CHAPTER III - AFFECTED ENVIRONMENT

This chapter provides a general description of the current social and economic characteristics and natural environment of the project area. These descriptions establish the existing baseline condition and provide a basis of comparison for the determination of the impacts and environmental consequences of the proposed action, as presented in Chapter IV - Environmental Consequences.

A. SOCIAL AND ECONOMIC CHARACTERISTICS

The Route 13 Corridor has been analyzed at three geographic levels: counties containing a portion of the Corridor; a study area comprised of political subdivisions delineated by the census which roughly approximates the actual Corridor; and principal cities contained within the Corridor. Specifically, the Route 13 Corridor is located in Henry County, Johnson County and Lafayette County. Various census totals for the three counties will serve as a demographic baseline for analysis of the more precise study area. The study area is defined by the following townships:

- *Lafayette County*
  - Davis
  - Dover (excluding the City of Corder and Dover)
  - Freedom (excluding the City of Concordia)
  - Lexington (excluding the City of Lexington)
- *Johnson County*
  - Hazel Hill
  - Post Oak
  - Simpson
  - Warrensburg
- *Henry County*
  - Bethlehem
  - Clinton
  - Deer Creek
  - Fields Creek
  - Shawnee
  - Tebo (excluding the City of Calhoun)

Only incorporated cities defined in the 1990 U. S. Census have been considered for the purpose of the demographic analysis.

The use of the defined "study area" allows for a more detailed assessment of many important social and economic characteristics, trends and issues than either the use of

county or city level data. It also provides the closest possible demographic approximation to the Corridor. The three principal cities within the Corridor account for most of the developed area of the Corridor. Little significant development has occurred outside of areas directly influenced by proximity to a city. Several very small communities and settlements are scattered throughout the study area. The significance of analysis of the principal cities is increased by the lack of other significant development. The level of data (e.g. county, Corridor, study area, city, community or neighborhood) which best reflects potential impacts and benefits of the Corridor will be used to analyze specific issues facing options for Route 13.

Other factors affecting the area are not directly quantifiable. Information related to land use and development was gathered through field surveys, interviews and interpretation of related documents.

The characteristics and activities associated with the use and development of land are primary influences over the social and economic characteristics of an area. In the Route 13 Corridor, proximity and access to principal cities, Route 13, recreation areas, Central Missouri State University, Whiteman Air Force Base and other major transportation routes such as US 50 are the main determinants of land use and development patterns.

A detailed explanation and analysis of the affected environment includes discussions of existing land use characteristics and patterns, an assessment of current land use plans and a description of the regulatory environment affecting development. Information in this chapter is the basis for the discussion in Chapter IV of the environmental consequences of each reasonable improvement alternative.

1. Land Use

Land use information in the Route 13 Corridor was compiled from field inventories, interpretation of aerial photography and interviews with local officials. Development trends were determined from census data, field surveys and discussions with local officials and appraisers. Local agencies consulted include:

- City of Clinton (various departments).
- Henry County Health Department.
- City of Warrensburg (various departments).
- Johnson County Health Department.
- Johnson County Surveying Inc.
- Lafayette County Planning and Zoning.
- Lafayette County Health Department.
- City of Lexington Planning and Zoning.
- City of Higginsville Community Development Department.

Most development within the Corridor is associated with one of the three larger cities or with the City of Lexington which is just north of the Corridor. Other development is associated with a small community, settlement or agricultural activities. The three principal cities are also commercial and industrial centers for the Corridor. The intersection of Route 13 and I-70 is within the city limits of Higginsville and is a distinct commercial area with a planned industrial park.

a. Existing Land Use

Lafayette County

The portion of the County within the Corridor is sparsely developed with the exceptions of the intersection of Route 13 and I-70, Higginsville and linear subdivisions along or near existing Route 13. The City of Lexington at the north end of the Corridor is not included in this study. Higginsville is located within the Corridor along Route 13. The City is located primarily to the east of Route 13. Higginsville benefits from its proximity to Lexington and I-70. The central location lends itself to both industrial and residential uses. The City used a strip annexation technique to branch south along Route 13 to I-70 and capture sales and property tax revenues. The City recently located a new industrial park at the junction of I-70 and Route 13. The junction is also a commercial node of significance within the Corridor. Most existing development, outside of Higginsville, is scattered and directly related to agriculture.

In Higginsville, commercial development along Route 13 and development at the intersection of I-70 and Route 13 are the primary commercial areas within the Lafayette County portion of the Corridor. Downtown Higginsville serves the local population along with the area along Route 13 which serves through traffic. The Intersection of I-70 and Route 13 serves traffic from I-70 and persons exiting from the interstate to travel on Route 13. Highway related services such as gas, food and lodging dominate land uses. Lexington also provides commercial facilities adjacent to and north of the Corridor. Exhibit III.A.1-1 illustrates generalized existing land use in and near Higginsville.

The primary industry in Higginsville is the Win Cup plant located in the northeastern portion of the city. Other agriculturally related industry exists along Route 13 between I-70 and Higginsville. No other significant non-agricultural industry exists in the Lafayette County portion of the Corridor.

Growth and development in the Lafayette County portion of the Corridor has been historically related to the agriculture industry's need for rail service. Higginsville became the rail center for this portion of the state and has grown to a moderate size as a result.

Aullville, a small town on the eastern edge of the Corridor, is the only rural community within the Lafayette County portion of the Route 13 Corridor.

Johnson County

A significant influence in the Johnson County portion of the Route 13 Corridor is Central Missouri State University (CMSU). The University is a major employment center for the City of Warrensburg and the region. Additionally, the University attracts over 8,000 students to the City. The Corridor is also affected by the military installation at Whiteman Air Force Base. Warrensburg is also the commercial and industrial center of Johnson County. Locations near U. S. 50 and Route 13 are popular as they provide quick access to major transportation routes and high volumes of traffic. Route 13 north of the University is almost entirely developed with commercial and strip commercial centers that, in conjunction with CMSU traffic, create congestion along existing Route 13. The remainder of the Corridor development in Johnson County appears to be closely linked to the existing

alignment of Route 13 with the exception of the communities of Fayetteville and Leeton. This trend is likely to continue as Route 13 provides quick access to Warrensburg, Interstate 70 and Clinton/Truman Lake.

Commercial development in Warrensburg has two principal centers of activity. North of CMSU along Route 13, strip commercial development dominates the development patterns. Commercial development along Route 13 ends to the north of U. S. 50 near the Wal-Mart. The second principal commercial area is downtown.

Warrensburg's industrial park is located to the east of Route 13 just south of U. S. 50. It is not yet at capacity. Johnson County has an area planned as an industrial park near the current city industrial park. This area, however, may develop to include a Veterans Administration Hospital.

New residential development and expansion of the City of Warrensburg has occurred extensively along Route 13 and to the east along Montserrat Road and Route DD. Large lot residential subdivisions are continuing to develop as water service becomes available to the south of Warrensburg west of existing Route 13 near Pertle Springs Park and Lion's Lake Park. Development east of Route 13 is served by a major wastewater trunk line designed to support the southeastern portion of the city at build out. Sewer service is a key for new developments as it influences the type and density of development which may occur. One example is the large lot subdivision activity south of the City and west of Route 13. Although these areas have or are being provided with water service, lack of sewer service dictates larger lots capable of supporting septic service. Similar to new development along Montserrat Road, some new residential development is occurring north of Highway 50 within the city limits of Warrensburg. These areas are developing at higher single family densities and are served by recent waste water system expansions. In-fill type development to the north of the City appears to be locating in gaps of previous scattered subdivision development north of the Warrensburg city limits. The subdivision development north of the Warrensburg city limits appears to consist of larger lots capable of supporting septic systems. Exhibit III.A.1-2 illustrates generalized existing land use in and near Warrensburg.

Smaller settlements and communities within the Johnson County portion of the Corridor include:

- Cornelia
- Fayetteville
- Leeton
- Mount Olive
- Post Oak

These smaller areas have developed in close proximity to Route 13 with few exceptions. These areas have little or no commercial activity. Generally, a few homes in a cluster is the extent of these neighborhoods. Leeton and Cornelia which are somewhat larger have more than 25 residences within a one mile area. Each of these areas has its own identity and provides a rural neighborhood lifestyle.

Henry County

The majority of development within the Route 13 Corridor in Henry County is centered in and around the City of Clinton. Outside of the Clinton area, development is related to either the small communities of Shawnee Mound and Quarles or agricultural activities. Clinton has benefited from the development of the Truman Reservoir, four golf courses and its centralized location between Kansas City and Springfield. Very little recent development has occurred within the Route 13 Corridor outside the Clinton Area. Development within the Clinton area has centered around the new golf courses and new industrial growth. Fluctuation in the area's population over the last two decades has centered on the success of local industry. The relatively small population of Clinton allows its population and economy to be adversely affected by the closing of one significant employer. Long-term success of existing and future industry and the continued attractiveness of the Clinton Area as a retirement destination will largely determine the significance of growth in and around Clinton. Land use patterns are also significantly influenced by the Truman Reservoir. The reservoir, large areas of Army Corps of Engineers land, wildlife preserves and park areas prohibit growth and development to the south of Clinton. Most major recent residential development has occurred in proximity to the east junction of Routes 7 and 13. The city has developed a new comprehensive plan which emphasizes upgrading and maintaining existing levels of service while adequately funding the facilities required to support new growth.

Clinton has three distinct commercial areas. Both junctions of Routes 7 and 13 serve as commercial nodes with regional attractions such as grocery, gas and Wal-Mart. Clinton's historic downtown is the third distinct commercial area of the City. In addition to these distinct areas, both Second Street (Business Route 13) and Ohio Street (Route 13) have areas of commercial development which is influenced by the connection that they provide between the highway junctions and Downtown.

Recently, Clinton opened a new industrial park in the northwestern part of the city along Route 7. The new 140-acre park is being developed to accommodate new industrial growth. The City's original industrial park, located along Routes 7 and 13 between the two junctions, is currently at capacity and cannot support new industrial development. Clinton's industrial growth has and will continue to benefit from good highway access and a skilled labor force.

The core of Clinton consists of older residential development which is experiencing scattered rehabilitation. Recent residential development has focused on the eastern and southern fringes of the City. One major residential development designed around a golf course is currently developing along the southern extension of Route 13. Most new development tends to be geared to higher income households. Moderately priced housing is found in the central core of Clinton. Older homes and homes in need of restoration are the primary option for housing of moderate income households although some modest in-fill new construction has occurred. Exhibit III.A.1-3 illustrates generalized existing land use in and near Clinton.

Recreational opportunities and good transportation access are major factors in the development of Clinton. A good industrial work force, affordable housing, good transportation access, Truman Reservoir, wildlife areas and golf opportunities help to attract industry to the town. Industry and industrial growth have historically been the key to

the town's overall growth and development. The same factors will be important to the growth of the Henry County portion of the Route 13 Corridor to the extent existing rural development is tied to Clinton and not agriculture.

The towns of Shawnee Mound and Quarles are small communities which have developed in rural Henry County along Route 13. The communities have developed near crossroads with Route 13 which provide local residents access to Route 13. The communities are residential in character relying on regional centers such as Clinton and Warrensburg for many services.

b. Land Use Planning and Regulation

Land planning and regulation has become an important part of managing the fiscal health of local municipalities. Planning and land use regulation allows municipalities to plan for and sequence expansion of facilities within the constraints of their financial resources. Within the Corridor, only Lafayette County has initiated planning and zoning. Both Henry and Johnson Counties use septic system permits and inspection to track growth. The City of Clinton has prepared a plan to address future land use. Warrensburg's plan was adopted in the mid 1980's. Warrensburg followed the planning process with capital improvements planning. Higginsville uses a policy plan within its zoning ordinance to guide growth. Each of the three largest cities use zoning to help regulate land use within their city limits. Land development trends, planning and regulatory schemes or lack thereof are important to the Route 13 Corridor as they have helped to shape the existing environment and will help to manage future growth which may occur within the Corridor.

Lafayette County

Lafayette County does have a comprehensive plan which was adopted in 1987 (see Exhibit III.A.1-4) and zoning which was adopted in 1984. Subdivisions are regulated through the zoning code. The County plan indicates that all growth will occur in and near the County's principal cities. The plan is not tied to a capital improvements plan or strategy. County land use regulations are supplemented by State laws regulating establishment of septic systems.

Higginsville - Higginsville uses zoning to control new development. The zoning ordinance addresses comprehensive planning briefly. The City's zoning code and comprehensive plan need to be updated.

Johnson County

The County does not have planning, subdivision regulations, or zoning to regulate development, although they are currently in the process of developing zoning ordinances for the county. The County relies on state laws and local policies governing septic system development to regulate growth. The County relies on the Health Department to enforce state septic standards. The County was unable to produce records of septic system permits and inspections that could be used to monitor growth or manage septic systems in the unincorporated portion of the County.

Warrensburg - Warrensburg's comprehensive plan was updated in 1987 from an earlier plan adopted in 1985. Planned growth areas and a Capital Improvements Plan have

helped the City to provide municipal services to growing areas. Services are being planned rather than provided as a reaction to development. The planned provision of services is directly related to the City's 1994-1999 Capital Improvements Plan. Approaching growth in this manner de-emphasizes speculative re-zonings which may not be in accordance with a rational growth scheme. Exhibit III.A.1-5 illustrates future land use patterns in Warrensburg according to the 1987 Warrensburg Comprehensive Plan. This plan is somewhat out of date, however, as recent capital improvements will significantly shift growth to the eastern side of the city both to the north and south of U.S. 50.

Henry County

The County does not have planning, subdivision regulations or zoning to regulate development. The County relies on state laws and local policies governing septic system development to regulate growth. The County does have specific septic tank installation policies, application and inspection procedures that it enforces through the County Health Department. Septic system permits are the only method of tracking growth within the County.

Clinton - In October of 1995, the City adopted a new future development plan. The new plan will help Clinton to plan for new growth from industry and the attraction of the City's many recreational amenities. Exhibit III.A.1-6 illustrates generalized planned future land uses according to the 1995 Clinton Comprehensive Plan

2. Demographic and Social Characteristics

Socio-economic data and characteristics are important to an analysis of the Corridor. Learning about the population can give insights into many unique features and sensitive population segments. The analysis will allow comparisons between and among different population segments and characteristics throughout the Corridor. Data were primarily collected from the 1990 Census of Population and Housing.

Appendix D contains a detailed charting of a majority of the demographic data provided by Summary Tape File 3a of the 1990 U.S. Census. Specific appendix tables referenced by sections of this chapter are intended to supplement the main body of the chapter. Other tables within the appendix may give further insight into regional demographics beyond the scope of the main body of this report.

a. Demographic Data

Population

Johnson County is the most populated County in the Corridor. The concentrated 15,244 population of Warrensburg, the largest city in the Corridor, is the primary reason for the higher population of Johnson County. Warrensburg has a larger population than the other two cities combined. Other population centers such as the Whiteman Air Force Base/Knob Noster area also contribute to the higher population. Henry County has the smallest population. Chart III.A.2-1 compares the incorporated city and unincorporated area populations in the study area. Table III.A.2-1 compares the 1990 population size of various cities and the study area.

Persons residing in cities make up over one-half of the study area population. This does not include significant populations near the cities of Clinton and Warrensburg. Only 2,900 persons live in rural farm areas according to the 1990 U.S. Census. The three cities within the Corridor also have over thirty percent of the total three county population. Appendix D, Table 1 details the population, families, households and location of the population.

Chart III.A.2-1
City Populations

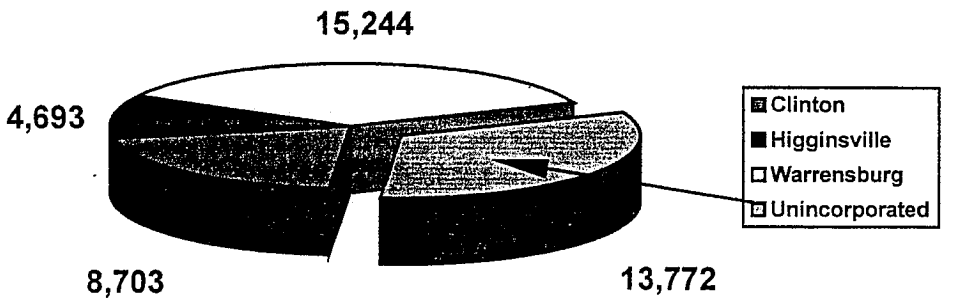


Table III.A.2-1
Population Comparisons

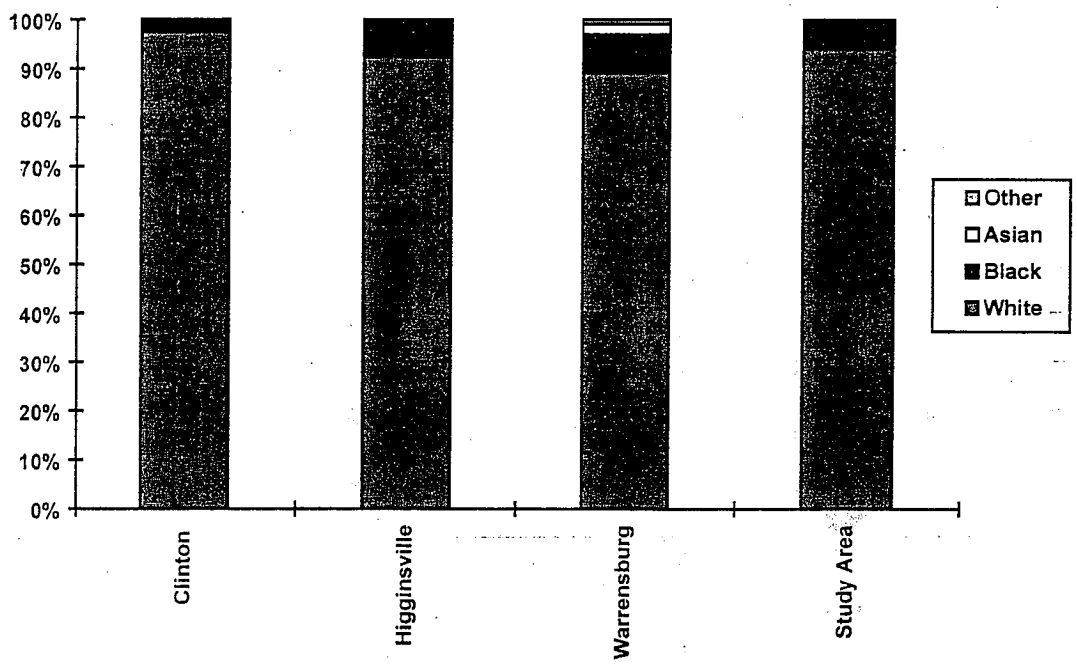
Geographic Division	Population (1990)
Henry County	20,044
Johnson County	42,514
Lafayette County	31,107
County Totals	**93,665**
Henry County Portion of study area	10,898
Johnson County Portion of study area	22,295
Lafayette County Portion of the study area	9,219
Study Area Totals	**42,412**
Clinton	8,703
Higginsville	4,693
Warrensburg	15,244
City Totals	**28,640**

Future Growth

Future growth in the Corridor will be tied to the creation of new employment opportunities within the Corridor's three principal cities. Forecasts of future population, employment and households were prepared using three methods for each principal city and each of the three counties. One method uses projections from a city's Comprehensive Plan, the second is a linear growth model (trends) and the third is an enhanced linear growth model

(growth). The forecasts indicate steady growth in the Corridor with the exception of Clinton which shows a significantly increasing growth rate based on recent building permits and an on-going successful economic development campaign. Higginsville, although it recently established a new industrial park, is not pursuing an aggressive marketing campaign. The park is also situated such that the potential new employees would not necessarily live in or near Higginsville. The Clinton comprehensive plan forecast assumes the City will be able to support the public facilities necessary to support the new growth. In the year 2020, the cities of Clinton, Higginsville and Warrensburg are expected to have populations of 15,700, 5,585 and 20,000, respectively. Exhibits III.A.2-1, III.A.2-2, and III.A.2-3 analyze the future growth (population, employment and households) of each county and city.

Chart III.A.2-2
Ethnicity



Race and Ethnicity

The Route 13 Corridor is 94 percent white. This lack of diversity is not surprising as it is similar to many rural areas of the Midwest. Data suggest that most of the minority population reside within one of the three principal cities. Warrensburg is the most diverse city in the Corridor. Warrensburg's minorities account for 10.2 percent of the City's population. Chart III.A.2-2 illustrates the ethnicity differences between Warrensburg and the Corridor as a whole. For further data on the racial and ethnic makeup of the Corridor refer to Appendix D, Table 2.

Gender

With the exception of Johnson County, each segment of the Corridor generally has a higher female than male population. This minor anomaly is most likely attributable to the Air Force Base. Detailed information on the gender make up of each county, the study area and cities within the Corridor is contained in Appendix D, Table 3.

Age

Johnson County is the youngest county in the Corridor with a median age of 26. The younger population is probably attributable to the university student population and the Air Force Base population. Henry County has the oldest population in the Corridor with a median age of 38. Lafayette County's median age is 35. Significantly higher percentages of persons over age 60 are the primary reason for the higher median age in Henry and Lafayette counties. With the exception of the CMSU / Warrensburg population, the Corridor is generally older than the state median age of 33. Appendix D, Table 4 is a chart of the population's age in five-year increments from aged under 1 year to aged more than 84 years, and those aged 85 years and older.

Education

Educational attainment in Johnson County is high when compared to the other portions of the Corridor. More than 80 percent of adults over age 25 have graduated from high school. Henry and Lafayette County's educational attainment levels are not above the state median of approximately 73 percent. Seventy-one percent of Lafayette County residents have completed high school while only 67 percent of Henry County residents having completed their basic education. One factor which may influence the educational attainment levels of the two counties is their relatively high median age. Older generations often feature a higher percentage of persons who did not complete high school as their educations were interrupted by war and the great depression. Chart III.A.2-3 illustrates the highest level of education attained by persons over 25.

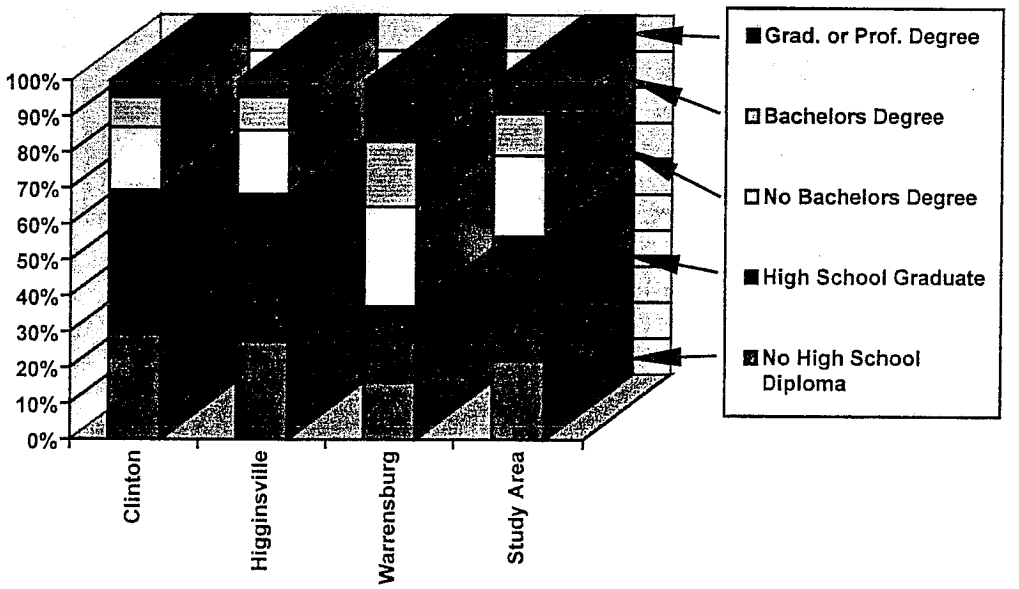


Chart III.A.2-3 Educational Attainment

Nearly 46 percent of the Johnson County residents within the Corridor are enrolled in a school from pre-primary to college. Only 22 and 25 percent of the Henry and Lafayette County residents, respectively, are currently attending classes. Obviously, the younger population near educational facilities such as CMSU is a key in the higher percentage in Johnson County. Henry County conducted a survey through the CMSU College of Business and Economics that indicated many county residents would take advantage of educational opportunities if the classes were offered in or near Clinton. Courses in

computers, business and nursing were the courses in most demand. Appendix D Table 5 is a detailed chart of educational data within the Corridor.

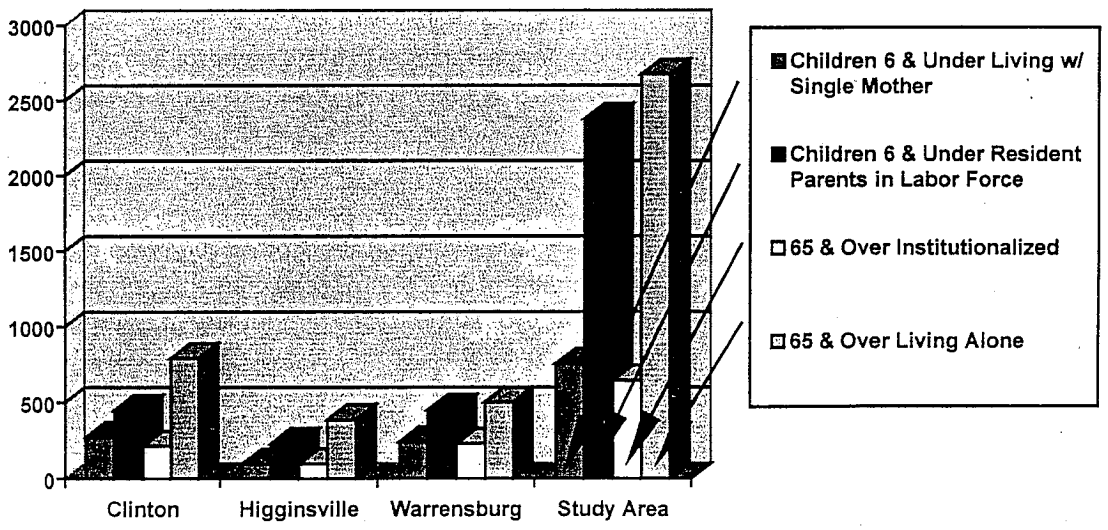
Households and Families

The household and family characteristics which are most pronounced in the study area are the more than 2,500 elderly persons (those 65 and over) living alone in addition to over 800 which are either institutionalized or living in group quarters. These persons account for nearly eight percent of the study area population. The 65 and over population is a large special needs group in the Route 13 study area.

The second population group which requires special attention are those households with children under 18 having only one parent present or having both parents in the labor force. These children, especially those under six, spend time in day care facilities. The study area has 5,300 children in one of the described situations. Potential impacts to day care facility location and accessibility are concerns. Impacts to the availability and location of day care, affordable housing and jobs are important concerns. If children with single-parents were closely associated with the 1,754 children under age 18 living in poverty, the potential impacts to poverty stricken single parent households would be magnified. Although no such study has been performed in the study area, the probability of this type of relationship is high.

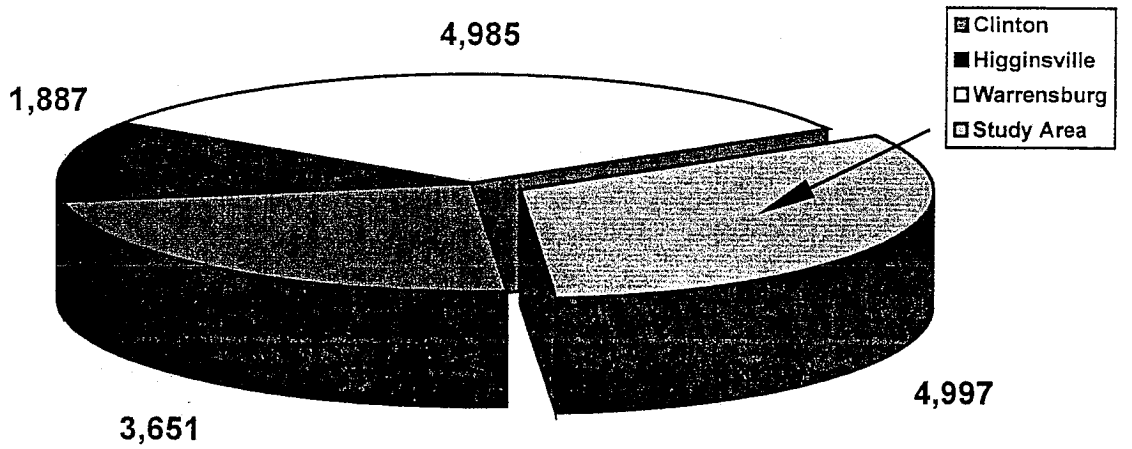
Chart III.A.2-4 illustrates households in which an elderly person or a child may need care which the household cannot provide without outside assistance. Children under age 6 and persons over 65 are charted.

Chart III.A.2-4 Need Groups



The average number of persons per household in the Corridor is 2.7. Persons per household range from a low of 2.3 in Clinton to a high of 3 in Warrensburg. The Corridor is made up of predominantly 2 person households. Three and four person households in most areas equal the number of 2 person households when combined. The total number of households is presented in Chart III.A.2-5.

Chart III.A.2-5 Households



The study area portion of the chart reflects the total number of households in the study area minus those households living in cities.

Appendix D, Table 6 identifies household characteristics such as persons per household, elderly households and single parent households within the Corridor. Table 7 of the appendix describes the number of children without parents at home during the day.

b. Neighborhoods and Communities

Population in non-rural areas makes up over 67 percent (28,640 persons) of the Corridor's population, while population in rural areas is over 32 percent of the population (13,772 persons). Over 3,500 persons living in rural areas live near Warrensburg. The Corridor has five basic types of communities: (1) the rural agricultural community; (2) the rural subdivision/neighborhood community; (3) very small towns; (4) low density areas adjacent to or near one of the principal cities; and (5) the cities of Higginsville, Clinton and Warrensburg. Some of these act independently as a neighborhood, while other larger communities consist of a network of neighborhoods.

Rural agricultural communities consist of large farms without residential subdivision activity. The rural subdivisions usually consist of 5-20 homes grouped together in a rural neighborhood. Small towns are areas where some type of municipal organization or commercial activity either exists or did exist at one time. Small towns usually have a name, other than a subdivision name, associated with those living in and near the community. The difference between communities four and five can be difficult to distinguish in transition areas. One factor which can separate the two is the reliance on on-site waste water disposal versus being connected to a city sanitary sewer line.
Interaction between communities, neighborhoods and the commercial activities of the larger cities is a very important component of the Corridor.

c. Housing Characteristics

Nearly 5,700 housing units in the study area were built prior to 1950. However, few of these units built prior to the end of World War II have unique architectural and or historic significance to the region. Those units having unique or significant qualities are described

in the Historic and Archaeological Resources section found later in this chapter. Older homes also provide a source of affordable owner occupied housing. Recent subdivision and building activity within the Corridor has targeted higher income buyers, forcing households with low and modest incomes to habitat in older units which are more affordable but tend to require more maintenance and are typically not as energy efficient.

Vacancy rates range from a low of 3.7 percent in Johnson County's Simpson Township to 14.6 percent in Henry County's Deer Creek Township. These rates are somewhat deceiving due to the fact that both townships have fewer than 150 units. Because some townships have very few units, in any give year the vacancy may fluctuate significantly due to several factors. A second implication is that the elimination of a few houses in any one Corridor segment could have a significant impact on the availability, quality and affordability of housing near the area impacted. The vacancy rate for the study area as a whole is 8.1 percent. The vacancy rate for the Corridor is fairly typical for both owner occupied and rental housing when combined.

Water supply and sewage disposal are very important to development in rural areas. Development relying on individual wells and/or septic tanks and cesspools is susceptible to pollution concerns. Septic tanks and cesspools can, if not designed, constructed or maintained properly, create unsanitary environmental conditions. Approximately 1,400 homes in the study area rely on individual wells for water supply. Approximately 4,500 homes in the study area are not tapped into a public sewer system. Water quality issues are discussed later in this chapter and in Chapter IV.

Table 8 of Appendix D details many housing characteristics of the counties, study area and cities.

3. Economic Characteristics

The Route 13 Corridor provides a typical midwestern environment for economic activity. Historically, the three urban communities developed as agricultural centers, providing a staging area between farm and market. Agriculture is still a dominant economic industry in the Corridor, especially in the north where land is more suitable to row cropping. Farther south, the terrain becomes hilly and rocky and more suitable as pasture land.

Higginsville is still primarily an agriculturally oriented community, while Warrensburg and Clinton have developed several other industries. Central Missouri State University is the dominant industry in Warrensburg, but the community also serves as a bedroom community for Whiteman Air Force Base located approximately 16.1 kilometers (10 miles) to the east in Knob Noster. The community has some light-industry located primarily in the industrial park and a strong service sector feeding primarily off the University.

Central Missouri State University is a state sponsored institution with approximately 1200 employees and 12,000 students. It is located in the south-central part of Warrensburg. The Warrensburg/Johnson County Industrial Park encompasses four basic companies: UNITOG with 300 employees; STAHL Industries with 120 employees; Gates Energy with 500 employees; and RIVAL with 250 employees. Other major industries include Industrial Service Contractors, Inc., Inland Chemical Company, Innes Mills, Harmon Electronics, Inc., and Swisher Mowers and Machine Co., Inc.

The Golden Valley Industrial Park is located along Route 13/7 in Clinton's northeast quadrant and is the major industrial area for the community. The three major industries

located in the park include RIVAL with 550 employees, Tracker Marine with approximately 300 employees, and Schreiber Foods with 250 employees. The current industrial park is reaching capacity and city officials have planned an additional industrial park in the northwest quadrant of the city.

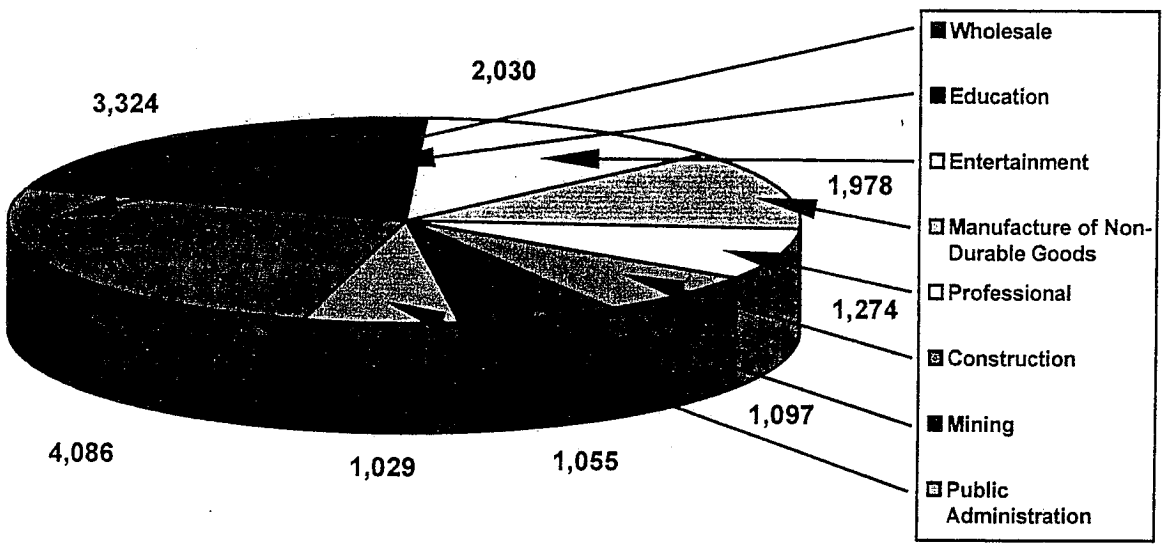
With Truman Reservoir just south of Clinton, tourism and recreational activities associated with the lake exist in Clinton. Likewise, the service industry is supported by through traffic headed for the Springfield and Branson areas.

The economic activity present in the Route 13 Corridor area centers around agriculture but has significant diversification and stability, especially within Warrensburg and Clinton. Survey results indicate that the average age of businesses along Route 13 is over 20 years and over 96 percent of the patronage comes from the local populations. While these results vary by the type of business, the results indicate that a reduction in "drive-by" trips will not adversely affect the local economy. Similarly, the strong manufacturing base coupled with improvements in transportation efficiency will allow existing industries to expand and potentially draw other industry to locate in the area.

a. Employment and Labor Force

Nearly 21,000 persons are employed within the Route 13 study area. The three dominant employment sectors within the three counties and the study area are education, manufacture of non-durable goods and wholesale trade. Other major employment sectors are entertainment and recreation, professional and related services, public administration, mining and construction. These employment characteristics are influenced by the presence of CMSU in Warrensburg. The education employment segment is very important to this Corridor. Potential benefits or impacts to the University's employment base could have major impacts to the regional economy. Industrial growth spurred by good transportation access will also have impacts on regional employment factors. Chart III.A.3-1 shows employment by sector for the eight largest employment sectors.

Chart III.A.3-1 Employment by Sector



The eight employment sectors illustrated above account for approximately 75.6 percent of the total study area employment.

Appendix D Table 10 is a detailed table of employment by sector for each of the Corridor's political subdivisions and the Study Area.

b. Income

Median household income in the Corridor ranges from a low of $14,762 in Henry County, Fields Creek Township, to a high of $32,986 in Johnson County, Hazel Hill Township. Per capita income in the area also varies significantly. Per capita income varies from $6,608 to $12,453. Table III.A.3-1 shows the per capita and median household incomes for the three major cities and counties in the Corridor.

Table III.A.3-1 Income Characteristics

Geographic Division	Household Median Income	Per Capita Income
Henry County	$18,476	$ 9,835
Johnson County	23,044	10,202
Lafayette County	24,669	11,470
Clinton	15,769	10,165
Higginsville	18,507	11,444
Warrensburg	21,618	9,490

More significant than raw income characteristics is the number of persons living below poverty. Approximately 7,300 persons or 17.3 percent of the study area population live below the poverty level. Over 1, 700 of the persons living below poverty in the Corridor are under the age of 17. Only 1,000 of the study area residents with below poverty level incomes live in one of the Corridor's three major cities. Chart III.A.3-2 indicates the number of people living below poverty in the study area and in each major city.

Chart III.A.3-2 Household Income Below Poverty

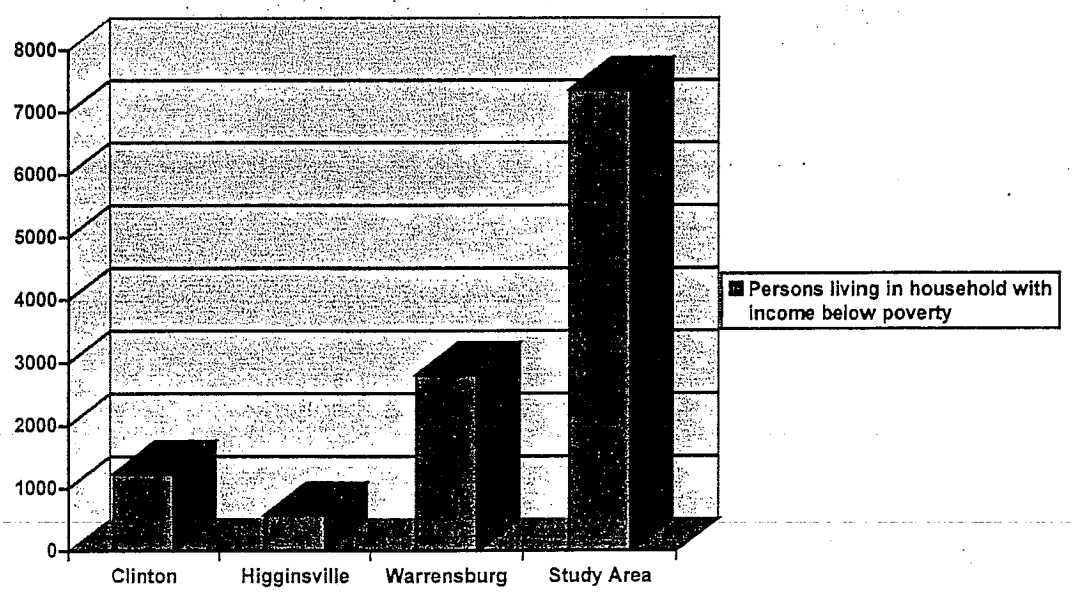


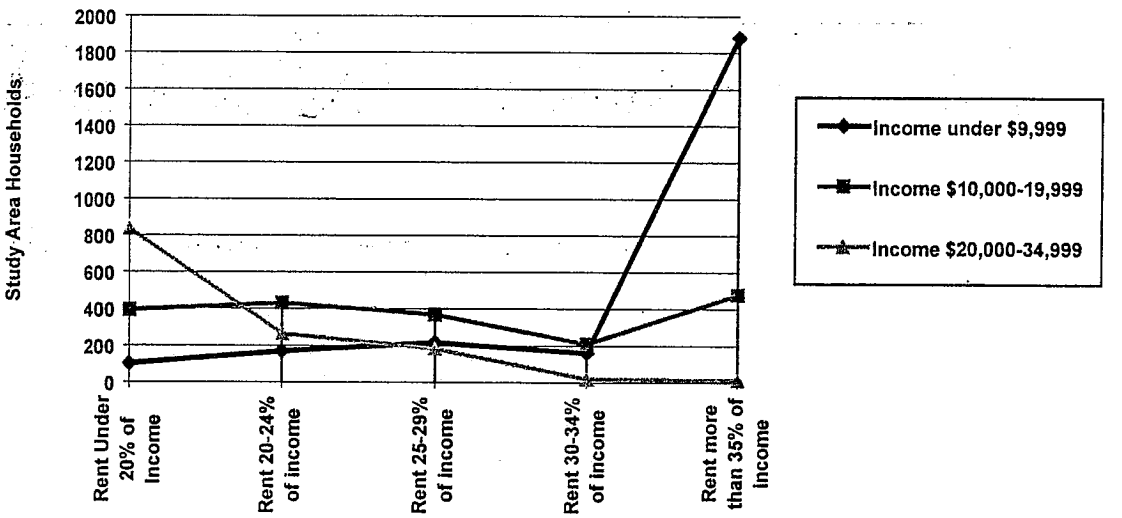
Table 9 in Appendix D lists detailed data on household income, per capita income and persons living below poverty. These tables give insight to specific townships which may have concentrations of low income households.

c. Cost of Housing

The direct cost of housing is the single largest expense to most households. Because housing is a major expense, an analysis of its cost is important to the Route 13 Corridor. Two levels of analysis are important to the Corridor. Median housing cost is the first analysis. The median cost allows a comparison of the raw cost of housing throughout the Corridor. The second level of analysis, housing cost as a percentage of income, will give insight to an area's ability to produce income to adequately support its housing cost.

Chart III.A.3-3 indicates the number of households earning under $35,000 annually and paying more than 30 percent of their income to gross rent. This condition generally indicates a housing affordability problem, especially in those families earning under $20,000 per year. Those families earning under $20,000 per year and spending more than thirty percent of their income on rent would only be left with $990 per month for other living expenses assuming they pay 15 percent of their gross income in taxes. Families earning under $10,000 per year and spending more than thirty-five percent of their income on rent would only be left with $460 per month for other living expenses assuming they pay 15 percent of their gross income in taxes. Over 1,800 study area households earning under $10,000 pay more than 35 percent of their income for rent. The chart shows that once a household earns more than $20,000 per year, they are better able to choose how much money to allocate to housing costs. The census does not report similar statistics for home ownership. Persons purchasing a home make a conscious choice to allocate additional resources to housing costs, where as those in the rental market may not be in a position to choose whether or not to purchase or rent.

Chart III.A.3-3 Gross Rent Affordability



Income figures used in the following analysis are based on census data and may not include income from public assistance, child support or other sources.

The eight employment sectors illustrated above account for approximately 75.6 percent of the total study area employment.

