Bonds. Subject to certain constitutional and statutory limitations, primary of which is a constitutional limit on the total amount of debt the County can incur based upon a set percentage of its assessed valuation, the County has the ability to raise funds for street

improvements by the issuance of general obligation bonds. General obligation bonds are long-term obligations of the County backed by the full faith and credit of the County.

Missouri statutes authorize the County Commission to issue bonds for the "construction, reconstruction, improvement, maintenance and repair of any and all public roads, highways, bridges and culverts" within the County, and includes the acquisition of property through eminent domain powers. The proceeds from such bonds must be kept as a separate fund to be known as "The Road Bond Construction Fund." These funds may also be used in the construction, reconstruction, improvement, maintenance and repair of any street, avenue, road or alley in any incorporated city, town or village if that construction or improvement forms part of a continuous road, highway, bridge or culvert of the County.

Government Programs. State and federal programs exist that may provide a funding source for street improvement projects. Typically, such programs would be available only for projects meeting the criteria of that particular program and for transportation improvements forming a part of the funding entities' transportation network, i.e., federal funds for U.S. highways. Although some grants may be available, most programs will require a local "match" by the County to pay a specified portion of the project costs in order to leverage the funds from the other governmental entity. It should be noted that funding decisions have already been made for virtually all of these possible funding sources for the immediate future.

Neighborhood Improvement Districts. State statutes authorize the creation of a Neighborhood Improvement District (NID). Under the NID statutes, particular areas of land may be designated by the County Commission as a "neighborhood" that will benefit from a particular public improvement. Landowners within each neighborhood must authorize the formation of the NID either by a vote of approval or by execution of a petition to the County Commission. The boundaries of the NID are created at an election and the approval percentages are the same as those for approval of general obligation bonds (see above). State statute requires that a landowner petition to create a NID must be signed by the owners of record of at least two-thirds by area of all real property located within the proposed NID. If approved, the County Commission may authorize the issuance of general obligation bonds to finance construction of an improvement, such as road improvements. To secure the bonds, a portion of the total cost is assessed against each landowner within the NID and the special assessment becomes a tax lien against the property. The method of apportioning assessments among the property owners within the NID is established prior to the creation of the NID. The bonds may be issued without a vote of the public if the county agrees to rely on existing revenues and surpluses as a source of repayment in the event that the special assessments made against property in the NID prove to be insufficient to fund repayment. Bonds issued count against the county's debt limit. A NID allows the county to construct an applicable improvement sooner than other financing methods such as road impact fees.

Right-of-Way Exactions. Exactions are requirements imposed as part of the development approval process that require a person seeking such approval to give something to the county or to a common maintenance entity as a condition of such approval. Traditionally, counties have required developers to dedicate right-of-way for streets within the development and for streets

abutting the development as a condition of a specific development's approval requiring such a dedication is an exercise of the county's regulatory police power. Typically, these right-of-way exactions have been imposed at the time of zoning or subdivision approval, with the understanding that the dedication would take place at no cost to the entity requiring the dedication. In 1994, the United States Supreme Court decided the case of *Dolan v. City of Tigard*, in which it held that any requirements for the dedication of land imposed as a condition of development approval must be roughly proportional to that development's contribution to the need for new public facilities. Further, the Supreme Court held that the local government imposing the exaction must make an "individualized determination" regarding the proportionality between the exaction and the impacts caused on public facilities.

After *Dolan*, it can no longer be assumed that street right-of-way dedications may always be exacted at no charge. An individualized determination must be made, in each instance, to insure that the dedication requested is roughly proportionate to the demand for right-of-way created by the proposed development. At a minimum, there must be some methodology used to quantify the development's impact and the amount of the dedication required to offset that impact. However, the courts have made it clear that mathematical precision of the relationship between the impact and the dedication is not required.

Road Impact fees. A road impact fee is a monetary exaction on new development imposed as a part of the development approval process. There is some disagreement among the courts as to the application of the *Dolan* "rough proportionality" analysis to monetary exactions such as these fees.

Road impact fees would be exempt from the election requirements of the Hancock Amendment if structured as a impact fee consistent with Missouri case law; otherwise, an election would be required at which a majority of those voting on the question would be required to approve its imposition. All road impact fees collected by the county must be spent for improvements to the road network that benefit those who paid the fee. This generally requires the designation of multiple geographic areas within the jurisdiction for imposition of the fee, with the fees collected from developers within each area being spent only for public infrastructure within the area. This is not true of excise taxes, which are collected jurisdiction-wide and can be spent on public infrastructure any place within the jurisdiction. The amount of the fee collected with respect to each development cannot exceed an amount that reflects the cost of constructing improvements to the road network that are caused by the development.

The authority of counties in Missouri to impose a impact fee is uncertain. Research to date has uncovered no specific authorization for counties to impose impact fees, and the Missouri legislature has not enacted road impact fee enabling legislation. It should be noted that, unlike the constitutional provisions relating to excise taxes, the consultant team has also not uncovered any provisions of the Missouri Constitution or statutes which limit a county from enacting a impact fee system.

Special Road District. The Missouri statutes authorize the county to form a special road district comprised of any portion of the territory of the county as deemed necessary and advisable. Once properly formed, the road district has the authority of a public corporation for public purposes.

The commissioners of the road district maintain sole, exclusive and entire control and jurisdiction over all public highways, bridges and culverts, other than roads and highways controlled by the Highways and Transportation Commission, and may improve, repair and construct such highways, bridges and culverts or have that work completed by contract. The road district may issue bonds, levy a special tax for road improvements or repairs, and issue special assessments in accordance with the procedures set forth in the statutes.