Appendix D Table 10 is a detailed table of employment by sector for each of the Corridor's political subdivisions and the Study Area.

b. Income

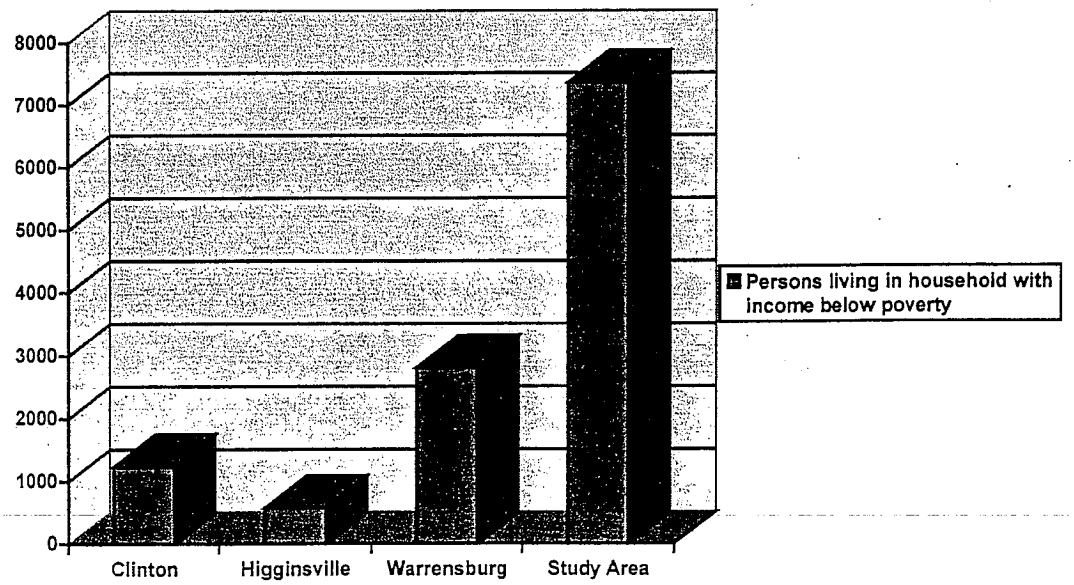
Median household income in the Corridor ranges from a low of $14,762 in Henry County, Fields Creek Township, to a high of $32,986 in Johnson County, Hazel Hill Township. Per capita income in the area also varies significantly. Per capita income varies from $6,608 to $12,453. Table III.A.3-1 shows the per capita and median household incomes for the three major cities and counties in the Corridor.

Table III.A.3-1 Income Characteristics

Geographic Division	Household Median Income	Per Capita Income
Henry County	$18,476	$ 9,835
Johnson County	23,044	10,202
Lafayette County	24,669	11,470
Clinton	15,769	10,165
Higginsville	18,507	11,444
Warrensburg	21,618	9,490

More significant than raw income characteristics is the number of persons living below poverty. Approximately 7,300 persons or 17.3 percent of the study area population live below the poverty level. Over 1, 700 of the persons living below poverty in the Corridor are under the age of 17. Only 1,000 of the study area residents with below poverty level incomes live in one of the Corridor's three major cities. Chart III.A.3-2 indicates the number of people living below poverty in the study area and in each major city.

Chart III.A.3-2 Household Income Below Poverty



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The direct cost of housing is the single largest expense to most households. Because housing is a major expense, an analysis of its cost is important to the Route 13 Corridor. Two levels of analysis are important to the Corridor. Median housing cost is the first analysis. The median cost allows a comparison of the raw cost of housing throughout the Corridor. The second level of analysis, housing cost as a percentage of income, will give insight to an area's ability to produce income to adequately support its housing cost.

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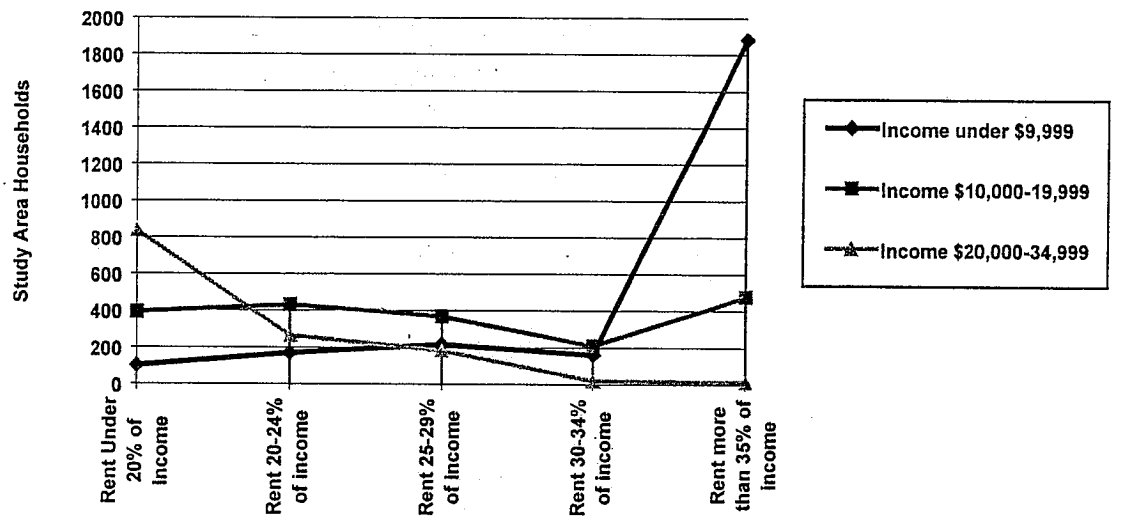
Chart III.A.3-3 Gross Rent Affordability



Income figures used in the following analysis are based on census data and may not include income from public assistance, child support or other sources.

The median value and cost of owner occupied housing and the median cash rent of the Corridor are compared in Table III.A.3-2.

Table III.A.3-2 Median Housing Values

Geographic Division	Med. Owner Occupied Housing Value	Median Owner Cost With Mortgage	Median Owner Cost Without Mortgage	Median Cash Rent	30 Percent of Median Monthly Household Income
Henry County	$35,700	$455	$154	$275	$461
Johnson County	$54,900	$561	$170	$341	$576
Lafayette County	$44,600	$529	$170	$307	$616
Clinton	$42,200	$477	$165	$298	$394
Higginsville	$41,500	$476	$162	$311	$462
Warrensburg	$62,600	$595	$173	$350	$540

The most significant fact produced by Table III.A.3-2 is that in each of the three major cities within the Corridor, the average household cannot afford the average home's monthly mortgage cost. To figure the level of spending which an average household can afford to spend on housing each month, divide annual median household income by 12 and multiply by 0.3 (30 percent of a household monthly income). The cost of a mortgage on the median home in the three cities is beyond the reasonable budget of the average household, that is the mortgage would require expenditures beyond 30 percent of the household income. The gap between the cost of a monthly house payment and 30 percent of the median income is illustrated in Chart III.A.3-4.

Chart III.A.3-4 Affordability Gap

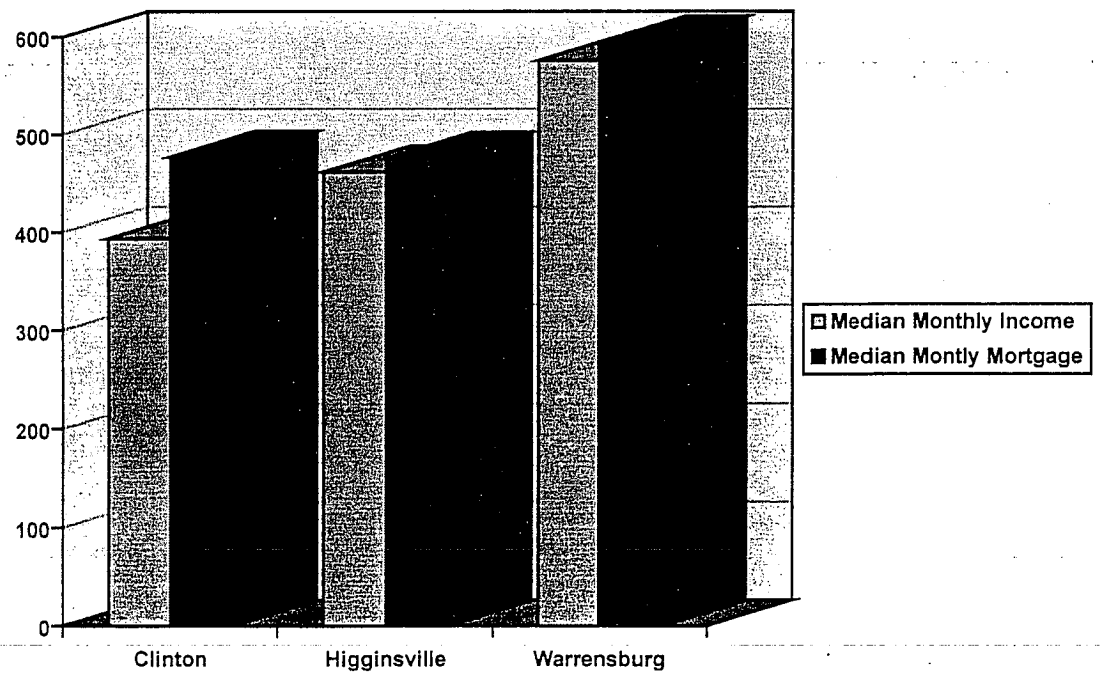


Table 11 in Appendix D details many factors which are important to fully understand housing cost in the Route 13 Corridor.

Assessed Value

Taxation based on the assessed valuation of real property is a primary income source for local governments. County governments in Missouri establish a value of land which is intended to approximate the market value of the property. State law then requires the county to establish an assessed value for each parcel. The assessed value is established by multiplying the property value by a percentage depending on the classification of property. Industrial, commercial, residential and agricultural lands are typically assessed at different rates. Industrial and Commercial properties are assessed at 32 percent of estimated property value. Residential and agricultural properties are assessed at 19 percent and 12 percent, respectively. When assessed values have been established, a uniform tax rate is applied to all property. For example, a parcel of agricultural land worth one million dollars will yield 31,200 dollars [$1,000,000 (value) x 0.12 (agricultural assessment rate) x 0.26 (Lafayette County General Revenue Assessment levy)] whereas the same million dollar parcel assessed at a commercial rate will yield 83,200 dollars [$1,000,000 (value) x 0.32 (commercial assessment rate) x 0.26 (Lafayette County General Revenue Assessment levy)]. In addition to the general revenue levies, school districts, cities, road improvement districts and others levy taxes against the assessed value of property.

The following tables and chart summarize total assessed values for each county and the Corridor.

Table III.A.3-4
Lafayette County Assessed Value Summary

Residential	$31,801,599
Agricultural	20,192,061
Commercial	4,975,395
Forest Croplands	None
Total Assessed Valuation - Rural Land	$56,969,055
Residential	47,158,936
Agricultural	504,248
Commercial	20,730,107
Forest Croplands	None
Total Assessed Valuation - Incorp. Town Lots	$68,393,291
Total Assessed Valuation - Real Property	**$125,362,346**

Table III.A.3-5
Johnson County Assessed Value Summary

Residential	$46,955,272
Agricultural	20,007,451
Commercial	5,926,747
Forest Croplands	None
Total Assessed Valuation - Rural Land	$72,889,470
Residential	$54,298,092
Agricultural	191,047
Commercial	30,969,887
Forest Croplands	None
Total Assessed Valuation - Incorp. Town Lots	$85,459,026
Total Assessed Valuation - Real Property	**$158,348,496**

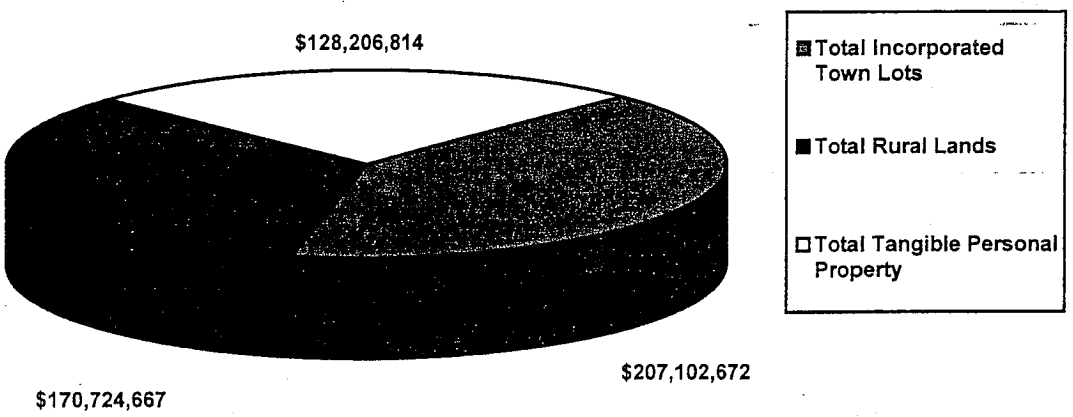
Table III.A.3-6
Henry County Assessed Value Summary

Residential	$19,217,150
Agricultural	15,024,590
Commercial	5,034,730
Forest Croplands	None
Total Assessed Valuation - Rural Land	$39,276,470
Residential	$35,007,100
Agricultural	169, 420
Commercial	19,510, 730
Forest Croplands	None
Total Assessed Valuation - Incorp. Town Lots	$54,687,250
Total Assessed Valuation - Real Property	**$93,963,720**

Table III.A.3-7
Assessed Value Summary

County	Total Incorporated Town Lots	Total Rural Lands	Total Tang. Personal Property	Grand Total for County
Henry	$54,581,370	$39,319,660	$34,321,191	$128,222,221
Johnson	$85,459,026	$72,889,470	$49,887,795	$208,236,291
Lafayette	$67,062,276	$58,515,537	$43,997,828	$169,575,641
TOTAL	**$207,102,672**	**$170,724,667**	**$128,206,814**	**$506,034,153**

Chart III.A.3-10 Total Assessed Value in Study Area



B. NATURAL ENVIRONMENT

1. Air Quality

The Federal Clean Air Act of 1970 and the Clean Air Act Amendments in 1990 require the adoption of ambient air quality standards. These were established in order to protect public health, safety and welfare from known or anticipated effects of sulfur dioxide (SO_2), particulates (PM-10, 10-micron and smaller), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3) and lead (Pb). In addition to these pollutants, the state of Missouri has established additional criteria for hydrogen sulfide (H_2S) and sulfuric acid (H_2SO_4). The Missouri and National Ambient Air Quality Standards (NAAQS) for these pollutants are listed in Table III.B.1-1.

Table III.B.1-1
Missouri and National Ambient Air Quality Standards

Pollutant	Averaging Time	Concentration
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean Twenty-four Hour[1] Three Hour[1] Secondary	0.03 ppm 0.14 ppm 0.50 ppm
Particulates (PM-10)	Annual Arithmetic Mean: Primary & Secondary Twenty-four Hour:[2] Primary & Secondary	50 ug/m^3 150 ug/m^3
Carbon Monoxide (CO)	One Hour[1] Eight Hour[1]	35 ppm 9 ppm
Photochemical Oxidants		
Ozone (O_3)	One Hour[7]	0.12 ppm
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.053 ppm
Lead (Pb)	Calendar Quarter Arithmetic Mean	1.5 ug/m^3
Hydrogen Sulfide (H_2S)	One-half Hour[3] One-half Hour[4]	0.05 ppm[8] 0.03 ppm[8]
Sulfuric Acid (H_2SO_4)	Twenty-four Hour[5] One Hour[6]	10 ug/m^3[8] 30 ug/m^3[8]

(1) = Not to be exceeded more than once per year.
(2) = Statistically estimated number of days with exceedances is not to be more than 1 per year.
(3) = Not to be exceeded more than twice per year.
(4) = Not to be exceeded more than twice in any five consecutive days.
(5) = Not to be exceeded more than once in any ninety consecutive days.
(6) = Not to be exceeded more than once in any two consecutive days.
(7) = Not more than one expected exceedance per year, on a three-year average.
(8) = Missouri Air Quality Standards.
ppm = Parts of pollutant per million parts of air (by volume) at 25°C.
ug/m^3 = Micrograms of pollutant per cubic meter of air.

Source: Code of Federal Regulations; Title 40 Part 50: Amended July, 1987.
Missouri Code of State Regulations; Title 10, Division 10, Chapter 6: Last Amended February 26, 1993.

All states are required to submit to the United States Environmental Protection Agency (EPA) a list identifying those air quality control regions, or portions thereof, which meet or exceed the NAAQS or cannot be classified because of insufficient data. Portions of air quality control regions which are shown by monitored data or air quality modeling to exceed the NAAQS for any criteria pollutant are designated "non-attainment" areas for that pollutant.

Lafayette, Johnson, and Henry Counties fall within the Southwest Missouri Intrastate Air Quality Control Region (AQCR). The AQCR has a designation of better than national standards for TSP (Total Suspended Particulates) and SO_2, unclassifiable/attainment for CO and O_3, cannot be classified or better than national standards for NO_2, and has no designation for Pb. The EPA has also classified the AQCR as Group III for PM-10 indicating a strong likelihood that the PM-10 standard is attained. The state of Missouri, Kansas City and Out-State Air Quality Control Region Implementation Plan does not contain any transportation control measures for this AQCR.

2. Water Quality

a. General

The Route 13 study Corridor lies within three major river basins -- Northern and Western Tributaries to the Missouri River, the Central and Eastern Tributaries to the Missouri River, and the Osage River Basin (1994 Missouri Water Quality Report). The Northern and Western Basin includes the northwestern half of Lafayette County. This area is

located within the glacial till plains. The rolling topography of this area supports a mixture of pasture fields, row crops and hay fields. Due to the high mineral content of bedrock groundwater throughout the basin, water supplies are taken from shallow alluvial groundwater sources located along major streams. Surface water is also used to supply drinking water. The streams and lakes that are used for water supplies do not exceed drinking water standards, however, the level of herbicides in the surface waters is a basin-wide concern due to the agricultural nature of the area. The Missouri River supplies drinking water to the majority of people within the basin. The basin contains a mixture of large and small streams and lakes.

The Central and Eastern Basin includes the southeastern half of Lafayette County and most of Johnson County, excluding the southwest corner of the county. This area of the basin lies within the Osage Plains, which is characteristically flat and supports agricultural land use. Bedrock aquifers accessed by deep wells provide drinking water to most of the small communities in this area of the basin. But communities in the northern section of the Osage Plains obtain their water supplies from shallow alluvial groundwater or surface water due to the heavily mineralized groundwater of the underlying bedrock aquifers. Like the Northern and Western Basin, the streams and lakes that are used for water supplies do not exceed drinking water standards, but again the levels of herbicides in surface waters is a basin-wide concern. The basin does not contain any large lakes and most of its streams are small.

The Osage River Basin includes the southwest corner of Johnson County and all of Henry County and lies within the Osage Plains. In the western section of the basin, streams and small lakes are used to supply drinking water since the groundwater in the bedrock aquifers is too mineralized. The majority of the basin can rely on bedrock aquifers for drinking water supplies. The Truman Reservoir is located within the study Corridor. It is one of four large reservoirs in the basin and is an impounded section of the Osage River. The multipurpose pool is 22,500 hectares (55,600 acres) with 1542 kilometers (958 miles) of shoreline (Basin Planning, 303e, Basin 34, pg. 1). Water released from Truman Dam immediately enters the upper section of Lake of the Ozarks. A study by Jones and Kaiser in 1988, which followed the construction of Truman Dam, indicated that nutrient uptake by algae and sedimentation of particulate material now take place in Truman Lake before that surface water enters the Lake of the Ozarks. Small streams are characteristic of this basin.

Table III.B.2-1 lists the lakes that are located within the project area which have been classified by the Department of Natural Resources (Rules of Department of Natural Resources, Division 20-Clean Water Commission, Water Quality Standards, 10 CSR 20-7.031, Chapter 7). Tebo Freshwater Lake is located outside of the study Corridor, but was included since its tributaries are located within the project area (Table III.B.2-2).

Table III.B.2-3 lists the classifications and use designations of particular sections of certain creeks, streams, rivers and tributaries that would be directly affected by the proposed improvement alternatives. There are two classifications: 1) Class C - streams that may cease to flow in dry periods but maintain permanent pools which support aquatic life, and 2) Class P - streams that maintain permanent flow even in drought periods. Each section of the classified stream is affected in one of the following two ways: 1) the classified section is located within the Corridor and is potentially crossed by a proposed alternative, or 2) the classified section is located outside of the Corridor, but could be crossed or has tributaries that could be crossed by improvement alternatives upstream of the designated section. The streams are alphabetically arranged by county.

Table III.B.2-1
Classifications and Use Designations of Lakes within the Corridor

No.	Lake	Class	Acres	Location	County	LWW	AQL	CDF	WBC	BTG	DWS	IND
LAFAYETTE COUNTY												
1	Maple Leaf Lake	L3	140	4, 48N, 26W	Lafayette	X	X			X		
JOHNSON COUNTY												
2	Lions Lake	L3	5	26, 46N, 26W	Johnson	X	X			X		
HENRY COUNTY												
3	Conner O. Fewel Lake	L3	10	32/29, 43N, 25W	Henry	X	X			X		
4	Poague Wildlife Area Lake	L3	77	19, 42N, 26W	Henry	X	X			X		

Source: Department of Natural Resources Water Quality Standards, (10 CSR 20-7.031, 3-30-94, pgs. 31-37)

Class L3 = Lakes which are waters of the State, excluding major reservoirs (L2), and lakes used primarily for public drinking water supply (L1). Class L3 lakes include both public and private lakes. For effluent regulation purposes, publicly owned L3 lakes are those for which a substantial portion of the surrounding lands are publicly owned or managed.

LWW- Livestock and wildlife watering
AQL- Protection of warm water aquatic life and human health fish consumption
CDF- Cold water fishery
WBC- Whole body contact recreation
BTG- Boating and canoeing
DWS- Drinking water supply
IND- Industrial

Table III.B.2-2
Classifications and Use Designations of Lakes Which Have Numerous Tributaries within the Corridor

No.	Lake	Class	Acres	Location	County	Impacted Waterways	LWW	AQL	CDF	WBC	BTG	DWS	IND
HENRY COUNTY													
1	Tebo Fresh-water Lake	L3	300	SW SW 25, 43N, 25W	Henry	Sand Cr. and tribs, Wade Cr. and tribs.	X	X					

Source: Department of Natural Resources Water Quality Standards, (10 CSR 20-7.031, 3-30-94, pgs. pgs. 31-37)
See notes on Table III.B.2.-1.

All of the classified rivers and streams located within the project area, except for the following waterways which are classified as C class streams, are presented in Table III.B.2-3: Crooked Creek, Hogans Fork, Stoak Creek, West Fork Post Oak Creek, Tributary to the West Fork of Post Oak Creek and Bear Creek. Use designations for these creeks were not listed. A classified section of South Grand River in Henry County and of Brush Creek in Lafayette County are located in the Corridor but are not affected by a proposed alternative.

Table III.B.2-3
Classifications and Use Designations of Streams and Rivers

No.	Waterbody	Class	Miles	Location	County	IRR	LWW	AQL	CLF	CDF	WBC	BTG	DWS	IND
LAFAYETTE COUNTY														
1	Davis Creek	P	25.0	Mouth - 8, 48N, 26W	Saline Lafayette		X	X						
2	Garrison Fk.	C	5.0	Mouth - 13, 50N, 27W	Lafayette		X	X						

No.	Waterbody	Class	Miles	Location	County	IRR	LWW	AQL	CLF	CDF	WBC	BTG	DWS	IND
3	Lick Fork	C	8.9	Mouth - 2, 50N, 27W	Lafayette		X	X						
4	Tabo Cr.	C	9.1	27,50N,6W - 20,49N, 26W	Lafayette		X	X						
5	Tabo Cr.	P	11.0	Mouth - 27, 50N, 26W	Lafayette		X	X						
JOHNSON COUNTY														
1	E. Bear Creek	C	1.0	Mouth - 33, 46N, 25W	Johnson		X	X						
2	Blackjack Cr.	C	4.0	Mouth-16, 47N, 25W	Johnson		X	X						
3	Blackwater R.	P	76.0	Mouth-12, 46N, 27W	Cooper Johnson	X	X	X			X	X	X	
4	Brawley Cr.	C	3.0	Mouth-26,45N, 26W	Johnson		X	X						
5	Flagstaff Cr.	C	4.0	Mouth - 3, 47N, 25W	Johnson		X	X						
6	Mineral Cr.	C	4.3	Mouth - 20, 44N, 25W	Johnson		X	X						
7	Trib. to Mineral Creek	C	1.0	Mouth - 18, 44N, 25W	Johnson		X	X						
8	Post Oak Cr.	P	4.0	Mouth - 22, 46N, 26W	Johnson		X	X						
9	E. Fk. Post Oak Cr.	C	13.0	22, 46N, 6W-9, 44N, 26W	Johnson		X	X						
10	Trib. to E. Fk. Postoak Cr.	C	2.0	Mouth - 34, 45N, 6W	Johnson		X	X						
11	Trib. to E. Fk. Post Oak Cr.	C	3.9	Mouth - 23, 44N, 26W	Johnson		X	X						
12	Walnut Cr.	C	2.0	Mouth - 27, 47N, 26W	Johnson		X	X						
HENRY COUNTY														
1	Coal Creek	P	3.0	Mouth - 35, 42N, 26W	Henry		X	X						
2	Deer Creek	C	0.5	Mouth - 12, 41N, 26W	Henry		X	X						
3	Sand Cr.	C	15.0	Mouth-12, 43N, 26W	Henry		X	X						
4	Wade Cr.	C	8.0	Mouth - 33, 44N, 25W	Henry		X	X						
5	West Fork Tebo Creek	C	7.0	Mouth - Hwy. 52	Henry		X	X						

Source: Department of Natural Resources Water Quality Standards, 10 CSR 20-7.031, 3-30-94, pgs. 42-111)

Class C = Streams that may cease flow in dry periods but maintain permanent pools which support aquatic life.
Class P = Streams that maintain permanent flow even in drought periods.

IRR- Irrigation
LWW- Livestock and wildlife watering
AQL- Protection of warm water aquatic life and human health- fish consumption
CLF- Cool water fishery
CDF- Cold water fishery
WBC- Whole body contact recreation
BTG- Boating and canoeing
DWS- Drinking water supply
IND- Industrial

b. Groundwater and Springs

Various local groundwater levels occur in nearly all strata to some degree; however, the regional level lies in the deeper pre-Pennsylvanian aquifers. The local groundwater that occurs in the residual soils, alluvium, and upper bedrock layers is often of very small quantity, polluted from surface contaminates and not considered a reliable water supply.

Most of the study area is directly underlain by bedrock consisting of shale which is almost impermeable to downward and lateral movement of water. Some of the limestone layers through bedding, joints and fractures are permeable and may locally transmit water. Channel sandstone deposits may also contain water depending on local conditions. These upper Pennsylvanian strata are also not considered as a reliable water supply for quality and quantity reasons.

The regional groundwater is contained in the underlying pre-Pennsylvanian limestones, dolomites and sandstones. The groundwater of these deeper aquifers is divided into two districts within the study area-- the fresh water province and the saline water province. Water in the saline province is too highly mineralized (greater than 1000 parts per million total dissolved solids) to be considered potable. These waters contain calcium and magnesium carbonate which produce ordinary hardness, as well as variable concentrations of sodium sulfate and sodium chloride. The contact between the two roughly parallels the outcrop line of the Pennsylvanian Rocks throughout the state of Missouri. In the study area, all groundwater north of Warrensburg is considered to be in the saline province. Therefore, potable water from these bedrock aquifers is not available north of Warrensburg. Warrensburg is essentially in the fringe area with water quality somewhere in between the two. The public water supply of Warrensburg is obtained from wells that draw from the Roubidoux Formation of Ordovician Age. Productive wells south of this area also yield fresh water from these formations.

Springs and seeps only occur locally where limestone layers convey water from recharge areas short distances, usually no more than a few hundred meters away. The two springs listed in MDNR literature in the study area are Pertle Springs and Electric Springs, both in Warrensburg. Pertle Springs is part of the Central Missouri State University Park System. Electric Springs located just off Young Street was obliterated by urban development. Both springs are small, recharged locally, and would not be impacted by any of the proposed alternatives.

Due to highly mineralized groundwater in much of the study area, water from surface impoundments and groundwater from outside the Study Area are utilized for public water supplies. The City of Higginsville and the City of Clinton supplement their water supplies from groundwater from either deep wells in the non-mineralized bedrock area, or wells in the Missouri River alluvium. The Higginsville municipal reservoir serves as a water supply for the City of Higginsville Water Department, and Truman Reservoir is used as a supply for the City of Clinton.

Since one of the predominant sources of water in the Study Area is surface impoundments, the water supply may be more susceptible to water quality degradation due to surface activities than an area predominantly served by groundwater or outside sources. However, it has been determined that based on the projected traffic volumes along Route 13, the effects of roadway pollutants would be insignificant.

c. Sanitary Sewer Facilities

Each of the three large communities in the Corridor support sanitary sewer facilities to serve within the city limits. Warrensburg has recently expanded its sanitary facilities through the construction of a new plant and primary interceptors to serve the east side of the community to existing Route 13. Clinton's plant experiences flows exceeding its capacity during periods of heavy rain due to infiltration problems.

d. Municipal Water Supplies

Each municipality operates or has significant control over municipal water supplies. Much of the remainder of the Corridor is served by private wells. Higher density rural areas are served by rural water districts.

3. Geology

a. General

The entire study area is located within the Osage Section of the Central Lowlands Physiographic Province. The southern limit of continental glaciation approximates the present location of Interstate 70. Thus the area north of I-70 is influenced by the advance and retreat of ice during the Pleistocene time period. In Lafayette County, the glacial resultant is not till, but loess. Predominant northerly winds carried silt size particles from the unvegetated, barren land, and deposited it on the Missouri River bluffs and land southward. The loess covering the bedrock surface ranges from approximately 30 meters (100 feet) thick near the Missouri River to less than a meter (3.04 feet) thick at the southern Lafayette County border. Loess can probably be found south of Lafayette county but only in thicknesses of less than a meter. Many apple orchards located on the southern bluff of the Missouri River are located on loessial soils. The physical properties of loess have it stand best near vertical in highway cuts. These properties also lend to a tendency of easy erosion resulting in deep, steep gullies.

The area south of I-70 is influenced by differential erosion of underlying bedrock and subsequent formation of residual soils. The varying erodability of the underlying bedrock has created gently to steeply inclined slopes in the study area. Normally, more resistant limestone or sandstone forms the steeper slopes. However, most of the study area is influenced by shale bedrock forming gentle slopes. Residual soils are formed by chemical and mechanical weathering of the rock which yield varying soil thickness. Most of the soils in this area, however, tend to be thin - averaging 1.5 to 1.8 meters (5 or 6 feet) in thickness.

Topography can generally be described as gently rolling hills. Drainages are characterized by dendritic patterns flowing either northward to the Missouri River or southward to the South Grand River and Tebo Creek. The north - south drainage divide is roughly the Johnson - Henry County boundary. The general north - south orientation of the drainages yields broad wide ridges between them that lend themselves to transportation routes in the same north-south direction due to the lack of natural barriers. The exception is the east - west orientation of the Blackwater River north of Warrensburg.

Local relief is typically in the order of 15 meters (50 feet), while across the entire study area, relief is approximately 51 meters (300 feet) from low to high elevation. The low elevation point is shared almost equally by four different locations within the study area --

Tabo Creek (north of Route 13 in Lafayette County), Davis Creek (near Aullville in Lafayette County), Blackwater River (northeast of Warrensburg), and the flooded portion of Truman Reservoir (south of Clinton). All these points are near elevation 207 meters (680 feet) above mean sea level. Truman Reservoir normal pool is elevation 215 meters (706 feet) with a maximum water elevation of 226 meters (740 feet) above mean sea level.

The highest location in the study area is approximately elevation 302 meters (990 feet) above mean sea level near the intersection of Routes 13 and 2, just north of the Johnson - Henry County line.

Agriculture is the prime land use in the study area outside of the three small urban areas. Row crops such as corn and soybeans are predominant in Lafayette County, where the land surface has been contoured, or terraced to control the erosion of topsoil hastened by tillage. The fields are terraced by mounding soil at like elevations to prohibit the downhill erosive action of the water. Intermediate field drainageways are concave shaped and planted with grasses.

Much of the agricultural land use in Johnson and Henry Counties is pasture, or grazing for livestock. Soils are thinner and less productive as row crops are typically only planted in the alluvial valleys. A greater percentage of the total land is also forested in this area, but remains predominantly grasslands.

The natural drainageways have nearly all been channelized to maximize field use and reduce flooding. Streams in the alluvial valleys that once meandered are now characteristically nearly straight and steep sided. Much of the low, seasonably wet areas have had positive drainage constructed to allow agricultural use. Also, many small drainages in the upland are blocked to form stock ponds. Nearly all landowners have several ponds of varying sizes.

The difference in agricultural use between Lafayette County and Johnson/Henry Counties would appear to coincide with the limit of glaciation and deposition of loess, as the underlying bedrock is similar throughout the study area.

Noticeable landforms in the southern portion of the study area are abandoned strip mines. The area north of Clinton in Henry County has been mined for coal in the past by strip methods. No mining is presently in progress. The former mines west of Route 13 have had no reclamation efforts and are now overgrown with vegetation and filled with water. The mines east of Route 13 have had varying amounts of reclamation efforts, leaving a landscape that now resembles rolling pasture although many high headwalls remain next to water filled excavations.

Geology

The geology is characterized by relatively horizontal layers of sedimentary rock of the Paleozoic Era, Pennsylvanian System. These rocks were formed for some 40 million years in a shallow marine environment by transgressing and regressing seas approximately 300 million years before the present.

The layer upon layer formation of these rocks would indicate that older formations are overlain by younger ones. Therefore, since the formations are nearly horizontal, the older formations are found in the lower elevations, while the younger formations cap the hilltops.

Most of the bedrock throughout the study area has similar physical and visual properties and seldom crops out. The majority of the bedrock is shale -- an indurated, laminated sediment comprised of mostly clay particles. Lesser amounts of sandstone, limestone, and coal are also found. Limestone beds are seldom thicker than 3 meters (10 feet), while some sandstones formed by fluvial erosion and subsequent deposition have resulted in channel sandstones up to 30 meters (100 feet) in thickness.

Also, some 610 meters (2,000 feet) of unexposed Mississippian, Devonian, Ordovician, and Cambrian sedimentary strata underlie the Pennsylvanian uncomformably on the Precambrian basement. No direct involvement with these underlying formations is expected in this study except for some deep water wells that draw from aquifers located in these zones.

Stratigraphy of exposed rocks (Pennsylvanian System). The following are brief, general descriptions of the stratigraphy of the bedrock units from lowest (oldest) to highest (youngest). The geologic column is displayed in Exhibit III.B.3-1.

The oldest and lowest bedrock in the geologic succession encountered in the study area is the Cherokee Group of the Desmonian series. The Cherokee contains two subgroups, the lower Krebs, and the overlying Cabaniss. Both of the subgroups contain many formations and members totaling no more than 91 meters (300 feet) and more likely 61 meters (200 feet) of the geologic column. The many formations and members that make up the Cherokee are similar in composition and physical characteristics, thus, each individual member is not described in separate detail. Much of this bedrock is not exposed in naturally occurring outcrops in the study area due to its composition and weathering characteristics.

The Cherokee Group is made up of primarily shale, with occasional layers of sandstone, limestone, coal, and clay. The shales are mostly clayey but can be sandy or calcareous. Sandstone may be found in layers, either massive, horizontally or crossbedded with varying amounts of cementation. Many of the sandstones are channel fill sandstones formed by deposition of sand sediments in former drainage channels eroded into the underlying formations. Many of these channel sands may vary in thickness in short lateral distances due to the nature of deposition. The channel sandstones may be silty, micaceous and vary in grain size. The overall limestone content of the Cherokee is volumetrically insignificant, with the few identifiable layers less than a half meter.

The coal beds in the Cherokee make up almost all the minable coal in Missouri. Coal occurs from smuts to beds over 1 meter (3.04 feet) thick. The most mined bed is the Tebo, which was the principal strip-mined bed north of Clinton. The Tebo, along with about 10 other coal beds in the Cherokee, make up nearly all the coal mined and in reserve in Henry and Johnson Counties.

The Marmaton Group also of the Desmonian Series overlies the Cherokee Group. The Marmaton consists of a succession of shale, sandstone, limestone, clay, and coal. Compared with the Cherokee below, the Marmaton contains more limestone units that are also thicker and more persistent. The Marmaton is also divided into two subgroups -- the Fort Scott and the overlying Apanoose.

The Fort Scott is made up of three formations, the Blackjack Creek, a nodular shaly limestone, Little Osage, shale and sandstone, and Higginsville, a limestone. The Higginsville limestone is the only limestone found in the study area that is quarried for aggregate.

Above the Fort Scott is the Apanoose subgroup which is also composed of shale, sandstone, limestone, and coal beds. The Apanoose contains seven formations with numerous members. Again the predominant material is shale, however limestone becomes more common. The Lexington Coal Member is found in the lower Apanoose and has been extensively mined in the northern portion of the study area in the past. Almost all the mining of the Lexington Member was underground. Many mines near the cities of Lexington and Higginsville were accessed through shallow shafts, slopes, drifts, or adits.

The Pleasanton Group of the Missourian Series is located above the Marmaton. The Pleasanton consists of three formations which in the past have been unnamed, but now have names submitted for regional approval and correlation. Almost the entire group is composed of shale except for three layers of sandstone. One of the sandstone members, the Warrensburg, now suggested as the Weldon River Member, plays a very important role in the geology of the study area. As the sea level lowered during Pleasanton time, the Warrensburg valley was eroded through middle and lower Pleasanton, Marmaton, and into upper Cherokee strata. The drainage was thought to flow from north to south through the entire study area, very different from today's patterns. When the sea level slowly rose, the valley was inundated again and an aggradation of the sand in the eroded channel began. The Warrensburg (Weldon River), roughly located near the present Route 13, is a channel sand 3.2 to 4.8 kilometers (2 to 3 miles) wide extending from Lexington to just north of Clinton. The maximum thickness may be as much as 46 meters (150 feet). This channel sandstone has deeply eroded and replaced the underlying geology typical of the area including the Higginsville Limestone Member and nearly all the coal beds. Therefore, no coal mines or limestone quarries are located within this belt although some quarries were developed during the late 19th century in the sandstone, supplying dimension stone for building construction. Many of the proposed highway alternates are located on the area of the channel sandstone. This feature is best displayed on the geologic map on Exhibit III.B.3-1.

In the far northwest corner of the study area on the highest points south of Lexington, the lower portion of the Kansas City Group, also of the Missourian Series, is encountered. Only the Hertha Formation, lowest of the Kansas City Group, is encountered. The Hertha is composed of approximately 0.67 meter (2 feet) of limestone overlying 3 meters (6 feet) of shale.

Quaternary System (Pleistocene Series). As mentioned previously, the Quaternary System, Pleistocene Series deposits of loess mantle the surface in a wedge from the Missouri River southward. The loess is mainly reddish brown, non calcareous, medium to coarse grained silt with various amounts of clay. Deep gullies in the northern portion of Lafayette county are due to the eroding nature of the loess.

Quaternary System (Holocene Series [recent]). The youngest deposits of the study area are unconsolidated alluvial deposits of silt, clay, sand, and gravel transported by water and deposited adjacent to all major streams and tributaries. The predominant portion of the alluvium is clay and silt with very little granular material. The most significant

areas of alluvium occur in the valleys of Tabo Creek, Davis Creek, Blackwater River, Post Oak Creek, Bear Creek, Fields Creek, and South Grand River. The thickness of alluvium is rarely over 15 meters (50 feet).

Structural Geology

The sedimentary bedrock layers are essentially horizontal with a regional dip of about 1.88 meters per kilometer (10 feet per mile) to the northwest, and are modified only slightly by several gentle northwest-trending folds common to structure throughout the state. The major structural feature of the study area is the Centerview-Kansas City anticline which extends in a line from Kansas City to Centerview. Typically dips are steeper on the southwest flanks, but are shallow and not readily noticed. Minor local folds and dips may also be present. Faulting has not been identified nor thought to have taken place in the Paleozoic rocks of the study area nor is seismicity a concern for special engineering design; however, micro-faulting or slickensides may appear in many of the shale formations probably formed during the consolidation process.

Caves

The predominance of shale bedrock in the study area would preclude the formation or existence of caves in the study area. The only recorded cave within the study area is Pertle Springs Cave on the Pertle Springs property of Central Missouri State University. The cave is a relatively small opening in the Warrensburg Sandstone. Dimensions of the cave are; entrance 1.8 meters high by 4 meters wide (6 feet high by 13 feet wide) with a length of 9.1 meters (30 feet). The entrance has been sealed and is used by the CMSU for biologic studies. Only very small amounts of water seep into the cave.

Geologic Hazards

The study area is not in a seismically active region and in accordance with AASHTO is classified in Seismic Performance Category A and does not require detailed seismic analysis for bridges.

Hazards are imposed by former coal mining throughout the study area. In the area from Higginsville to the northern limit, coal was previously mined underground. Some subsidence has been documented in the area in the past; however, recent interviews and field study found no evidence of ongoing subsidence problems associated with the mines. Mining was by the longwall method whereby all the coal from a 41 to 51 centimeters (16 to 20 inches) seam was removed and spoil material from other required excavation was placed in the excavated area, leaving little gob (mine spoil shale) material brought to the surface except for excavation of the shaft. It is hypothesized that most of the past subsidence problems are associated with last working faces and haul roads within the mines that were the largest and last excavations left open when mining ceased. It is also thought that most settlement has already occurred where unstable areas existed. There is currently no evident distress in buildings constructed on the formerly mined areas nor are there any restrictions on future building. The MDNR in the past has investigated complaints of subsidence, evaluated the potential of danger to humans and property and does not have any plans for reclamation of these mines. Past reclamation projects have involved filling and sealing dangerous openings such as shafts. Therefore, underground mined areas would not significantly impact the selection or location of an improvement to Route 13. Consideration should be given during any final engineering design of

investigating the subsurface sufficiently, in particular for bridge structures in areas where past mining is suspected. Many gob piles also occur on the surface in the underground mined area. These piles, if encountered, may be spread and leveled. They may also be treated with an application of agricultural lime to reduce the chance of acidic conditions. Acid forming materials are defined as those earthen materials (coal) that contain sulfide minerals or other materials which, if exposed to air, water, or weathering processes, form acids that may create acid drainage.

The area north of Clinton has been extensively strip mined for coal in the past. It is not thought that these areas will preclude the use of any feasible alternative due to the condition and location of the mined lands. Strip mined areas should also be thoroughly investigated during the design stage. Most likely, the spoil material should be removed and recompacted to engineered depth, and positive drainage maintained or restored. Agricultural lime treatment may also be required to reestablish conditions for revegetation. Alternatives located on strip mined lands will likely be more costly and require special engineering.

b. Strip Mine Operations

As agriculture is the economic base of the study area, soil is the most valuable geologic resource of the area. In the sense of mineral resources, coal is the most valuable resource of the area. The coal is classified as bituminous with a high sulfur content, but above average Btu heat content. The study area has a long history of coal mining. Mining began on a small scale in the 1840's, becoming larger after the Civil War. The Lexington coal bed, 41 to 51 centimeters (16 to 20 inches) thick, was initially mined in Lafayette County from drifts in the bluffs of the Missouri River to serve the steamboat and railroad business as well as the Kansas City market. Underground mining progressed southward through the additional use of shafts and slopes from the surface. Large commercial operations as well as one-man type mines were noted to exist throughout the area. Coal was also heavily mined underground in the Higginsville area, mostly on the west side of town. Shafts in the area were 12 to 37 meters (40 to 120 feet) deep. The coal mining was performed by the longwall method, whereby all the coal was removed. Roof conditions were favorable due to the occurrence of the overlying Myrick Station Limestone Member which provided a stable excavation. There is documentation of some settlement and subsidence due to underground coal mining in the Lafayette County area. However, it is not thought to be widely occurring. Due to various reasons, mining eventually slowed and ended in the Lafayette County during the World War II era.

Strip mining became popular as machinery was developed that facilitated the removal of the overburden. In strip mining, an initial strip of overburden is removed, then the coal is taken. Subsequent strips of overburden are removed linearly and placed in the former excavation, creating a landscape of parallel furrows. Mining of the easily accessible coal (thin overburden) in the study area was completed in the late 1960's. Natural drainage was disrupted in the process and water has filled many of the excavations. (Acid water drainage from mined lands is not a common problem in the study area as fish and aquatic life occupy the water filled pits.) Lands mined prior to reclamation legislation are now overgrown with vegetation and are very rugged. The Department of Natural Resources has no large scale plans to reclaim the old mines with the idea that their present state supports, and is better suited to, wildlife. Current small reclamation projects involve improving drainage, checking acid drainage, and remediation of high, dangerous headwalls.