Tax Increment Financing. The basic concept behind tax increment financing (TIF) is that the redevelopment of the area will increase the equalized assessed valuation of the property, thereby generating new revenues to the county that can be used to pay for specified costs of the redevelopment project. Property taxes and other revenues generated by the existing development in a legislatively defined redevelopment area are frozen on the day that the redevelopment area is approved by the County Commission and the increased property tax and a portion of other revenues generated by the new development are captured and placed in a special fund to pay for the costs of redeveloping the area. Those new property tax revenues are the source of the term "increment," and they are also referred to as "payments in lieu of taxes" (PILOTs). In addition to the PILOTs, the development may also capture up to 50% of certain locally imposed taxes (commonly referred to as economic activity taxes or "EATS") such as local sales, franchise taxes and use taxes and local earnings taxes to fund project costs. State statutes also authorize bonds to be issued that are paid off from the PILOTS and EAT's generated in the redevelopment area. The bonds do not count against the county's debt limit. TIF has been the subject of much discussion and debate in the Kansas City area. The TIF statute limits the areas of the county that are eligible for TIF to "blighted," "conservation" or "economic development" areas as defined in the statute. The constitutionality of the use of TIF in "economic development" areas has been questioned.

Transportation Corporations. State statutes authorize the creation of non-profit transportation corporations, which have been used in a few instances. Transportation corporations are private entities formed for the same purposes as a transportation development district (see below). Transportation corporations are created by submission of an application signed by at least three registered voters to the Missouri Highways and Transportation Commission requesting that the commission authorize creation of a transportation corporation to act within a designated area. The application must include preliminary plans and specifications, including the proposed plan for financing a project. Projects are limited to those that will be a part of the state highways and transportation system. The transportation corporation is governed by a board of directors appointed by the commission. The transportation corporation is a private, nonprofit corporation with the power to contract, to lease or purchase real or personal property, and to sue and be sued. Transportation corporation projects are subject to approval by the Missouri Highways and Transportation Commission. Transportation corporations are authorized to charge fees for services and to collect tolls for use of transportation corporation projects. Transportation corporations are also authorized to issue bonds, including revenue bonds, by resolution of the board of directors without a vote of the public. The maximum amount of the fees and/or tolls that may be collected or bonds that may be issued is not set by statute.

Transportation Development Districts. Missouri statutes authorize the county to create transportation development districts encompassing all or a portion of the county. The purpose of a transportation development district is to "fund, promote, plan, design, construct, improve, maintain, and operate one or more [transportation] projects or to assist in such activity." A transportation development district is created by submission of a petition to the circuit court from either 50 registered voters in each county in the district or by the County Commission. The petition must identify the district's boundaries, each proposed project, and a proposal for funding the projects.

After receipt of a petition and a hearing to determine that the petition complies with the law, the circuit court enters a judgment certifying the questions regarding creation of the district, projects to be developed, and proposed funding for voter approval. If a simple majority of those included in the district boundaries vote in favor, the transportation development district is created. If the issue fails, it cannot be resubmitted to the voters again for two years. If approved, an election is held within 120 days to elect a board of directors for the district. Once created, a transportation development district is a separate political subdivision of the state with powers such as condemnation, the power to contract with parties, to lease or purchase real or personal property, and to sue and be sued. The county has no control and jurisdiction over transportation development district projects unless provided by contract. However, the board of directors of the district cannot increase or decrease the number of projects in the district without first obtaining authorization of the voters and approval by the Missouri Highways and Transportation Commission and/or the county, depending on the project.

A transportation development district may fund approved transportation projects (subject to the approval of the county or the Missouri Highways and Transportation Commission, depending upon the project) utilizing one or more financing mechanisms authorized in the election. The financing mechanisms available are special assessments, property taxes, sales taxes and tolls. The amount of sales tax may not exceed one percent. After enactment, the sales tax is subject to a citizen petition for an election to repeal the tax.

There is no statutory limit on the amount of special assessments or tolls that can be imposed. Transportation development districts are also authorized to issue bonds, including revenue bonds, by resolution of the board of directors without a vote of the public. These bonds do not count against the county's debt limit because they are issued by the district (a separate political subdivision of the state) and not by the county.

Federal Highway Administration Programs. The Intermodal Surface Transportation Efficiency Act of 1991 (as amended) provides federal-aid programs for transportation improvements. The federal-aid program available to Cass County is the Surface Transportation Program. This is a block grant program for any roads that are not functionally classified as a local or rural minor collector, referred to as Federal-aid roads. These funds are distributed to the states and the State must set aside 10 percent for safety construction activities and 10 percent for transportation enhancements, including environmental-related activities. 30 percent can be used in any area of the State. The Bridge Replacement and Rehabilitation Program is another program Cass County is eligible for.

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CHAPTER SIX: ROADWAY IMPLEMENTATION PROGRAM

INTRODUCTION

The county has determined that the primary infrastructure improvement for which financing will be provided is roadway improvements. Other than a regional sewer district under consideration, financing of other infrastructure improvements is not critical at this time. Therefore, the implementation program focuses on roadway improvements and financing strategies.

The roadway financing strategy defines the best approach for Cass County in financing roadway improvements. The strategy identifies the primary funding mechanisms to be adopted, or those that will remain, the responsible parties of those funding mechanisms, and the primary areas of the county that are targeted for roadway improvements. The intention of the strategy is to control financing of roadway improvements while controlling growth and development of specific areas of the county and allowing flexibility in adapting those financing mechanisms.

ROADWAY FINANCING STRATEGY

Table 6.1 Roadway Financing Strategy identifies the financing mechanisms that are discussed in Chapter 5. The table indicates if the strategy is currently being used and if it is proposed for future use. The funding source and actions to either improve an existing program or initiate a new program are identified.

Existing roadway funding mechanisms will remain, including the automobile sales tax, capital improvement sales tax, CART, real estate tax and vehicle fee. Further, the 1/4 cent sales tax is proposed to eventually increase to a ½ cent sales tax in order to make improvements to areas that are not experiencing immediate development activity. The Mount Pleasant Special Road District will remain; however, other Special Road Districts will not be established within Cass County.

Upon review of the available financing opportunities that are currently not in use, the county will be supporting financing of roadway improvements with developer contributions. Adoption of a road impact fee will be the primary source of financing roadway improvements in Cass County. The road impact fee will be based on traffic impact studies and the impact the proposed development will have on the roadway system within designated "Transportation Analysis Zones" (TAZ). The county will develop specific criteria that will trigger the assessment of a road impact fee.

The county may consider using Neighborhood Improvement Districts as a financing mechanism. This mechanism will be initiated by the developer and approval will be determined by the Cass County Commission.

TABLE 6.1: ROADWAY FINANCING STRATEGY

Y = Yes, N = No, C = Consideration

Roadway Financing Option	Currently Used	Proposed for Future Use	Funding Source	Action/ Improvements
Automobile Sales Tax	Y	Y	Vehicle Purchaser	Increase from 1/4 to ½ cent.
Capital Improvement Sales Tax	Y	Y	Retail Purchaser	No immediate action.
CART	Y	Y	Fuel Purchaser	No immediate action.
Real Estate Tax	Y	Y	Real Estate Purchaser	No immediate action.
Vehicle Fee	Y	Y	Vehicle Licensor	No immediate action.
County Special Road and Bridge Tax	N	N	N/A	N/A
Excise Tax	N	N	N/A	N/A
General Obligations Bonds	N	N	N/A	N/A
Government Programs	N	C	State/ Federal	Investigate opportunities.
Neighborhood Improvement Districts	N	Y	Property Owner	Developer initiative.
Right-of-Way Exactions	N	N	N/A	N/A
Road Impact Fees	N	Y	Developer	Develop process for measuring, collecting and distributing road impact fee.
Special Road District	Y	N	N/A	N/A
Tax Increment Financing	N	N	N/A	N/A
Transportation Corporations	N	N	N/A	N/A
Transportation Development Districts	N	N	N/A	N/A
FHWA Programs	Y	Y	State/ Federal	Lobby for 15 year plan inclusion.

Control of Funding Mechanisms
The county will be responsible for all funding mechanisms, with the exception of the Mount Pleasant Special Road District, which is operated by the district itself. The county is responsible for collecting and distributing the funding mechanisms identified above.

Jurisdiction of Funding Mechanisms
The funding mechanisms will apply to all areas of the county. The county will target funding mechanisms for use in the Transportation Analysis Zones (TAZ), as designated in the Comprehensive Plan. Priority for upgrading roadways will be based on traffic counts; however, financing of roadway improvements will be evenly distributed throughout the county.

Coordination Between Cities and County
The county currently coordinates funding mechanisms with the cities in Cass County. One-third of the 1/4 cent sales tax currently goes to the cities. The county intends to continue this cooperative effort. Further, the county will coordinate all roadway improvements with cities primarily impacted by improvements.

ROAD IMPACT FEE IMPLEMENTATION

The County should implement a road impact fee program. A comprehensive legal analysis of road impact fees would be required before proceeding with imposition of a road impact fee. However, the general steps for implementing a road impact fee are as follows:

1. *Develop a transportation plan.* The Cass County Development Plan in essence, is the transportation plan for Cass County. Therefore, the first step is already completed.

2. *Create road impact fee service areas.* The fee charged on new development must be reasonably related to the needs created by the development (its impact) on the County's road system and the benefits conferred upon that development through the use of the fee that is collected. Therefore, road impact fee service areas should be designated to ensure that developers pay their fair share and that fees are being distributed to the appropriate area of impact. The service area would identify the principal area from which the proposed development would attract traffic that would impact roads within the identified planning area. Using the Roadway Classification map provided in the Development Plan, county officials should designate these road impact fee service areas. They should be created with boundaries that are equidistant from roadways requiring improvements. Note that as development occurs, the Roadway Classifications map will need to be updated. Therefore, the road impact fee service area must also be adjusted to meet development activity.

3. *Adopt traffic demand variable rates.* Each particular development will generate only a small percentage of the total existing or future traffic impacting particular road segments or intersections. As a result, each particular development would be required to pay only its proportionate share of the costs associated with traffic improvements in the service area. Moreover, all existing traffic as well as pass-through traffic and future traffic must be factored in to the essential nexus/rough proportionality equation.

Traffic demand variables can be obtained from the Institute of Transportation Engineers' (ITE's) Trip Generation Manual. The Trip Generation Manual is designed to estimate the number of trips that could be generated by a specific land use. Traffic count data for various types of land uses are provided for both daily traffic volumes and peak hour traffic volumes. An average between the peak hour and daily traffic volumes should be used to determine the proportion of total traffic impacted by a single use. A listing of the land uses for which the ITE Manual has traffic counts is listed in Appendix A. This list should be used to amend the zoning ordinance and identify which land use code used in the ITE manual applies to specific land uses listed in the zoning ordinance.

4. *Establish roadway improvement cost estimates.* Once the districts have been established, cost estimates for road improvements in that district should be determined.