Newer strip mined lands, particularly northeast of Clinton, have been reshaped to resemble former contours and restore positive drainage. Much of this land now resembles adjacent pasture with the exception of a few water-filled headwall areas.

Although much of the easily mined coal in the study area has been removed, many millions of tons of reserves remain. However, future production for coal mining in the study area is rather bleak. Environmental factors involved with burning high sulfur coal further reduce its chance of use. High sulfur coals produce emissions that create acid rain, thus economic factors involving the installation of scrubbers and pollution control equipment further reduce its attractiveness. Finally, detrimental environmental factors associated with mining also reduce the chance of future activity. Availability of thick beds of low sulfur coal in vast quantities on less valued land in the western states has economic and environmental benefits over the use of Missouri coal. For these reasons, it would not appear that coal will be mined from the study area in the foreseeable future.

Limestone has been quarried at many locations in the study area in the past as there are numerous small abandoned pits and quarries. The Higginsville Limestone Formation of the Marmaton Group is mined by open excavation. Three quarries presently operate in the study area, Hilty (Marr) and adjacent Keystone, south of Warrensburg, and Hilty at the Ellis Scott landfill site at Quarles. The crushed limestone aggregate is suitable for nearly all construction uses with the exception of MoDOT standards for concrete. Concrete aggregate suitable for this use is obtained from quarries in Mississippian limestones of the Truman Lake area and Pennsylvanian limestones in the Kansas City area.

The Warrensburg channel sandstone, as discussed in the geology section, has removed and replaced both the limestone and coal resources mentioned above. If the alternative were located in the area of the channel sandstone, none of the coal and limestone resources would be impacted.

c. Soils

Soils of the study area are classified as eolian, residual, colluvial, and alluvial. Eolian soils such as loess, as previously discussed, are formed and deposited through wind action during late and post glacial periods. These soils are predominantly silt sized but also contain clay. Differing amounts of weathering of the loess also occurs, forming various soils. Eolian soils are encountered from the northern limit of the study area south to I-70.

Residual soils in this area are formed by the weathering of the parent bedrock material and are typically shades of brown or gray and are low to highly plastic. The residual soils in the study area are located from Route I-70 to the southern terminus and are of varying thickness dependent on the weathering characteristics of the parent rock. Residual soils should tend to be thicker on softer, shale bedrock than on limestone or sandstone. Depth to bedrock in residual soils ranges from 0 to 6 meters (0 to 20 feet) with a typical depth of 1.8 to 3.0 meters (6 to 10 feet).

Colluvial soils are formed by the downward gravitational and fluvial movement of soil particles accumulating at the base of slopes. Typically, in the Lafayette County area, thick layers of organic, top soil material may be encountered at the base of some slopes.

Alluvial soils are formed by erosion and deposition by water and coincide with the major river and creeks of the study area. Alluvium typically consists of clay, silt, sand, and gravel, but are usually silt or clay. Some of the alluvium may be water bearing, soft in consistency and compressible under certain conditions. Thickness of alluvium is typically 15 meters (50 feet) or less.

For engineering purposes, the soils of the area can be classified by the Unified Soil Classification System as follows: CL, CH, ML, for residual, eolian, and colluvial, and CL, CH, ML, SM, and SP for alluvial.

Soil Associations

Based on the classifications and nomenclature of the Missouri General Soil Map, the Route 13 Corridor includes soils from several general soil associations.

Lafayette County contains the following soil associations:

- Knox-Marshall association
- Marshall-Higginsville association
- Blackoar-Otter-Nodaway association
- Winfield-Sampsel association

The dominant soil association is the Marshall-Higginsville Association which is encountered in approximately 80 percent of the Corridor in the county. It is found between Highway 24 and the Johnson/Lafayette County line, excluding the Blackjack and Davis Creek areas. This association's soils formed in silty loess that ranges from approximately 27 meters (90 feet) in thickness in the northern part of the Corridor to approximately 2.4 meters (eight feet) thick in the southern part. These soils are silty, slowly to moderately permeable, somewhat poorly drained and well drained. They are located on ridges, hillsides and the upper part of hillsides with slopes ranging from gently sloping (two to five percent) to strongly sloping (9 to 14 percent).

The Blackoar-Otter-Nodaway Soil Association occurs on bottom lands along Davis Creek and the northern part of Blackjack Creek in Lafayette County. These soils formed in alluvium and are level or nearly level. They are loamy, moderately permeable, poorly drained and moderately well drained.

The Winfield-Sampsel Soil Association in Lafayette County is encountered in the southern portion of Lafayette County upland of Davis Creek and along the southern part of Blackjack Creek. They are loamy, moderately permeable and slowly permeable, moderately well drained and somewhat poorly drained soils on slopes ranging from gently sloping (two to five percent) on ridges to moderately steep (14 to 20 percent) on hillsides. The Winfield soils were formed in loess with a thickness of one or more meters (three or more feet), and the sampsel soils formed primarily in shale residuum with a thickness of 1.2 meters (four feet) or more.

The Knox-Marshall Soil Association occurs only in the uplands of the northwest corner of the Corridor in Lafayette County. These soils formed in loess approximately three meters to 27 meters (10 feet to 90 feet) in thickness. They are loamy, moderately permeable, well drained soils on slopes ranging from gently sloping (two to five percent) to steep (20 to 25 percent).

Johnson County contains the following soil associations within the Corridor:

- Macksburg-Sampsel association
- Sampsel-Snead-Polo association
- Mandeville-Norris-Bolivar association
- Sampsel-Deepwater-Haig association
- Zook-Dockery-Blackoar association

The Macksburg-Sampsel Soil Association is located in the upper northwest corner of the county in the upland areas just north of Fayetteville. These soils were formed in loess and residuum from shale, are somewhat poorly drained, contain silt loam and silky clay loam subsoils. They are on slopes ranging from gently sloping (one to four percent) on the higher, wider divides, to moderately sloping (five to nine percent) on the side slopes. Depth to bedrock ranges from one to 1.7 meters (3.5 to 5.5 feet) in sampsel soils to more than 1.5 meters (five feet) in Macksburg soils.

The Sampsel-Snead-Polo Soil Association can be encountered in the upland areas between the Blackwater River and the Johnson/Lafayette County line, along the north Blackjack Creek and northwest and southwest of Brawley Creek. These soils were formed from loess and residuum from limestone and shale, are well drained to somewhat poorly drained, have silt loam and silty clay loam surface layers, and have silty clay and silty clay loam subsoils. The Snead soils typically have limestone and shale near the surface on the steeper side slopes. This association's soils are located on gentle side slopes (two to five percent) at the head of drainageways, on steep side slopes (35 percent), narrow ridgetops and the upper parts of side slopes. Depth to bedrock ranges from 38 to 76 centimeters (15 to 30 inches) in Snead soils, one to 1.7 meters (3.5 to 5.5 feet) in Sampsal soils, and more than 1.5 meters (five feet) in Polo soils.

The majority of the Mandeville-Norris-Bolivar Soil Association is located in the upland areas around Warrensburg, south of the Blackwater River to Fletcher Creek, and between Post Oak Creek and Bear Creek. This association's soils were formed in residuum from sandstone and shale; are well drained and moderately well drained; have silt loam, shaly silt loam, fine sandy loam or loam surface layers; and have silty clay loam, shaly silt loam, loam or clay loam subsoils. These soils are encountered on gently sloping (two to five percent) ridgetops and moderately sloping (five to 14 percent) to moderately steep (14 to 35 percent) side slopes. Depth to bedrock ranges from 20 to 51 centimeters (eight to 20 inches) in Norris soils, and from one to 1.7 meters (3.5 to 5.5 feet) in Mandeville and Bolivar soils.

The majority of the Sampsal-Deepwater-Haig Soil Association can be encountered in the uplands of the southern quarter of the Corridor in Johnson County from approximately one mile south of Cornell to the Johnson/Henry County line. There are also areas 2.4 to 3.2 kilometers (1.5 to two miles) north and south of the Long Branch Fork and an area between Fletcher Creek and Stoak Creek. These soils formed mostly in loess and residuum from shale, are moderately well drained to poorly drained, contain silt loam and silty clay loam surface layers, and have silty clay and silty clay loam subsoils. They can be found on stable ridgetops and side slopes that are moderately sloping (five to nine percent) to nearly level. Depth to bedrock ranges from one to 1.7 meters (3.5 to 5.5 feet) in Sampsel soils to more than 1.5 meters (five feet) in Deepwater and Haig soils.

The Zook-Dockery-Blackoar Soil Association can be found in the nearly level bottom lands along the Blackwater River, Post Oak Creek and Bear Creek. These soils formed in silty and clayey alluvium; are poorly drained and somewhat poorly drained; have silt loam and silty clay loam surface layers; and have silty clay, silty clay loam and silt loam subsoils. Depth to bedrock in these soils is greater than 1.5 meters (five feet).

Henry County contains the following soil associations within the study Corridor:

- Hartwell-Deepwater association
- Verdigris-Osage association
- Barco-Coweta association
- Mandeville-Bolivar association
- Summit-Newtonia-Snead association
- Mine Pits and Dumps association

The majority of the Hartwell-Deepwater Soil Association can be found on wide divides and undulating areas between major streams in the south half of the Corridor in Henry County, from Quarles to the floodplain of Harry S. Truman Reservoir. Other upland areas where this soil association can be found include the following: northeast of Wade Creek, between Wade Creek and Sand Creek, between Sand Creek and the West Fork of Tebo Creek and southwest of the West Fork of Tebo Creek. The soils in this association formed in thin loess and residuum derived from shale and are somewhat poorly drained and moderately well drained. They have a silt loam surface layer and have clay and silty clay loam subsoils, within clay pan in Hartwell soils. They can be found on slopes that are nearly level to moderately sloping (five to ten percent). Depth to bedrock in these soils is greater than 1.8 meters (six feet).

The Verdigris-Osage Soil Association is located along nearly level drainageways and in the channels of the following streams within the Corridor in Johnson County: Wade Creek, Sand Creek, West Fork Tebo Creek, Fields Creek, Rose Creek, Town Creek, Deer Creek, Dillon Creek, Dumpling Creek and the Grand River. The soils in this association were formed in alluvium and are moderately well drained and poorly drained. Verdigris soils are deep silt loam and Osage soils have a silty clay loam surface layer and a silty clay subsoil. Depth to bedrock in those soils is greater than 1.8 meters (six feet).

The Barco-Coweta Soil Association is located in upland areas along most of the major drainageways within the Corridor. These soils were formed in residuum derived from sandstone, are well drained, have loam and fine sandy loam surface layers, and have clay loam and fine sandy loam subsoils. Sandstone outcrops are common in the areas of Coweta Soils. These soils can be found on slopes ranging from gently sloping (two to five percent) to moderately steep (25 percent). Depth to bedrock is from 30 to 46 centimeters (12 to 18 inches) in Coweta soils and 0.5 to 1.1 meters (1.5 to 3.5 feet) in Barco soils.

The Mandeville-Bolivar Soil Association is located in narrow upland areas along major drainageways including Wade Creek, Sand Creek, the West Fork of Tebo Creek, the East Fork of Honey Creek, small segments of Fields Creek and a small area southwest of Coal Creek near Harry S. Truman Reservoir. The soils in this association were formed in residuum derived from shale and sandstone; are well drained; contain certain

surface layers of silt loam and fine sandy loam; and contain certain subsoils of clay loam, silt loam and loam. They can be found on slopes ranging from gently sloping (two to five percent) to moderately steep (25 percent). Depth to bedrock in these soils is 0.5 to 1.1 meters (1.5 to 3.5 feet).

The majority of the Summit-Newtonia-Snead Soil Association is located in the northwest quarter of the Corridor in Henry County. This association's soils were formed in residuum derived from shale and limestone; are somewhat poorly drained to well drained; have surface layers of silt loam, silty clay loam, and silty clay; and have subsoils of silty clay and clay. These soils can be found in areas that are nearly level to gently sloping (two to five percent) and strongly sloping (15 percent). Rock outcrops are common and depth to bedrock can range from 0.5 to 1.1 meters (1.5 to 3.5 feet) in Snead soils, and greater than 1.8 meters (six feet) in Summit and Newtonia soils.

The Mine Pits and Dumps Association is located in the strip mine areas northwest and northeast of Clinton. The surface mining has destroyed the natural soil and has resulted in a series of high dumps and low pits with a mixture of shale, sandstone and limestone in steep areas.

Prime Farmland

Within the Lafayette County section of the Route 13 Corridor, there are eleven soils classed as prime farmland. These prime farmland soils are:

- Bremer silt loam (one to five percent slopes)
- Knox silt loam (two to five percent slopes)
- Leslie silt loam (two to five percent slopes)
- Macksburg silt loam (zero to five percent slopes)
- Macksburg silt loam (two to five percent slopes, eroded)
- Marshall silt loam (two to five percent slopes)
- McGirk silt loam (two to five percent slopes)
- Minden silt loam (one to five percent slopes)
- Moniteau silt loam (one to four percent slopes)
- Sampsel silty clay loam (two to five percent slopes)
- Winfield silt loam (two to five percent slopes)

Within the Johnson County section of the Route 13 Corridor, there are 14 soils classed as prime farmland. These are:

- Barco silt loam (two to five percent slopes)
- Bremer silty clay loam
- Deepwater silt loam (two to five percent slopes)
- Freeburg silt loam
- Haig silt loam
- Hartwell silt loam (zero to two percent slopes)
- Hartwell silt loam (two to five percent slopes, eroded)
- Macksburg silt loam (one to four percent slopes)
- Mandeville silt loam (two to five percent slopes)

- Polo silt loam (two to five percent slopes)
- Sampsel silty clay loam (two to five percent slopes)
- Sharpsburg silt loam (two to five percent slopes)
- Weller silt loam (two to five percent slopes)
- Winfield silt loam (two to five percent slopes)

Within the Henry County section of the Route 13 Corridor, there are 12 soils classed as prime farmland. These are:

- Barco loam (two to five percent slopes and eroded)
- Cherokee silt loam (one to three percent slopes and eroded)
- Creldon silt loam (two to five percent slopes)
- Crider silt loam (two to five percent slopes and eroded)
- Deepwater silt loam (two to five percent slopes and eroded)
- Hartwell silt loam (zero to two percent slopes)
- Hartwell silt loam (two to four percent slopes)
- Hartwell silt loam (two to five percent slopes, eroded)
- Mandeville silt loam (two to five percent slopes)
- Muldrow silt loam
- Newtonia silt loam (one to three percent slopes)
- Summit silty clay loam (two to five percent slopes and eroded)

Farmland of Statewide Importance

Lafayette County has 23 soils classed as farmlands of statewide importance. The farmlands of statewide importance are:

- Higginsville silt loam (five to nine percent slopes and eroded)
- Higginsville silt loam (nine to 14 percent slopes, eroded)
- Higginsville silty clay loam (five to nine percent slopes, severely eroded)
- Hodge loamy fine sand
- Knox silt loam (five to nine percent slopes, eroded)
- Knox silt loam (nine to 14 percent slopes, eroded and severely eroded)
- Knox silt loam (14 to 20 percent slopes, eroded)
- Leslie silt loam (five to nine percent slopes, eroded)
- Mandeville silt loam (four to nine percent slopes, eroded)
- Mandeville silt loam (nine to 14 percent slopes, eroded)
- Marshall silt loam (five to nine percent slopes, eroded and severely eroded)
- Marshall silt loam (nine to 14 percent slopes, eroded and severely eroded)
- McGirk silt loam (five to nine percent slopes, eroded)
- Myrick silty clay
- Polo silt loam (five to nine percent slopes, eroded)
- Polo silt loam (nine to 14 percent slopes, eroded)
- Sampsel silty clay loam (five to nine percent slopes, eroded and severely eroded)
- Sampsel silty clay loam (nine to 14 percent slopes, eroded)

- Sarpy fine sand
- Winfield silt loam (five to nine percent slopes, eroded)
- Winfield silt loam (nine to 14 percent slopes, eroded)
- Winfield silty clay loam (five to nine percent slopes, severely eroded)
- Winfield silty clay loam (nine to 14 percent slopes, severely eroded)

Johnson County has ten soils classed as farmlands of statewide importance. They are:

- Barco loam (five to nine percent slopes)
- Bolivar loam (five to nine percent slopes, eroded)
- Deepwater silt loam (five to nine percent slopes, eroded)
- Gorin silt loam (five to nine percent slopes, eroded)
- Higginsville silt loam (four to seven percent slopes)
- Mandeville silt loam (five to nine percent slopes)
- Polo silt loam (five to nine percent slopes, eroded)
- Sampsel silty clay loam (five to nine percent slopes and severely eroded)
- Winfield silt loam (five to nine percent slopes)
- Winfield silty clay loam (five to nine percent slopes, severely eroded)

Henry County has 16 soils classed as farmlands of statewide importance. The farmlands of statewide importance are:

- Barco loam (five to ten percent slopes and eroded)
- Bolivar fine sandy loam (two to five percent slopes and eroded)
- Bolivar fine sandy loam (five to ten percent slopes, eroded)
- Creldon silt loam (five to ten percent slopes)
- Crider silt loam (five to 15 percent slopes, eroded)
- Deepwater silt loam (five to ten percent slopes and eroded)
- Deepwater silty clay loam (two to five percent slopes, severely eroded)
- Deepwater silty clay loam (five to ten percent slopes, severely eroded)
- Eldon cherty silt loam (two to five percent slopes)
- Eldon cherty silt loam (five to ten percent slopes)
- Hartwell silty clay loam (two to five percent slopes, severely eroded)
- Mandeville silt loam (five to ten percent slopes, eroded)
- Roseland silt loam (two to ten percent slopes)
- Snead silty clay (two to five percent slopes and eroded)
- Snead silty clay (five to 15 percent slopes, eroded)
- Summit silty clay loam (five to ten percent slopes and eroded)

Prime Farmland and Farmland of Statewide Importance

Soils which are classed as both prime farmland and farmland of statewide importance are present in all three counties within the Corridor. They are found on nearly level bottom lands along rivers and streams and are moderately to poorly drained. The prime farmland soils and soils of statewide importance have been mapped on a Route 13 Corridor base map and are shown on Exhibit III.B.3-2.

Those soils in Lafayette County include:

- Blackoar silt loam
- Otter silt loam
- Booker silty clay
- Colo silty clay loam
- Dockery silt loam
- Haynie silt loam
- Kennebec silt loam
- Leta silty clay
- Modale silt loam
- Nodaway silt loam
- Ray silt loam
- Waldron silty clay loam
- Waubonsie
- Haynie soils
- Zook silty clay loam

Those soils in Johnson County include:

- Blackoar silt loam
- Dockery silty clay loam
- Lightning silt loam
- Nodaway silt loam
- Wabash silty clay
- Zook silty clay loam

Those soils in Henry County include:

- Lightning silt loam
- Osage silty clay loam
- Osage silty clay loam (high bottom)
- Osage silty clay
- Quarles silt loam
- Urich silt loam
- Verdigris silt loam

Hydric Soils

The hydric soils within the study Corridor are divided into two categories: *Level 1* - listed on the National, State and County Hydric Soils List and *Level 2* - listed on the National, State and County Hydric Soils List based on inclusions of Level 1 Hydric Soils.

The *Level 1* hydric soils within the study Corridor include the following soil classifications for each designated county:

Lafayette County	Johnson County	Henry County
Blackoar	Blackoar	Lightning
Bremer	Bremer	Muldrow
Colo	Lightning	Osage
Moniteau	Wabash	Quarles
Zook	Zook	Urich

The following are brief descriptions of the soil classifications identified for each county:

- The Blackoar soils are deep, silty loam, alluvial soils that are poorly drained (1.5 to 5.1 centimeters or 0.6 to 2.0 inches per hour permeability), and found on nearly level bottom lands along streams. The seasonal high water table varies from zero to 0.3 meters (zero to one foot).

- The Bremer soil series consists of deep, silty loam or silty clay loam, alluvial soils that are poorly drained (0.15 to 1.5 centimeters or 0.06 to 0.6 inches per hour permeability) and found on small stream terraces of zero to five percent slopes. The seasonal high water table varies from 0.3 to 0.9 meters (one to three feet).

- The Colo soils are deep, silty clay loam, alluvial soils that are poorly drained, (0.51 to 1.5 centimeters or 0.2 to 0.6 inches per hour permeability) and encountered on nearly level bottom lands along streams.

- The Lightning soil series consists of deep, silty loam, alluvial soils that are poorly drained to somewhat poorly drained (0.15 to 1.5 to 5.1 centimeters or 0.06 to 0.6 to 2.0 inches per hour permeability) and encountered on nearly level stream floodplains and low terraces. The seasonal high water table varies from zero to 0.61 meters (zero to two feet).

- The Moniteau soils are deep, silty loam, alluvial soils that are poorly drained (1.5 to 5.1 centimeters or 0.6 to 2.0 inches per hour permeability) and found on small stream terraces of one to five percent slopes.

- The Muldrow soil series consists of deep, silty loam, alluvial soils that are somewhat poorly drained (1.5 to 5.1 centimeters or 0.6 to 2.0 inches per hour permeability) and found on nearly level flood plains and slightly concave low stream terraces. The seasonal high water table varies from 0.46 to 1.07 meters (1.5 to 3.5 feet).

- The Osage soils are deep, silty clay loam and silty clay, alluvial soils that are poorly drained (0.15 to 5.1 centimeters or 0.06 to 2.0 inches per hour permeability) and encountered on nearly level low terraces along major streams. The seasonal high water table varies from zero to 0.46 meters (zero to 1.5 feet).

- The Quarles soils series consists of deep, silty loam, alluvial soils that are poorly drained (1.5 to 5.1 centimeters or 0.6 to 2.0 inches per hour

permeability) and found on nearly level terraces along major streams. The seasonal high water varies from zero to 0.46 meters (zero to 1.5 feet).

- The Urich soils are deep, silty loam, alluvial soils that are poorly drained (1.5 to 5.1 centimeters or 0.6 to 2.0 inches per hour permeability) and found on nearly level stream terraces and areas subject to flooding. The seasonal high water table varies from zero to 0.46 meters (zero to 1.5 feet).

- The Wabash soil series consists of deep, silty clay, alluvial soils that are very poorly drained (<0.15 centimeters or <0.06 inches per hour permeability) and found in large depressions of floodplains. The seasonal high water table varies from zero to 0.3 meters (zero to one foot).

- The Zook soils are deep, silty clay loam, alluvial soils that are poorly drained (0.51 to 1.5 centimeters or 0.2 to 0.6 inches per hour permeability) and found on nearly level bottom lands along streams. The seasonal high water table varies from zero to 0.3 meters (zero to one foot).

The *Level 2* hydric soil classifications (based on inclusions of Level 1 hydric soils) occur in Johnson County and Henry County as follows (no Level 2 hydric soils are listed for Lafayette County):

Johnson County	**Henry County**
Dockery	Verdigris
Freeburg	
Nodaway	

- The Dockery soil series includes small areas of Nodaway soils (Level 2 hydric soil) and Zook soils (Level 1 hydric soil). These two inclusions make up approximately four to seven percent of the Dockery unit.

- The Freeburg soil series includes small areas of Bremer soils (non-hydric soil) and Lightning soils (Level 1 hydric soil). These two inclusions make up approximately five percent of the unit.

- The Nodaway soil series includes small areas of Blackoar soils (Level 1 hydric soils) and Freeburg soils (Level 2 hydric soils). These two inclusions make up three to eight percent of the unit.

- The Verdigris soil series includes small areas of Muldrow and Urich soils which are both Level 1 hydric soils. These two inclusions make up less than ten percent of the unit.

4. Water Bodies

a. Lakes, Rivers and Streams

The "Aquatic Community Classification System for Missouri" and "The Fishes of Missouri" by William L. Pflieger, Missouri Department of Conservation, were consulted for aquatic community descriptions. In this classification system, Missouri is divided into the following four faunal regions: Big River, Lowland, Ozark and Prairie. The Route 13

study Corridor is located in the Prairie Faunal Region and is bordered by the Big River faunal region to the north. The Missouri River borders the northern portion of the Corridor and is the only community within the Corridor associated with the Big River Faunal Region.

The Big River Faunal Region contains the Missouri River community which has changed substantially over time as a result of the construction of rock dikes and revetments. The wide, braided channel, turbid water and fluctuating shape have been replaced with a narrow, single channel, and a nearly constant width. The turbidity of the water has been reduced and the natural flow has been modified by the construction of several reservoirs north of Missouri on the main channel. Due to the changes of the original channel habitat, the fish fauna have been measurably altered. Records of faunal distribution from the 1940's more nearly approach the natural faunal composition of the original channel habitat. The average gradient of the river as it flows through Missouri is 0.17 meters per kilometer (0.90 feet per mile) with a channel bottom that consists primarily of silt and sand.

Typically, the streams of this region flow through broad valleys and have a meandering character. High alluvial banks, relatively long pools and a lack of riffles are typical of prairie streams. The streams are often turbid due to the silt and sand of the channel bottoms. Streams are not influenced by large springs and generally have low base flows or are intermittent.

The entire Corridor is comprised of the Lower Missouri, Upper Missouri and Osage communities associated with the Prairie Faunal Region. The Lamine-Blackwater drainage is within the Route 13 Corridor and is part of the Lower Missouri community. In general, streams in this drainage flow through dolomites and limestones. Streams in the north and west section of this division tend to be turbid while streams to the south and east tend to be clearer. Streams in the Upper Missouri division flow through shales and sandstones and are turbid due to the silt and sand substrates. Sloughs, oxbow lakes and marshes occur along the larger streams. The Osage division is composed of all the streams that form the Osage River drainage. The streams are turbid and flow through alternating beds of limestones, shales and sandstones. Oxbow lakes, marshes and sloughs are common along the larger streams.

Streams of the Prairie Faunal Region may be divided into four zones according to their length. They are as follows: Headwater Zone, Creek Zone, Small River Zone and Large River Zone. Each of the four zones is represented in the Route 13 Corridor. The Headwater Zone is the point from which the stream begins with a length of zero to 9.7 kilometers-to-headwater (zero to six miles-to-headwater) and an average of 4.9 meters/kilometer (26.0 feet/mile) gradient. The Creek Zone includes reaches with a length of 11.3 to 49.9 kilometers-to-headwater (seven to 31 miles-to-headwater) and an average of 1.6 meters/kilometer (8.5 feet/mile) gradient. The Small River Zone includes all reaches with a length of 51.5 to 154.6 kilometers-to-headwater (32 to 96 miles-to-headwater) and an average of 0.59 meters/kilometer (3.1 feet/mile) gradient. The Large River Zone includes all reaches with a length of 156 or greater kilometers-to-headwater (97 or greater miles-to-headwater) and an average of 0.33 meters/kilometer (1.7 feet/mile) gradient.

Prairie Headwaters usually originate from upland prairies and occupy broad valleys. The channels usually contain well defined riffles and short pools and experience wide fluctuations in flow. By late summer most streams are dry, except for large pools. The channel bottom is often a combination of gravel and rubble and may include silt and sand. Stream sections in the Creek Zone are usually bordered by high alluvial banks and cease flow in dry conditions. Pools are usually long and deep and riffles are well defined and short. Pools and backwaters often collect considerable amounts of silt. Stream sections from the Small River Zone usually contain water year round and are highly turbid. Steep alluvial banks border the stream, which contains very long pools and poorly defined or absent riffles. The channel bottom is silt and sand with slabrock or gravel forming the riffles. Prairie reaches of the Large River Zone include streams that contain long pools and deep chutes, riffles are usually absent. The water is highly turbid and flow is generally permanent. Sand and gravel are the materials which form the stream bottom.

"Springs of Missouri", published by the Missouri Department of Natural Resources, lists the locations of three springs within the Route 13 Corridor. Two of the springs are located within the Warrensburg city limits. Electric Spring (seep) is just south of Business Route 50 in the northwest corner of the city limits. Pertle Spring is located in the southwest corner of the city limits. The third spring is located just north of Leeton. Participants from the Public Information Meeting held in Warrensburg, Missouri provided the locations of three additional springs in Johnson County. One of the springs is located east of Fayetteville near existing Route 13 along a tributary of Blackjack Creek. The second spring is located along existing Route 13, between the Blackwater River and Warrensburg. The third spring is near the Johnson County and Henry County border along a tributary of the East Fork Honey Creek.

Streams and Streambeds

Streams are regulated under Section 404 as "Waters of the U.S." A Department of the Army permit would be required for any project requiring the discharge of fill or dredged material riverward of the limits of the ordinary high water mark on such streams. Projects that propose to bridge a "Waters of the U.S." and which, by design, do not require discharges of fill or dredged material riverward of the ordinary high water mark, are normally not subject to regulation.

The Route 13 Corridor within Lafayette County has two major drainages, Tabo Creek and Davis Creek. Southwest of Lexington several small streams flow westerly into the Little Sni-A-Bar Creek which flows northerly into the Missouri River. Tabo Creek is located southeast of Lexington and flows northerly. Its drains are influenced by Lick Fork, Garrison Creek and Brush Creeks which flow easterly and Long Branch which flows northwesterly into Tabo Creek. North of Higginsville, Cottonwood Creek flows in a northerly direction into Little Tabo Creek, which flows into Tabo Creek, where upon Tabo drains into the Missouri River. Davis Creek is located south of Higginsville and flows in an easterly direction. Its tributaries include, southerly flowing Maries and Bear Creeks and northerly flowing North Blackjack Creek. Davis Creek flows easterly and eventually drains into the Blackwater River.

Route 13 then follows a ridge from the south end of Lafayette County into Johnson County, just north of the Blackwater River basin. The ridge separates the westerly and easterly flowing streams. The major drainage basin in Johnson County is the Blackwater

River which lies north of Warrensburg. The easterly flowing streams drain the eastern side of Route 13 and consist of Mulkey, Flagstaff and Blackjack Creeks, which eventually drain into the Blackwater River. Colburn Branch on the east side of Route 13 flows from north to south and drains into the Blackwater River. Smaller tributaries along the west side of Route 13 drain westerly into Walnut Creek which flows in a southerly direction into the Blackwater River.

As Route 13 continues south of Warrensburg, it again follows a ridge. South of the Blackwater River and west of Warrensburg, Devils Branch drains in an easterly direction into Post Oak Creek which flows northerly into the Blackwater River. West of Route 13, three tributaries, Fletcher, Stoak and Brawley Creeks, drain westerly into East Fork Post Oak Creek. The East Fork flows northerly, where it is met by West Fork Post Oak Creek and drains into Post Oak Creek. The tributaries to the east of the Route 13 are West Bear Creek which flows northeasterly and East Bear Creek which flows northwesterly where both meet to form Bear Creek which flows in an easterly direction and eventually drains into the Blackwater River.

Continuing down the same ridge into Henry County north of Clinton, there are several small tributaries. Along the west side of Route 13, East Fork Honey and Fields Creeks flow in a southwesterly direction into the South Grand River. The South Grand River is a major drainage basin and flows into the Truman Reservoir. Wade and Sand Creeks flow in a southeasterly direction from the eastern side of Route 13 into Tebo Freshwater Lake and West Fork Tebo Creek flow into Tebo Creek. Tebo Creek drains into the Truman Reservoir. Also, in the Clinton area, Town, Coal, Deer, Dillon and Dumpling Creeks all flow southerly and drain into the Truman Reservoir.

Ponds

The study Corridor contains several ponds of various sizes ranging from less than 0.4 hectare up to 12.4 hectare (one acre up to 30 acres). However, the majority of the ponds range in size from less than 0.4 hectare to 1.5 hectare (one acre to 3.5 acres). The remainder are anywhere from 1.7 to 6.2 hectares (4 to 15 acres) with the exception of one 12.4 hectare (30 acre) pond. The ponds are usually contained on the downstream side of a flowing or intermittent drainage by a manmade berm.

They are typically shallow and often support a narrow fringe of hydrophytic vegetation. Construction and maintenance of a stock pond are exempt from regulation under Section 404, as are some other normal farming activities. However, changing the land use by building a road which directly impacts the ponds by either excavation or placement of fill would require a permit. In this case, a determination that the farm pond is a wetland would be made and the impacts assessed.

Abandoned strip mine pits

Located in Henry County north of Clinton are areas of abandoned strip mines. These areas are characterized by the long and narrow pits that remain after surface mining operations are complete. Most of the pits are filled with water, as a result of the exposure of an impermeable layer of subsoil, and provide a source of water for wildlife, irrigation or livestock. The steep side slopes, however, typically restrict the area of hydrophytic vegetation and limit it to a very narrow band at the water's edge.

Natural ponds, isolated ponds and isolated strip mine pits are subject to regulation under Section 404 if their use, degradation or destruction affects interstate or foreign commerce.

b. Wetlands

The Clean Water Act regulates discharges of dredged or fill material, into "waters of the United States," which includes jurisdictional wetlands and other special aquatic sites. Wetlands are defined for regulatory purposes by the EPA and the Corps of Engineers to administer the Section 404 permit program:

> (Wetlands are) *those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, bogs, and similar areas. (EPA, 40 CFR 239.3 and CE, 33 CFR 328.3).*

As in definitions by other agencies, such as the U.S. Fish and Wildlife Service, this definition recognizes and emphasizes the fact that wetlands possess three essential characteristics: hydric soils, prevalence of hydrophytic vegetation, and wetland hydrology, which is the driving force creating all wetlands. These three characteristics are the mandatory technical criteria required for wetland determination. Areas must meet all three of these criteria before being designated as a wetland.

All activities conducted on land classified as Prior Converted Cropland by the USDA Natural Resource Conservation Service are exempt from Section 404 permitting requirements.

Wetlands are usually classified according to a system developed by the U.S. Fish and Wildlife Service. This system is often referred to as the Cowardin System after its principal author (Cowardin et al, 1979). It was determined during field surveys that three of the wetland systems that are represented in the project area are: the palustrine system, the riverine system, and the lacustrine system. This classification system is very important for establishing the type of ecosystem being inventoried. It should be noted that potential jurisdictional wetland determinations performed for regulatory purposes are not dependent on this classification system, but on the three mandatory criteria previously mentioned.

To identify streams and potential jurisdictional wetland areas for the purpose of screening alternative alignments, four types of data were gathered. These included U.S. Geological Survey quadrangle maps which show locations of streams, springs and water bodies; the U. S. Fish and Wildlife Service's National Wetlands Inventory maps which show potential wetland areas including isolated ponds; maps of hydric soils and soils with hydric inclusions from the Natural Resource Conservation Service(NRCS) formerly known as the Soil Conservation Service (SCS); and SCS Food Security Act wetland maps.

This information is the minimum mapping data that is required by the MoDOT protocol for identifying streams and jurisdictional wetlands. This data was compiled and transferred onto USGS base maps at a scale of 1 centimeter = 240 meters (1" = 2000'). Streams having a drainage area greater than 3.89 sq. km. (1.5 sq. miles) were also identified and delineated on the base maps as additional MoDOT wetland identification criteria. The information delineated on the composite maps indicated areas that have the most POTENTIAL for containing jurisdictional wetlands. These occur in portions of the flood plain adjacent to the creeks and rivers throughout the Corridor and as isolated ponds and abandoned strip mine pits. The compiled potential jurisdictional wetland data within the

study Corridor is shown in Exhibit III.B.4-2. A full explanation of MoDOT criteria for wetland identification can be found in the Wetland Technical Memorandum, Appendix E.

Lafayette County

Tabo Creek - This system has a large potential jurisdictional wetland area and is located between Lexington and Higginsville. It extends the width of the Corridor in a South to North direction and has four tributaries flowing into it. They are Lick Creek, Garrison Creek and Brush Creek on the west side and Long Branch on the east side. The upper reaches of Lick Creek will be impacted, but the other tributaries will not.

Cottonwood Creek - This is a smaller system, but does have a potential jurisdictional wetland area and is located north of Higginsville. It has one tributary, the Rocky Ford Branch which flows in from the east. The upper reaches of Cottonwood Creek could be impacted.

Davis Creek - This is a large system which extends the width of the Corridor in an west to east direction. It is located south of Higginsville and has a large potential jurisdictional wetland area. Three tributaries flow into Davis Creek, they are; Maries Creek and Bear Creek which are located on the northern side and North Blackjack Creek, located to the south. The upper most reaches of both Maries and Bear Creeks and the lower reaches of North Blackjack Creek will be impacted.

Johnson County

Blackwater - This is a major system which extends the width of the Corridor in an west to east direction. Located north of Warrensburg this creek has a large potential jurisdictional wetland area. Its tributaries include Walnut Creek and Colbern Branch on the north side and Post Oak Creek on the south side. The upper to mid reaches of the Colbern Branch will be impacted, while Walnut Creek will not.

Post Oak Creek - This is a major system which extends in a south to north direction in the Corridor and is located just west of Warrensburg. It has a large potential jurisdictional wetland area. It has two tributaries that flow into it from the west, Devils Branch and West Fork Post Oak Creek. Three tributaries flow into it from the east, Fletcher Creek, Stoak Creek and Brawley Creek. The lower reaches of Devils Branch and West Fork Post Oak Creek will be impacted and the upper reaches of Fletcher, Stoak and Brawley creeks will be impacted.

Bear Creek - This is a smaller system which extends in a south to north direction in the Corridor, but has a potential jurisdictional wetland area. It is located east of Warrensburg. Both West Bear and East Bear Creeks flow into Bear Creek from the south. The lower reaches of East Bear Creek and Bear Creek and the uppermost reaches of West Bear Creek will be impacted.

Henry County

Fields Creek - This is a smaller system extending in a north to south direction in the Corridor and eventually flowing into the South Grand River. It is located north of Clinton and has a potential jurisdictional wetland area, only the upper reaches will be impacted.

Town Creek - This is a smaller system which extends in a north to south direction in the Corridor and flows into the South Grand River drainage basin. It is located west and to the north of Clinton and has a potential jurisdictional wetland area. The mid reaches of the creek will be impacted.

South Grand River - This is a large system that flows in a west to east direction at the southwestern corner of the Corridor. It is located west and south of Clinton and is not crossed by an alternative. Truman Reservoir backs up into South Grand River creating flooded areas which make it a large potential jurisdictional wetland area. Lake induced wetlands generally occur between the 216.1 meter (709 foot) contour elevation and the 219.5 meter (720 foot) contour elevation.

Natural Features Inventory Sites

In addition to the streams, ponds, strip mine pits, and their adjacent wetland areas, the following seven wetland sites have been identified by the Missouri Department of Conservation as part of the Natural Features Inventory. All of the sites which occur within the study Corridor are located in Johnson County. They are:

- Wetland/wet prairie - a low quality swamp located 3.22 kilometers (two miles) north of Highway 50, 1.61 kilometers (one mile) west of Route 13 and south of the Blackwater River.

- Mesic/wet-mesic prairie - located northeast of Warrensburg, 4.83 kilometers (three miles) east of Route 13 and 2.42 kilometers (1.5 miles) north of Highway 50, at the Lamb's Prairie Registered Site. This is a very diverse 8.7 hectare (21.5 acre) prairie with a "significant" status designation. It contains a complex pattern of moisture classes due, in part, to slowly permeable clay subsoils.

- Seep - Electric Spring is a small seep located in the northwest corner of the city of Warrensburg near Cave Hollow. The flora at the seep is very minimal.

- Mesic/wet-mesic prairie - the prairie is referred to as Sellman's Prairie and is located east of Warrensburg, 3.22 kilometers (two miles) east of Route 13 and 2.82 kilometers (1.75 miles) south of Highway 50. This 5.7 hectare (fourteen acre) prairie has a fairly good diversity of plant species, but conservative forbs are only occasional. The prairie has a "significant" status designation.

- Pertle Springs - is located at the southern edge of Warrensburg, 1.21 kilometers (0.75 mile) west of Route 13. This spring is habitat for the Green Tree Frog, a watch-listed species.

- Mesic/wet-mesic prairie - the prairie is known as Greim's Prairie and is located near Bowmansville, 7.65 kilometers (4.75 miles) south of Highway 50 and 0.81 kilometers (0.5 mile) east of Route 13. This 0.83 hectare (two acre) site has a fair diversity of plant species and a "notable" status designation.

- Spring - a ponded spring located due north of Leeton approximately 1.21 kilometers (0.75 mile). The site has been severely disturbed.

Project Impacts to "Waters of the U.S."

A field survey of the Route 13 Study Corridor was conducted on August 3 and 4, 1994, to determine the extent and classification of wetlands potentially impacted by the proposed action. National Wetland Inventory maps (U.S. Fish and Wildlife Service) were consulted to provide broad based data for field investigation purposes. The potential jurisdictional wetlands affected by the alignments were reviewed at the screening level. Actual impact zones will be evaluated in terms of the three mandatory technical criteria of hydric soils, hydrophytic vegetation and wetland hydrology.

c. Floodplains

In Lafayette and Johnson Counties, the project impacts three major streams of Tabo Creek, Davis Creek, Blackwater River and their tributaries which flow to the Missouri River. In Henry County, the project crosses several creeks which flow to Harry S. Truman Reservoir. Most of the streams in the basins pass through the bottom of well defined valleys, with floodplains extending from edge of valley to edge of valley. The crossings of Tabo Creek, the Blackwater River, Bear Creek of Johnson County, and Davis Creek have drainage areas in excess of 51.8 square kilometers (20 square miles). However most of the streams crossed by the studied alignments are relatively small, with drainage areas ranging from approximately 51.8 square kilometers (20 square miles) to less than 2.59 sq. km (one square mile). Due to the topography of the area, most of the floodplains are relatively narrow, even though they generally encompass the entirety of the valley floors. Channel widths for these streams range from approximately 3 meters to 15 meters (10 feet to 50 feet), and floodplain widths range from approximately 30.5 meters to 213.4 meters (100 feet to 700 feet), except for Tabo Creek in Lafayette County, the Blackwater River and Bear Creek in Johnson County, which have floodplains ranging up to 914, 975 and 1,585 meters (3000, 3200 and 5200 feet) wide, respectively.

Deer Creek and Coal Creek floodplains are entirely within the flood control pool of the Harry S. Truman Reservoir. The primary effect of flood stages on the Harry S. Truman Reservoir would be to back water into the floodplains of tributary streams. Harry S. Truman Reservoir multipurpose pool elevation is 215 meters (706.0 feet) above mean seal level, which causes backwater into the lower portions of the Deer Creek and Coal Creek floodplains. The reservoir's flood control pool elevation is 225.4 meters (739.6) feet above mean seal level.

The floodplains within the project area have gradual, sweeping bends. The stream channels wind across the floodplains generally without sharp bends. The floodplains and streams tend to have moderate stream gradients. The stream channels are rocky, mostly with heavily vegetated banks. The floodplains of the smaller streams are generally heavily wooded. The floodplains of many of the larger streams have been cleared for agricultural purposes.

Lafayette County is in the regular flood insurance program. Johnson, and Henry Counties have flood hazard boundary maps (FHBM) that show special flood hazard areas for most of the streams discussed in this section. Special flood hazard areas show the approximate 100-year flood boundary.

The following floodplain information was used for the Route 13 Corridor Study:

- Lafayette County, Mo. (Unincorporated Areas)
  FIRM and Floodway, Effective Date: September 4, 1986
- Johnson County, Mo. (Unincorporated Areas)
  FHBM, Effective Date: April 2, 1990
- City of Warrensburg, Mo.
  FIRM and Floodway, Effective Date: July 16, 1990
- Henry County, Mo. (Unincorporated Areas)
  FHBM, Effective Date: April 19, 1983
- City of Clinton, Mo.
  FIRM, Effective Date: July 4, 1988

The study Corridor crosses or closely parallels the floodplains and special flood hazard areas of the following streams: Lick Fork, Garrison Creek, Tabo Creek, Bear Creek, Davis Creek, North Blackjack Creek in Lafayette County; Flagstaff Creek, Blackwater River, Blackjack Creek, Colburn Branch, Fletcher Creek, Town Creek, Brawley Creek, Mineral Creek in Johnson County; Fields Creek, Sand Creek, Rose Creek, Town Creek, Dillion Creek, Deer Creek, and Coal Creek in Henry County. (Exhibit III.B.4-1).