5. *Establish accounting procedures.* The funds collected from road impact fees must be kept in a separate account for the area or district in which those funds are to be spent. Also, these funds must be used to pay for eligible expenses only, primarily improvements necessary due to the impact of the new development. The revenues derived from a impact fee can be used for both land acquisitions and construction of public facilities to support new development. These fees cannot be used to cure "existing deficiencies" in the County's road system. These existing deficiencies must be funded from other sources, generally by the public at large.

6. *Write road impact fee ordinance.* The road impact fee ordinance should include the following sections and information:

   - Purpose: Identify the reasons and scope of the ordinance and for requiring road impact fees.
   - Definitions: Define any term used in the ordinance that requires detailed explanation.
   - Authority to Impose Road Impact fees: Describe the roles and responsibilities of those enforcing the road impact fee.
   - Requirements or Road Impact fees: List and describe specific requirements or standards for applying road impact fees.
   - Fee to be Generated on Impact-generating Land Development Activity: Identify district and areas where road impact fees are to be enforced.
   - Individual Assessment of Fiscal Impact: Identify the method for calculating road impact fee requirements for specific land or property owners.
   - Use of Funds: Describe the activities for which the use of road impact fee funds are applicable.

7. *Implement.* Once the road impact fee ordinance is in place, the process for implementing the program should be as follows: When a developer submits a plat or site plan, the zoning administrator will determine the land use, referring to the zoning ordinance use table to determine the appropriate code for which the road impact fee will be applied. The zoning administrator will look up that land use code in the ITE trip generation manual and calculate both the average daily traffic and the peak hour traffic, then average the results. This number will be divided by the total anticipated daily traffic for the road user district in which the development is located. This proportion will be multiplied by the total estimated

roadway improvement costs to determine the road impact fee the developer is required to pay.

NEIGHBORHOOD IMPROVEMENT DISTRICT IMPLEMENTATION

The County Commission may approve or decide to establish neighborhood improvement districts to help finance roadway improvement costs. The process for establishing a neighborhood improvement district (NID) may be initiated by either the County Commission or a property owner within the area proposed.

1. *Designate the neighborhood.* Either the County Commission will designate particular areas in need of specific improvements or a property owner will submit a petition to form a NID. If the County Commission designates a neighborhood for an improvement district, all landowners must approve of the designation. If a property owner initiates the district, at least two-thirds of owners of record of all real property located in the proposed NID must sign a petition. At this time, the county has no immediate intentions to create NID neighborhood improvements districts, therefore, they are most likely to be initiated by a property owner.

3. *Determine the method for apportioning assessments.* The method for apportioning assessments among the property owners must be determined prior to approving the NID.

4. *Hold an election.* An election must be held to determine the boundaries of the NID.

5. *Issues general obligation bonds.* Once approved, the county will authorize the issuance of general obligation bonds to finance construction of an improvement. The cost of the improvement is assessed against each landowner within the neighborhood and becomes a tax lien against the property.

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APPENDIX A: TRAVEL DEMAND MODEL FOR CASS COUNTY

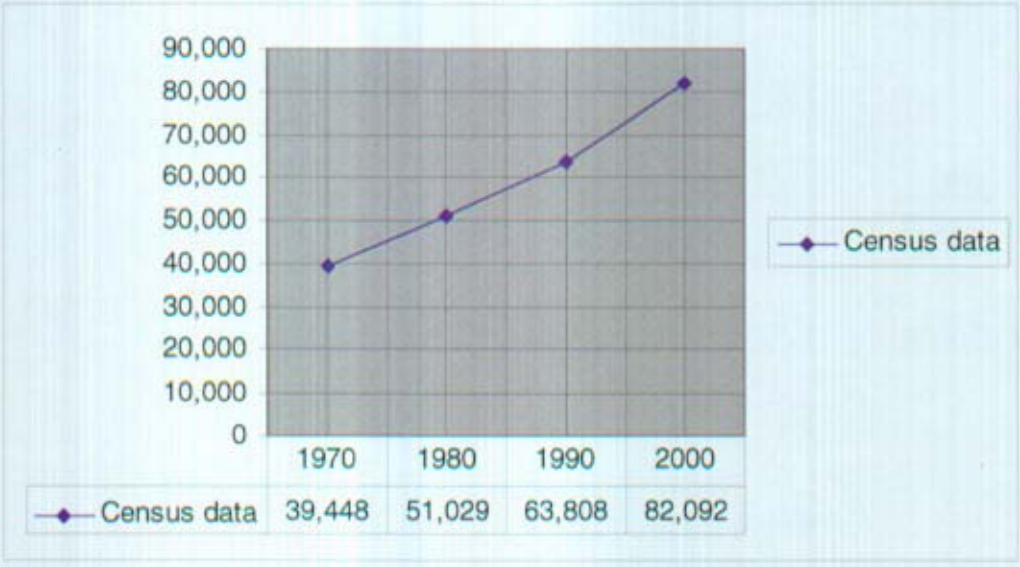
INTRODUCTION

The original travel demand model of Cass County is a PM Peak-hour model and its study area covers the entire county. This model was set up and calibrated in 1999 by using the following input data and information,

1) Daily traffic counts in 1997 and 1998,
2) 1998 population and household (1990 Census estimate),
3) 1997 employment data from 1997 economy census.

From 1990 Census estimate, the 1998 population is 75507 that was used in the original model. After the 2000 census is available in 2002, it's clear that this 1998 population estimate is about 3000 less the actual number. The population change of Cass County is shown in the figure below. It provides not only the accurate total population and household but also its distribution information. Therefore it is necessary to use this accurate information resource as inputs to update the travel demand model.