5. Terrestrial Communities

a. General

The three counties which comprise the Route 13 Study Corridor fall within the Prairie Faunal Region of Missouri, which is an area south of the Missouri River and adjacent to the Kansas state line. The northern section of the study Corridor is located within Lafayette County. The northwest section of this area lies within the Upper Missouri Prairie Faunal Region while the southern section is located in the Lower Missouri Prairie Faunal Region. The central section of the Corridor is located in Johnson County and lies within the Lower Missouri Prairie Faunal Region. The southern end of the study Corridor is located in Henry County and lies within the Osage Prairie Faunal Region of Missouri. In general, the topography of this areas is characteristic of flat to gently rolling plains, with elevations approaching those found in the adjacent Ozark Faunal Region. Elevations in the Prairie Faunal Region seldom exceed 61 meters (200 feet). The principle bedrocks underlying the prairies are Pennsylvanian shales and thin sandstones, but Mississippian limestone outcrops occur along the lower Missouri River. The soils in this area are less stony and deeper than Ozark soil, with the bedrock being covered by glacial till and loess to considerable depths in some areas. At one time the Prairie Region was covered with prairie grasses, except for sections of timber which covered the more hilly sections of this region. Over time this area was put into agricultural production and has become heavily cultivated.

"The Terrestrial Natural Communities of Missouri", by Paul Nelson, was consulted to determine natural divisions within the Route 13 Study Corridor. The Natural Divisions of Missouri and their Sections which make up the three counties in the Corridor are as follows: the Upper Missouri Section in the Big Rivers Division, located in the northernmost part of Lafayette County; the Western Section in the Glaciated Plains Division, which covers a majority of Lafayette County and extends into the northeastern corner of Johnson County; and the Osage Plains which make up the majority of both Johnson and Henry Counties. These sections are then divided further into terrestrial natural communities.

Terrestrial natural communities, as defined by the Missouri Natural Areas Committee in "The Terrestrial Natural Communities of Missouri" by Paul Nelson, are "interrelated assemblage of plants and animals found in a given area." The natural communities are characterized by plants, soil, rock and water. Within these characteristics the most distinguishing feature is identified and thus categorized accordingly. These distinguishing features are not always recognized so easily, as they may be found in soil moisture, soil chemistry or the complexity of a rock type. Plant communities are based on the types of vegetation and are not synonymous with natural communities, although a plant community can be considered to be a feature. Animals are not used when classifying a terrestrial natural community because they are mobile and more widely distributed than plants. Although animals cannot be used as a distinguishing feature, species which prefer a certain natural community are considered.

Although natural forces can effect and alter natural communities, man has also greatly altered the characteristics which distinguish the communities. Even though some of the natural communities are degraded, they are still important natural features as they may contain endangered species or habitats. This is evident throughout the Study Corridor.

The natural vegetative communities include forests, prairies, a fen and a glade. The forests consist of Dry, Dry-mesic, Mesic, Dry Limestone/Dolomite, Dry-mesic Limestone/Dolomite, Mesic Limestone/Dolomite, Wet-mesic Bottomland, Wet Bottomland and Flatwoods. These forests, which typically consist of hardwoods such as oaks, hickories and maples with some cedar are present throughout the Study Corridor. However, much of these forests have been altered through selective logging, clearing for agricultural use and heavy grazing. The majority of forested areas are located along streams and rivers. The prairie grasslands consist of Mesic, Wet Mesic, Dry-Mesic, Dry, Wet, Dry-Mesic Limestone/Dolomite, Dry-Mesic Chert, Dry Mesic Sandstone/Shale and Hardpan. The typical vegetation existing in these prairies are grasses such as big bluestem, little bluestem, buffalo grass, Indian grass, prairie dropseed, bluejoint grass, cord grass, switch grass, sedges, reed canary grass and broomsedge. Many of the areas have been altered through the degradation of grazing and agricultural use, the presence of exotics invading the area, and complex patterns of moisture, partly due to clay subsoils. Scattered remnant prairie grass areas are found in some of the cool season grass pastures. The Mesic Prairie is listed as endangered in the State of Missouri according to the MDC. Also located within the Corridor is a remnant Fen that has been disturbed but still is considered a unique feature and a remnant Glade area is also present in the Corridor.

Table III.B.5-1 describes the natural features located in the Route 13 Study Corridor. The locations correspond by numeric description to this table's text (See Exhibit III.B.5-1). The table lists the exhibit site number, site name and location, ranking and the feature's descriptions and comments. The exhibit site numbers occur in numeric order from the north end of the Corridor to the south end. There are a total of 38 sites which are divided by county. Two sources were used to develop this table, the MDC's Missouri Natural Features Inventory, Final Report; Lafayette and Johnson Counties 1987 by Greg Gremaud, and MDC's Southwest Missouri Natural Areas Project, Final Report; Henry County 1984 by Gary Reese.

Table III.B.5-1
Natural Features Inventory

Site No.	Site Name & Location	Ranking	Feature & Comments
LAFAYETTE COUNTY			
L 1	----- T51N, R27W, Sec. 23 Lexington East Quad.	R	Forest Recently logged according to former owner.
L 2	----- T48N, R26W, Sec.3 Fayetteville Quad.	R	Forest Mostly mature. Abundant logging and grazing sign.
L 3	----- T48N, R26W, Sec. 22 Fayetteville Quad.	R	Forest Heavily grazed old growth and old 2nd growth.
JOHNSON COUNTY			
J 1	----- T47N, R26W, Sec. 14, 23 Warrensburg, West Quad.	R	Prairie Small, degraded prairie in part.
J 2	----- T47N, R26W, Sec. 23, 24, 25 Warrensburg East Quad.	R	Prairie Invasive prairie grass stands.
J 3	----- T47N, R25W, Sec. 16 Warrensburg East Quad.	R	Forest Heavily selective logging
J 4	----- T46N, R26W, Sec. 11 Warrensburg West Quad.	R	Wetland/Wet Prairie Low quality swamp.
J 5	----- T46N, R25W, Sec. 4 Warrensburg East Quad.	R	Forest Grazed. Formerly logged?
J 6	Lamb's Prairie T46N, R25W, Sec. 9 Warrensburg East Quad.	S	Mesic/Wet-mesic Prairie Grade A and B. ca. 8.7 hectares (21.5 acres). Very diverse. Light to locally moderate exotics. Complex pattern of moisture classes probably in part due to slowly permeable clay subsoils.
		E	Dry-mesic Prairie Grade A. ca. 3.2 hectares (8 acres). Very diverse.
		S	Natural Study Area Frequently used as study area by CMSU students.
J 7	----- T46N, R26W, Sec. 13 Warrensburg East Quad.	R	Prairie Scattered prairie grasses in cool season grass pasture.
J 8	Cave Hollow T46N, R26W, Sec. 23 Warrensburg West Quad.	N	Sandstone Shelter Large shelter. Somewhat disturbed.

Site No.	Site Name & Location	Ranking	Feature & Comments
		R	Seep Small. Floristically depauperate.
J 9	----- T46N, R25W, Sec. 21 Warrensburg East Quad.	R	Prairie Pasture with scattered prairie grasses and non-conservative forbs.
J 10	Sellman's Prairie T46N, R25W, Sec. 29 Warrensburg East Quad.	S	Mesic/Wet-mesic Prairie Low grade B. ca. 5.7 hectares (14 acres).Fairly good diversity but conservative forbs only occasional.
		N	Dry-mesic Prairie High to low grade C. ca. 3.2 hectares (8 acres). Good forbs occasional. Moderate to sometimes severe exotic invasion.
J 11	----- T46N, R26W, Sec. 36 Cornelia Quad.	R	Prairie Scattered prairie grasses in cool season pasture.
J 12	----- T45N, R26W, Sec. 16, 17 Centerview Quad.	R	Prairie Not prairie.
J 13	Greim's Prairie T45N, R25W, Sec. 7 Cornelia Quad.	N	Prairie ca. 0.8 hectare (2 acre) mesic and wet mesic prairie. Fair diversity, moderate to heavy exotics. Grade C.
J 14	Mudd Prairie T45N, R25W, Sec. 18 Cornelia Quad.	E	Prairie Dry-mesic and mesic prairie. Very indefinite boundaries gradually grading into cool season pasture especially on south and east. Fair-good diversity. Moderate to heavy exotic invasion. Grades low B to low C. ca. 6.1 hectares (15 acres).
J 15	Greer Cemetery T45N, R26W, Sec. 23 Centerview Quad.	R	Prairie (cemetery) Some prairie grasses. No forbs.
J 16	----- T45N, R26W, Sec. 25 Cornelia Quad.	R	Fen Drained and developed. Steyermark site.
J 17	----- T45N, R25W, Sec. 30, 31, 32 Cornelia Quad.	R	Prairie Not prairie.
J 18	----- T45N, R25W, Sec. 28 Cornelia Quad.	R	Prairie Not prairie.
J 19	----- T44N, R26W, Sec. 3 Centerview Quad.	R	Prairie Not Prairie.

Site No.	Site Name & Location	Ranking	Feature & Comments
J 20	----- T44N, R25W, Sec. 5, 6 T44N, R26W, Sec. 1 Cornelia Quad.	R	Prairie Not prairie.
J 21	Providence Cemetery T44N, R26W, Sec. 14 Chilhowee Quad.	R	Prairie (cemetery) Small area of good forbs on east and south but weeds dominate. Most is closely manicured.
J 22	----- T44N, R25W, Sec. 17 Leeton Quad.	R	Spring Ponded. Severely disturbed.
J 23	----- T44N, R26W, Sec. 22 Chilhowee Quad.	R	Prairie Small area of cut off forest with some prairie species.
HENRY COUNTY			
H 1	----- T44N, R25W, Sec. 31	N	Prairie 3.2 hectares (8 acres). Notable natural area. Exceptional or notable feature.
H 2	----- T43 N, R25W, Sec. 19	E	Prairie Qualifying natural feature site. Also section 30.
H 3	----- T43N, R25W, Sec. 28	--	Glade Clearing of vegetation.
H 4	----- T43N, R25W, Sec. 32	N	Prairie 5.7 hectares (14 acres). Notable natural area. Exceptional or notable feature. Corporation-commercial ownership.
H 5	----- T42N, R26W, Sec. 36	N	Prairie 3.8 hectares (9.5 acres). Notable natural area. Exceptional or notable feature.
H 6	----- T41N, R25W, Sec. 04	E	Prairie 10.7 hectares (27 acres). Exceptional natural area. Exceptional or notable feature.
H 7	----- T41N, R25W, Sec. 07	--	Prairie Cultivation
H 8	----- T41N, R25W, Sec. 09	--	Prairie Seeded to exotics.
H 9	----- T41N, R25W, Sec. 16	--	Prairie Seeded to exotics.
H 10	----- T41N, R25W, Sec.19	E	Prairie 1.2 hectares (3 acres). Notable natural area. Owned by USACOE. Exceptional or notable feature. Private land seeded exotics.

Site No.	Site Name & Location	Ranking	Feature & Comments
H 11	----- T41N, R25W, Sec. 16	N	Prairie 6.5 hectares (16 acres). Notable natural area. Exceptional or notable feature.
H 12	Lover's Leap (Clinton) T41N, R26W N1/2 SE1/4 NW1/4 SW1/4 Sec. 3	--	Bluff 15.2 meters (50 feet) above Town Creek.

Note: State Status Symbols
S = Significant; N = Notable; R = Rejected; E = Exceptional; -- = No ranking

Source:
MDC's Missouri Natural Features Inventory, Final Report; Lafayette and Johnson Counties 1987; Gremaud, Greg
MDC's Southwest Missouri Natural Areas Project, Final Report; Henry County 1984; Reese, Gary

b. Threatened or Endangered Species

Several Federally listed threatened and endangered and State listed rare species of plants and wildlife have habitats located in the Route 13 Corridor. The MDC provided generalized locations and descriptions of sensitive species or communities, which included both federal and state endangered or threatened species. The following lists those species located within the Corridor that could potentially be impacted.

- *Texas Horned Lizard (Phrynosoma cornutum),* is a species for which the Fish and Wildlife Service (FWS) has concern and is listed in the State of Missouri as a rare (R) species. Its habitat is located in dry sandy soils or rocky areas and can be found in the vicinity of the Truman Reservoir in Henry County.

- *Greater Prairie-chicken (Tympanuchus cupido),* is listed as a rare (R) species in the State of Missouri. They typically have habitats located in large permanent grassy areas and are present in Johnson and Henry Counties during nesting season and Lafayette County during times other than nesting season. "Booming grounds," or courtship areas, are also located in the vicinity of the nesting area.

- *Henslow's Sparrow (Ammodramus henslowii),* is a species for which the FWS has concern and is listed in the State of Missouri as a rare (R) species. This species is found nesting in dense grass such as native tall grass prairies or ungrazed pastures. Henslow's sparrow is present in Lamb's Prairie Registered Site, a privately owned area near Warrensburg. Some species occupy St. Clair County which borders Henry County.

- *Bald Eagle (Haliaeetus leucocephalus),* a Federally listed threatened (LELT) species and an endangered (E) species in the State of Missouri. They typically nest in major lake and river areas and many of the birds winter in Missouri. There are two nest locations at Truman Reservoir in Henry County and they may also occupy areas in Lafayette County.

- *Great Blue Heron (Ardea herodias),* is a candidate (C) for listing in the State of Missouri.

- *Shaved Sedge (Carex tonsa),* is listed as an endangered (E) species in the State of Missouri and can be found growing in sandstone outcrops and bluffs. This sedge exists in Johnson County.

- *Small Sundrops (Oenothera perennis),* is listed as an endangered (E) species in the State of Missouri and can be found growing in upland woods near sinkhole ponds. It is present in Johnson County at Lamb's Prairie Registered Site.

- *Narrow-leaved Coneflower (Echinacea angustifolia),* is listed as status undetermined (SU) in the State of Missouri. They occur in prairies located in Johnson County.

- *Buffalo Clover (Trifolium reflexum),* is listed as status undetermined (SU) in the State of Missouri and is present in Johnson County at Lamb's Prairie Registered Site.

Table III.B.5-2 is a summary of federal and state-listed threatened and endangered species. This table reveals potentially impacted species within the Corridor as well as species located outside the Corridor that could be impacted by construction. The corresponding sites are located on Exhibit III.B.5-1. The information for this table was obtained through correspondence with the MDC dated September 20, 1994, and August 22, 1994, the MDC's Rare And Endangered Species of Missouri Checklist, 1992, and the MDC's Natural Features Inventory publications for Lafayette and Johnson Counties (December, 1987) and Henry County (January, 1984).

Table III.B.5-2
Endangered, Threatened and Rare Species

Site No.	Site Name & Location	State Status	Federal Status	Feature & Comments
JOHNSON COUNTY				
J 1	T46N, R25W, Sec. 7 Warrensburg East Quad.	E	--	Carex tonsa (Shaved Sedge) - Specimen, 1971. Identification uncertain.
J 2	Lamb's Prairie T46N, R25W, Sec. 9 Warrensburg East Quad.	E	--	Oenothera perennis (Small Sundrops) - 2nd location in state. Likely only extant population.
J 3	Lamb's Prairie	R	SOC	Ammodramus henslowii (Henslow's Sparrow)
J 4	Lamb's Prairie and Sellman's Prairie T46N, R25W, Sec. 29 Warrensburg East Quad.	WL	--	Dolichonyx oryzivorus (Bobolink) Cistothorus platensis (Sedge Wren)

Site No.	Site Name & Location	State Status	Federal Status	Feature & Comments
J 5	Lamb's Prairie	SU	--	Trifolium reflexum (Buffalo Clover)
J 6	T46N, R26W, Sec. 23, 24 Warrensburg East Quad.	SU	--	Cyperus odoratus (Fragrant Cyperus) 1916 record. Habenaria leucophea (Prairie White Fringed Orchid) 1926 record. Scrophularia lanceolata (Figwort) 1916 record. Did not relocate in this survey.
J 7	Hale's Lake T46N, R26W, Sec. 24 Warrensburg East Quad and T46N, R25W, Sec. 29 Warrensburg East Quad.	WL	--	Rana areolata circulosa (Northern Crawfish Frog) Specimens, 1976. Did not search for in this survey.
J 8	T46N, R25W, Sec. 20 Warrensburg East Quad.	SU	--	Echinacea angustifolia (Narrowed-leaved Coneflower) Specimen, 1971. Identification is questionable. Did not relocate in this survey.
J 9	Pertle Springs T46N, R26W, Sec. 36 Cornelia Quad.	WL	--	Hyla cinerea (Green Tree Frog) Specimen, 1976. Apparently an introduced population. Did not search for in this survey.
HENRY COUNTY				
H 1	T43N, R25N, Sec. 31	R	--	Tympanuchus cupido (Greater Prairie-chicken Lek)
H 2	T43N, R25W, Sec. 18	C	--	Ardea herodias (Great Blue Heron Rookery)
H 3	T41N, R26W, Sec. 02	R	SOC	Phrynosoma cornutum (Texas Horned Lizard)
H 4	T41N, R25W, Sec. 19	E	LELT	Haliaeetus leucocephalus (Bald Eagle). Nests found in Truman Reservoir Area.

Note: State and Federal Status Symbols
E = Endangered; R = Rare; SU = Status Undetermined; SOC = Species for which the FWS has concern; LELT = Listed endangered in part of range and listed threatened in a different part; LT = Listed threatened; WL = Watch list.

Sources:
MDC's Rare And Endangered Species of Missouri Checklist, 1992.
MDC's Missouri Natural Features Inventory, Final Report; Lafayette and Johnson Counties, 1987; Gremaud, Greg.
MDC's Southwest Missouri Natural Areas Project, Final Report; Henry County, 1984; Reese, Gary.

6. Historic and Archaeological Resources

a. Survey Methods

Cultural resources in the study area have been identified through a series of inter-related efforts including reviews of records curated by the Archaeological Survey of

Missouri (ASM) and the Missouri Department of Natural Resources Office of Historic Preservation (MDNR-HPP), reviews of published literature relating to the general area and the specific study corridor and interviews with local residents and others knowledgeable about the area. Field methods for Phase I survey efforts were based on DNR *Guidelines* (Weichman, 1986).

Cultural resources have been identified for the following types of resources:

- Previously recorded archaeological sites.
- Architectural resources.
- Historical bridges.

Investigations of cultural resources within the study area were coordinated with the definition of the transportation improvement alternatives. Consequently, all previously recorded resources that are located in the study area were identified, but field review, known site verification or survey activities were limited only to those areas that would be potentially affected by the proposed undertaking. Exhibit III.B.6-1 shows the known cultural resources located within the study area that could potentially be affected by the reasonable improvement alternatives as well as those resources currently listed on the National Register of Historic Places (NRHP). Only those resources potentially affected by the proposed undertaking and NRHP resources located in the study corridor have been shown.

b. Archaeological Investigations

The study corridor is located in the Missouri and South Grand Study Unit, Osage Prairie, West Missouri and Blackwater Watersheds boundaries of the Missouri State Plan (B-18-1). One hundred sixteen (116) prehistoric archaeological sites (Table III.B.6-1; Table III.B.6-2) were on record within the study corridor boundaries. Most of these resources were recorded by individuals interested in the prehistory of the area or are based on recollections and archival information prior to the formation of the Missouri Archaeological Society. Exact locations have not been verified and most records reflect sites that produced ceramics or complete stone tools. These sites are generally located along high ridges and bluffs overlooking the major stream valleys or in the valleys inundated by Truman Lake.

In accordance with MoDOT Cultural Resources Investigations Protocol, prior to the Draft EIS, no extensive field work was performed for previously reported archaeological sites. Decisions regarding alternative selection are made based on previously recorded data and probabilities of encountering archaeological sites. Between the Draft and Final EIS, a Phase I archaeological investigation has been performed for the Preferred Alternative. All archaeological sites located within the Preferred Alternative have been evaluated for eligibility to the National Register of Historic Places (NRHP).

The background review and previously reported site documentation conducted in Lafayette, Johnson and Henry counties took place from October, 1994 through March, 1995. The purpose of these reviews was to determine the number and nature of previously reported archaeological resources within the alternative alignments. The ASM site files and library were consulted for previously reported archaeological resources and associated projects, reports and manuscripts. The DNR-HPP library was

consulted for previously completed cultural resource projects and reports for the project vicinity and the listing of properties on the National Register of Historic Places was reviewed.

Each previously recorded resource was plotted on USGS maps to assess their location in relation to alternative alignments and a short list of sites was compiled for further review. Field investigations of all sites in or immediately adjacent to alternative alignments were conducted

Goals of the records and literature review and the field survey of previously reported archaeological sites were to:

- Contact landowners to obtain permission to enter the property.
- Collect particular information about each site including:
  - ◊ Site location and general limits,
  - ◊ relative condition of the site at time of visit,
  - ◊ surface visibility, and
  - ◊ photograph site location.
- Prepare site updates where necessary.
- Conduct no extensive fieldwork.

Field methods included gathering of data from direct surveying, oral interviews (property owners, occupants, local officials and resource informants), accumulation of information about specific properties as well as broad contexts, photography and the synthesis of data including the analysis of information about the distribution of resources within the alternative alignments within a 183 meter (600 foot) wide corridor with buffers on either side. Information and results gathered during the background review and field survey was used to develop a predictive model for the Phase I survey.

Review of Archaeological Survey of Missouri site files and Request for Information (ASM 94-14) is an ongoing process during the EIS process. Initial contact was made on 4 January, 1994, with the ASM for archeological site information. The Request for Information is not included with the EIS documents to protect the site specific location data included on the form. The Request for Information sheet is included with the supplemental Phase I survey report as required by DNR Guidelines for Phase I work (Weichman, 1986). The use of previously recorded site data is included in section III.6.a-b and totals are listed in Table III.B.6-1 and Table III.B.6-2. MoDOT protocol requires evaluation of all previously recorded archaeological sites within the alternative alignments.

A record review of the ASM site files and records identified 121 archaeological sites in Lafayette County, 387 archaeological sites in Johnson County and 949 archaeological sites in Henry County. The large number of sites identified in Henry County is due to the cultural resource responsibilities of the Kansas City District Corps of Engineers on federal property. A total of 116 archaeological sites were identified within the general boundaries of the study corridor. Identification of all previously recorded archaeological sites within the study corridor assisted the study team in early identification of potential flaws in alternatives.

Table III.B.6-1
Number of Previously Recorded Archaeological Sites within the Limits of the Study Corridor

County	Prehistoric	Historic	Total
Lafayette	17	2	19
Johnson	33	0	33
Henry	60	4	64
Total	110	6	116

Table III.B.6-2
Previously Recorded Archaeological Sites within the Limits of the Study Corridor

Township	Section	Quadrangle	Sites
LAFAYETTE COUNTY			
T48N,R26W	2	Knob Noster NW, Fayetteville	LF60
T48N,R26W	10	Fayetteville	LF62
T48N,R26W	15	Fayetteville	LF61
T49N,R25W	16	Higginsville	LF23, 25
T49N,R25W	31	Higginsville Knob Noster NW	LF43
T49N,R26W	3	Mayview	LF54
T49N,R26W	9	Mayview	LF56, 59
T49N,R26W	15	Mayview	LF55
T49N,R26W	21	Mayview	LF57, 58
T50N,R26W	30	Mayview	LF40
T50N,R26W	33	Mayview	LF44
T50N,R27W	7	Lexington W	LF33
T51N,R26W	32	Lexington E	LF15
T51N,R26W	33	Lexington E	LF16
T51N,R27W	23	Lexington W	LF53
T51N,R27W	24	Lexington E & W	LF18
JOHNSON COUNTY			
T44N,R25W	18	Leeton	JO92
T44N,R26W	4	Chilhowee; Centerview	JO78
T44N,R26W	9	Chilhowee	JO51
T44N,R26W	10	Chilhowee	JO52
T44N,R26W	11	Leeton; Chilhowee	JO53, 54
T45N,R25W	4	Cornelia	JO71
T45N,R25W	5	Cornelia	JO68, 72
T45N,R25W	6	Cornelia	JO65, 367, 368
T45N,R25W	8	Cornelia	JO66, 67
T45N,R25W	9	Cornelia	JO69
T45N,R25W	17	Cornelia	JO74, 75
T45N,R26W	26	Centerview, Cornelia	JO48
T45N,R26W	34	Centerview	JO47
T46N,R25W	7	Warrensburg E	JO14
T46N,R25W	21	Warrensburg E	JO128
T46N,R25W	32	Cornelia	JO369, 370, 378
T46N,R25W	33	Cornelia	JO70
T46N,R26W	2	Warrensburg E & W	JO60
T46N,R26W	3	Warrensburg W	JO59
T46N,R26W	14	Warrensburg E & W	JO3
T46N,R26W	21	Warrensburg W	JO55
T46N,R26W	23	Warrensburg E & W	JO6, 10
T46N,R26W	34	Centerview	JO50

Township	Section	Quadrangle	Sites
T47N,R26W	34	Warrensburg W	JO61
HENRY COUNTY			
T41N,R25W	6	Gaines; Calhoun W.	HE283, 284
T41N,R25W	18	Gaines	HE365
T41N,R25W	19	Gaines	HE362, 363, 364, 545, 546, 547, 564
T41N,R25W	20	Gaines	HE328, 350, 351, 352, 353
T41N,R25W	21	Gaines	HE929
T41N,R26W	9	Clinton S	HE540
T41N,R26W	10	Clinton S	HE126, 340, 915, 916, 917, 918
T41N,R26W	13	Clinton S; Gaines	HE335, 368, 369, 370, 371, 372, 373, 880
T41N,R26W	14	Clinton S	HE17, 131, 336, 591
T41N,R26W	15	Clinton S	HE337, 338, 339
T41N,R26W	21	Clinton S	HE182, 183, 277, 278, 390, 391
T41N,R26W	22	Clinton S	HE13, 113, 184
T41N,R26W	23	Clinton S	HE8, 180, 311
T41N,R26W	24	Clinton S; Gaines	HE254, 255, 361, 366, 367, 475, 476, 477, 478, 479, 480, 481, 482
T43N,R25W	20	Calhoun W; Leeton	HE949

Draft EIS efforts concentrated on reviews of existing data, field checks and preliminary assessments of previously recorded archeological sites located within each of the alternative alignments (Table III.B.6-3) and development of a general predictive model relating to the likely location of unrecorded archeological sites.

Site Probability Factors

Experience has indicated that prehistoric sites are most often found in certain environmental situations. Only on very rare occasions will prehistoric sites be encountered in unusual or unexpected contexts. The following paragraphs consider the conditions under which most sites are found and establish environmental zones as High Probability, Medium Probability and Low Probability for prehistoric archaeological resources.

Prehistoric Native Americans needed certain basic resources. First, they had to have water and almost all residential sites were located close to it. Next, they required food, and base camps and seasonal sites were established in close proximity to food supplies. They also needed certain raw materials such as chert and wood, and finally, they required shelter, which they were capable of erecting wherever they chose. We now consider factors involved in the location of several kinds of sites established prehistorically.

High Probability Areas

Proximity to Water - Perennial water as found in rivers, creeks and springs is often associated with high probability areas. Since water was also used as a means of transportation via canoes, dugouts, etc., base camps and important seasonal sites were most often located along major streams and rivers. Hunting camps were usually located along major streams at a distance from major camps or along smaller streams and near springs. Bluff shelters and caves were frequently used by hunting and foraging parties, especially when these were near water and needed raw materials.

Extractive sites, such as chert quarries and resource procurement sites, were located at the chert outcrop or colluvial slope where the resources were found. Bluffs with usable chert or deposits of chert residuum are likely quarry or extractive site locations. In southwestern Missouri, for example, almost all quarries and extractive sites are located at outcrops or deposits of residual Burlington chert or Reeds Spring chert. Geological maps can be used to determine if these deposits are present. If they are, then hilltops and high ridges bounded by steep sideslopes should be checked since they are high probability areas for extractive sites. If there is no high quality chert in the area being considered, then such places may be low probability areas.

Vertical Location - Native Americans almost never established sites in areas that were susceptible to flooding on a frequent basis. High terraces near streams, elevated ridge settings or hilltops near perennial water sources were usually chosen for base camps. Of course it must be realized that conditions may have changed throughout the years, and there may be no water today where it existed 5,000 years ago. The presence of old meander scars or oxbow lakes near elevated areas may make these locations high probability areas. Base camps and frequently used seasonal sites are more likely to have been established adjacent to larger streams. Hunting and foraging sites may be found near them too, but they are often found adjacent to smaller streams or near dependable springs. Bluff shelters and caves located at positions above the flood zone were also used as temporary sites. Rarely were such shelters used as base camps or seasonal sites unless they were located near a major stream or near an important extractive zone.

Food Resource Availability or Biomass - Since most edible plant species, nuts, acorns and the greatest abundance of animals were found in alluvial terrace settings, these locations reflect the highest probability for sites. Seasonality of floral resources is certainly a factor, and the fact that a certain area may have yielded heavy crops of nuts, acorns, edible seeds and fall fruits (such as persimmon, papaw, black haw and hackberry) may have promoted seasonal use. It is important to recognize that present-day conditions of that area may not reflect what conditions may have been like just a few centuries ago.

In summation, a high probability area is one which is now or once was near a substantial source of perennial water. It is elevated enough above the floodplain or stream basin so that it is not susceptible to flooding. A high probability area may be a location near some important resource such as high quality chert . And finally, a high probability area is one where many food resources were available during prehistoric times.

Historic sites may have had different criteria for their placement. Pioneers dug wells and could build houses anywhere. A close proximity to water was often desirable but not as imperative as it was to prehistoric Native Americans. Generally speaking, historic house sites are found adjacent to present-day or early roads and usually close to better quality soils. Exceptions are such locations as those chosen for grist mills, sawmills and mining operations.

Medium Probability Areas

Proximity to Water - While moisture levels and conditions may have fluctuated considerably during prehistoric times, and there is evidence of this at certain times, it is usually possible to determine from a stream bed whether the flow is intermittent or

perennial. Extent of gravel deposits and an abundance of meander scars may suggest earlier stream flow was greater than at present. Experience has shown that major sites and even temporary sites are less likely to have been positioned adjacent to intermittent or undependable water supplies than they were near streams with perennial flow. Sites may have been located in such settings if some desirable resource, such as high grade chert, was found nearby. It is also more probable that temporary hunting-foraging sites would have been located near intermittent water sources than would base camps or much-used seasonal sites.

Vertical Location - In late prehistoric times, sites were sometimes established on low terraces near streams and earlier sites sometimes were positioned on moderate slopes, such as toe slopes and low ridges that were located fairly close to water. The chance of finding a site at such a location is far less than that of finding one on an elevated terrace near the junction of two streams or adjacent to a major stream. Temporary hunting-foraging sites are more likely to be found along the smaller streams than are base camps.

Food Resource Availability - In areas with a moderate biomass, such as in narrow hollows, extensions of prairie fairly near small streams, etc., sites are less likely to be found.

Low Probability Areas

Proximity to Water - Environments located far from water, such as upland areas, prairie zones and upland forest locations, rarely feature prehistoric sites. Hilltops and ridges far from water are poor locations for sites with the exception of extractive sites.

Vertical Location - Low, frequently flooded and swampy areas reflect low probability areas. It is extremely rare to find sites of any kind in extremely swampy areas or in locations that regularly flood. This does not mean that prehistoric peoples never used locations that sometimes flooded. But if there were a choice between a well-drained and elevated terrace and a swamp, the elevated terrace would have been selected.

Food Resource Availability - Barren, rocky ridges and wooded upland areas with few vegetal foods were seldom chosen as site locations. Hunting parties may have traversed such environments while hunting, and may have lost an occasional dart point or other tool, but base camps and repeatedly used seasonal sites are generally not found in such locations .

Archaeological Site Density

No comprehensive intensive survey had been conducted in the study corridor prior to the initiation of this corridor study. General summaries of archaeological site information can be reviewed from the ASM and MDNR-HPP site files and records to approximate conditions within the study area. This previously recorded information is generally biased toward larger archaeological sites that produce artifacts for private collections or site information recorded by an amateur or professional with a specific research goal emphasis.

Based on the number of previously recorded archeological sites (1,447) for the entire three county area, there is a site density of one archaeological site per 390 hectares (936 acres) (Table II.B.6-3). When only the limits for the No-Build Condition and Expressway/Freeway Build Alternatives are considered the site density is one site per 1,124 hectares (2,777 acres). Although the number of archaeological sites is lower within the study corridor alignments than the county numbers, the study corridor alignments include the area along existing Route 13 that contains no known sites due to the built environment that significantly lower the number of recorded sites.

Table III.B.6-3
Previously Reported Archaeological Site Density by County

County	# of hectares (acres)	# of sites	1 site per hectares (acres)
Lafayette	163,563 (404,160)	121	1,352 (3,340)
Johnson	213,941 (528,640)	387	552 (1,365)
Henry	190,889 (471,680)	949	201 (497)
Total	**568,393 (1,404,480)**	**1,457**	390 (963)

The area located immediately south of the study corridor had undergone intensive Phase I surveys and provide a more accurate representation of probable site density within environments similar to those of the study corridor. Systematic archaeological surveys within or immediately adjacent to the study corridor have only occurred at Truman Reservoir, resulting in the highest site density of the three counties with one site per 201 hectares (497 acres) for Henry County. The area contained within the Corps of Engineers, Truman Reservoir boundaries immediately south of the study corridor has a site density exceeding one site per 2.7 hectares (6.6 acres). The environmental conditions outlined in the site probability factors occur throughout the study corridor.

Using the site probability factors and information gained in review of previously recorded archaeological resources, 61 specific locations containing 582 hectares (1,438 acres) were identified as having a high potential for archaeological sites (Table III.B.6-4). These specific areas represent 8% of the total locations (206 hectares or 508 acres) and represent 11% of the total area (6,743 hectares or 16,661 acres) of alternative alignments within the study corridor.

Table III.B.6-4
Predictive Archaeological Model for High, Medium and Low Probability of Number of Areas and Number of Hectares (Acres) for Archaeological Sites

County	High Probability areas	High Probability hectares (acres)	Medium Probability areas	Medium Probability hectares (acres)	Low Probability areas	Low Probability hectares (acres)
Lafayette	21	174 (430)	39	18 (45)	67	1,547 (3,823)
Johnson	18	221 (545)	98	592 (1,463)	135	2,060 (5,089)
Henry	22	187 (463)	43	271 (670)	65	1,390 (3,434)
Total	**61**	**582 (1,438)**	**180**	**1,164 (2,877)**	**267**	**4,996 (12,346)**

A full Phase I survey of the preferred alignment was conducted in the summer of 1996. Sixteen archaeological sites (23LF132-136, 23JO406-411, 23JO413 and 23HE958-961) (Table III.B.6-5) were identified within the preferred alignment. Six archaeological sites are prehistoric (23LF132, 23JO406, 23JO408, 23JO410, 23JO411 and 23HE960) and 10 sites are historic (23LF133, 23LF134, 23LF135, 23LF136, 23JO407, 23JO409, 23JO413, 23HE958, 23HE959 and 23HE961).

Of these 16 sites, four [23JO407 and 23HE960 along with 23LF133 and 23HE959, for which HPP has requested additional archival research as part of a Phase II assessment effort (HPP-DNR review letter dated 8 April 1998)] represent resources that have the potential of containing significant information that can contribute to prehistory and history. Phase II assessments should be conducted to determine site function, integrity and National Register of Historic Places eligibility. The remaining 12 new archaeological sites recorded during the Phase I cultural resource survey do not contain significant characteristics and are not considered eligible for the National Register. These resources are represented by surface scatters of historic and/or prehistoric artifacts. None of these sites are believed to contain intact subsurface cultural features or deposits. No further work in recommended for this group of resources.

Table III.B.6-5
Summary of Archeological Resources

Site	Date	Recommendations
23LF132	Late Woodland - Late Prehistoric	no further work
23LF133	1860 - 1940	no further work (additional archival work needed at the request of HPP; need for fieldwork contingent on outcome of archival work in accordance with6 January 1998 and 8 April 1998 HPP letters)
23LF134	1940s - 1970s	no further work
23LF135	pre-1920 - 1920	no further work
23LF136	pre-1920 - 1920	no further work
23JO406	8000 - 12,000 BC	no further work
23JO407	pre-1914 - 1960	Phase II assessment program (including archival research required in accordance with 6 January 1998 HPP letter)
23JO408	prehistoric	no further work
23JO409	pre-1914 - 1960s	no further work
23JO410	prehistoric	no further work
23JO411	prehistoric	no further work
23JO413	1920s - 1950s	no further work
23HE958	1860 - 1920	no further work
23HE959	post-1860 - 1967	no further work (additional archival work needed at the request of HPP; need for fieldwork contingent on outcome of archival work in accordance with 6 January 1998 and 8 April 1998 HPP letters)
23HE960	prehistoric	Phase II assessment program
23HE961	1880s - 1950	no further work

c. Architectural Resources Investigations

Architectural resources in the proposed study corridor have been identified through intensive records review and survey of 50+ year old resources located along existing

Route 13 and within the potential alternative alignments. Review of each resource included the potential of that property to impart the quality of significance in American history, architecture, archeology, engineering and culture in identified districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:

- That are associated with events that have made a significant contribution to the broad patterns of our history; or
- That are associated with the lives of persons significant in our past; or
- That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possesses high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- That have yielded, or may be likely to yield, information important in prehistory or history.

For a property to qualify for the National Register it must meet one of the National Register Criteria for Evaluation by:

- Being associated with an important historic context, and
- Retaining historic integrity of those features necessary to convey its significance.

Information on each architectural resource was recorded to provide documentation of each including description, condition, number of out-buildings and architectural details.

Architectural resources that contained historic archaeological components were recorded with ASM site numbers. The proximity of architectural resources recorded along existing Route 13 was measured to the centerline of the existing roadway. A Determination of Eligibility has been made by the SHPO on those architectural resources potentially affected by the No-Build and Expressway/Freeway Build Alternatives.

Ten buildings or structures are listed in the National Register of Historic Places within the limits of the study corridor (Table III.B.6-6 and Exhibit III.B.6-1). In Lafayette County, three of the properties (Linwood Lawn, Chicago & Alton RR Depot and the Houx-Hoefer-Rehkop House) were listed under Criterion C (properties that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction) and one (Confederate Cemetery & Lodge) was listed under Criterion A (properties that are associated with events that have made a significant contribution in our past)). In Johnson County, two of the properties (Johnson County Courthouse and Garden of Eden Station) were listed under both Criteria A and C and one (Old Johnson County Courthouse) was listed under Criterion C . In Henry County, the three properties listed

under Criteria A and C (Anheuser-Busch Brewing Building, Williams House and Dorman House). There are no architectural resources on record with MDNR-HPP that are located within the study corridor.

A total of 168 Missouri Historic Property Inventory Forms were completed on individual structures, buildings, objects or complexes of architectural resources located along the alternative alignments (Table III.B.6-7). Only structures, buildings or objects 50 years old or older were photographed and documented during this phase of the survey. The styles and types along the alternatives ranged from double pen to Italianate.

Barns represented the largest class of architectural resources recorded with 29 stand alone (with no other associated structures, buildings or objects) and a great number recorded in addition to other different primary architectural properties. Bungalows were the second greatest class of properties with 23 recorded as either stand alone or with associated buildings or structures. There were 20 composite, 17 Gabeled Ell, 13 I-House, 11 Open Gable, six Minimal Traditional, six Pyramid Square, six Central Passage, five Crossplan, five Double Pen, four Side Gabled, three ruins, three False Front, two Shotgun, two Single Pen and one each of American Four Square, Central Hall, Commercial Sign, Ell Shaped, Gable End, Gas Station, Multiple Entry, Saltbox, Shed, Side Hall, Side Steeple, Silo and T-shaped recorded.

There were 21 buildings that could be dated to before 1900 and numerous architectural resources dated to around the turn of the century. The range of architectural resources within the alternative alignments reflect the changing social and economic conditions of this primarily rural study corridor.

Architectural resources that were considered to be >50 years old were identified and reviewed as part of the DEIS program. As the project team worked through various alignment configurations, some of the alternatives were dropped from further consideration. With this refinement in the project scope, the team worked with DNR-HPP to identify whether any of the >50 year old architectural resources required further consideration. Based on a concurrent review of the 168 Missouri Historic Property Inventory forms with HNTB, HPA, MoDOT and representatives of the Missouri SHPO, 11 properties were considered potentially eligible for the NRHP (WW2, XX8, NN7, OO11, JJJ3, MM22, BB11, G3, N16, EE6 and BBB4) (Table III.B.6-6 and Table III.B.6-7). One hundred and thirty-four properties were determined to possess no significant characteristics. Of the original 11 properties considered potentially eligible for the NRHP, 6 (BBB4, BB11, MM22, JJJ3,XX8 and WW2) have been avoided by the preferred alternative. Determination of Effect documentation for 4 (G3, N16, NN7 and OO11) of the original 11 properties has been submitted to DNR-HPP for review and concurrence in accordance with 36 C.F.R. §800.9. EE6 (Higginsville sign) is a NRHP-eligible resource that will be affected by the preferred alignment. An additional 23 properties required further documentation before a determination could be made. Of these 23 structures, only seven would have been directly or indirectly affected by the preferred alternative. Further refinement of the preferred alignment avoided all of the seven structures.

Table III.B.6-6
Previously Listed National Register of Historic Places Properties within the Limits of the Study Corridor

Property Name	Quadrangle Location	Address
Linwood Lawn	Lexington East	RFD 2
Confederate Cemetery & Lodge	Higginsville	Business Rt 13
Chicago & Alton RR Depot	Higginsville	2109 Main Street
Houx-Hoefer-Rehkop House	Higginsville	1900 Walnut Street
Johnson County Courthouse	Warrensburg East	Courthouse Square
Old Johnson County Courthouse	Warrensburg West	Old Public Square
Garden of Eden Station	Warrensburg East	Old Hwy 13 at Co. Rd. 215
Anheuser-Busch Brewing Building	Clinton South	203 W. Franklin
Williams House	Clinton South	303 W. Franklin
Dorman House	Clinton South	302 W. Franklin

Table III.B.6-7
Architectural Resources Recorded along Alternative Alignments

HPA#	Name	Style	Type	Date
LAFAYETTE COUNTY				
EE6	Higginsville Sign	None Listed	Commercial Sign	Ca. 1940
W5	Unknown	None Listed	Pyramid Square	Ca. 1920
AAA3	Tempel, Betty, House	None Listed	Composite	Unknown
G3	Baker, Bruce, House	Greek Revival	I-House	1850s
LL29	Oetting, Mary, Privy	None Listed	Open Gable	Ca. 1920
N21	Nave, Forest, House	Tudor Revival	Composite	1940s
W17	Newland, Winfred, House	None Listed	Central Passage	1930s
N16	Moore, Charlessa, House	Victorian	Gabled Ell	1890s
P23	Unknown	None Listed	Open Gable	Unknown
EEE11	Dyer, Lynn, Barn	None Listed	Barn	1920s
W16	Newland, Winfred, House	None Listed	Bungalow	1928
W23	Burchett, Clyde, House	None Listed	Composite	1918
N19	Fairchild, Mary, House	None Listed	Shotgun	Ca. 1900
BBB11	Callahan, Scott, House	None Listed	Bungalow	Ca. 1930
DDD9	Teague, Jack, House	Victorian	Crossplan	1903
EEE3	Meineka, Clarence, House	None Listed	Open Gable	Unknown
LL14	Gasseri, Vern A., House	Victorian	Gabled Ell	Ca. 1890
V13	Unknown	None Listed	Central Passage	Pre-1949
V23	Unknown	None Listed	Barn	Unknown
F13	Bayne, Ron, House	None Listed	Pyramid Square	1890s
CCC4	Gieselman, Lambert, House	None Listed	Central Passage	1946
W20	Mcmenemy, Kevin, House	None Listed	Open Gable	1930s
AAA24	Wassam, Joann, Ruin	Ruin	Ruin	Unknown
BBB21	Verdught, Elvyn, House	None Listed	Side Gable	Unknown
BBB4	Yingling, Steve, House	None Listed	Bungalow	1920-1940
DDD7	Purnell, Catheryn, Silo	None Listed	Silo	Unknown
U1	Soendker, Wesley, Jr.	None Listed	Open Gable	Ca. 1920
F9	Scherlinger, Harry, House	None Listed	Composite	Unknown
AAA20	Young, Lila, House	None Listed	Crossplan	Pre-1900
BBB14	Cowherd, Robert, House	Gothic Revival	Pyramid Square	Ca. 1900
CCC19	Swigart, Russ, House	None Listed	Double Pen	Pre-1900
CCC22	Colbert, Bob, Barn	None Listed	Barn	Unknown
FFF19	Gray, Mary Virginia, House	None Listed	Gabled Ell	1913
M12	Burns School	None Listed	Central Hall	1935
CCC2	Greife, Alice, House	None Listed	Bungalow	1920s
T3	Ledom, Curt, House	Tudor	Central Passage	Ca. 1930
T7	Kenneth, House Buchanan,	None Listed	Central Passage	1940s

HPA#	Name	Style	Type	Date
V24	Bell, Steven, House	None Listed	Pyramid Square	Ca. 1920
BBB8	Unknown	None Listed	I-House	Unknown
DDD1	Littlejohn House	None Listed	Bungalow	1930s
W10	Newland Gifts	None Listed	Multiple Entry	1928
AAA11	Homfeld, Avril, Barn	None Listed	Barn	Pre-1900
FFF24	Romans, Pam, House	None Listed	Bungalow	1930s
CCC14	Kellum House	None Listed	Gabled Ell	Ca. 1900
T20	Duffet & Shipman, House	None Listed	Bungalow	Pre-1949
V5	Green, Susan, House	None Listed	Bungalow	Ca. 1940
W3	Bell, Robert, House	None Listed	Composite	1920-1950
EE7	Huscher, Harri, Barn	None Listed	Barn	Ca. 1920
AAA15	Unknown	None Listed	Pyramid Square	Ca. 1900
U8	Nuelle, Robert, House	None Listed	Bungalow	1905-1930
JOHNSON COUNTY				
Y19	Central Missouri Speedway	None Listed	Barn	Unknown
AA21	Sturgis, Iris, House	None Listed	Central Passage	1927
BB11	Mcandrus, Joseph, Ruin	None Listed	Open Gable	1928
BB6	Martin, Howard, Shed	None Listed	Double Pen	Pre-1900
HH6	Unknown	None Listed	Crossplan	Ca. 1900
VV2	Andrus, J. D., House	None Listed	Pyramid Square	Ca. 1920
BB24	Unknown	None Listed	Barn	Unknown
BB7	Martin, Howard, Barn	None Listed	Barn	Ca. 1900
UU24	Karr, Robert, House	None Listed	Composite	Ca. 1950
Y8	Baker, Glenda, House	None Listed	Gabled Ell	1913
Y16	Unknown	None Listed	Bungalow	1940s
AA23	Bozarth Barn	None Listed	Barn	Ca. 1900
FF1	Unknown	None Listed	Minimal Traditional	Unknown
GG21	Plattner, David, House	None Listed	I-House	Ca. 1900
QQ13	Unknown	None Listed	Gabled Ell	Ca. 1900
UU11	Cox, Linda, House	None Listed	Gabled Ell	1915
SMA5	Beard, John H., House	None Listed	Minimal Traditional	Ca. 1940
Y1	Gay, Jeff, House	None Listed	Open Gable	Unknown
BB5	New Life Church House	None Listed	Open Gable	Ca. 1930
CC9	Wehr, Tom, House	None Listed	Minimal Traditional	1947
GG15	Lamb, Dale, Barn	None Listed	Barn	Ca. 1900
DDD13	Oak Grove Church	None Listed	Gabled End	1876
MM20	Hanna, Hugh, House	None Listed	Double Pen	Unknown
QQ24	Unknown	None Listed	Barn	Unknown
LL31	Unknown	None Listed	T-Shape	Unknown
QQ23	Patton, E. F., Barn	None Listed	Barn	1920
UU18	Unknown	None Listed	Ruin	Unknown
GG2	Minor, Susan, House	None Listed	Bungalow	1920-1940
GG16	Wiley, Dan, House	None Listed	Side Gable	Ca. 1900
FFF2	Stockton, Gerald, Barn	None Listed	Barn	1920s
QQ15	Sullins, Vernon, House	None Listed	I-House	Pre-1900
RR17	Byers, John, House	Queen Anne	Composite	Ca. 1900
SS6	Buie, Chris, House	Gothic Revival	I-House	Ca. 1900
TT17	Edmiston, Wanda, Barn	None Listed	Barn	Ca. 1900
CC1	Unknown	None Listed	Gabled Ell	Unknown
HH3	Boka, Rick, House	None Listed	Composite	Unknown
BB16	Williams, Dan, House	None Listed	I-House	Ca. 1900
FF5	Unknown	None Listed	Bungalow	1920-1940
VV5	Cecil, Perry, House	None Listed	Composite	Ca. 1900
BB23	Schumate, Terry, House	None Listed	Gabled Ell	Unknown
HH1	Jenkins Barn	None Listed	Barn	Unknown
MM22	Sellman, Mrs. Warren, Barn	None Listed	Barn	Pre-1900
QQ2	Teuscher, Sherman, House	None Listed	Bungalow	1928

- 1995 Culvert Maps (MoDOT 1995c:Lafayette County, Johnson County and Henry counties) [showing no culvert structures in Lafayette County, G399R (Br-024) and G397R (Br-026) in Johnson County and showing no culvert structures in Henry County] and

- Offsystem County Bridge Maps (MoDOT 1994, 1993 and 1992) [showing no offsystem structures in or adjacent to the preferred alignment in Lafayette, Johnson or Henry counties]

Age of construction for the bridge and culvert structures was estimated by comparison to existing bridges of known ages, location of bridges relative to upgraded sections of Route 13 and Route 7, general appearance, weathering and construction techniques. Six bridges [north to south - A4595 (Br-080), G818R2 (Br-003), G819R1 (Br-004), G399R (Br-024), G397R (Br-026) and Br-085:no MoDOT designation) (Table III.B.6-8) have a built date or are known to have been constructed in the last two years. Eighteen bridges (north to south - Br-102, Br-080, Br-103, Br-004, Br-109, Br-013, Br-025, Br-154, Br-155, Br-156, Br-158; Br-159, Br-160, Br-161, Br-029, Br-164, Br-085 and Br-165) are or are estimated to be <50 years old.

Table III.B.6-8
Route 13 and Route 7 Bridge Structures with Known Dates

Field #	MoDOT #	Year Built	Build Date Determination
Br-024	G399R	1922	1995 Service Ratings (MoDOT 1995a:12)
Br-026	G397R	1922	1995 Service Ratings (MoDOT 1995a 12)
Br-003	G818R2	1924	1995 Service Ratings (MoDOT 1995a:13)
Br-080	A4595	1989	1995 Service Ratings (MoDOT 1995a:13)
Br-004	G819R1	1989	dated by sign on bridge and not listed in Service Ratings
Br-085	none	1996-1997	Constructed during EIS documentation and not listed in Service Ratings

A4595 (Br-080) (MoDOT 1995a:13) and G819R1 (Br-004 based on a designation on the bridge) were constructed in 1989. Br-085 was built as a replacement to an existing structure in 1995 or 1996 as part of the programmed MoDOT Route 7 improvements from the City of Urich through Clinton (FHWA-MO-EIS-95-06-D 1995:I-4).

Although most ages were estimated, <50 year old structures comprise 3 groupings (being north of Higginsville, north and west of Clinton and structures dispersed along Route 13):

- Br-102, A4595 (Br-080) and Br-103 are located north of Higginsville in the vicinity of Tabo Creek

- Br-154, Br-155, Br-156, Br-158, Br-159, Br-160, Br-161, Br-029, Br-164, Br-085 and Br-165 are located immediately north and west of Clinton

- 4 structures are located north of Warrensburg -- Br-004 crosses Blackjack Creek, Br-109 (the only plastic pipe) and Br-013 a box culvert and Br-025 crosses Brawley Creek north of Cornelia

Sixty-four structures are estimated to be >50 years and a number of these structures should correspond to the Route 13 original construction time frame (Table III.B.6-9).

G399R (Br-024) and G397R (Br-026) in Johnson County represent the oldest known structures within the preferred alignment and were built in 1922 (MoDOT 1995a:12). While G399R (Br-024) and G397R (Br-026) have known dates, the culverts located north and south of these structures have structural and appearance similarities. G818R2 (Br-003) in Lafayette County was built in 1924 (MoDOT 1995a:13).

Eighteen structures are estimated to be <50 years old (Table III.B.6-9). G819R1 (Br-004) crossing Blackjack Creek in Lafayette County had a 1989 build date on the bridge and is not listed in the MoDOT (1995a) Service Ratings. Br-085 (no current MoDOT designation) spans Rose Creek and has been constructed in 1995 and 1996 as a result of programmed improvements to Route 7. None of the other structures have known dates of construction.

Table III.B.6-9
Route 13 and Route 7 Bridge Resources
by Span or Culvert Type

Bridge #	Span or Culvert Type	Total
Br-101, Br-006, Br-107, Br-012, Br-121, Br-122, Br-123, Br-124, Br-125, Br-129, Br-132, Br-028, Br-133, Br-134, Br-135, Br-136, Br-137, Br-139, Br-142, Br-145, Br-148	Culvert, Box (BXCU), headwall	21
Br-104, Br-118, Br-119, Br-120, Br-130, Br-138, Br-140, Br-143, Br-083, Br-144, Br-146, Br-149, Br-150, Br-151, Br-153, Br-154, Br-155, Br-156, Br-158, Br-159	Culvert, Box (BXCU), headwall, wingwalls	20
Br-126, Br-027	Culvert, Box (BXCU), headwall, flared wingwalls	2
Br-161	Culvert, Box (BXCU), diagonal to roadway, headwall	1
Br-005, Br-105, Br-108, BR-010, Br-111, Br-112, Br-013, Br-113, Br-114, Br-115, Br-025, Br-141, Br-147, Br-160, Br-029, Br-162	Culvert, Box (BXCU), diagonal to roadway, headwall, wingwalls	16
Br-102, Br-116	Culvert, Box (BXCU), diagonal to roadway, headwall, flared wingwalls	2
Br-110, Br-127, Br-152, Br-157	Culvert, Box (BXCU), headwall, wingwalls at parallel diagonal to roadway	4
Br-011	Culvert, Box (BXCU), diagonal to roadway, headwall, wingwalls at parallel diagonal to roadway	1
Br-117	Culvert, Box (BXCU), headwall (west), drop inlet (east side)	1
Br-085	Culvert, Double Box (BXCU), wingwalls	1
Br-024 (G399R), Br-026 (G397R)	Culvert, Double Box (BXCU), headwall, wingwalls	2
Br-163	Culvert, Concrete Pipe, diagonal to roadway, headwall, wingwalls	1
Br-103, Br-106	Culvert, RCP (reinforced concrete pipe)	2
Br-128, Br-131	Culvert, RCP (reinforced concrete pipe), headwall	2
Br-164, Br-165	Culvert, CMP (corrugated metal pipe)	2
Br-109	Culvert, Plastic Pipe, unshaped exterior concrete headwall	1
Br-004 (G819R1)	Steel Stringer (STRG)	1
Br-003 (G818R2)	Stringer/Multi-beam Girder (STRG)	1
Br-080 (A4595)	Tee Beam (T-BM)	1
	Total	82

Bridge and culvert structures were classified by the principal structure type of the main span. The majority (79 or 96%) of the 82 structures recorded during the preferred alignment documentation are culvert style (structure enclosing a transverse drainage) comprised of concrete box or pipe, metal pipe and plastic pipe configurations. Single box culverts comprised the largest group of structures at 68 (83%).

Box culverts differ in headwall, wingwalls, orientation of culvert and wingwalls to road, and in one case drop inlet (Br-117). The box culvert with headwall, with no additional exposed structure is the largest single type with 21 (31%) structures recorded. Double box culverts with headwalls and wingwalls represent the oldest known structures being constructed in 1922 (MoDOT 1995a:12). Double box culverts with wingwalls also represent the newest structures being built within last two years.

Eight culverts vary by pipe material and design. Br-163, Br-103, Br-106, Br-128 and Br-131 are constructed of concrete pipe. Br-164 and Br-165 are corrugated metal pipe. Br-109 is a plastic pipe with a rough unshaped concrete headwall. G818R2 (Br-003) represents the only stringer/multi-beam girder bridge (stringers are longitudinal members set parallel to the direction of the traffic) structure type. G819R1 (Br-004) represent the only steel stringer bridge (stringers are longitudinal members set parallel to the direction of the traffic) structure type. A4595 (BR-080) represents the only tee beam bridge (a "T" shaped structure used to absorb compressive and tensile stresses) structure type.

Documentation for each of the 82 bridge and culvert resources identified along the preferred alignment was submitted to the SHPO for review and comment. None of these resources was considered eligible for the National Register of Historic Places and no significant bridge or culvert resources will be affected by the preferred alignment.

e. Historical Investigations

General Historical Development

In Lafayette, Johnson and Henry County, several broad patterns of development are expected to be represented by extant structures. Early settlement in the Missouri River towns of Napoleon, Waverly and Wellington represents a broad historic context in this part of Missouri . Lafayette County has been strongly influenced by southern plantation traditions and by 1860 the county had the state's highest percentage of slaves. Southern influences on the county's architecture in the nineteenth century when the county was characterized by a plantation-slavery complex based upon hemp production along the river could be developed as a context. Coal mining was a major industry in Lafayette County during the 1880s, with significant production continuing well into the twentieth century. Exactly how the development of coal mining affected the architecture is not known, but some towns -- such as Corder -- became overnight coal boom centers . Miners' houses still exist in some of the communities.

Upon the arrival of the railroads in the late 1860s, various towns including Mayview, Concordia and Aullville were located along the routes. The influences of the railroads on settlement patterns is another context that could be developed. While a general agricultural context is feasible, a context focused on the production and shipment of hemp during the riverboat era might also be considered. Another specific agricultural context could be based on the apple and peach industry, which grew rapidly in the

Lexington-Dover-Waverly area beginning at around the turn of the century. Thousands of settlers and their ox-drawn wagons followed the Santa Fe Trail through the northern part of Lafayette County early in its history and some extant resources may be discussed within this context.

An awareness of historic contexts is essential both in suggesting directions for the research and then in organizing and analyzing the data Another useful approach is to group and discuss resources according to themes. Both themes and historic contexts can be considered as they relate to specific resources located during ongoing cultural resource investigations. In the study corridor, the expected themes and some of the representative structural types which may be found include:

- *Agriculture:* Farmhouses, barns tenant houses, smoke houses, grain elevators, silos, grange meeting houses and other structures associated with agricultural production.
- *Architecture:* Structures selected for the purity of their formal style or as especially good representative types of rural resources.
- *Commerce/Trade:* Buildings erected as general stores, banks, blacksmith shops, drugstores and for other business purposes.
- *Education:* Schoolhouses.
- *Exploration/Settlement:* Pioneer architecture and town sites.
- *Government:* City halls, post offices, infrastructure.
- *Culture & Entertainment:* Public auditoriums, opera houses and movie theaters.
- *Religion:* Church Buildings and parsonages.
- *Transportation:* Railroad depots, filling stations, automobile dealerships, truss bridges and stagecoach stops.

Transportation Overview

High-potential sites and segments along the trails, traces and roads have been identified within the preferred alignment. Each site or segment must have the potential, to interpret the trail's historical significance, the presence of historical remains and historical integrity. The types of sites may include the following geographic landmarks, water crossings, campsites, graves, trail junctions, stage stations, and other structures. A number of well known trails, traces and other transportation routes are located in the vicinity of the study corridor including:

- *Santa Fe Trail:* One of the most notable Historic Trails in the country is located along the northern boundary of the Route 13 Study Corridor. The Santa Fe Trail was the first of America's great trans-Mississippi routes. The trail, including the Mountain and Cimarron routes, crossed over 1,930 kilometers (1,200 miles) of the central and southwestern United States, from Franklin, Missouri, to Santa Fe, New Mexico. The trail played a critical role in

the westward expansion of the United States and for more than half a century (1821-1880) it was an important two-way avenue for commerce and cultural exchanges.

A meeting and trail visit between representatives of Historic Preservation Associates (Jim Smith), MoDOT (Scott Humphrey), Santa Fe Trail Advisory Council (Virginia Lee Fisher), and Branch of Long Distance Trails, National Park Service (David Gaines), determined that the preferred alignment would not affect the Santa Fe Trail.

- *Osage Trail:* This trail ran from Osage village in St. Clair County to the present Post Oak village and north through Warrensburg to Lexington. Existing Route 13 follows this route through the county In the 1830s it lead pioneers from the Lexington boat landing south into the Johnson County fertile lands.

- *Indian Trail:* Cutting east and west is the route now followed by Highway 50. If it bore a name as an Indian Trail, this name has long been forgotten. But the route linked early Georgetown on the east with Ft. Osage and Westport Landing on the west. The traffic it carried was always considerable.

- *Santa Fe-Georgetown Trail:* Cutting across the southeastern portion of Johnson County, this trail was important in its day. It crossed the Shawnee Trace near Chilhowee and the Osage Trail at Cornelia, and it joined at Knob Noster the east-west trail to Westport Landing at Knob Noster.

- *Shawnee Trace:* Angling through southwest Johnson County, this trail served with the Warrensburg-Ft. Scott Road to open this portion of the territory. This was a major thoroughfare for many years, passing through Post Oak and Chilhowee and on to Magnolia, Holden and Kingsville and then westward. The Missouri, Kansas and Texas Railroad follows this trail from Post Oak to Holden, where Highway 58 and the Missouri Pacific Line pick it up and join its westward drive.

- *Warrensburg-Ft. Scott Road* (the settlers name for this route)*:* This trail divides the county from northeast to southwest. From Ft. Scott this trail passed through Warrensburg and on to Marshall and Arrow Rock. Because of its oblique angle, it has not been followed by later routes to any great degree, though the ill-fated Blackwater Marshall Railway started its cut along this trail.

- *Indian Trail - Lexington-Warsaw:* This early road passed through Warrensburg at the corner of Gay Street and College and angled southeast through Johnson County. The Lexington-Warsaw Road was essentially the same, connecting the Missouri River and the Osage River. Existing segments of the old road were noted by Cockrell (1918:78), but none are known to exist today (Stevenson, et. al. 1987:21).

- *Shawnee Trail:* This trail entered Henry County southeast of Chilhowee passing northwest through Rose Hill Township to Center Knob near Kingsville (Cockrell 1918:79). The old Clinton to Independence Road followed this trail. The Shawnee Trail was reportedly used by the Spanish

passing through the area from Santa Fe to St. Louis and continued to be used for many years (Stevenson et al. 1987:21-22).

- *Lexington-Warrensburg-Clinton Road:* The Johnson County seat was established along the Lexington-Clinton Road where a blacksmith named Martin Warren drew business. The town was platted in 1836 and named Warrensburg for the blacksmith. A county road system began in 1836 with the Jefferson City-Independence Road as a top priority in 1837. The 6.1 meters (twenty-foot) road was cleared of stumps taller than 30 centimeters (twelve inches) and then maintained through mandatory county labor. Early roads were also established from Warrensburg to Blackwater and from Honey Creek to Independence (Cockrell 1918:80). These roads were important additions to the well traveled Lexington-Warrensburg-Clinton, the Warrensburg-Jonesboro by way of Gallaher's Mill and the Warrensburg-Warsaw routes.

f. Summary

General results of the EIS cultural resource documentation efforts are as follows:

- No archaeological sites are listed on the NRHP for Lafayette County (20 non-archaeological historic listings).
- No archaeological sites are listed on the NRHP for Johnson County (8 non-archeological historic listings).
- No archaeological sites are listed on the NRHP for Henry County (3 non-archeological historic listings).
- Seventeen prehistoric archaeological sites were previously recorded in Lafayette County within the limits of the Study Corridor.
- Thirty-three prehistoric archaeological sites were previously recorded in Johnson County within the limits of the Study Corridor.
- Sixty prehistoric archaeological sites were previously recorded in Henry County within the limits of the Study Corridor.
- Two historic archaeological sites were previously recorded in Lafayette County within the limits of the Study Corridor.
- No historic archaeological sites were previously recorded in Johnson County within the limits of the Study Corridor.
- Four historic archaeological sites were previously recorded in Henry County within the limits of the Study Corridor.
- Ten National Register of Historic Places listings are located within the limits of the Study Corridor.
- No previously recorded historic archeological sites are located within an alternative alignment in Lafayette County.

- No previously recorded historic archeological sites are located within an alternative alignment in Johnson County.
- No previously recorded historic archeological sites are located within an alternative alignment in Henry County.
- No isolated finds were previously located in Lafayette County.
- No isolated finds were previously located in Johnson County.
- No isolated finds were previously located in Henry County.
- One hundred sixty-eight architectural resources were recorded within alternative alignments.
- With refinements in the preferred alignment, no architectural resources either listed in or considered potentially eligible for the National Register of Historic Places will be directly or indirectly affected.
- Eighty-two bridge and culvert structures are located along the preferred alignment .
- None of the 82 bridge and culvert structures was considered eligible for the National Register of Historic Places by the SHPO and no significant bridge or culvert structure will be affected by the preferred alignment.
- Sites within the Study Corridor include lithic scatters, limited activity sites, bluff shelters, cairns, incorporated hamlets, mining pits, townsites and ranching activities.
- Cultural affiliations of sites within the Study Corridor range from the Late Archaic (3000 BC to 1000 BC) through the Mississippian Period (AD 1450 to AD 1700) and 19th and 20th centuries.
- A full Phase I survey of the preferred alignment has been conducted. Sixteen archaeological sites (23LF132-136, 23JO406-411, 23JO413 and 23HE958-961) were identified within the preferred alignment.
- Six archaeological sites are prehistoric (23LF132, 23JO406, 23JO408, 23JO410, 23JO411 and 23HE960).
- Ten archeological sites are historic (23LF133, 23LF134, 23LF135, 23LF136, 23JO407, 23JO409, 23JO413, 23HE958, 23HE959 and 23HE961).
- Of these 16 sites, four [23JO407 and 23HE960 along with 23LF133 and 23HE959, for which HPP has requested additional archival research as part of a Phase II assessment effort (HPP-DNR review letters dated 6 January 1998 and 8 April 1998)] represent resources that have the potential of containing significant information that can contribute to prehistory and history.

- Phase II assessments should be conducted to determine site function, integrity and National Register of Historic Places eligibility.

- The remaining 12 new archaeological sites recorded during the Phase I cultural resource survey do not contain significant characteristics and are not considered eligible for the National Register

7. Hazardous Waste Sites

a. Survey Methodology

A hazardous material screening was conducted for the Route 13 Corridor. The screening was submitted as Technical Memorandum No. 2, Hazardous Material Screening Report, dated 1995. The purpose of the waste assessment was to identify sites within the Corridor that are contaminated or potentially contaminated with hazardous materials or waste. Sites containing solid waste were also identified. Where sites were identified, discussions of their potential severity of impact to the proposed project have been developed. The urban core areas in Higginsville, Warrensburg and Clinton were excluded from the screening due to the unlikeliness of routes through these areas.

For the purposes of this screening, hazardous wastes and materials are defined as products or wastes regulated by the U.S. Environmental Protection Agency (EPA) or the Missouri Department of Natural Resources (MDNR). These include substances regulated under the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (ToSCA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), solid waste management and underground storage tanks.

The hazardous waste assessment for the Route 13 Corridor involved data collection efforts, including review of numerous government agency lists and files, as well as a field reconnaissance of the study Corridor. The documents reviewed include the following: EPA and MDNR computer databases provided by Environmental Risk Imaging and Information Services (ERIIS) (May 1994); EPA Region VII files, Kansas City, Kansas; MDNR Central Office (Jefferson City) and Regional Office (Independence).

A summary table from Technical Memorandum No. 2, *Hazardous Material Screening*, is included in Appendix F of this document. The site number listed in the summary table corresponds with the locations identified on Exhibit III.B.7-1.

b. Potential Hazardous Waste Sites

In all, 178 sites were identified within the study Corridor as having the potential for hazardous or solid waste contamination. The site locations are identified on Exhibit III.B.7-1. Identified Waste Sites of Concern. In general, these sites can be characterized as follows: 11 of the sites are missile launch facilities undergoing abandonment by the U.S. Air Force; 52 are documented by state and federal agency lists; and the remaining 114 sites were identified during the field reconnaissance as having the potential for contamination. All sites are summarized in the table in Appendix F of this document.

Seventeen of the sites in the 9.7 by 112.7 kilometer (6 by 70 mile) Corridor were identified as having a possible impact to an alignment alternative. Of these 17 sites, two are considered to have a high potential for contamination, 12 are considered to have a

moderate potential for contamination and two are considered to have a low potential for contamination.

Of these 17 sites, five have regulatory documentation while the remaining 12 were discovered through the field reconnaissance. These sites store or generate hazardous material; are former or operating service stations with known or unknown underground or above ground storage tanks; are suspected to be contaminated with hazardous materials by nature of land use or business; were reported to emergency spill response authorities; or store considerable amounts of solid waste.

c. Assessment of High Potential Sites

Two sites have the greatest potential impact on the project because of their high contamination potential and their close proximity to the alignment alternatives. Neither of these sites were documented or investigated by government agencies.

At the Higginsville Gun Club (Site L-34), the possibility of high concentrations of lead shot from firearms may exist as well as other contamination from its former use as a quarry and coal mine.

At the Hilty(Marr) Quarry (Site J-27), a former sanitary landfill operated for several years in the early 1960's on the quarry property and was known to accept general waste from the surrounding community.

8. Visual Quality

a. Regional Visual Environment

The Study Corridor is located within the Western Glaciated Plains and Osage Plains of west-central Missouri. These areas are characterized by flat to gently sloping topography used primarily for agriculture. The area north of the Lafayette/Johnson County line is predominantly cultivated cropland, and the majority of the area south of that line is a mixture of grassland, cropland and scattered woods (see Exhibit III.B.8-1). The visual experiences within these two areas are relatively constant throughout the Corridor.

The Study Corridor also includes several river and creek valleys which are composed of water, trees, agricultural crops and grassland (see Exhibit III.B.8-2). In contrast to the low-lying valleys, there are ridges at the higher elevations of the Corridor where there are opportunities for distant views of the surrounding environment.

The remainder of the visual environment is composed of small portions of forested areas, reforested abandoned strip mines, grassed abandoned strip mines and lakes. The forested areas within the Corridor are minimal, but their presence provides a visually pleasing contrast to the many open areas throughout the Corridor. The abandoned strip mines contain several linear bodies of water that contribute to the visual quality of these environments (see Exhibit III.B.8-3). There are three small lakes in the Corridor that also possess unique visual characteristics in contrast to the predominantly agricultural environment: Higginsville Reservoir, Maple Leaf Lake and Hazel Hill Lake. The larger lake at the south end of the Corridor, Harry S. Truman Reservoir, provides a quality visual environment with water, trees and floodplain surroundings (see Exhibit III.B.8-4).

The majority of the built environment is concentrated in the cities and towns within the Corridor. The areas where highways dissect the larger communities (Higginsville, Warrensburg, Clinton) are typically comprised of commercial strip development that lacks harmonious or cohesive aesthetic relationships. The exceptions to this occur in the relatively small communities (Aullville, Leeton) where the commercial/business district is concentrated in the interior downtown area. (see Exhibit III.B.8-5). The remainder of the built environment consists of occasional residences located along the existing highway Corridors, and farmsteads scattered along the unpaved roads (see Exhibit III.B.8-6).

b. Visual Quality

The visual impacts of a project may be quite varied in different areas of a project Corridor because the areas themselves can be visually distinct and can exhibit unique visual characteristics. The Study Corridor has been segregated into nine (types of) visual assessment units for the purpose of evaluating the existing visual quality and the potential visual impacts on the environment. For the purpose of this analysis, a *visual assessment unit* is defined as an area within which there are consistent visual characteristics and a uniform visual experience. These units have been identified through the analysis of aerial photography, ground-level site photography, topographic relief and through field reconnaissance. Exhibit III.B.8-7, Visual Assessment Units, shows the delineation of these areas. Utilizing the methodology which is described in the Visual Quality Assessment Appendix, the relative existing visual quality for these areas was determined and is presented in the following Table III.B.8-1.

Table III.B.8-1
Visual Quality Rating

No.	Visual Assessment Unit	Visual Quality Rating
1	Cultivated Cropland	Moderately Low
2	Grassland/Cropland and Scattered Woods	Moderately Low
3	River and Creek Valleys	Moderate
4	High Point Ridges	Moderate
5	Forest	Moderately High
6	Reforested Abandoned Strip Mines	Moderately High
7	Grassed Abandoned Strip Mines	Moderately High
8	Lakes	Moderately High
9	Cities/Towns	Moderately Low

c. Visual Resources

The previously defined Visual Assessment Units are used to inventory large areas of apparent similarity and continuity. A number of distinct "visual resources" occur within the various visual assessment units throughout the Study Corridor. These features are scenically significant and contribute to the visual identity of the environment. Within the Study Corridor the following visual resources are particularly notable (see Exhibit III.B.8-7 for locations).

- Confederate Memorial Park
- Higginsville Reservoir
- Maple Leaf Lake and Conservation Area
- Hazel Hill Lake
- Connor O. Fewel Conservation Area (and Forest)

- Bethlehem State Wildlife Area
- Abandoned Strip Mines
- Grand River Bottoms State Wildlife Area
- Harry S. Truman Reservoir

d. Viewers

Visual impact is determined by change in the visual environment as related to viewer response. For the purpose of highway project assessment, there are two distinct categories of viewer response to be considered: viewers who are users of the project facility (views *from* the road), and people who can observe the roadway from an adjacent vantage point (views of the road).

The best potential for the most vivid landscape views *from* the road occurs on the open high point ridge tops (for distant views), at areas adjacent to the lakes and other water courses and in the wooded areas that provide scenery that contrasts with the predominantly open areas throughout the Corridor. The quality of views *from* the road, as analyzed for each visual assessment unit, is presented in Table III.B.8-2.

The residential and recreational groups that have the potential for views *of* the road are referred to in this discussion as "Visual Receptors". The relative concentration of visual receptors is high in the cities and towns, moderate at the lakes (the recreationists), and low in the remainder of the Corridor. This information is presented in Table III.B.8-2 for each visual assessment unit.

Table III.B.8-2
Views from the Road and
Relative Concentration of Visual Receptors

No.	Visual Assessment Unit	Quality of Views from the Road	Rel. Concentration of Vis. Receptors
1	Cultivated Cropland	Moderately Low	Low
2	Grassland/Cropland and Scattered Woods	Moderate	Low
3	River and Creek Valleys	Moderately High	Low
4	High Point Ridges	High	Low
5	Forest	High	Low
6	Reforested Aban. Strip Mines	High	Low
7	Grassed Aban. Strip Mines	Moderately High	Low
8	Lakes	High	Moderate
9	Cities/Towns	Low	High

9. Noise Quality

a. Noise Terminology

Noise is a vibrational energy form that causes pressure variations in elastic media such as air and water. The ear is sensitive to this pressure variation and perceives it as sound. The intensity of these pressure variations causes the ear to discern different levels of loudness. These pressure differences are most commonly measured in decibels.

The decibel (dB) is the unit of measurement for noise. The decibel scale audible to humans spans approximately 140 dBs. A level of zero decibels corresponds to the

lower limit of audibility, while 140 decibels produces a sensation more akin to pain than sound. Table III.B.9-1 presents some familiar noise sources with their respective peak noise levels. The decibel scale is a compressed view of the actual sound pressure variations. Therefore, a 26 percent change in the energy level only changes the sound level one decibel. The human ear would not detect this change except in an acoustical laboratory. A doubling of the energy level would result in a three decibel increase, which would be barely perceptible in the natural environment. A tripling in energy level would result in a clearly noticeable change of five decibel in the sound level. A change of ten times in the energy level would result in a ten decibel change in the sound level. This would be perceived as a doubling (or halving) the apparent loudness.

The human ear has a non-linear sensitivity to noise. To account for this in noise measurements, electronic weighting scales are used to define the relative loudness of different frequencies. The A-weighting scale is widely used in environmental work because it closely resembles the sensitivity of the ear. This A-weighting scale is the most sensitive between 1,000 hertz (cycles per second) and 5,000 hertz, dropping drastically below 1,000 hertz and gradually above 5,000 hertz. The A-weighting scale has been standardized throughout the world. The unit of measurement for an A-weighted noise level is dBA.

b. Methodology

Highway noise is not constant. It varies as each vehicle passes a point. The time-varying characteristics of environmental noise are analyzed statistically to determine the duration and intensity of noise exposure. In an urban environment, noise is made up of two distinct parts. One is ambient or background noise. Wind noise and distant traffic noise make up the hum of the acoustical environment. These sounds are not readily recognized, but combine to produce a non-irritating ambient sound level. This background sound level varies throughout the day, being lowest at night and highest during the day. The other component of urban noise is intermittent, higher in pitch and louder than the background noise. Rush hour traffic, aircraft operations and local industrial noise are examples of this type of noise. Sounds of this nature can be very disturbing; brief and intense noises can interrupt, annoy or startle. It is for these reasons that environmental noise is analyzed statistically. The maximum A-weighted noise level (L_{max}) represents the maximum noise level that occurs when a vehicle passes a point. When the L_{max} is measured at a defined point, 15.2 meters (50 feet) from the edge of roadway, it can be used for regulatory purposes. This distance is also used as a reference distance from which other noise levels at various distances can be developed. The reference noise level (Lo) is referred to as the emission level. The background noise level is defined as the noise level that is exceeded 90 percent of the time; it is termed the L90 noise level. Noises produced by trucks, trains, and aircraft can produce intense, disturbing noise levels. These noises are some of the loudest produced and are associated with the 10 percent level (L_{10}). The 50 percent noise level L_{50} is the mode. The A-weighted equivalent sound level of the L_{eq} represents the average energy level of the time period being considered.

Existing and projected peak hour noise levels for known sensitive receptors potentially impacted by the proposed action were modeled using the FHWA highway traffic noise prediction computer program, STAMINA 2.0. Modeled noise levels were based on current and projected traffic volumes and vehicle mix on major roadways located adjacent to the receptors. For those receptors not located in the vicinity of a major

roadway, an ambient noise level between 45 and 50 dBA was assumed. Identified sensitive receptors include cemeteries, churches, recreational use areas, schools, historic sites, etc. Known sensitive receptors located in the urban areas where Route 13 and Route 7 improvements are not anticipated were not investigated. The list of receptors located within the study area is not intended to be all inclusive.

Table III.B.9-1
Typical A-Weighted Sound Levels in Indoor and Outdoor Environments

Sound Source	Sound Level (dBA)	Subjective Response
	140	Threshold of Pain
Military Jet Takeoff with after-burner at 15.2 meters (50 feet)	130	
Jet Fly-Over at 305 meters (1,000 feet)	120	Uncomfortably Loud
Power Lawn Mower at Operator	110	
	100	Very Loud
Diesel Truck traveling at 88.5 kph (55 mph) at 15.2 meters (50 feet)	90	
High Urban Ambient Sound Automobile traveling at 88.5 kph (55 mph) at 15.2 meters (50 feet)	80	Moderately Loud
TV-Audio, Vacuum Cleaner	70	
Normal Conversation	60	
	50	Quiet
Lower Limit Urban Ambient Sound	40	
Unoccupied Broadcast Studio	30	Very Quiet
	20	
	10	
	0	

Sources: *Noise Assessment Guidelines Technical Background*, HUD Report No. TE/NA 172; *Handbook of Noise Control*, C.M. Harris, 1979; *FHWA Highway Traffic Noise Prediction Model*, FHWA-RD-77-108, 1978.

c. Current and Projected Noise Levels

Table III.B.9-2 shows the current and projected design hour noise levels for the known noise sensitive receptors potentially impacted by all alternative routings of Route 13 and Route 7 improvements. These levels establish the noise quality of the potentially affected environment.

Table III.B.9-2.
1993 and 2022 L_{eq} Peak Hour Existing Noise Levels (dBA)

Site No.	NAC Category	Description	Noise Levels dBA 1993	2022
Lafayette County				
L1	Cemeteries	*****	50	53
L2	Churches	*****	47	50
L3	Cemeteries	*****	68	71
L4	Cemeteries	Page Cemetery	51	54
L5	Recreational Uses	Confederate Mem. State Park	50	53
L6	Recreational Uses	City Park	48-53	48-56
L7	Recreational Uses	McCords Park	48-53	48-56
L8	Schools	Emmanuel Lutheran School	60	63
L9	Churches	Emmanuel Lutheran Church	60	63
L10	Cemeteries	Salem Cemetery	60	63
L11	Cemeteries	Sharp Cemetery	56	59
L12	Institutional	John Knox Village	55	58
L13	Churches	First Assembly of God	57	60
L14	Churches	Church of Christ	55	58
L15	Cemeteries	*****	60	63
L16	Recreational Uses	Fairground Park	75	79
L17	Schools	Rolling Meadows St. School	59	63
L18	Schools	Higginsville Jr. & Sr. High	60	64
L19	Cemeteries	Mount Muncie Cemetery	54	57
L20	Cemeteries	Republican Cemeteries	49	52
L21	Recreational Uses	Maple Leaf Park	56-74	59-77
L22	Cultural Sites	Linwood Lawn	48	51
L23	Cultural Sites	Confederate Cemetery	48	51
L24	Cultural Sites	Houx-Hoefer-Rehkop House	60	63
L25	Cultural Sites	Chicago & Alton RR Depot	60	63
Johnson County				
J1	Churches	Oak Grove Community	53	56
J2	Recreational Uses	Cecil G. Grove Wildlife Area	47-55	47-58
J3	Cemeteries	Mount Maxie Cemetery	47	47
J4	Churches	Bethel Baptist Church	76	79
J5	Cemeteries	Grange Cemetery	50	53
J6	Cemeteries	*****	56	59
J7	Institutional	Future V.A. Hospital	50-56	50-59
J8	Cemeteries	Sunset Hill Cemetery	61	64
J9	Recreational Uses	Cave Hollow Park	55-70	58-73
J10	Institutional	West Central Recovery Center	63	66
J11	Cemeteries	Maxwell Cemetery	51	54
J12	Recreational Uses	Warrensburg Country Club	47-61	47-64
J13	Recreational Uses	Community Recreation Center	60	63
J14	Schools	Middle School	60	63
J15	Schools	*****	60	63
J16	Recreational Uses	City Park	47-61	47-64
J17	Recreational Uses	Lions Park	49-60	49-63
J18	Churches	Baptist Church	68	70
J19	Recreational Uses	Golf Course	47-60	47-63
J20	Churches	LDS Church	59	62
J21	Schools	High School	50-55	50-55
J22	Cemeteries	Rock Cemetery	61	64
J23	Cemeteries	*****	72	74
J24	Cemeteries	Sutten Cemetery	59	62
J25	Cemeteries	Rickas Cemetery	47	47

Site No.	NAC Category	Description	Noise Levels dBA 1993	2022
J26	Churches	Mount Zion Church	59	62
J27	Cemeteries	Greer Cemetery	47	47
J28	Cemeteries	Mount Zion Cemetery	70	73
J29	Cemeteries	*****	62	65
J30	Churches	Harmony Church	60	63
J31	Cemeteries	Shiloh Cemetery	47	47
J32	Churches	Shiloh Church	56	59
J33	Cemeteries	Providence Cemetery	59	62
J34	Recreational Uses	Fair Ground	50	53
J35	Cemeteries	Mineral Creek Cemetery	60	63
J36	Cultural Sites	Garden of Eden Station	65	68
J37	Cultural Sites	Old Johnson Co. Courthouse	60	63
J38	Cultural Sites	Johnson Co. Courthouse	61	64
Henry County				
H1	Cemeteries	Wade Cemetery	47	47
H2	Churches	Shawnee Mound Church	60	63
H3	Cemeteries	Shawnee Mound Cemetery	59	62
H4	Churches	Hickory Grove Church	60	63
H5	Cemeteries	Hickory Grove Cemetery	47	47
H6	Recreational Uses	Connor O. Fewel Wildlife Area	47-60	47-63
H7	Churches	Quarles Baptist Church	57	60
H8	Cemeteries	*****	47	47
H9	Churches	Clinton Fellowship	60	63
H10	Cemeteries	Deer Creek Cemetery	60	63
H11	Cemeteries	Antioch Cemetery	50	53
H12	Institutional	Hospital	61	64
H13	Recreational Uses	Clinton Country Club	47-60	47-63
H14	Recreational Uses	Owen Creek Golf Club	55-66	55-70
H15	Cemeteries	Englewood Cemetery	47-60	47-63
H16	Churches	Lutheran Church	62	66
H17	Churches	St. Paul's Episcopal Church	62	66
H18	Cemeteries	Oak Grove Cemetery	60	63
H19	Recreational Uses	Artesian Park	47-60	47-63
H20	Recreational Uses	Bethlehem State Wildlife Area	47-68	47-72
H21	Recreational Uses	Grand River Bottoms	47-65	47-68
H22	Recreational Uses	Poague State Wildlife Area	47-69	47-73
H23	Cemeteries	Fields Creek Cemetery	60	63
H24	Recreational Uses	Golf Course	50-68	50-72
H25	Cultural Sites	Dorman House	60	63
H26	Cultural Sites	Williams House	60	63
H27	Cultural Sites	An. Busch Brewing Building	60	63
H28	Recreational Uses	KATY Trail State Park	65	68

10. Public Lands

Public Lands are present throughout the Route 13 corridor. These areas range from city parks to state wildlife management areas and fishing lakes and provide a variety of recreational opportunities to both the local and regional residents. Some public lands, such as Truman Lake, are nationally known and are a destination in and of themselves. These recreational resources on public lands are important to local and regional economies and the state as a whole.

These recreational resources are owned and managed by public agencies including the federal, state, and local governments. Large federal ownerships such as the Corps of Engineers lakes and reservoirs and the National Forests are multiple use facilities which typically provide for a variety of uses including transportation.

There are no National Parks or Forests in the Route 13 corridor. The U.S. Army Corps of Engineers (COE) is a major land manager in Henry County. The two major state agencies managing multi-purpose and recreational lands in the Route 13 corridor are the Missouri Department of Natural Resources (MDNR) and the Missouri Department of Conservation (MDC).

The public lands, parks and recreational areas were mapped and used as environmental control points for the alternative definitions. Exhibit III.B.10-1 shows the public lands and recreational resources of the Route 13 corridor area.

Public lands are an important environmental control point due to the provisions of the Section 4(f) of the Federal Aid Highway Act of 1968. Recreational resources which are determined by FHWA to be eligible will require analysis that demonstrates there is no feasible and prudent alternative to the taking of these public parks for a transportation purpose and that all possible planning to minimize harm to such resource has been undertaken. Those parks which appear to meet the basic purpose and intent of the Section 4(f) are identified as prime candidates for avoidance unless the avoidance would have other serious socio-economic or environmental consequences. It is for these reasons that these public lands are identified.

Public Lands which are managed as multiple-use public land holdings can have areas which are eligible as Section 4(f) resources but also may have areas which may not be eligible as Section 4(f) resources. The Section 4(f) Policy paper of FHWA states that the areas which would be subject to Section 4(f) are those portions of the multiple-use holdings which are designated by statute or identified in the management plans of the administering agency as being for park, recreation, or wildlife or waterfowl refuge purposes and which are determined to be significant for such purpose. Regarding this project, the KATY Trail State Park is a park and not a multi-use area. The Bethlehem Wildlife Management Area's major purpose is the management of wildlife and the conservation of habitat.

For example, a multiple use area, such as Truman Lake, has developed recreational areas such as campgrounds, picnic grounds and boat launching areas. These recreational areas would likely be subject to the provisions of Section 4(f) whereas the remaining areas which are managed for timber production or wildlife habitat or similar uses may not be eligible.

The Land and Water Conservation Fund (LWCF) has been providing grants for recreational land acquisition and development for many years. Some of the public lands within the Route 13 Corridor have been the recipient of these funds. Neither the KATY Trail State Park or the WMA have received any LWCF acquisition or development assistance.

Public lands and recreational resources located outside of the corridor were mapped and identified for orientation purposes. The public lands which are located within the Route 13 corridor, by county and managing agency, are listed below and the classification of the

public land and recreation area with regard to probable Sections 4(f) & 6(f) considerations, as appropriate to the Route 13 Corridor. The Section 6(f) data is as of June 30, 1995.