Figure A-1. Cass County Population



	1970	1980	1990	2000
Census data	39,448	51,029	63,808	82,092

In the next section, the original travel demand model is briefly introduced. Then the model update is described in the third section together with the results.

ORIGINAL TRAVEL DEMAND MODEL

The travel demand model development is to build and refine the model until it accurately reflects current transportation conditions. This process is called model development and calibration. After this is done, the model can be used to predict traffic flows based upon anticipated changes in land use and the roadway system. The process of Cass County model development and Calibration involves the following steps:

- Defining Traffic Analysis Zones (TAZs)
- Calculate socioeconomic data by TAZ
- Creating a computerized street network
- Developing trip generation equations and estimating the number of trips generated
- Distributing the trips between TAZs, and
- Assigning the trips onto the transportation network
- Calibrating the model by traffic counts

Definition of TAZ and Process of Socioeconomic Data

Traffic Analysis Zones (TAZs) represent the base level at which socioeconomic is input into the model. TAZ boundaries typically coincide with existing Census boundaries such as tracts, block groups or blocks. Each TAZ in the model is denoted by a centroid-node, which is connected to the transportation network. For Cass County, A total of 113 (1-113) internal TAZs were defined based on existing Census block group boundaries (see Figure 2-1). In addition to the internal TAZs, 21 (150-170) external stations were also developed to represent traffic entering and exiting the County.

Population, household and employment data is calculated by TAZ. The population is estimation based on the 1990 Census while the employment information is from the 1997 Economy Census. These data sets are basic inputs to the model.

Street Network Development

At its simplest level, a network is a computerized representation of the street system. It is comprised of intersections, which are represented in the model as nodes, and street segments, which are represented in the model as links. The attributes of each link includes:

- Distance
- Speed
- Functional classification
- Area type
- Number of lanes and
- Capacity

BWR developed the Cass County network based upon the primary road system of the County. This included freeways, expressways, major arterials (state highway numbered and lettered routes) and minor arterials (paved county roads).. Information on the number of lanes and

posted speed limits were collected for the County and coded into the model. The base link speeds and capacities are listed in Table A-1.