Lafayette County:

- Confederate Memorial State Park (MDNR) Section 4(f) & 6(f)
- Fairground Park (Higginsville) Section 4(f)
- Tennis Courts (Higginsville) Section 4(f) & 6(f)
- Higginsville City Lake (MDC) may include 4(f)
- Maple Leaf Lake Conservation Area (MDC) may include 4(f)

Johnson County:

- Hazel Hill Community Lake (MDC) may include 4(f)
- Grover Park & Municipal Swimming Pool (Warrensburg) Section 4(f) & 6(f)
- New unnamed City Park (Warrensburg) Section 4(f)
- Lions Park & Lake (Warrensburg) Section 4(f) & 6(f)
- Pertle Springs (Central Missouri State University) Section 4(f)
- Cave Hollow Park (Warrensburg) Section 4(f) & 6(f)

Henry County:

- Connor O. Fewel State Wildlife Area (MDC) may include 4(f)
- KATY Trail State Park (MDNR) Section 4(f)
- Haysler A. Poague State Wildlife Area (MDC) may include 4(f)
- Grand River Bottoms State Wildlife Area/Refuge (COE/MDC) may include 4(f)
- Hurt Park (Clinton) Section 4(f) & 6(f)
- Artesian Park (Clinton) Section 4(f) & 6(f)
- BMX Track (Clinton) Section 4(f) & 6(f)
- Bethlehem Wildlife Management Area (COE & MDC) may include 4(f)
- Harry S. Truman Reservoir (COE) may include 4(f)

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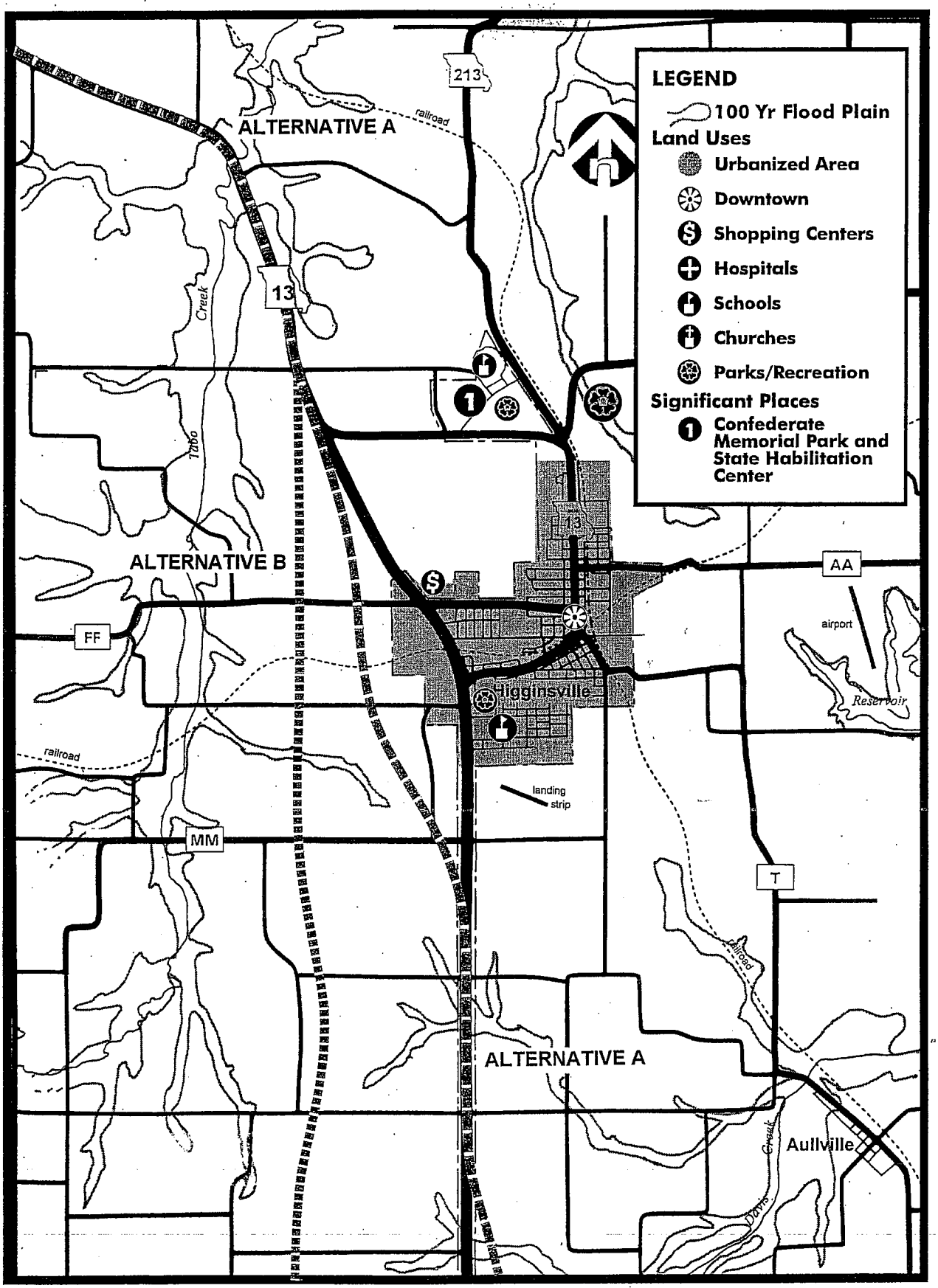


EXHIBIT III.A.1-1 Generalized Existing Land Use - Higginsville

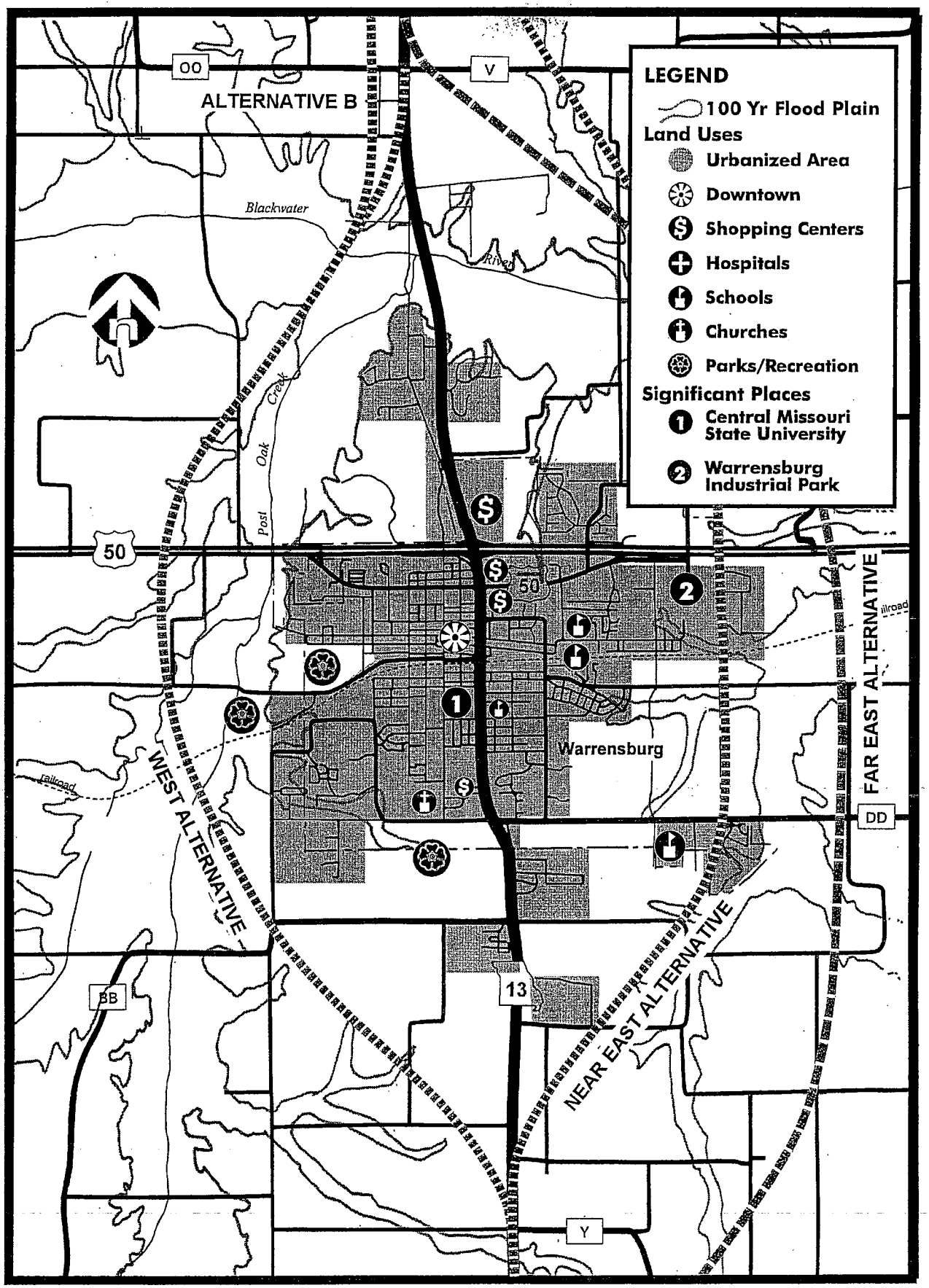
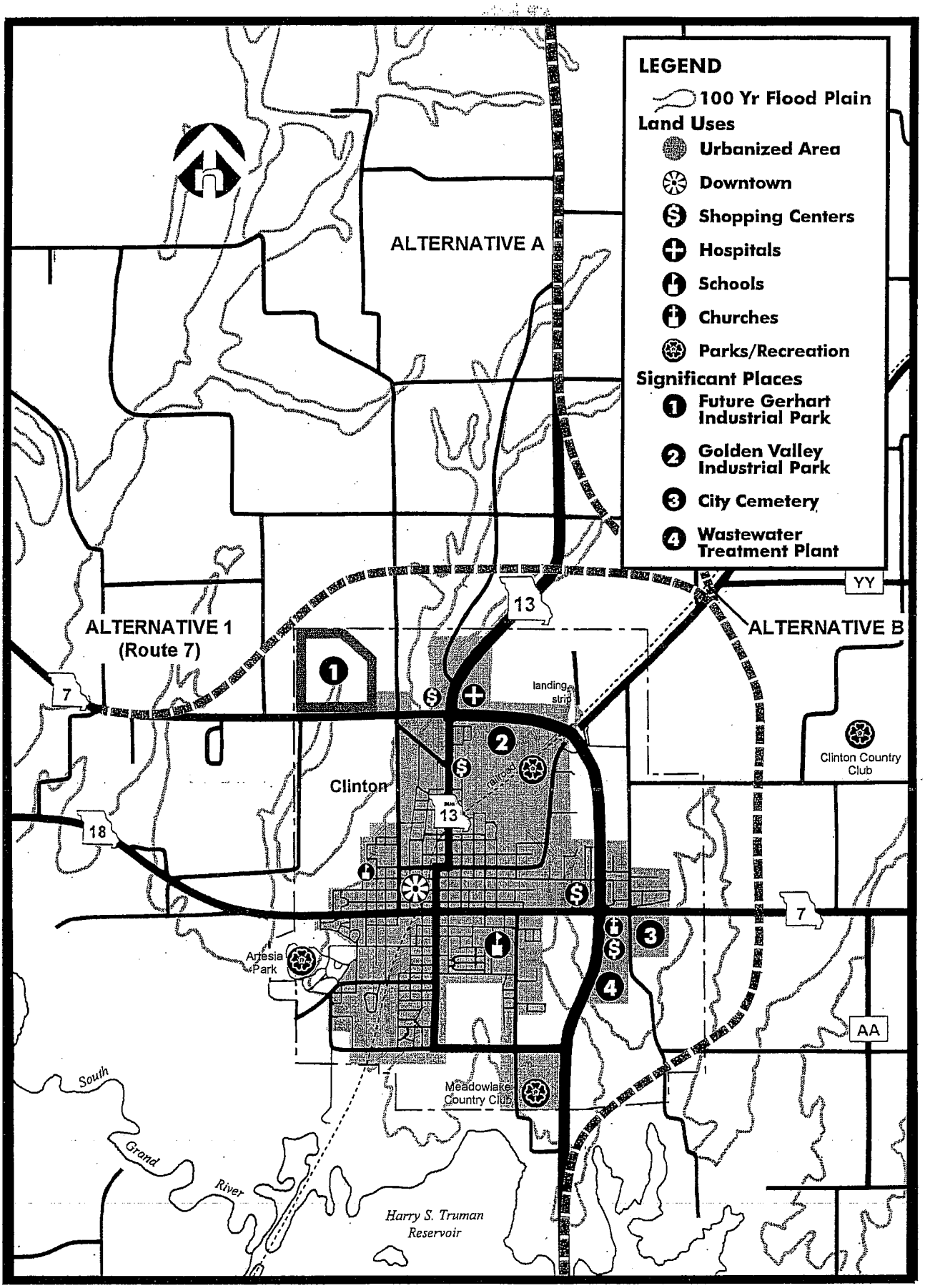


EXHIBIT III.A.1-2 Generalized Existing Land Use - Warrensburg



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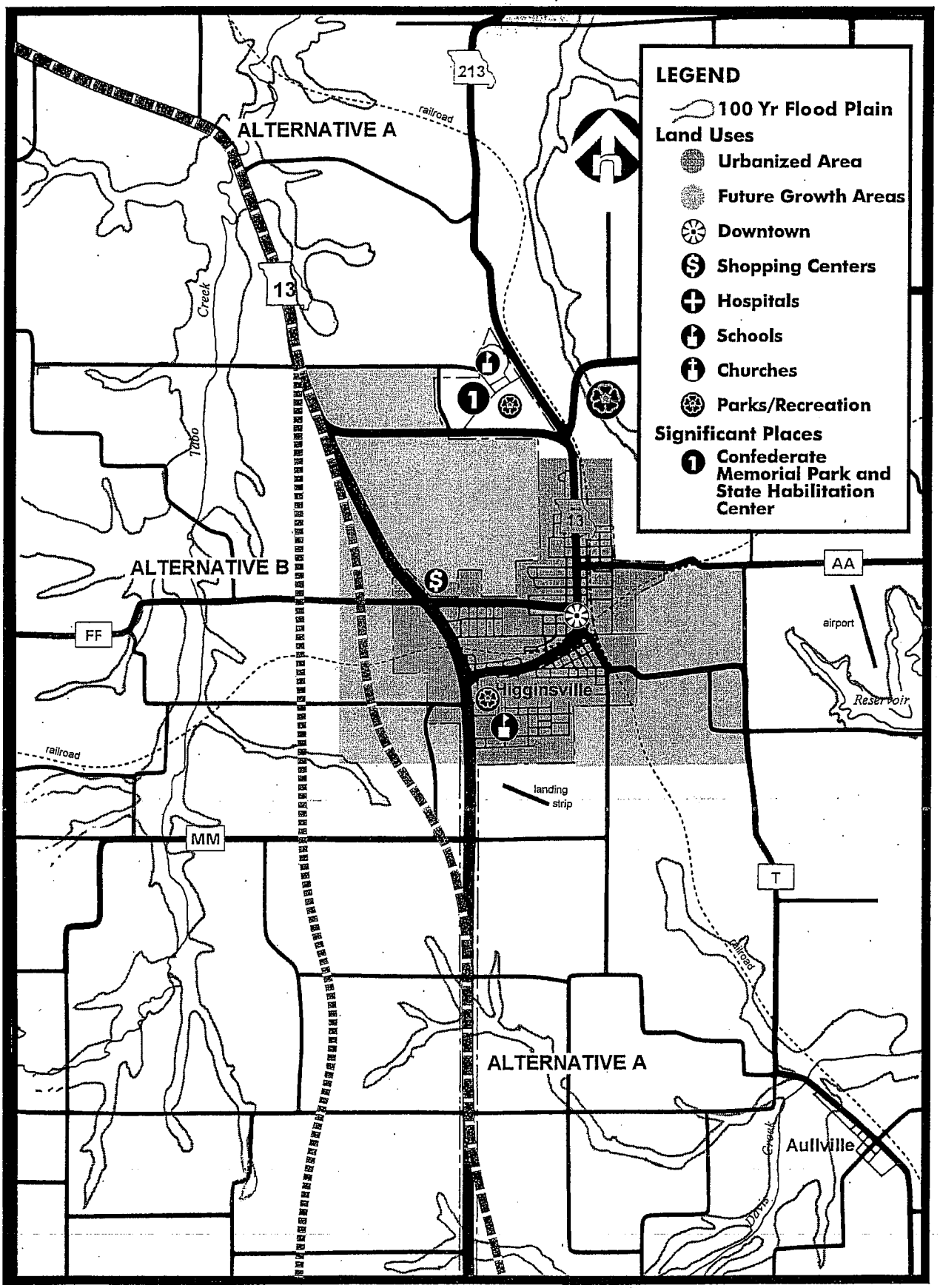
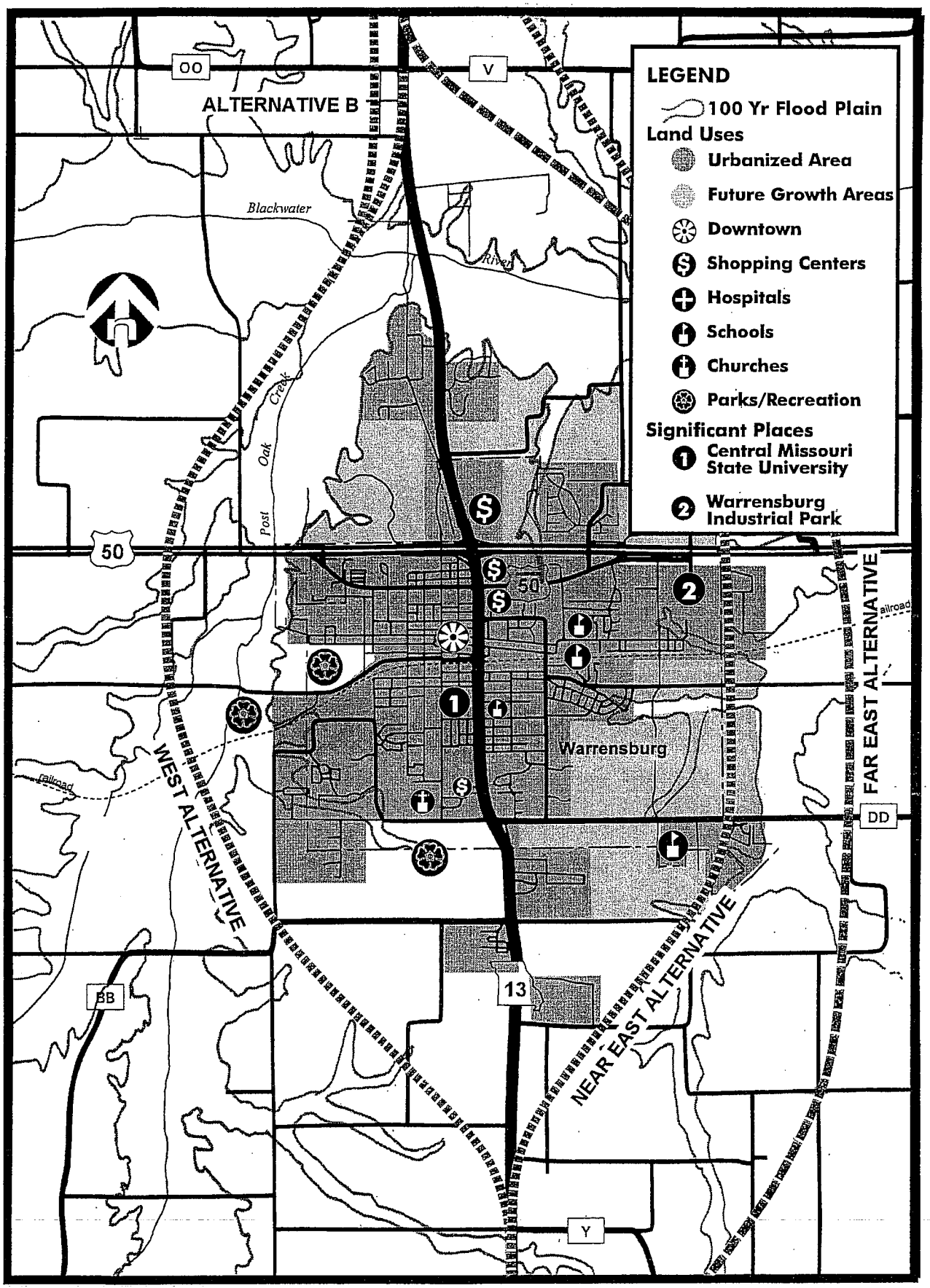


EXHIBIT III.A.1-4 Generalized Future Land Use - Higginsville



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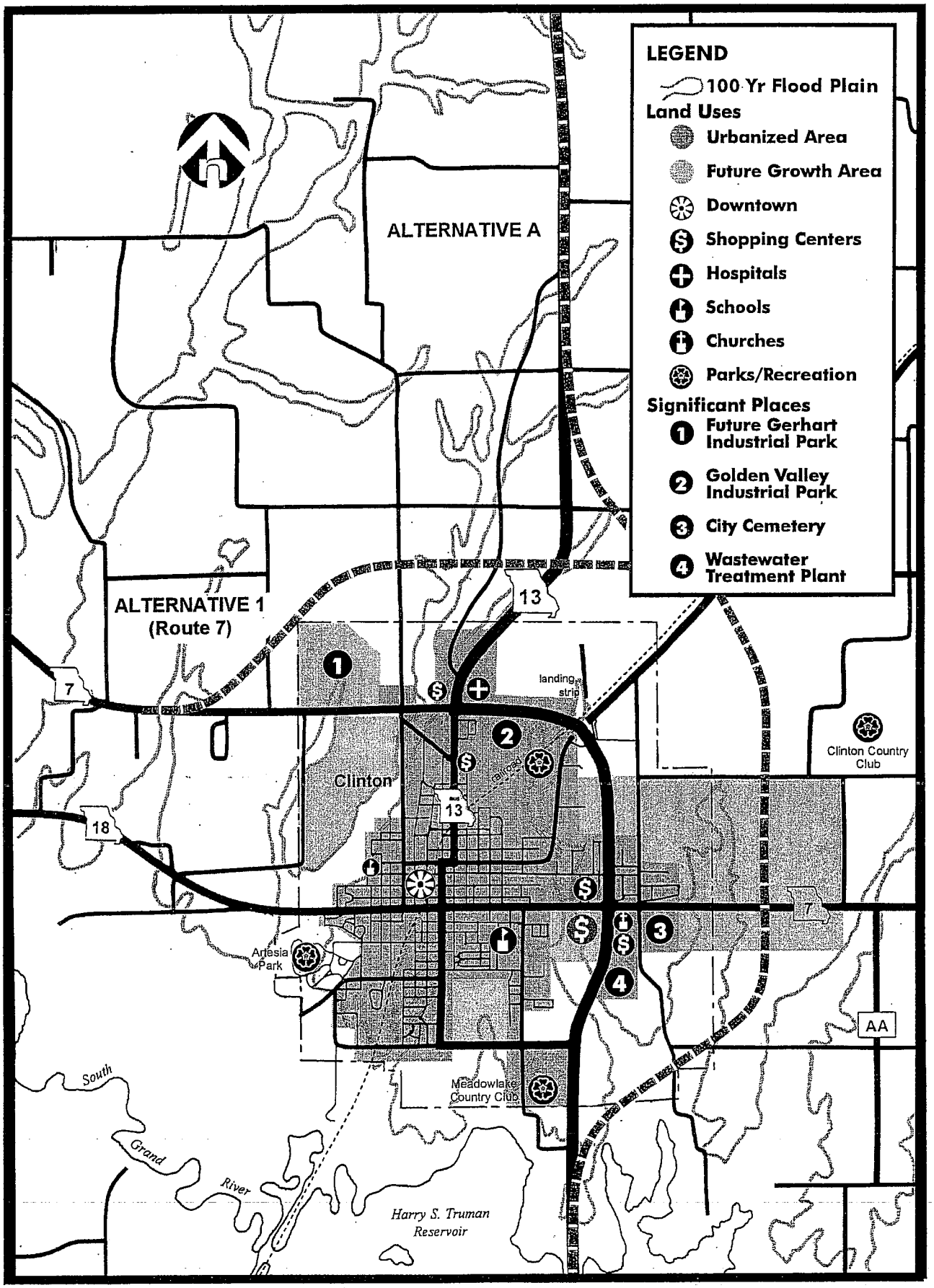
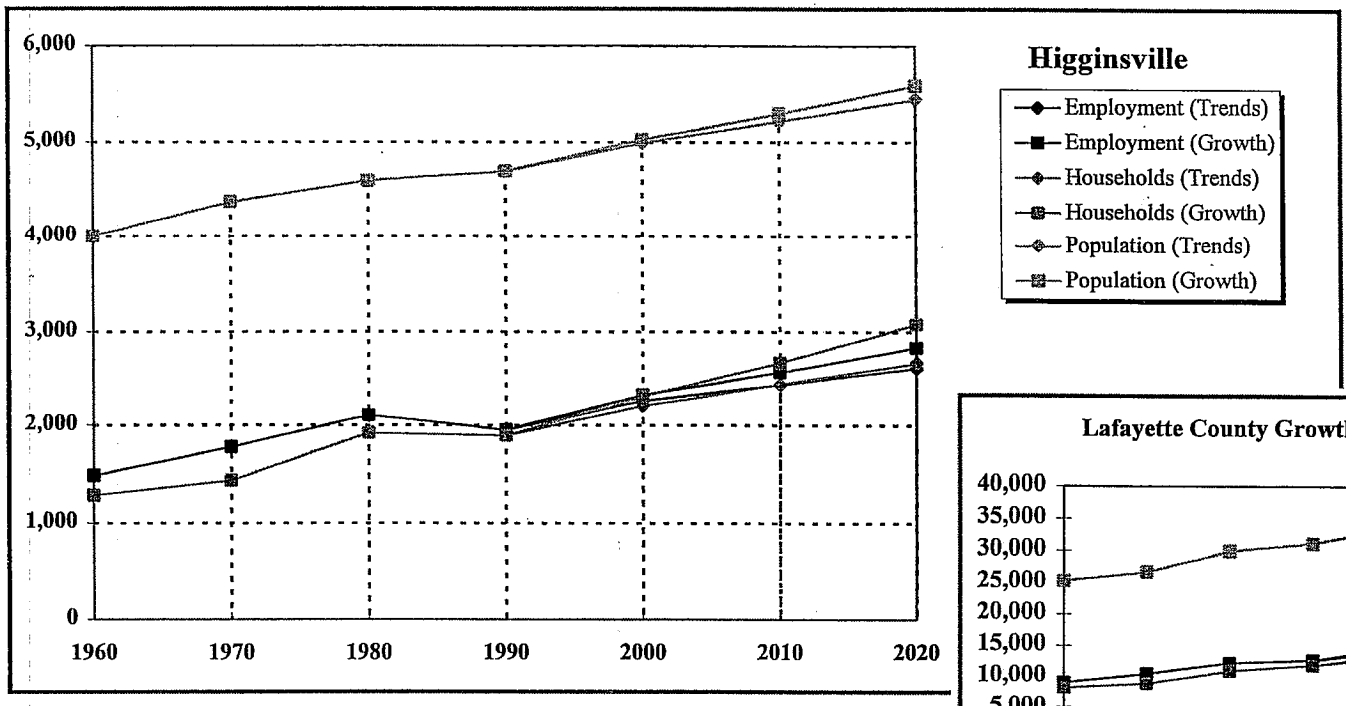
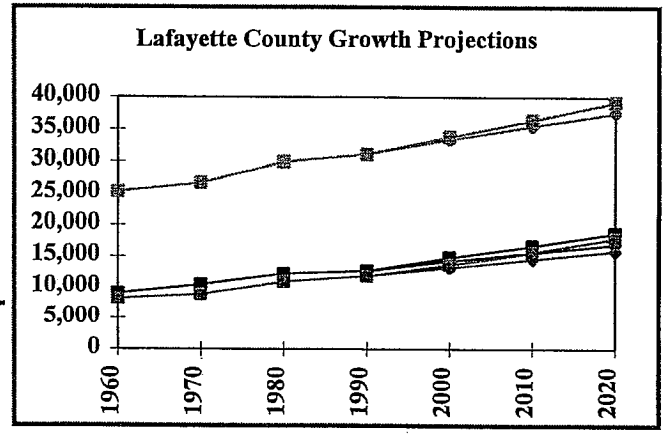


EXHIBIT III.A.1-6 Generalized Future Land Use - Clinton



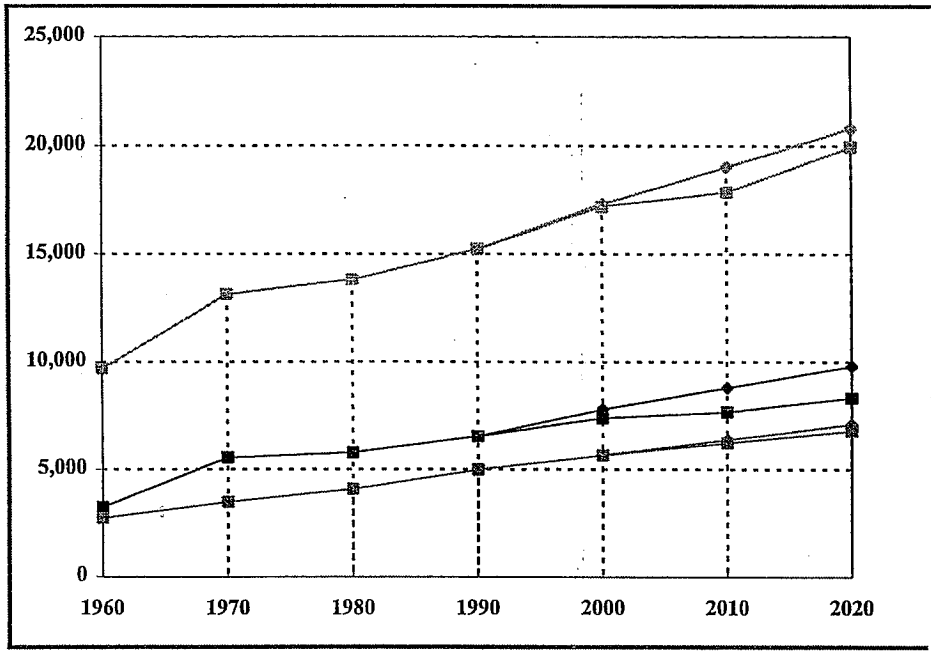


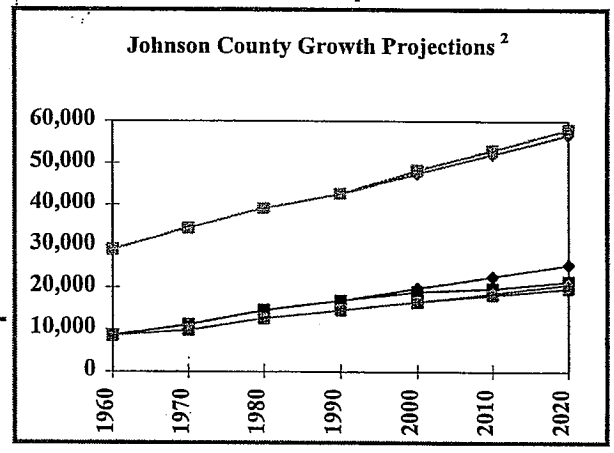
Higginsville Projections	1990	2000	2010	2020	Net Change
Employment (Trends)	1,949	2,258	2,431	2,603	654
Employment (Growth)	1,949	2,320	2,561	2,828	879
Households (Trends)	1,887	2,203	2,432	2,661	774
Households (Growth)	1,887	2,305	2,664	3,078	1,191
Population (Trends)	4,693	4,989	5,218	5,447	754
Population (Growth)	4,693	5,028	5,299	5,585	892

Higginsville 2020 Land Area Needs (Growth)[1]	Acres
Employment	50
Commercial	25
Average Density Residential	476
Rural Density Residential	1,191

[1] Approximate.

EXHIBIT III.A.2-1 Future Growth Projections - Higginsville/Lafayette Co.





Warrensburg Projections[1]	1990	2000	2010	2020	Net Change
Employment (Trends)	6,540	7,787	8,786	9,786	3,246
Employment (Comp Plan)[4]	6,540	7,547	7,666	8,556	2,016
Households (Trends)	4,985	5,656	6,382	7,108	2,123
Households (Comp Plan)[4]	4,985	5,658	6,225	6,793	1,808
Population (Trends)	15,244	17,303	19,038	20,772	5,528
Population (Comp Plan)[4]	15,244	17,195	17,870	19,944	2,626

Warrensburg 2020 Land Area Needs (Trends)[3]	Acres
Employment	190
Commercial	60
Average Density Residential	850
Rural Density Residential	2,125

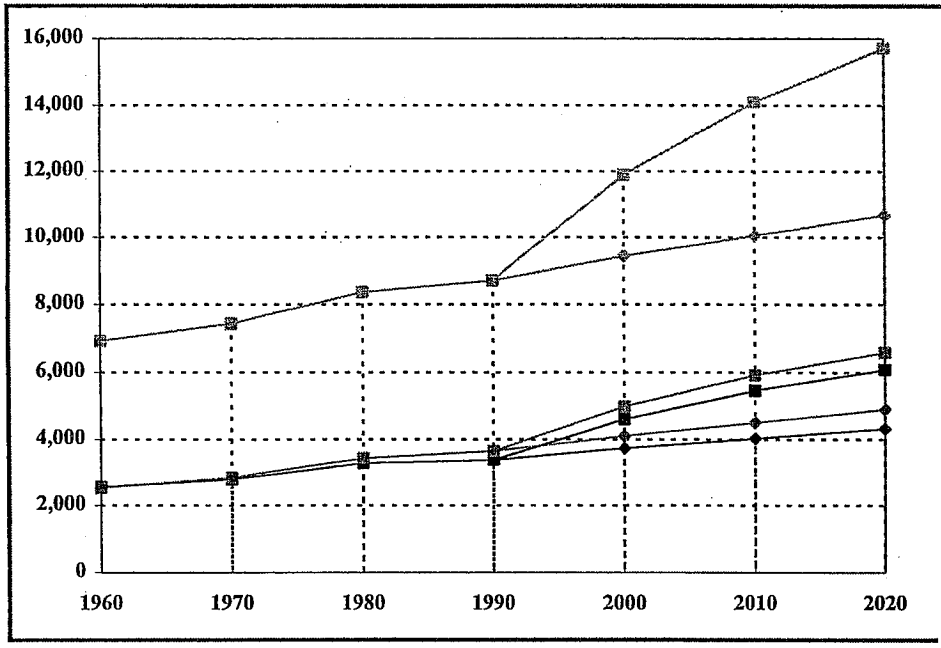
[1] Employment and household projections assume a consant relationship between population, employment and households based on the 1990 relationship.

[2] Assumes a constant relationship between the City population and the County population.

[3] Approximate.

[4] 2020 Comp Plan projections reached by projecting the actual Comp Plan projections to 2010 through 2020 using a linear trend model.

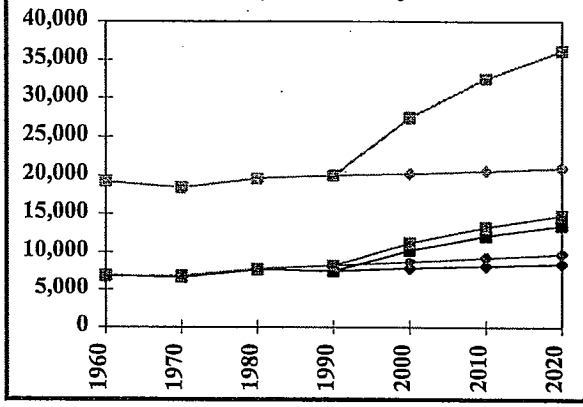
EXHIBIT III.A.2-2 Future Growth Projections - Warrensburg/Johnson Co.



Clinton

- Employment (Trends)
- Employment (Comp Plan)
- Households (Trends)
- Households (Comp Plan)
- Population (Trends)
- Population (Comp Plan)

Henry County Growth Projections[2]



Clinton Projections[1]

	1990	2000	2010	2020	Net Change
Employment (Trends)	3,369	3,730	4,025	4,321	952
Employment (Comp Plan)	3,369	4,608	5,459	6,079	2,710
Households (Trends)	3,651	4,107	4,506	4,905	1,254
Households (Comp Plan)	3,651	4,993	5,916	6,587	2,936
Population (Trends)	8,703	9,424	10,051	10,678	1,975
Population (Comp Plan)	8,703	11,903	14,103	15,703	7,000

Clinton 2020 Land Area Needs (Comp Plan)[3]

	Acres
Employment	155
Commercial	55
Average Density Residential	1,774
Rural Density Residential	2,936

[1] Employment and household projections assume a constant relationship between population, employment and households based on the 1990 relationship.

[2] Assumes a constant relationship between the City population and the County population.

[3] Approximate.

EXHIBIT III.A.2-3 Future Growth Projections - Clinton/Henry Co.

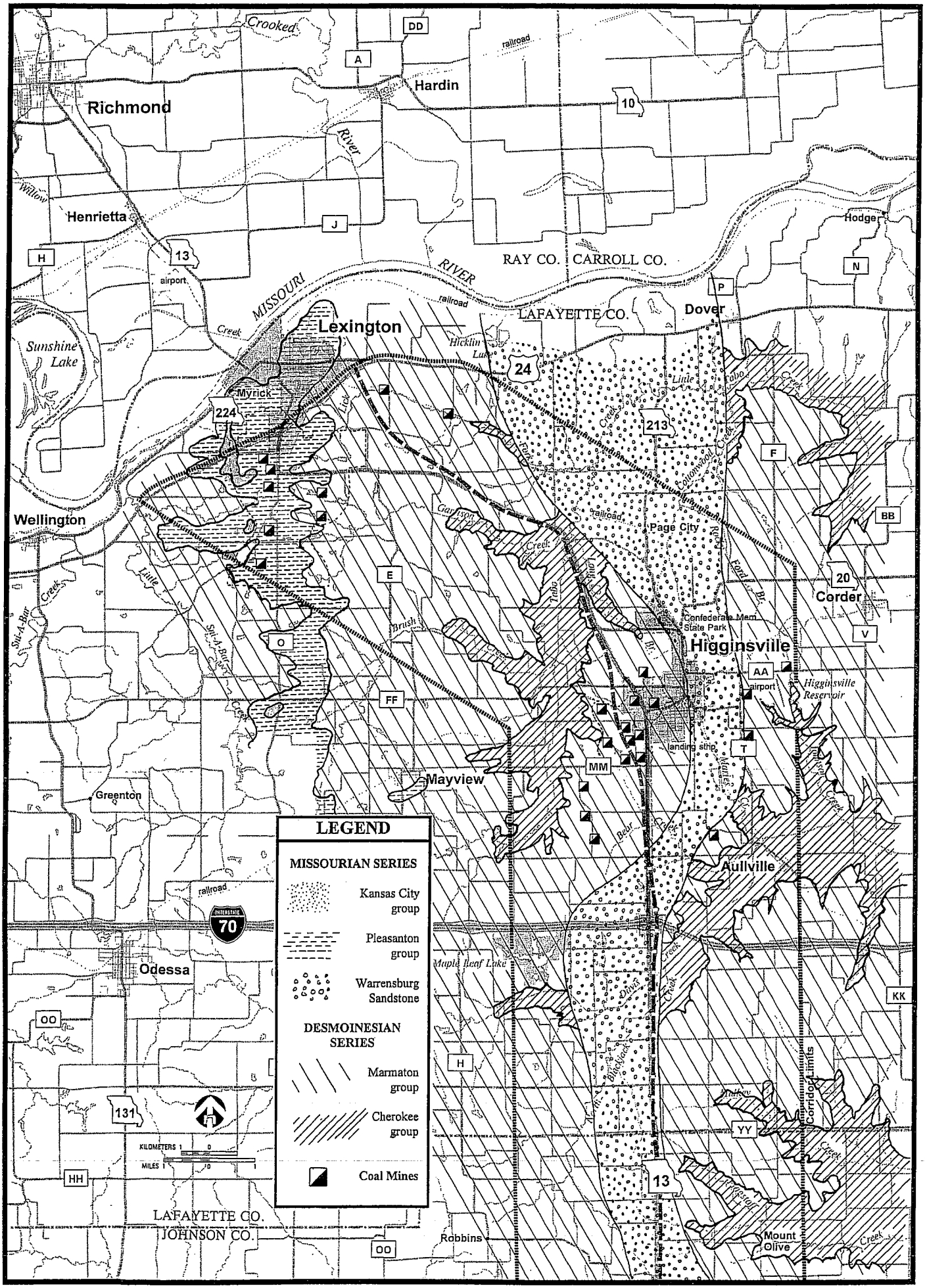


EXHIBIT III.B.3-1 Geologic Conditions Map - Lafayette Co.

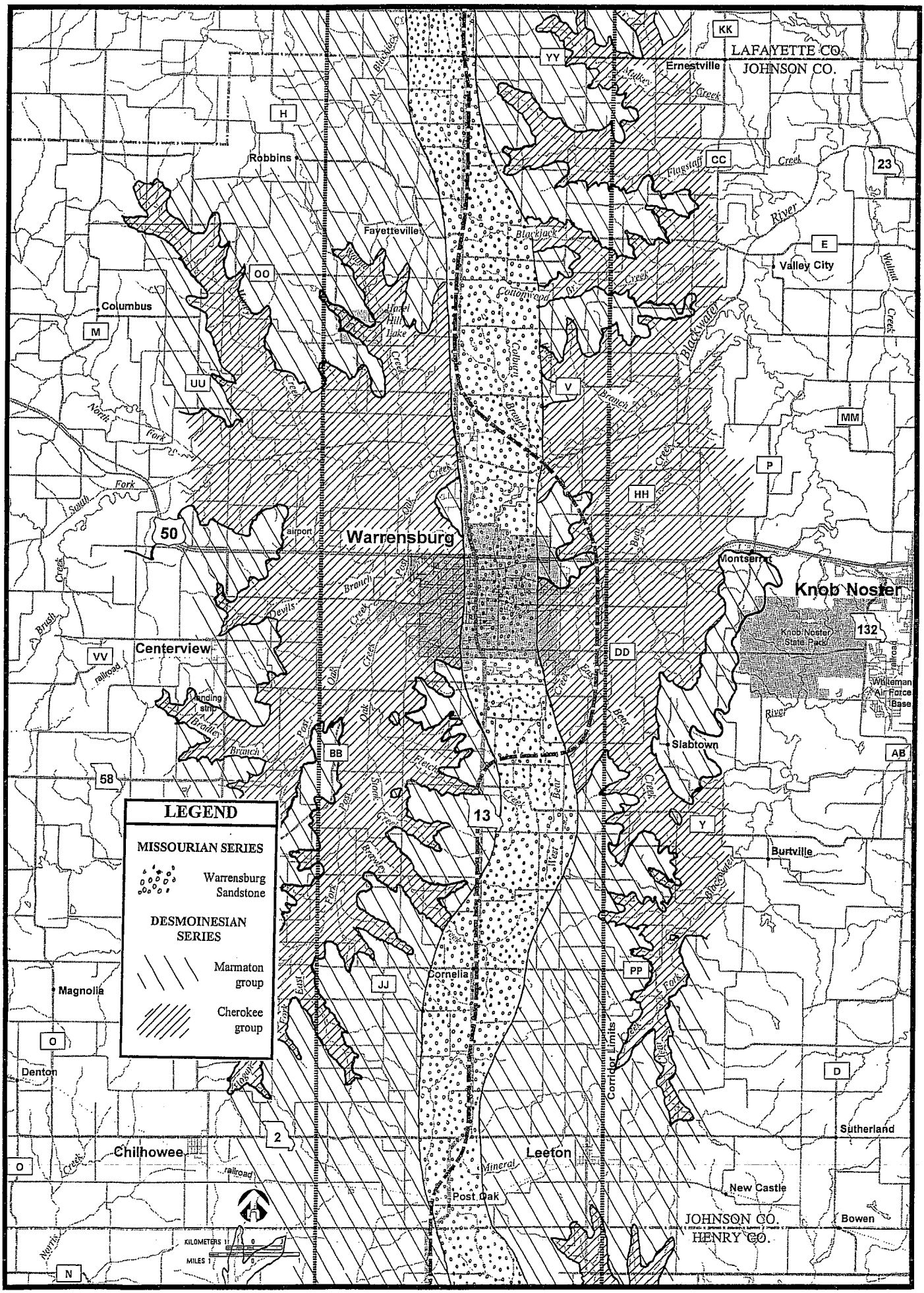
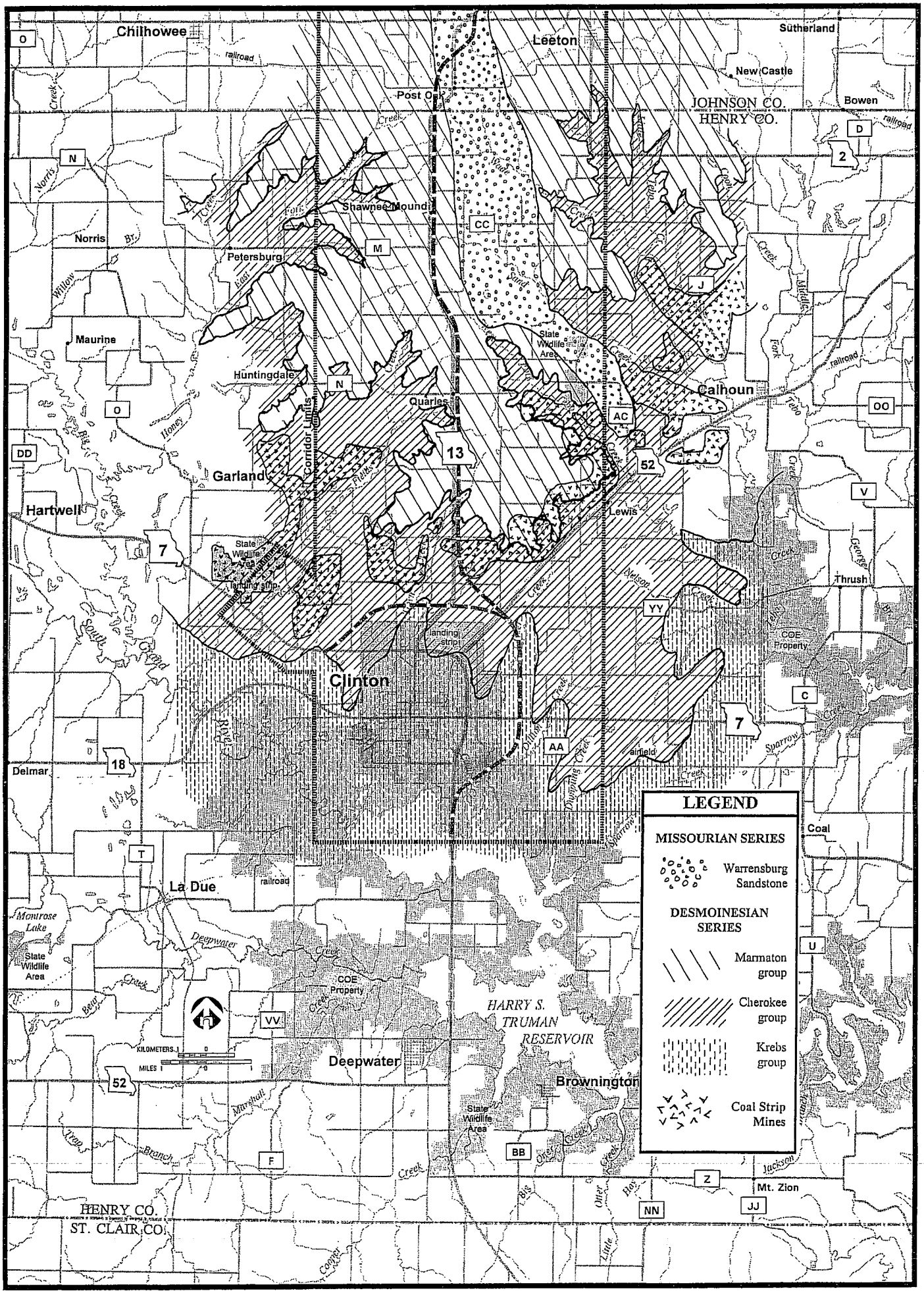


EXHIBIT III.B.3-1 Geologic Conditions Map - Johnson Co.



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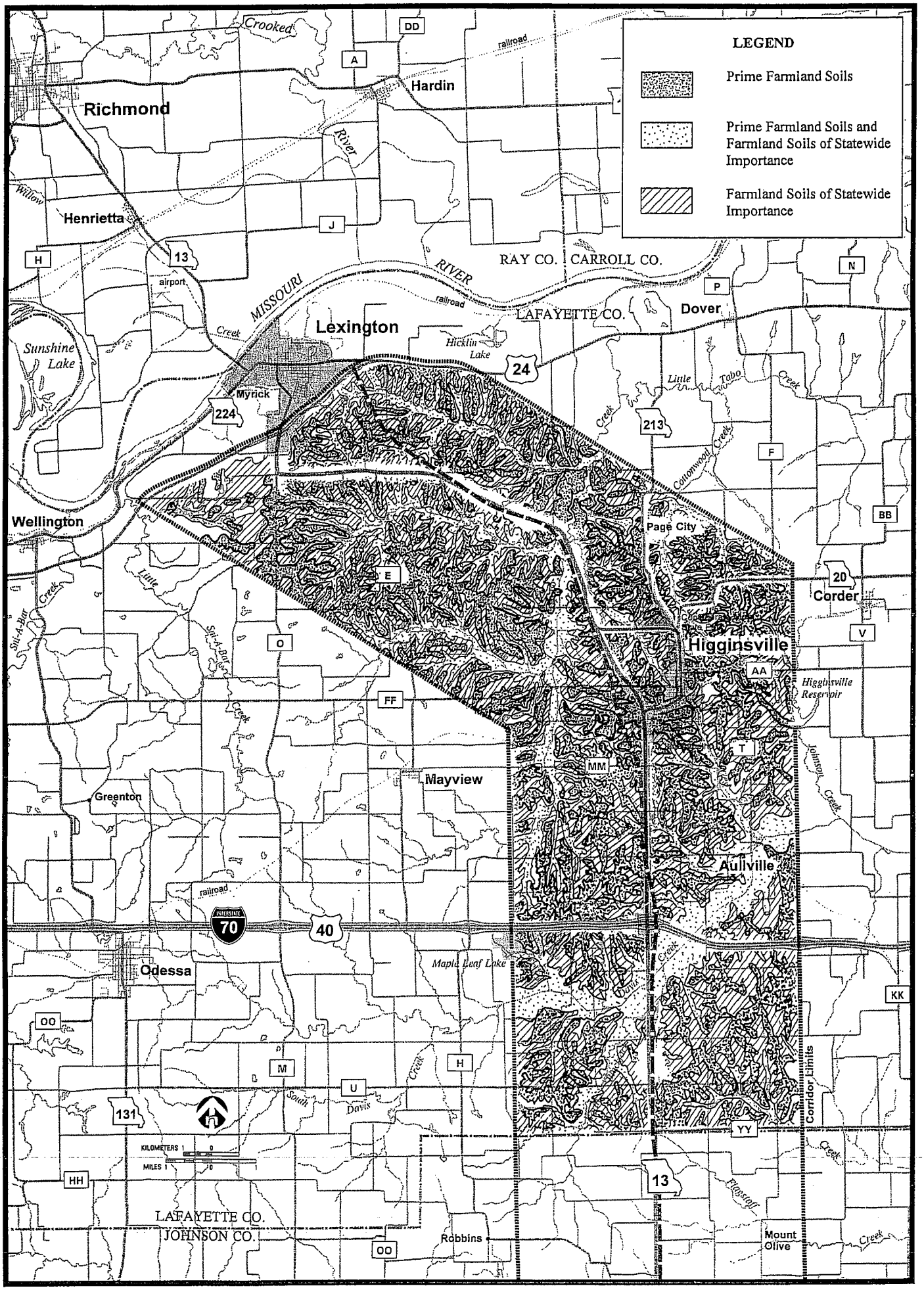
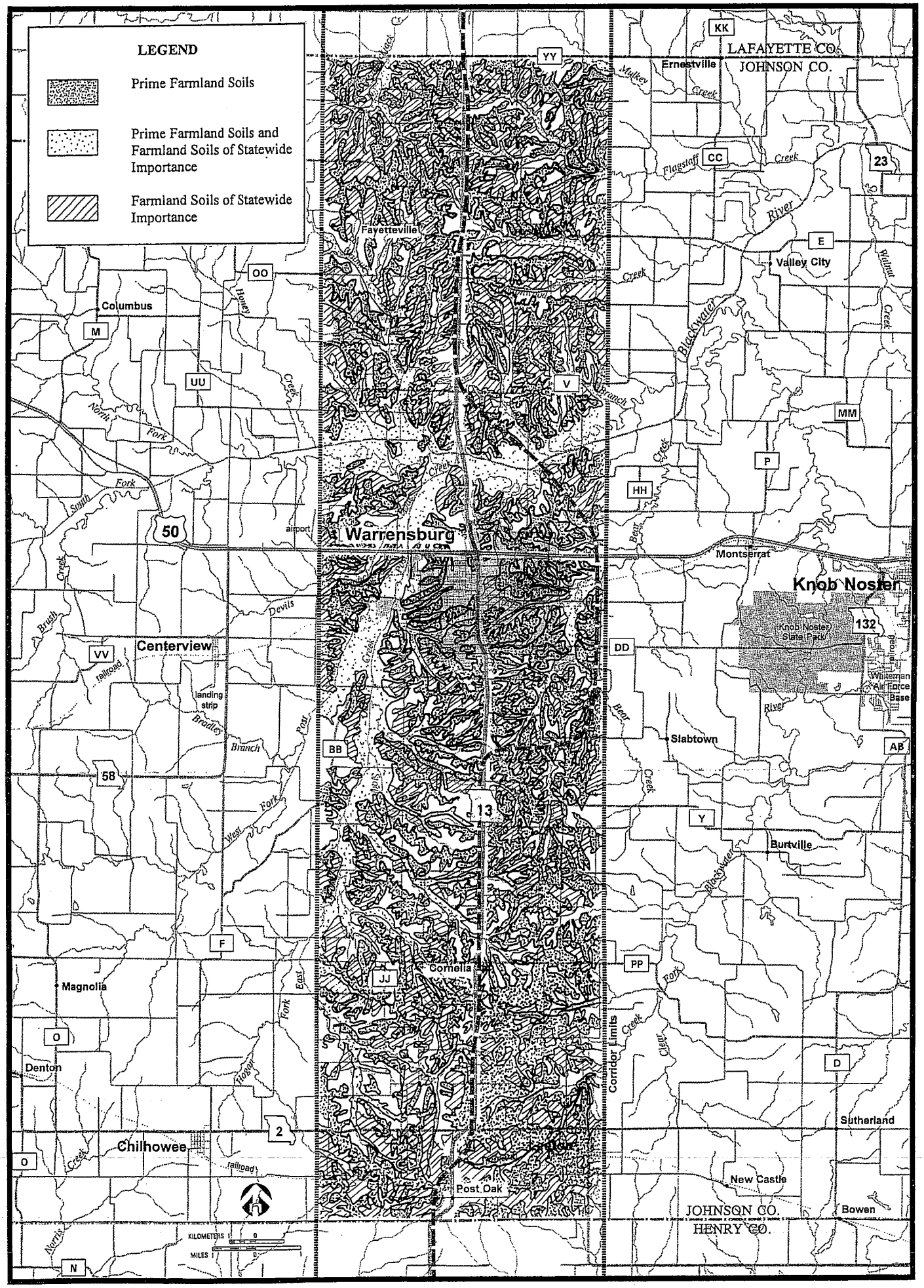


EXHIBIT III.B.3-2 Prime Farmland - Lafayette Co.



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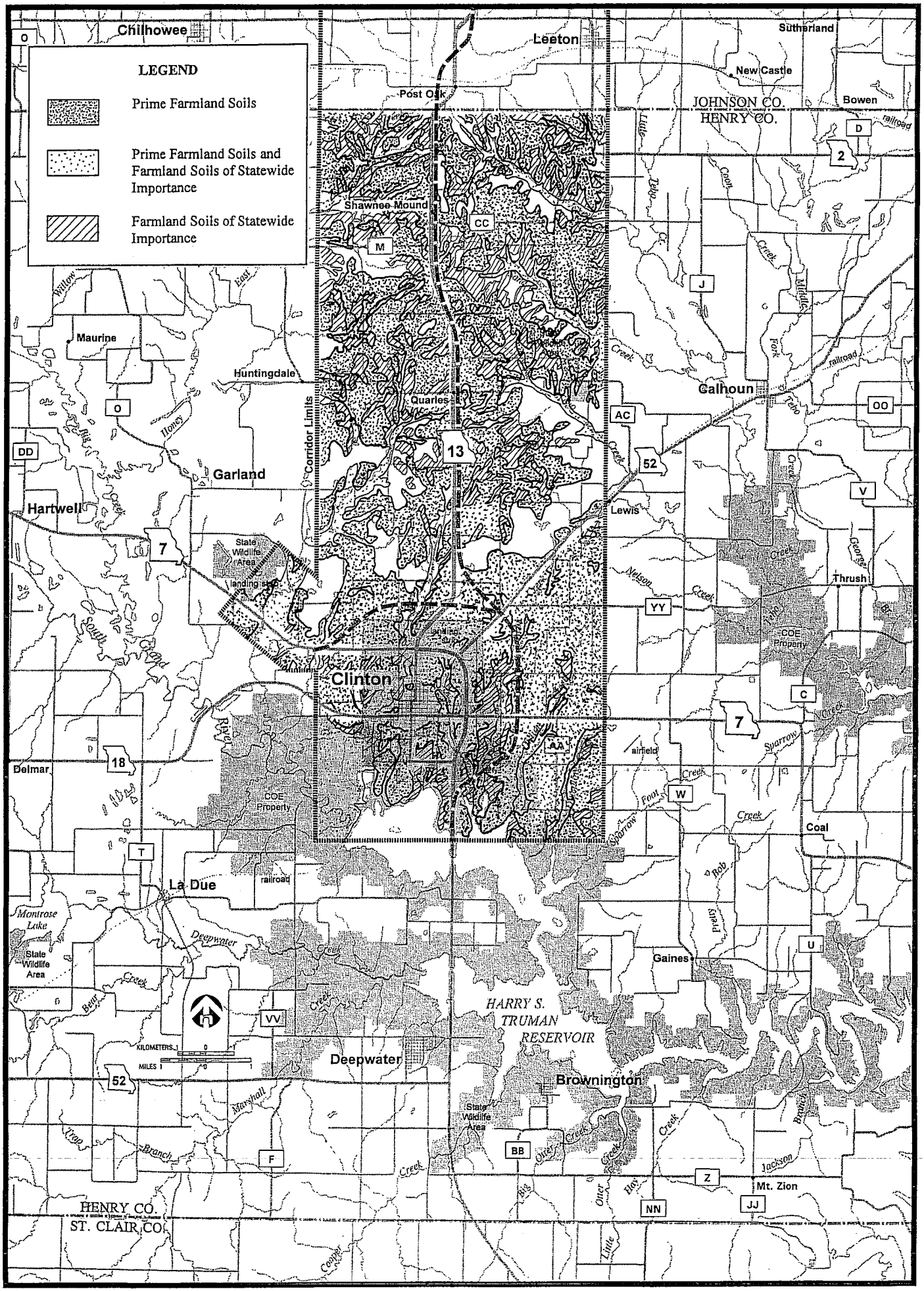

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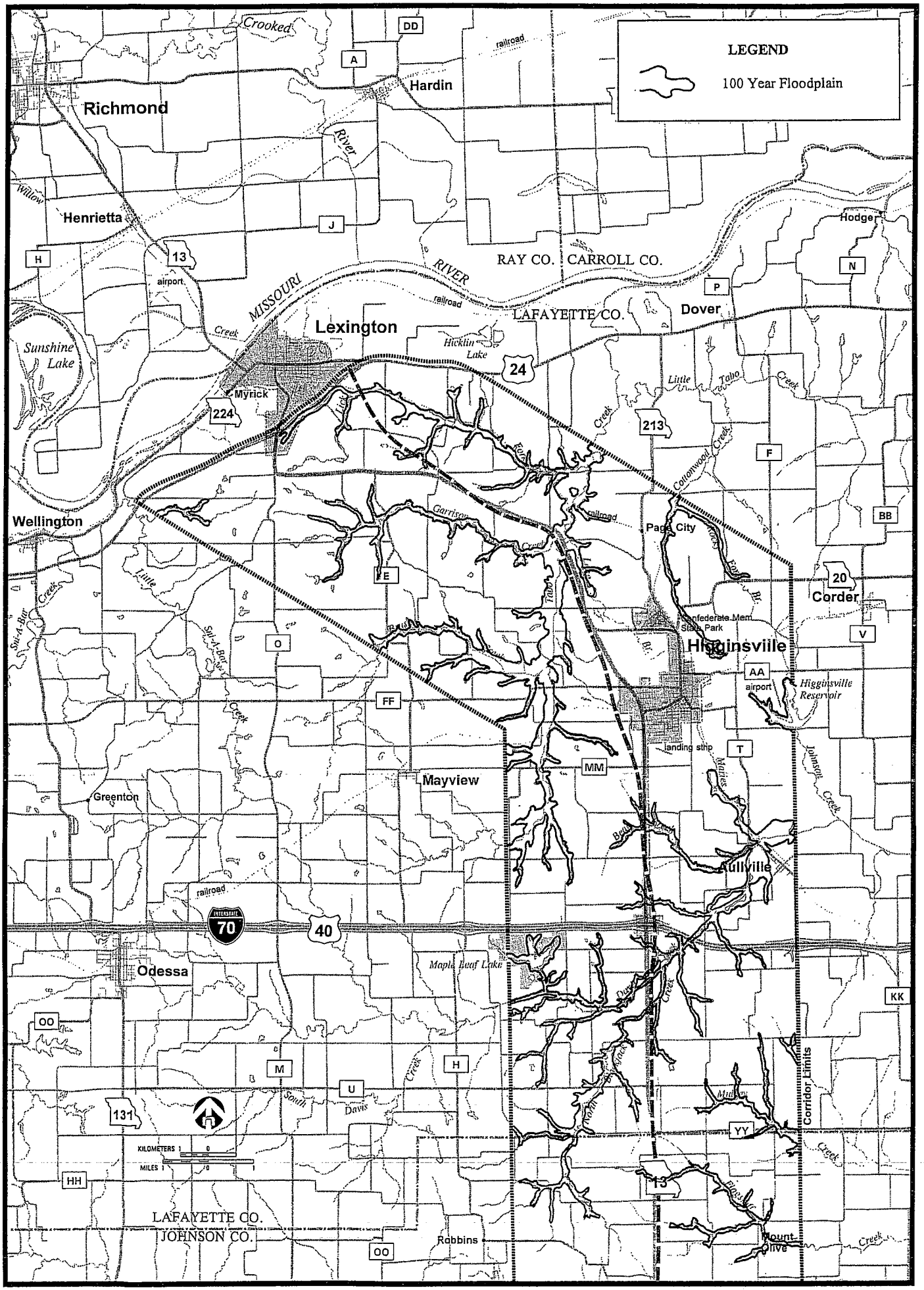

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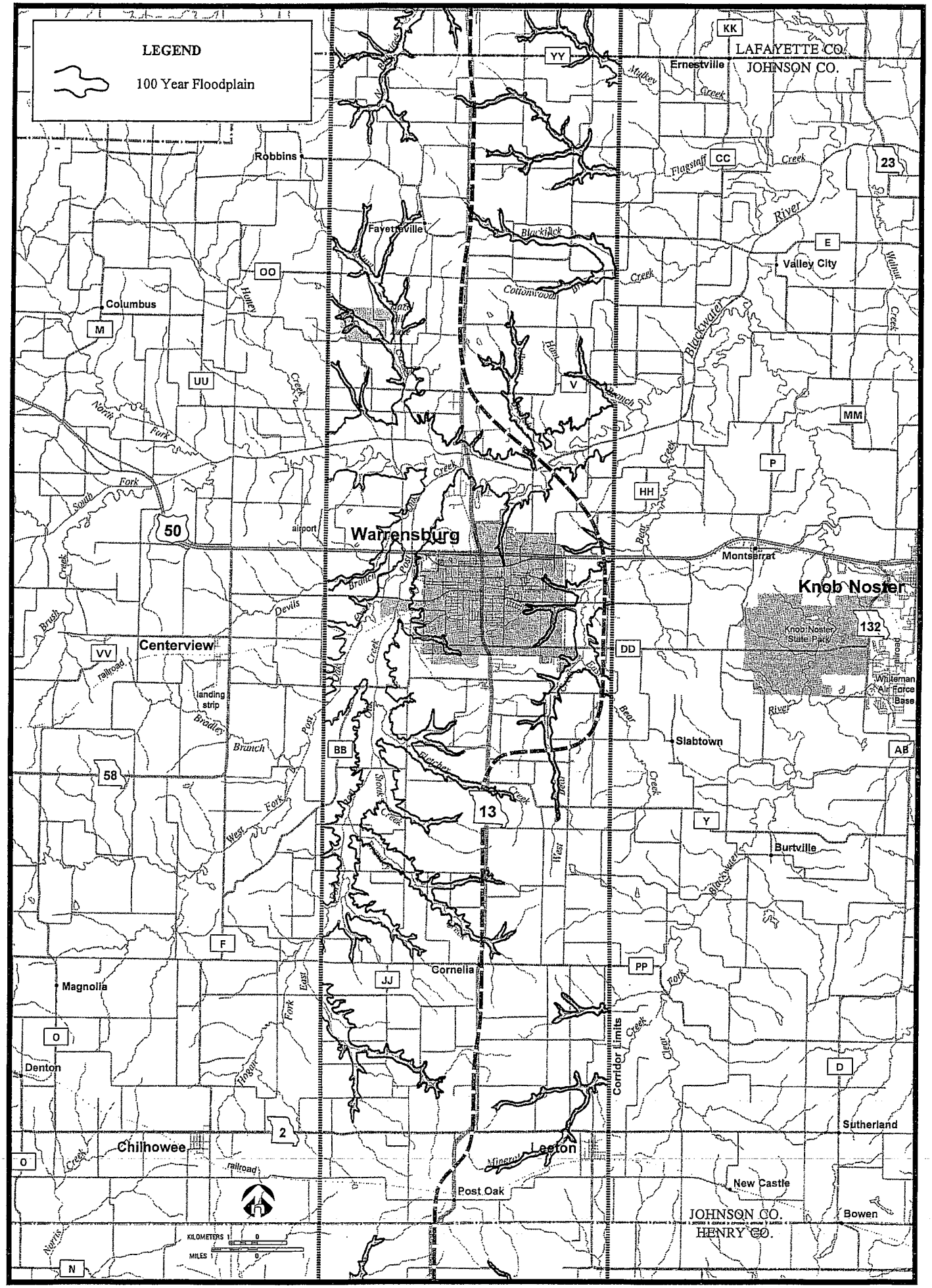

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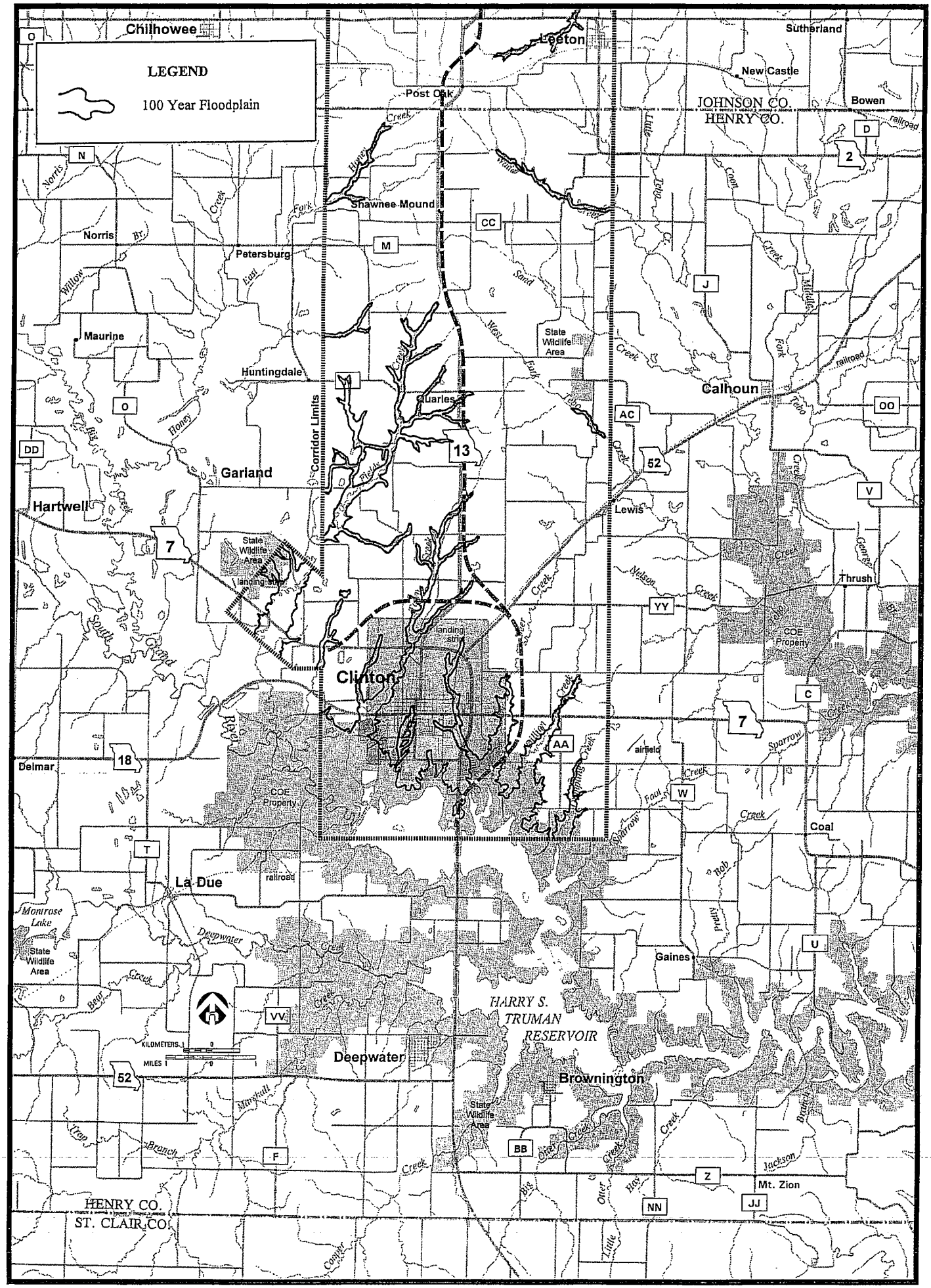

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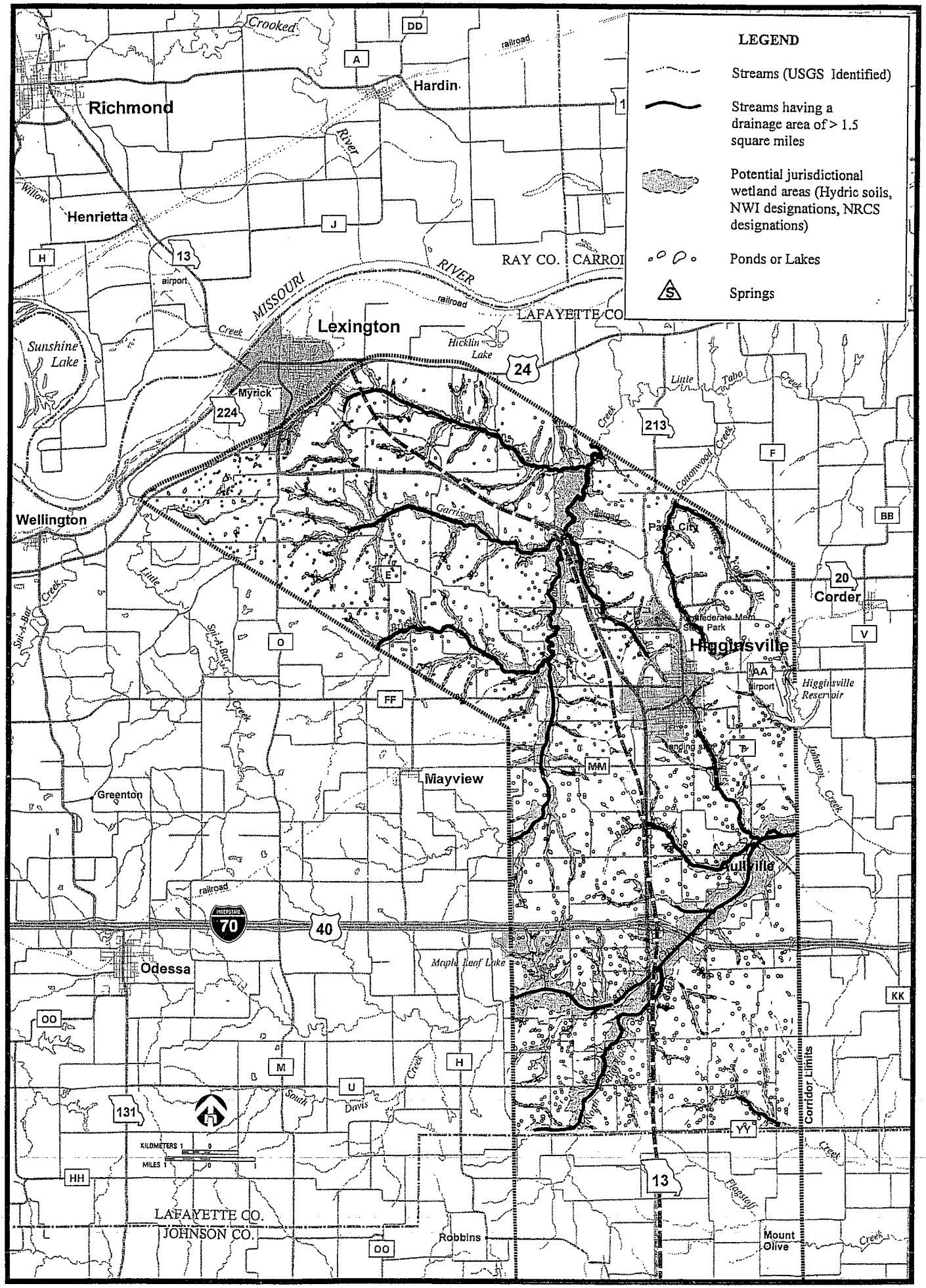


EXHIBIT III.B.4-2 Wetlands - Lafayette Co.

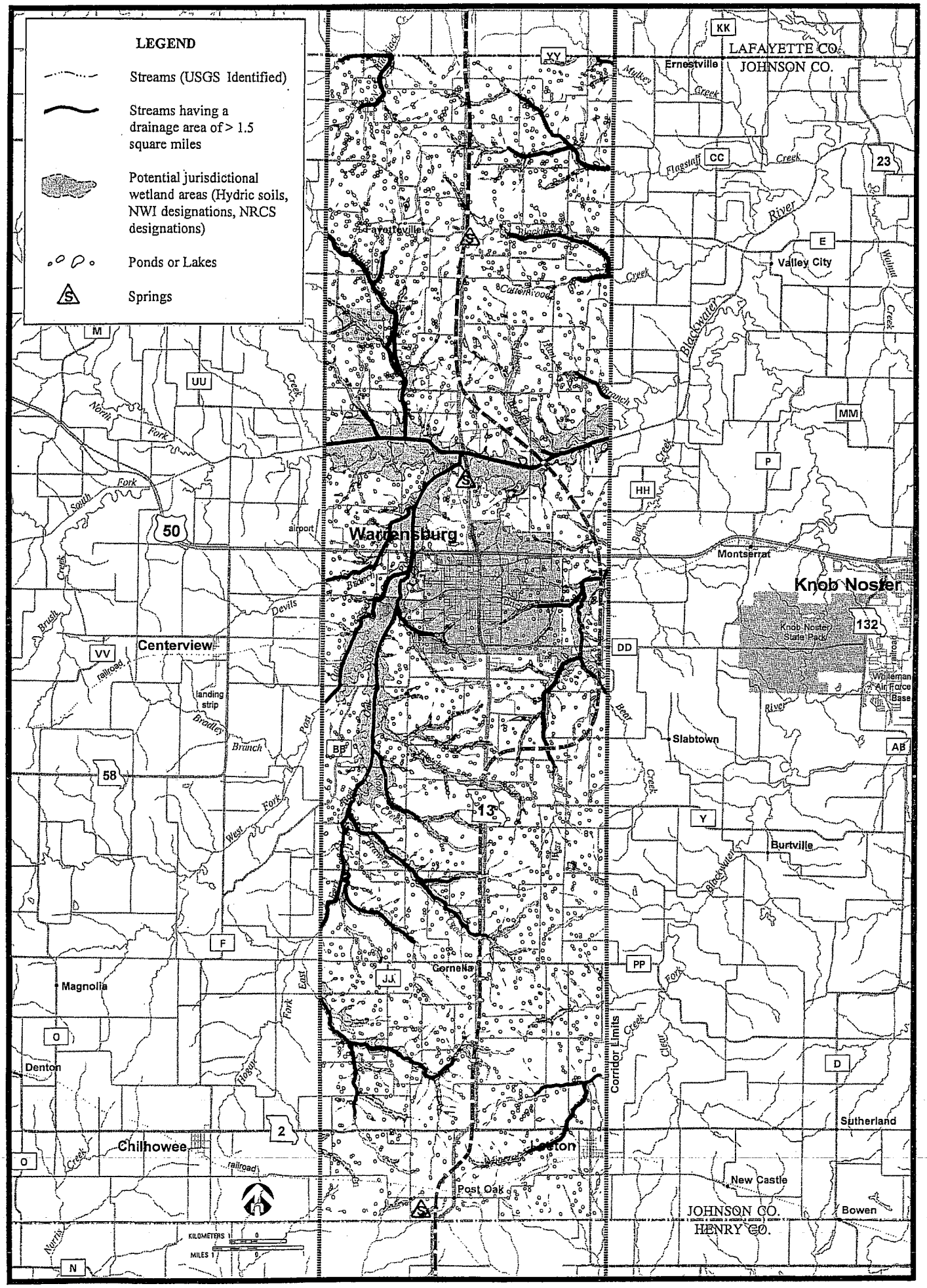


EXHIBIT III.B.4-2 Wetlands - Johnson Co.

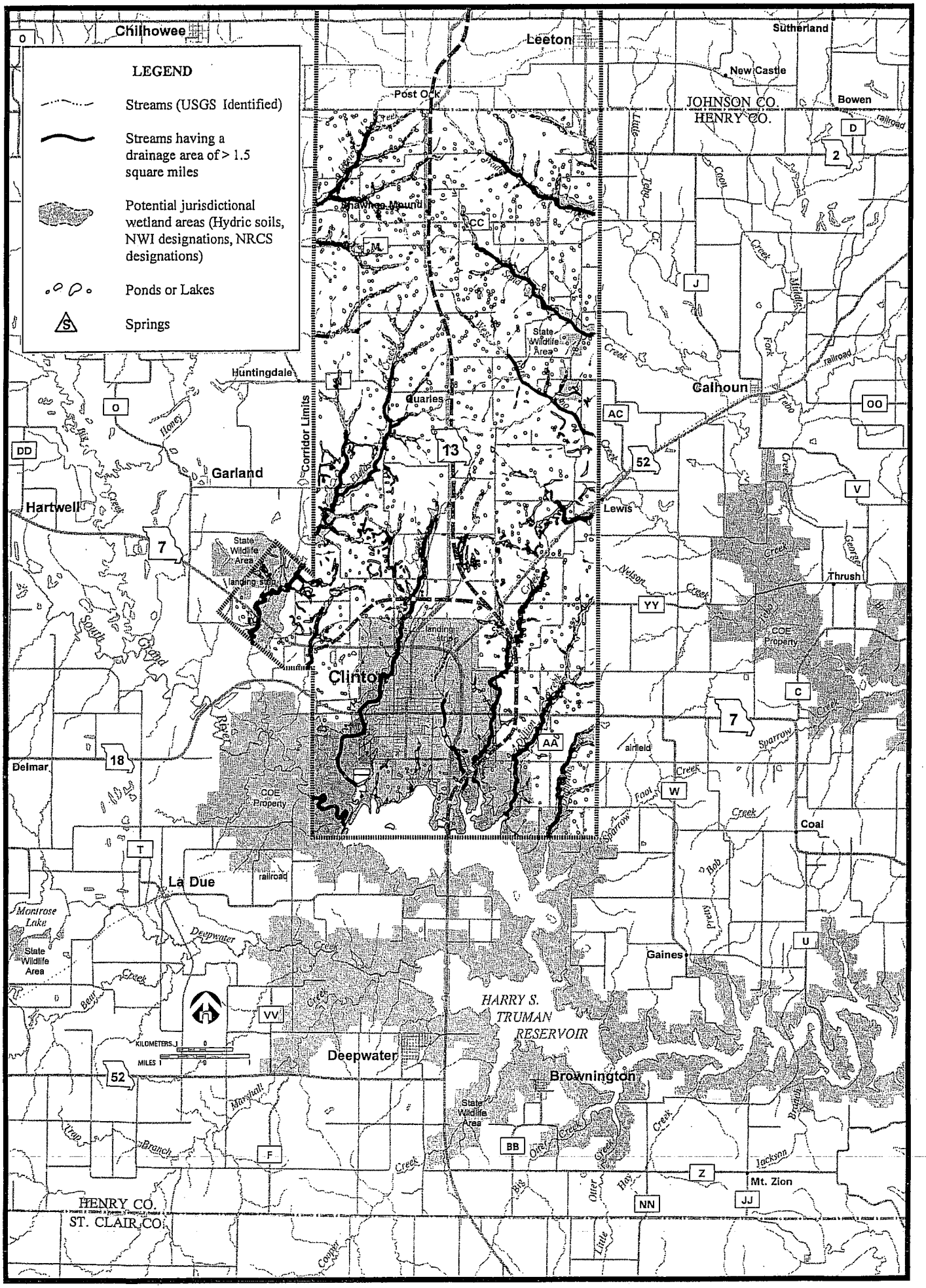


EXHIBIT III.B.4-2 Wetlands - Henry Co.

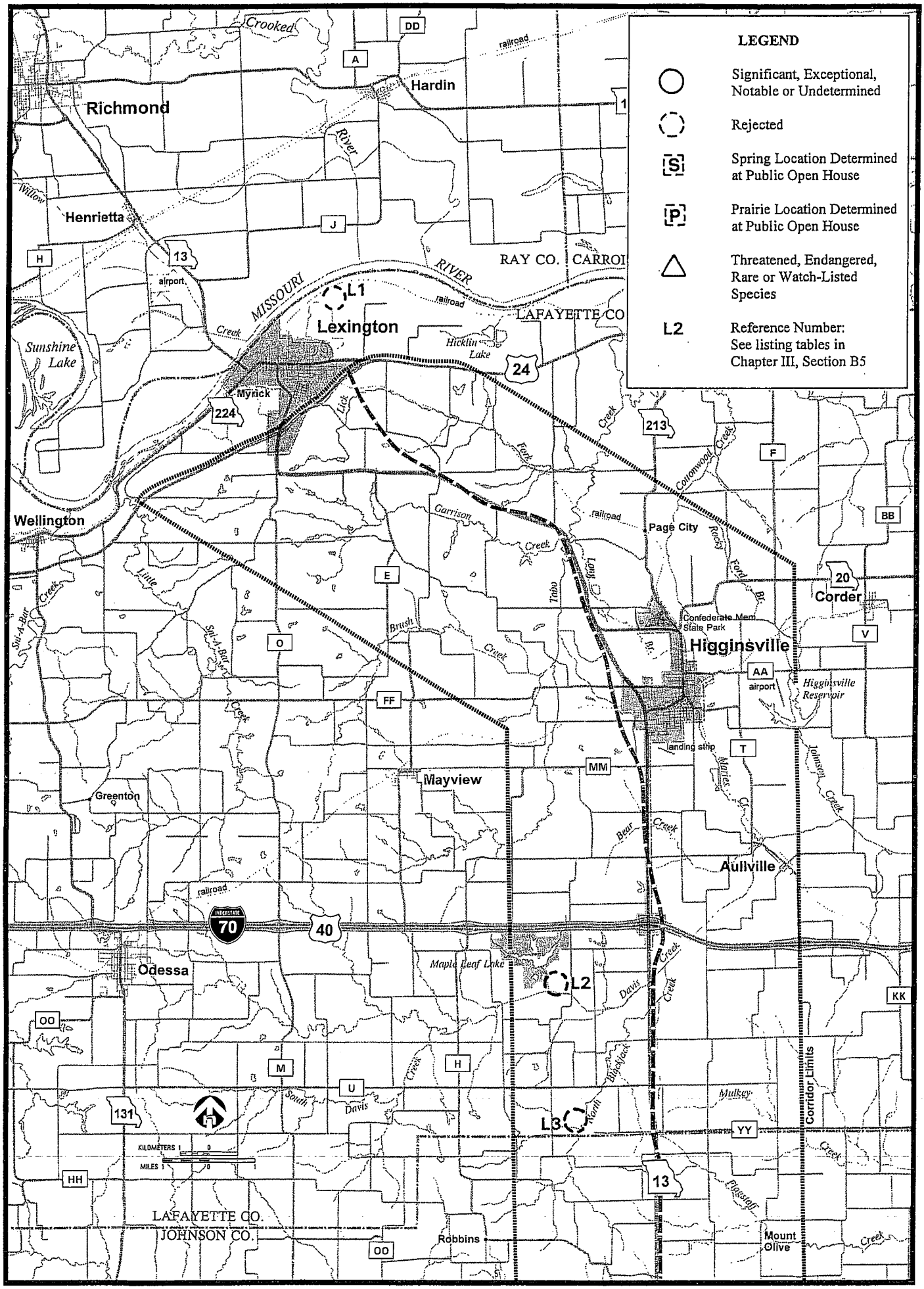
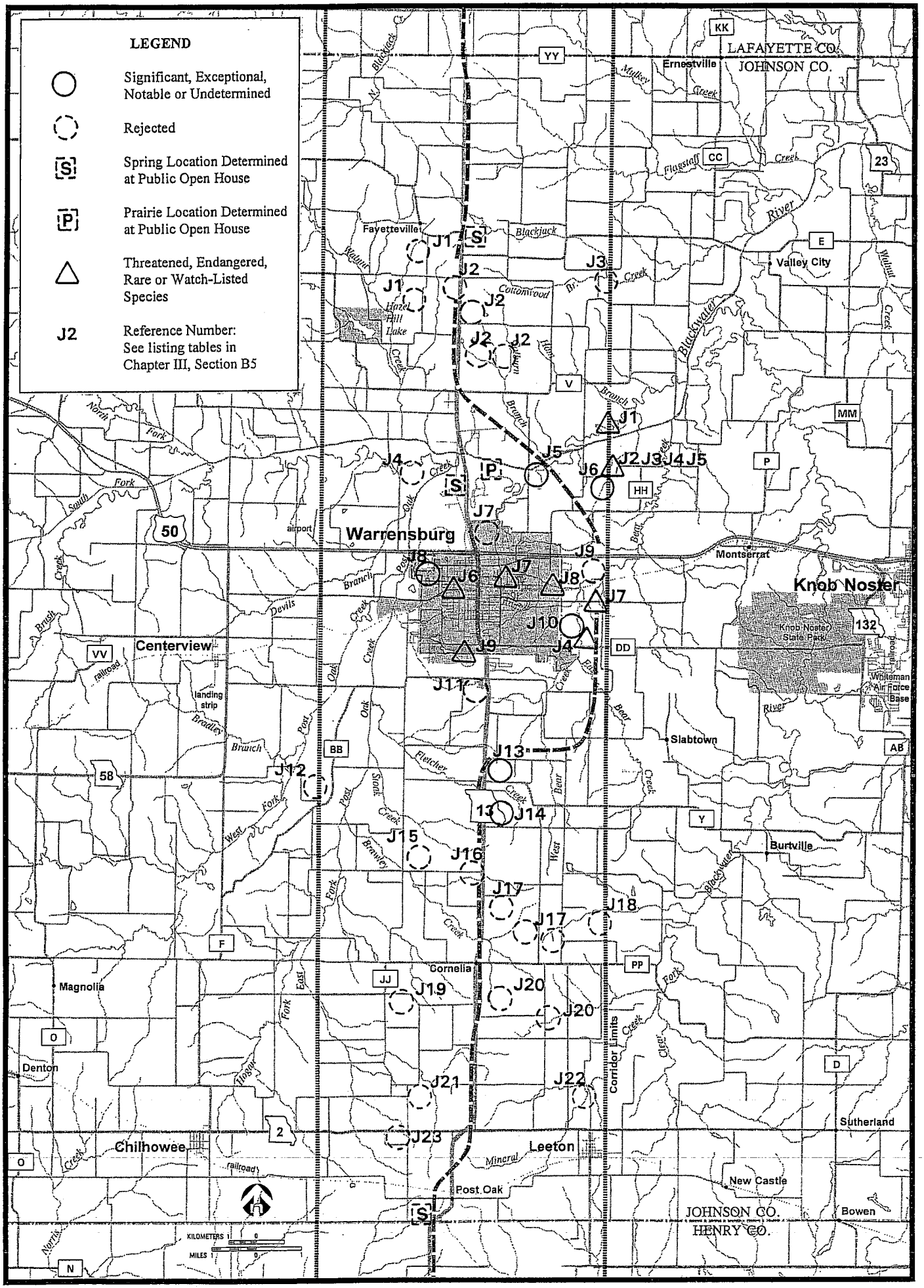


EXHIBIT III.B.5-1 Natural Environmental Constraints - Lafayette Co.