Figure A-2. TAZ Map

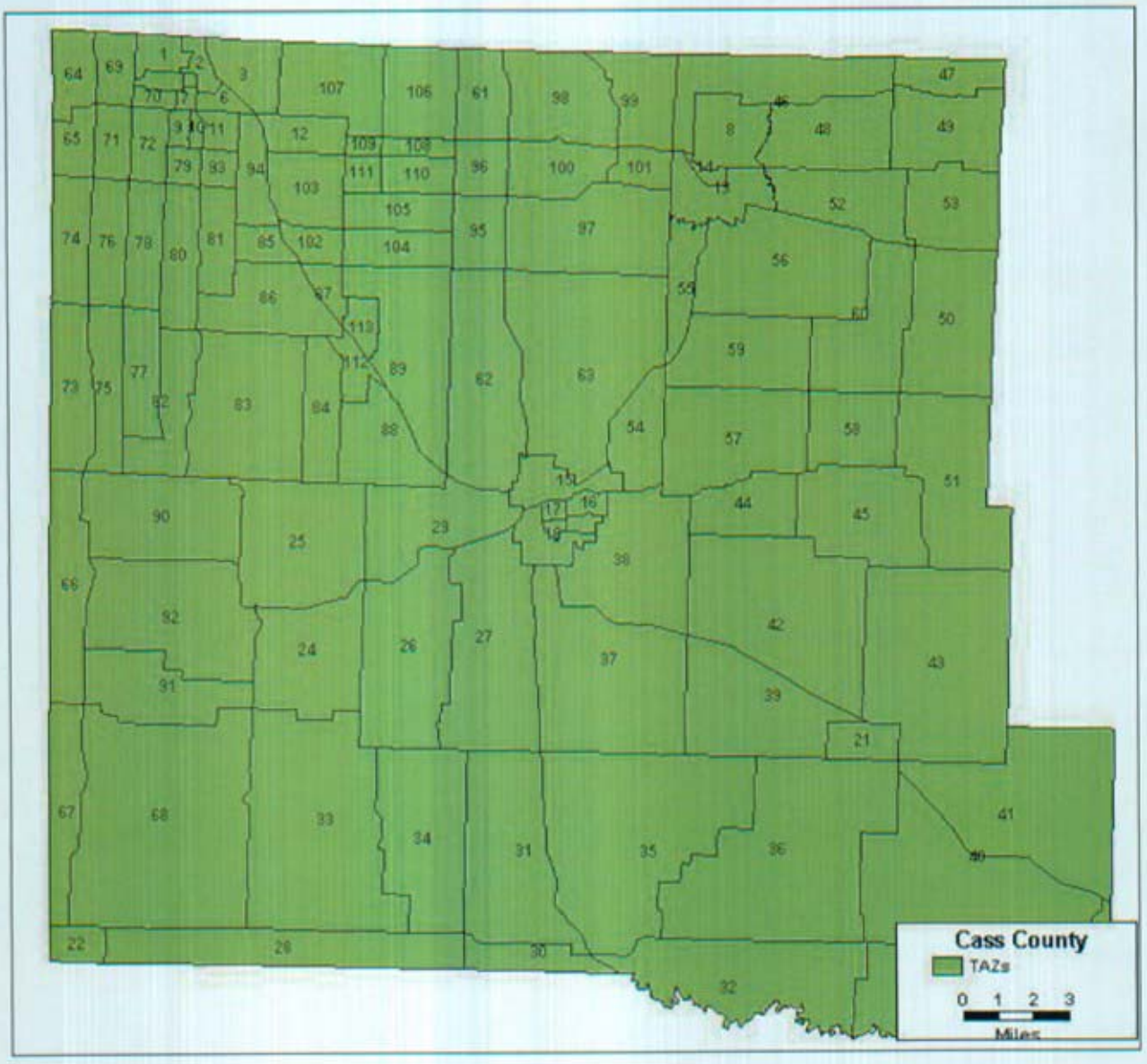


Table A-1. Link Functional Classifications

Class	Description	Area	Lanes per dir	Speed	Daily Cap per lane	Pcplph (10% daily)
1	Freeway	0	4	70	20,000	2,000
2	Expressway	0	4	65	18,000	1,800
3	Primary Arterial (rural highway)	0	2	55	12,000	1,200
4	Minor Arterial (rural arterial)	0	2	45	5,000	500
5	Collector (Asphalt)	0	2	40	2,000	200
5	Collector (Chip/Seal)	1	2	35	1,000	100
6	Local (Gravel)	0	2	30	500	50
7	Ramps	0	1	35	15,000	1,500

Pcphpl = passenger cars per hour per lane

To better model the existing traffic conditions, a volume-delay equation was used for each link class to simulation the travel delay caused by traffic when the traffic volume are loaded onto the street network. The Volume-Delay equation for each link class is listed in Table 2-2.

Table A-2. Link Delay Coefficients (.ldc)

If Volume/Capacity <= UL: ----------> Delay = $K_{1A} * (V/C + K_{2A})^{EA}$
If Volume/Capacity > UL: ----------> Delay = $K_{1B} * (V/C + K_{2B})^{EB}$

UL: Upper Limit of acceptable V/C
$K_{1A/B}$: Constant
$E_{A/B}$: Exponent
$K_{2A/B}$: Constant

Link Class	Description	V/C <= UL			UL	V/C > UL		
		K_{1A}	E_A	K_{2A}		K_{1B}	E_B	K_{2B}
1	Freeway	50	400	15	85	20	1000	15
2	Expressway	25	400	20	85	20	1000	15
3	Primary Arterial (rural highway)	20	400	25	85	20	1000	25
4	Minor Arterial (rural arterial)	20	400	25	85	20	1000	25
5	Collector (Asphalt)	20	400	25	85	20	1000	25
6	Local (Gravel)	20	400	25	85	20	1000	25
7	Ramps	30	400	15	85	20	1000	15

Node capacity was determined based on incoming link characteristics for each class. Summarized in the following tables are the node classes, descriptions and capacity equation values and node delay parameters.

Table A-3. Node Capacity Equations (.neq).

$C = K_1 + K_2(\text{Lanes}) + K_3(\text{lanes})^{E3} + K_4(\text{Link Cap})^{E5}$

WHERE:

C = Total number of vehicles that can enter the intersection at LOS D/E (vph) - 32,000 max

K_1 = Constant (can be used alone or in combination with others)

K_2 = Coefficient to be multiplied by the number of entering lanes (defined by link file)

K_3 = Coefficient to by multiplied by the number of entering lanes raised to an exponent E3

E3 = Exponent for third term of equation

K_4 = Exponent to be multiplied times the sum of entering link capacities (defined by link file)

K_5 = Coefficient to be multiplied by the sum of entering link capacities raised to an exponent E5

E5 = Exponent for fifth term of equation

Description	Factors								
	Type	K1	K2	K3	E3	K4	K5	E5	Base Delay
Not an Intersection	1	32,000				-			
Freeway Ramp Terminals - Merges	4	(1,500)				1.00			
Freeway Ramp Terminals - Diverges	5	32,000				-			
Ramp Intersection	6	-				0.45			
Future Intersection	7	32,000				-			
Internal Zone	10	32,000				-			
External Zone	11	32,000				-			
Freeway Crossing / Expressway	1					0.45			
Freeway Crossing / Principle Arterial	13					0.45			
Freeway Crossing / Minor Arterial	14					0.50			
Freeway Crossing / Collector Street	15					0.55			
Freeway Crossing / Local Street	16					0.60			
Freeway Crossing / Centroid Connector	18					0.65			
Expressway Crossing / Expressway	22					0.45			
Expressway Crossing / Principle Arterial	23					0.45			
Expressway Crossing / Minor Arterial	24					0.50			
Expressway Crossing / Collector Street	25					0.55			
Expressway Crossing / Local Street	26					0.60			
Expressway Crossing / Centroid Connector	28					0.65			
Principle Arterial / Principle Arterial	33					0.45			
Principle Arterial / Minor Arterial	34					0.50			
Principle Arterial / Collector Street	35					0.55			
Principle Arterial / Local Street	36					0.60			
Principle Arterial / Centroid Connector	38					0.65			
Minor Arterial / Minor Arterial	44					0.45			
Minor Arterial / Collector Street	45					0.50			
Minor Arterial / Local Street	46					0.55			
Minor Arterial / Centroid Connector	48					0.65			
Collector Street / Collector Street	55					0.45			
Collector Street / Local Street	56					0.50			
Collector Street / Centroid Connector	58					0.65			
Local Street / Local Street	66					0.45			
Local Street / Centroid Connector	68					0.65			
Signalized Intersection with no Cross Street	70					0.70			

Table A-4. Node Delay Coefficients (.ndc)

If Volume/Capacity <= UL: ---------->	Delay = $K_{1A} * (V/C + K_{2A})^{EA} + BD_A$
If Volume/Capacity > UL: ---------->	Delay = $K_{1B} * (V/C + K_{2B})^{EB} + BD_B$

WHERE:

UL	*Upper Limit of acceptable V/C or 0.85*
$K_{1A/B}$:	*Constant*
$E_{A/B}$:	*Exponent*
$K_{2A/B}$:	*Constant*
$BD_{A/B}$:	*Base Delay*

Description	Node Class	V/C <= UL				UL	V/C > UL			
		K_{1A}	E_A	K_{2A}	BD_A		K_{1B}	E_B	K_{2B}	BD_B
Not an intersection	1	0	1	0	0	0	0	0	0	0
Uncontrolled intersection	2	50	400	15	0	85	50	800	15	0
Yield control	3	0	0	0	0	0	0	0	0	0
Freeway ramp terminal - Merges	4	35	400	15	0	85	35	800	15	0
Freeway ramp terminal - Diverges	5	0	1	0	0	0	0	0	0	0
Ramp intersections	6	25	400	15	4	85	30	800	15	4
Future intersection	7	0	1	0	0	0	0	0	0	0
Centroid Connector Intersection	8	0	1	0	0	0	0	0	0	0
Internal zone	10	0	1	0	0	0	0	0	0	0
External zone	11	0	1	0	0	0	0	0	0	0
2-Way Stop	42	30	400	15	4	85	30	800	15	4
4-Way Stop	44	30	400	15	4	85	30	800	15	4
Signalized intersections	60	25	400	15	4	85	25	800	15	4

2.3 Modeling Procedure and Calibration

The first modeling step is to use socioeconomic data to calculation trips from/to each TAZ, i.e. *trip generation. Then all trips should be distributed from an origin TAZ to a destination TAZ, i.e.* trip distribution. The model calibration consists of two steps. One is the screen line calibration and the other system-wide calibration by traffic counts. The calibration procedure includes the feedback to the modifying the configuration, parameters and equations of the model so that better reflect the real traffic situation.

3. Model Update

3.1 Update of Socioeconomic Information

3.3.1 Population and Number of Households

Since the spatial units of Census data is smaller that TAZs, all demographic information from 2000 Census is aggregated to the TAZ level, including population and number of households. The aggregation of spatial information is realized by using ESRI Arc/view.

3.3.2 Employment Data

In 2000 Census, the employment information is not available at the Census block or TAZ level but at the county level. In 1997 Economy Census, the employment information by TAZ can be obtained by the aggregating the census blocks to TAZs. This was done in the original model. The 1997 employment distribution rate of each TAZ is defined as its number of employees divided by that of the County. Assuming the employment distribution rates of all TAZs keep no change

from 1997 to 2000, the 2000 employment figure of the county can be distributed to each TAZ by applying its employment distribution rates. In addition, the employment information is categorized by Manufacturing, Retail/Service, Office and other employment.

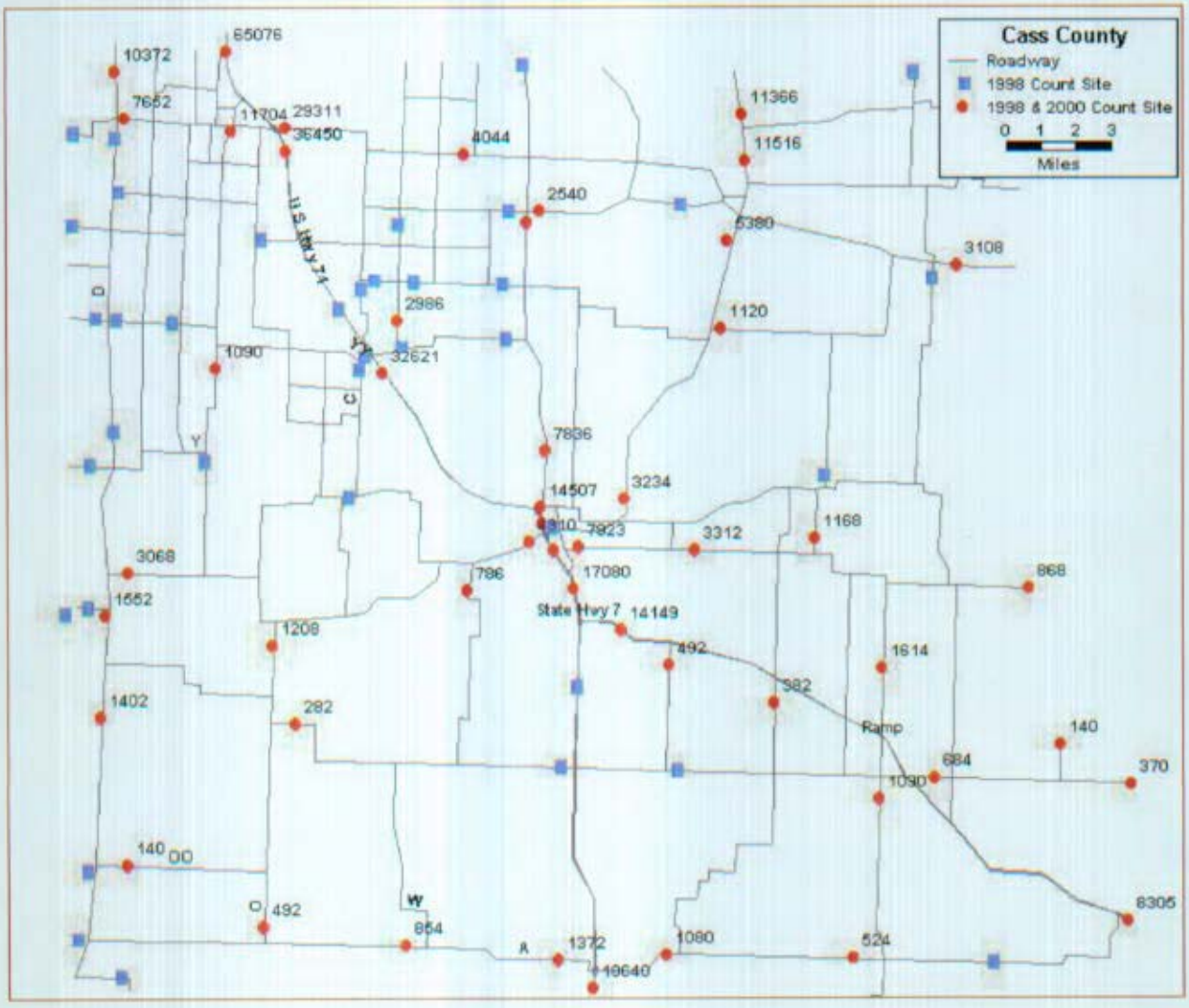
Street Network

The street network is the same as the original one. In other words, locations, attributes, coefficients and equations of links and nodes remain no change. All tables listed in Section 2 can still be used in the model.

Update of Traffic Counts

There are 88 traffic count sites in the county. The 2000 daily traffic counts are available at 55 count sites (See sites with red points in Figure 3-1). The 2000 traffic counts at rest sites can be estimated by applying an average growth rate to 1998 daily counts. Since the model calibration requires PM Peak-hr counts, all traffic daily counts are divided by 10 (assuming the peak-he traffic rate is 10%).

Figure A-3. Traffic Count Map



3.4 Changes in the Trip Generation and Distribution and Model Calibration

The model is re-calibrated by using all 2000 traffic counts. Some necessary changes are made for generation distribution rates as well as the distribution parameters.

Results

Figure A-4. Traffic Counts vs Assigned Volumes

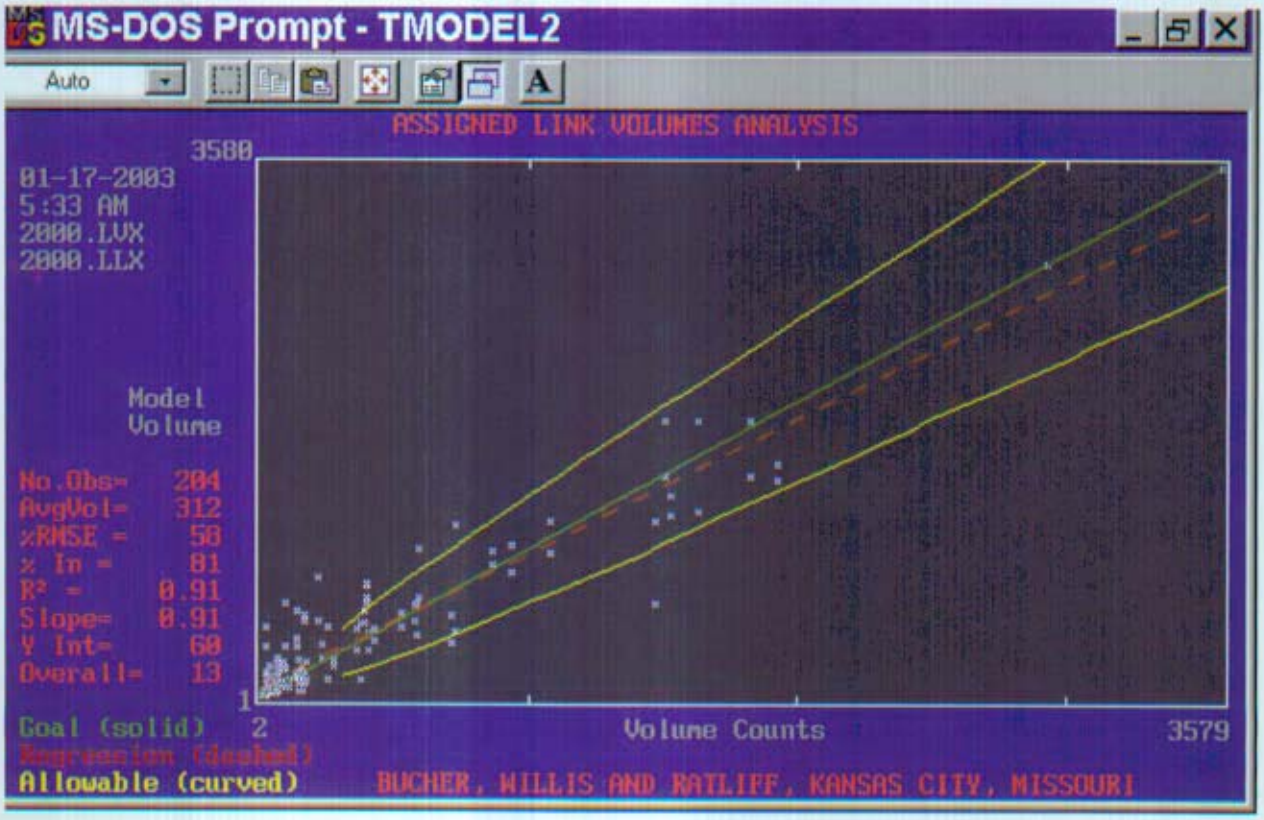


Figure A-5. Transportation Impact Fee Service Areas as Generated by the Model and Adopted by the Impact Fee Order