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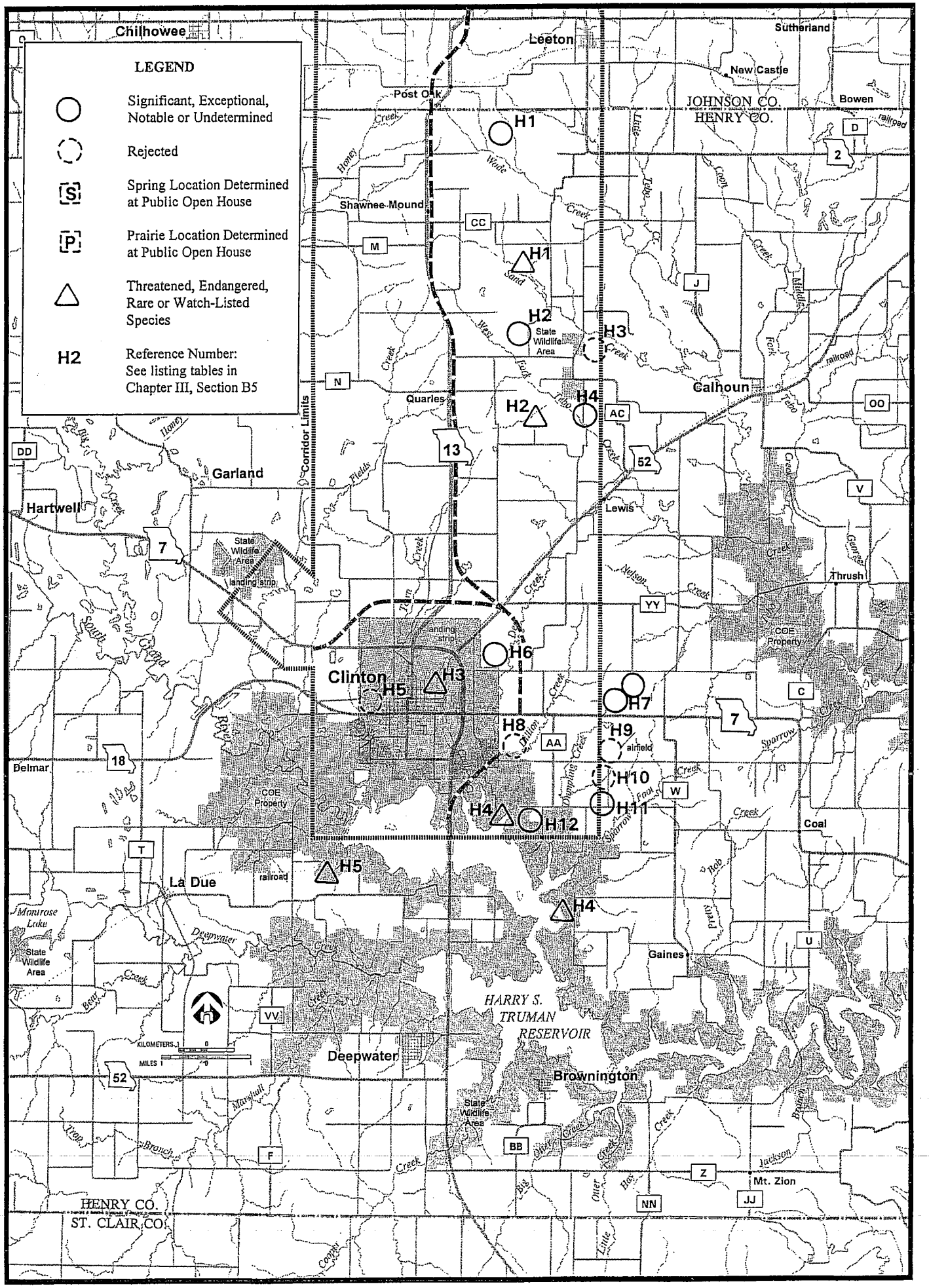

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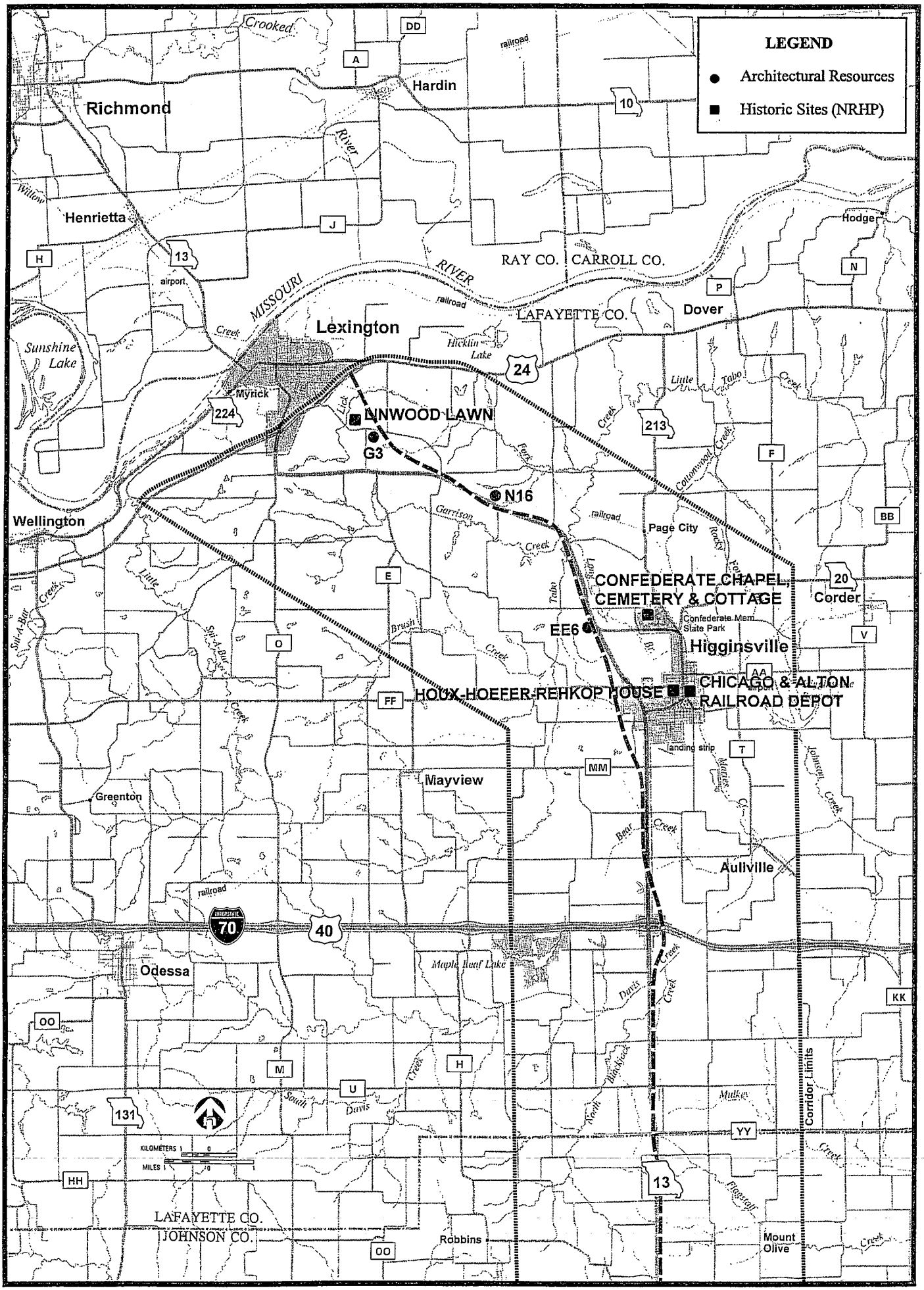


EXHIBIT III.B.6-1 Cultural Resources Investigations - Lafayette Co.

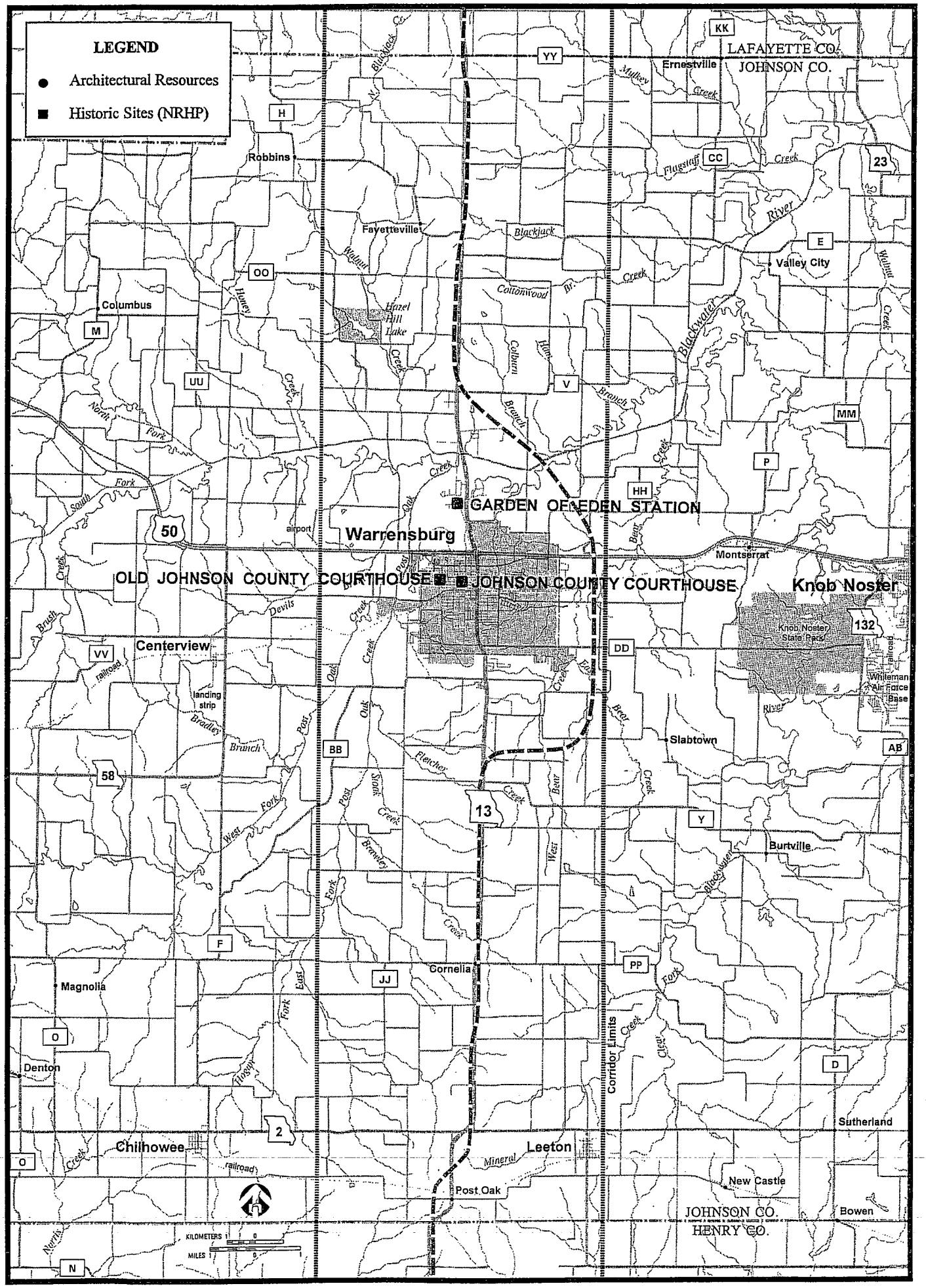
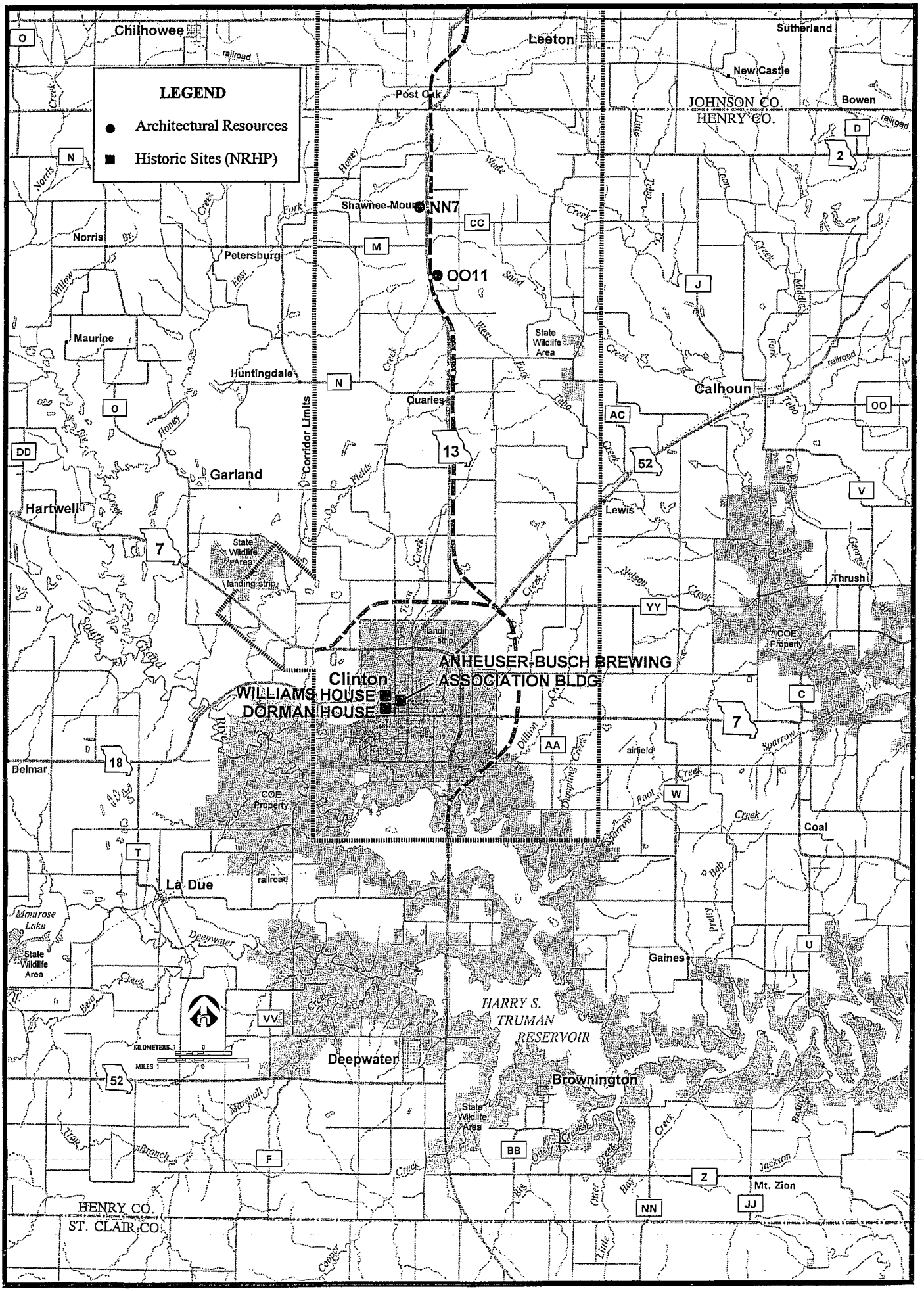


EXHIBIT III.B.6-1 Cultural Resources Investigations - Johnson Co.



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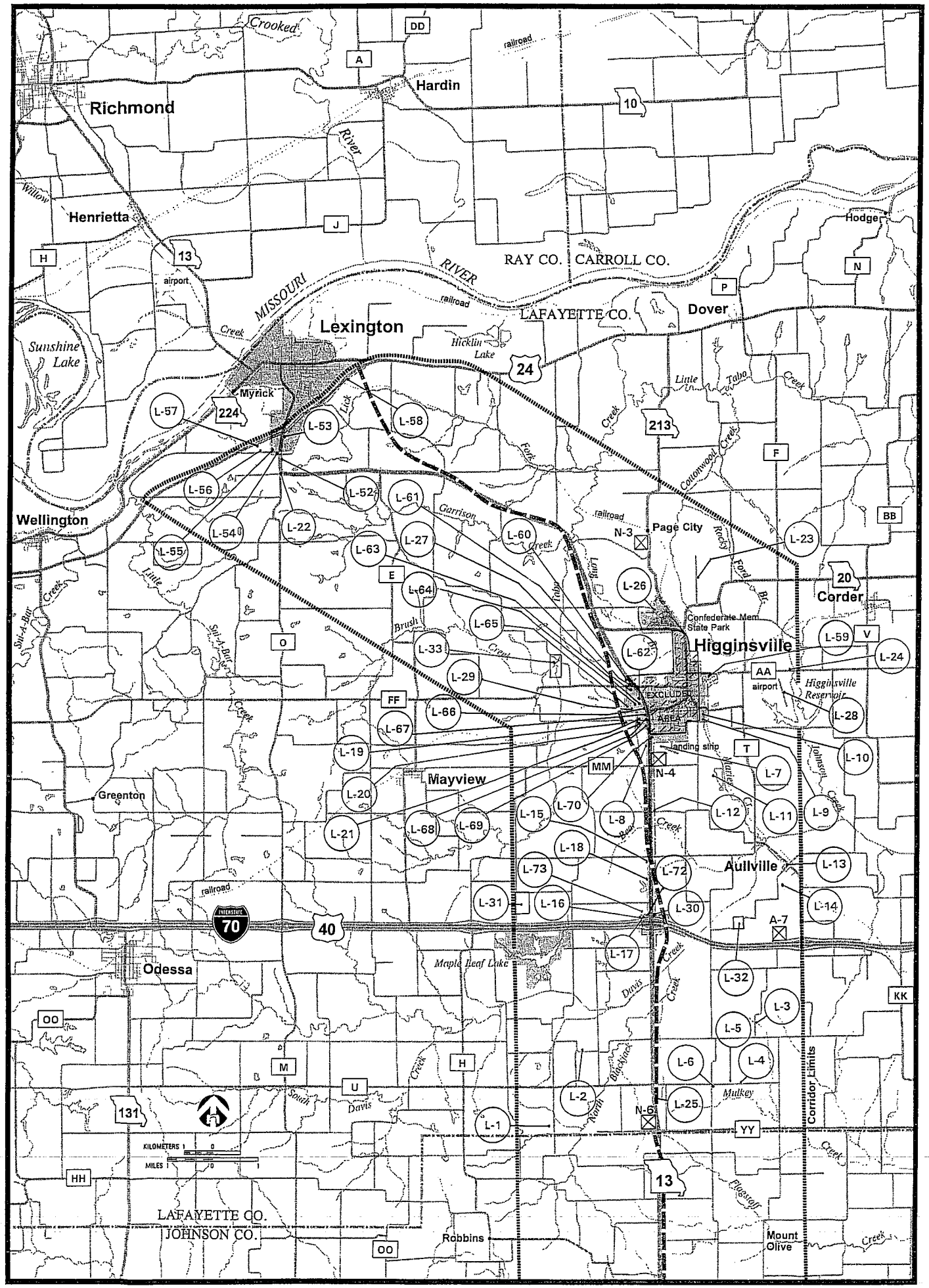
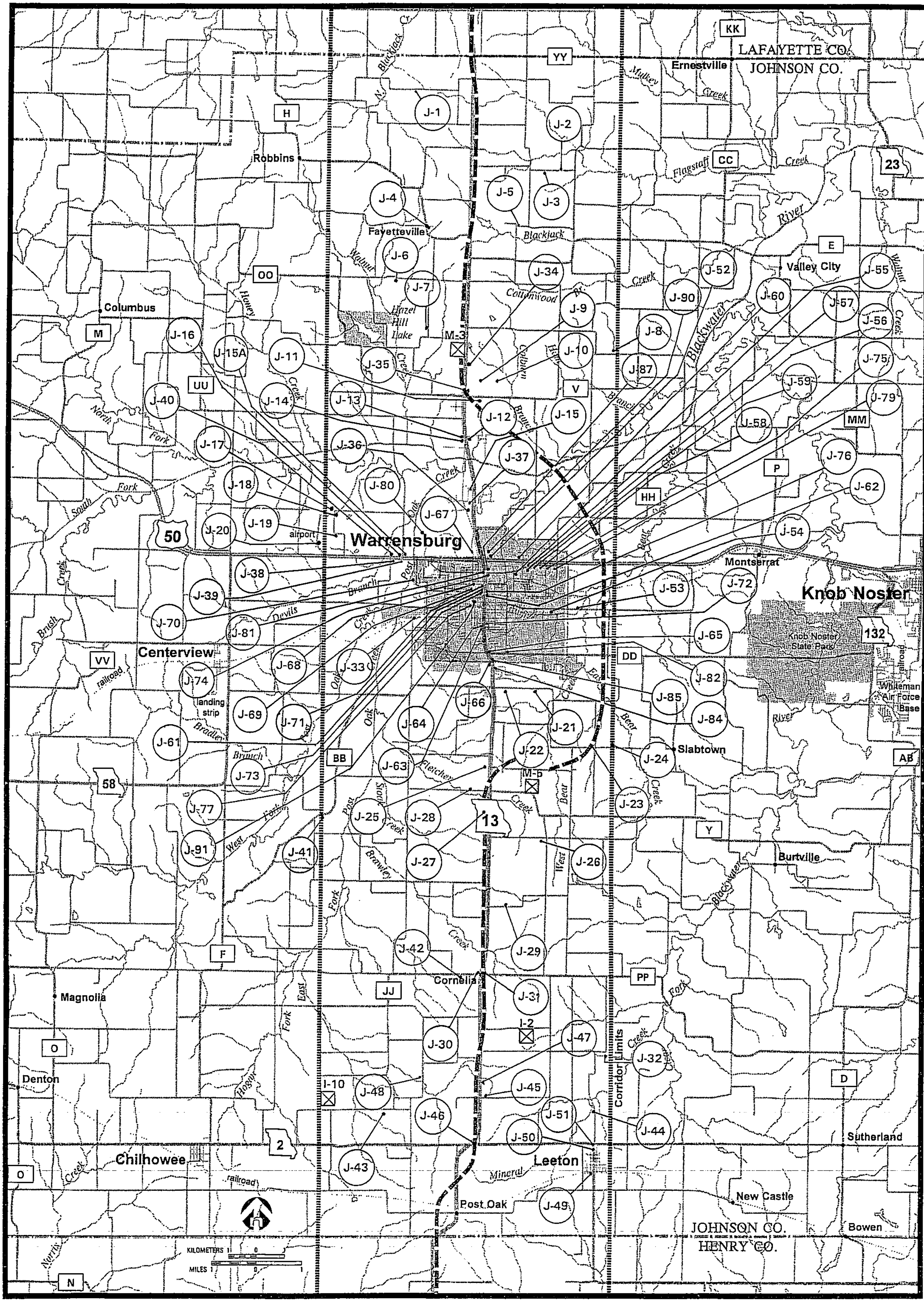


EXHIBIT III.B.7-1 Hazardous Waste Sites - Lafayette Co.



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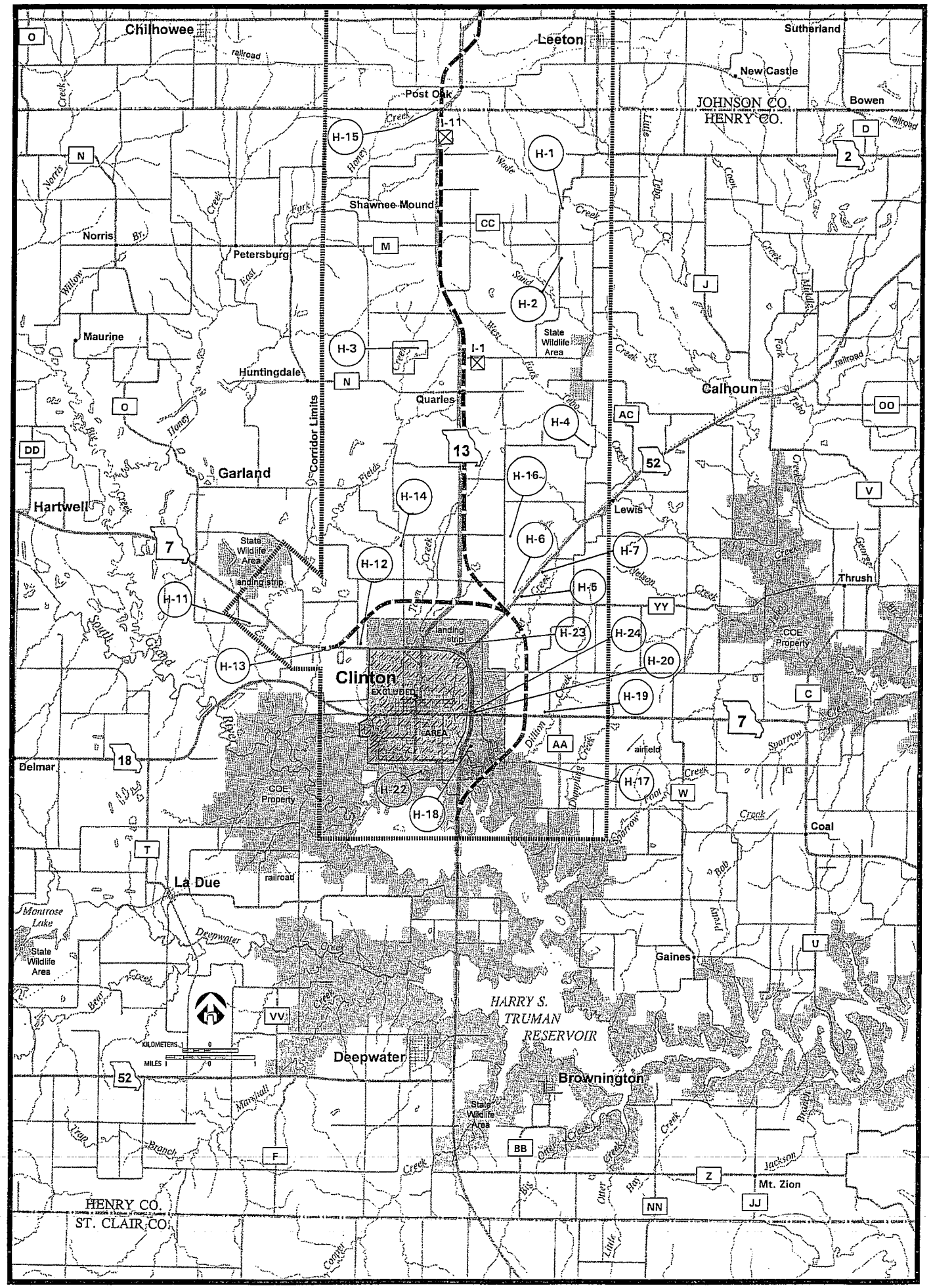
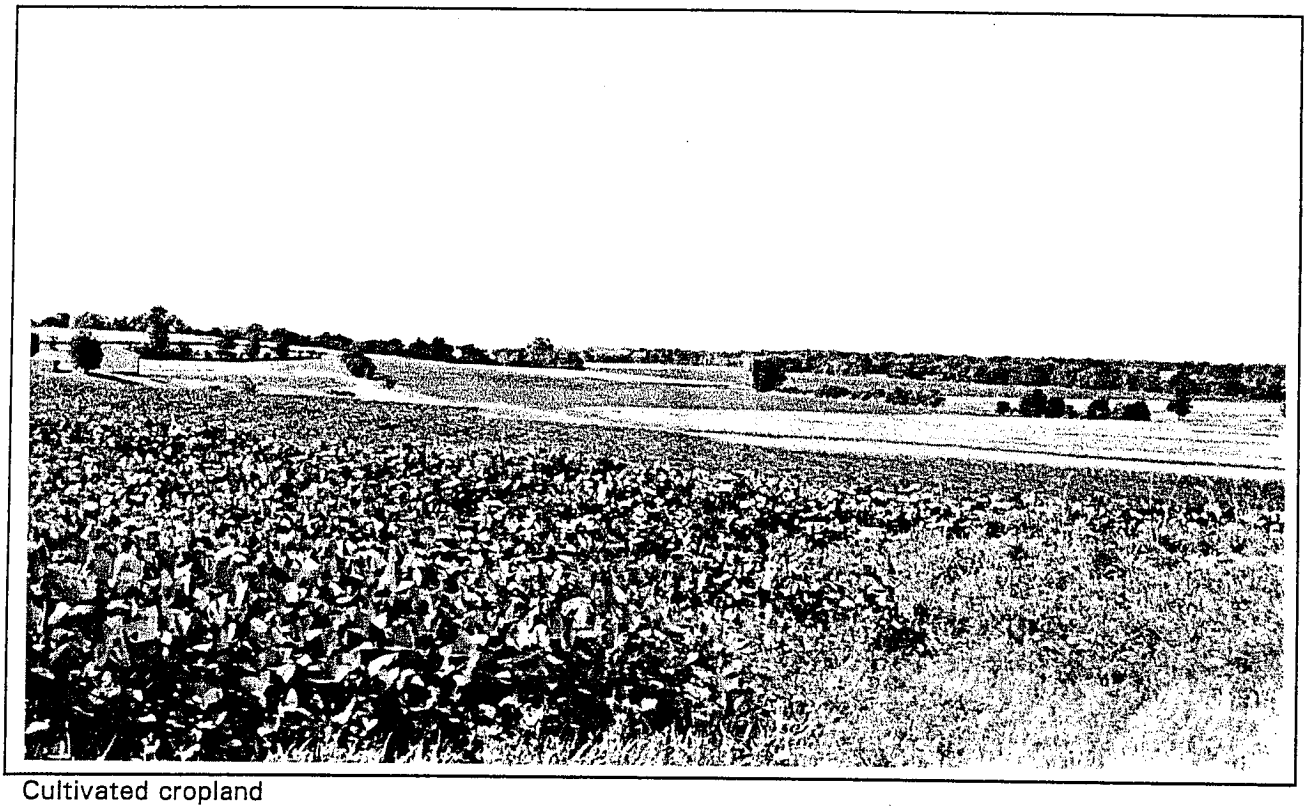


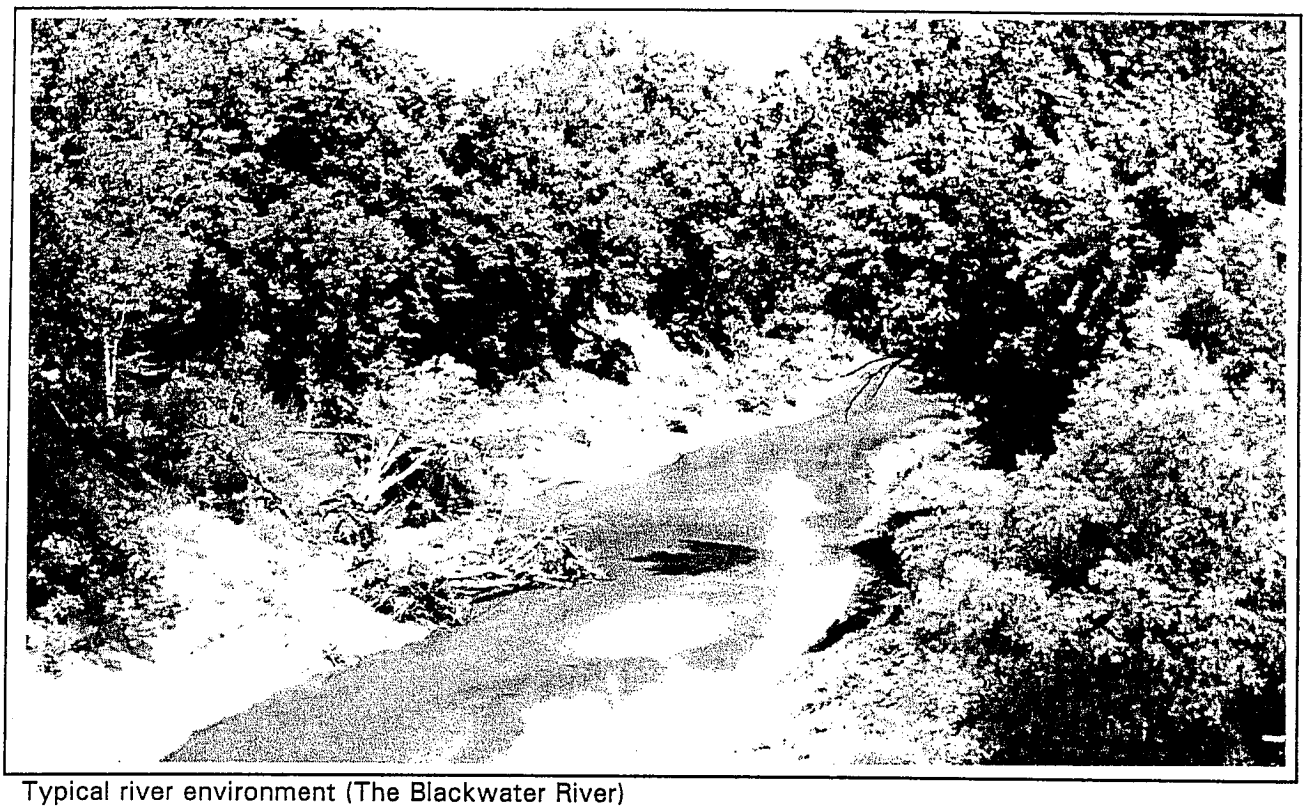
EXHIBIT III.B.7-1 Hazardous Waste Sites - Henry Co.



Cultivated cropland

Grassland and scattered woods

EXHIBIT III.B.8-1 Agricultural Land

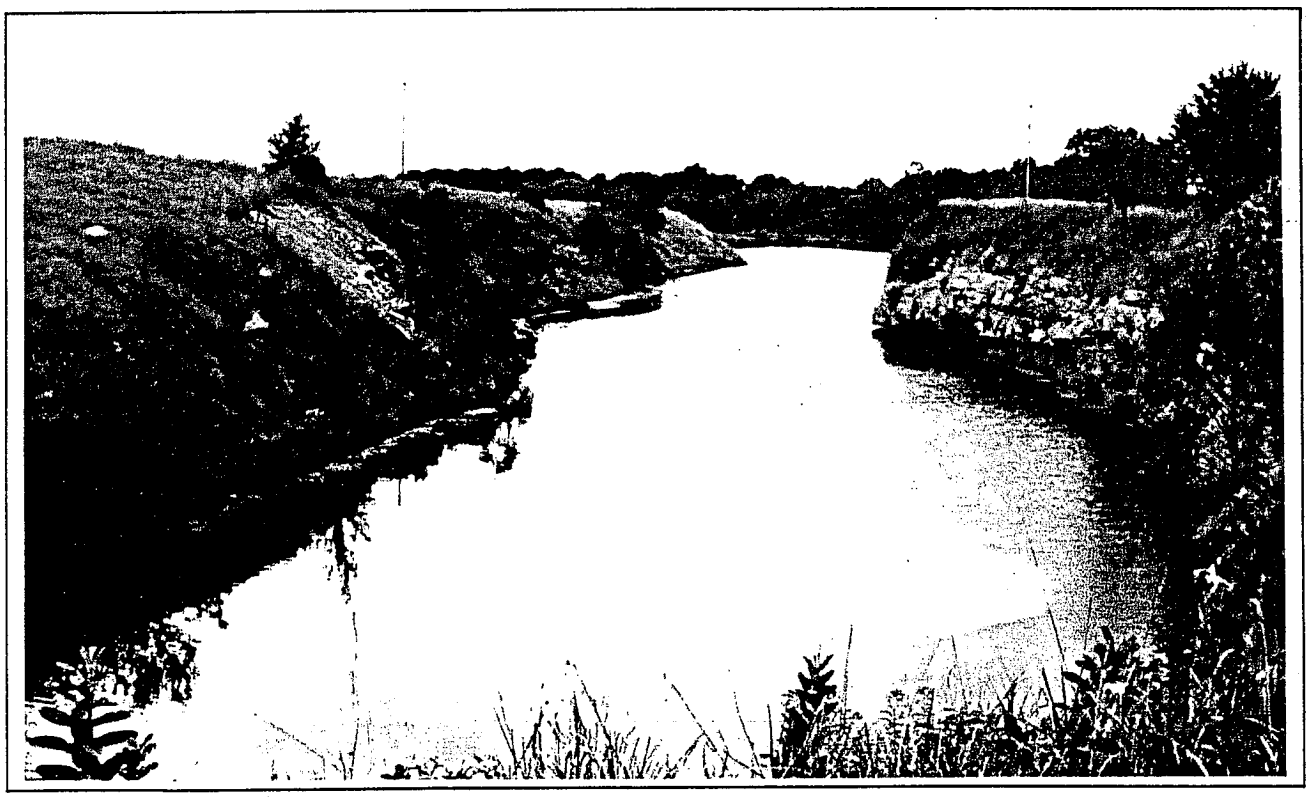


Typical river environment (The Blackwater River)

Agricultural use in a creek valley

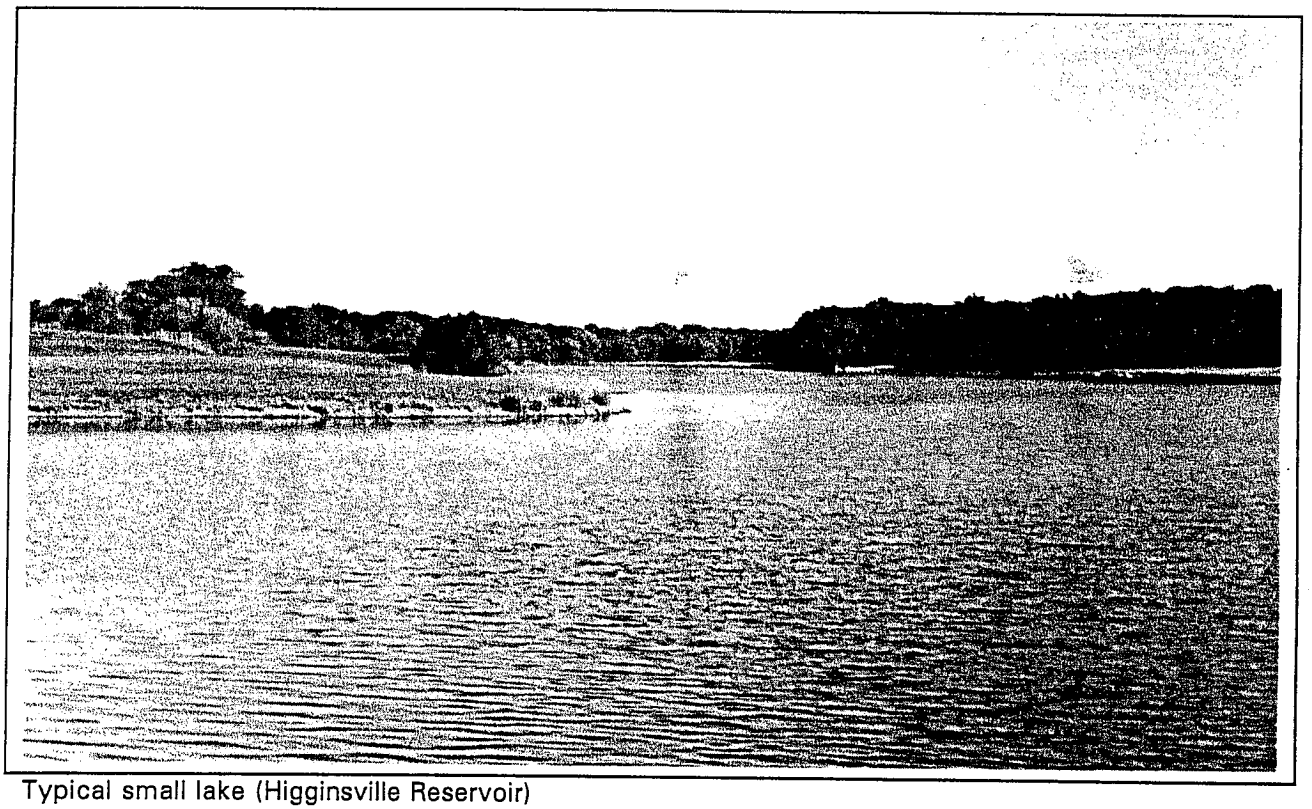
EXHIBIT III.B.8-2 River and Creek Valleys

Forest at Connor O. Fewel Conservation Area

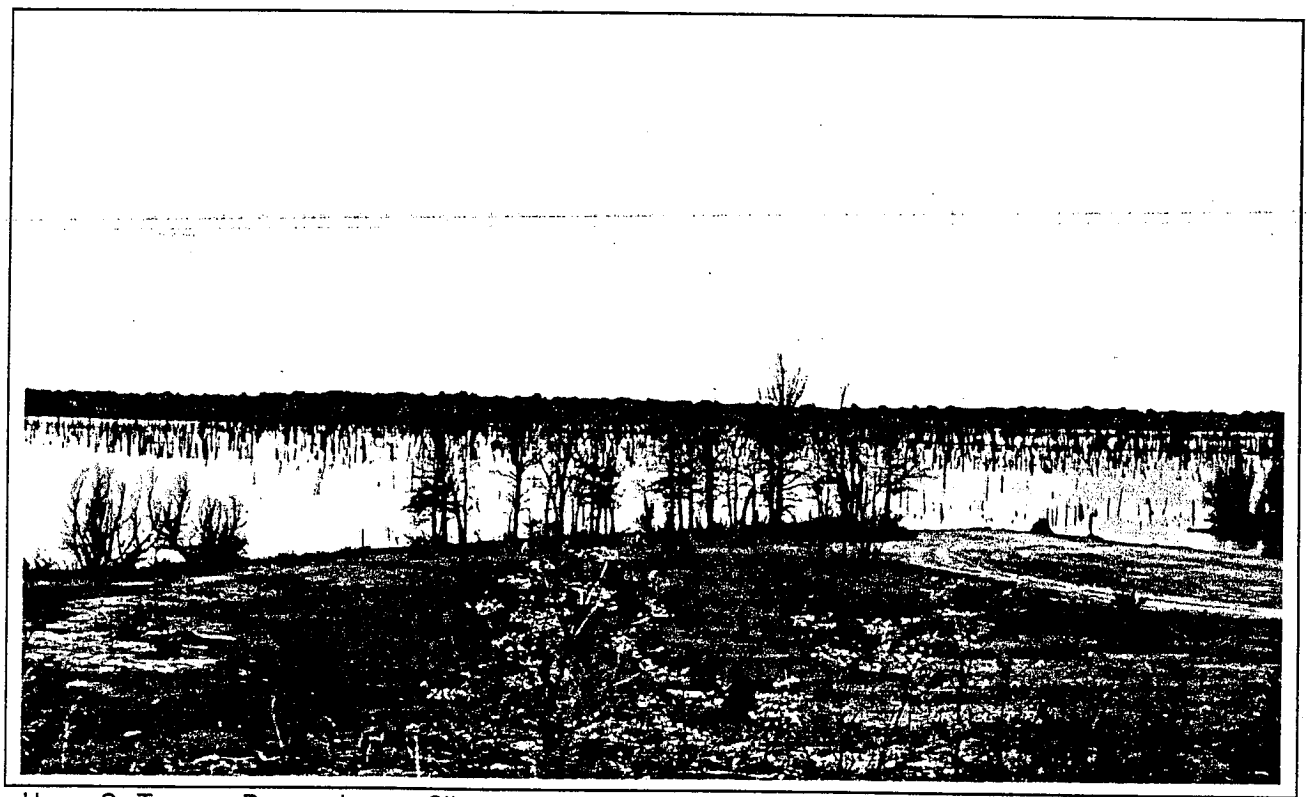


Abandoned strip mine

EXHIBIT III.B.8-3 Forest and Strip Mines



Typical small lake (Higginsville Reservoir)



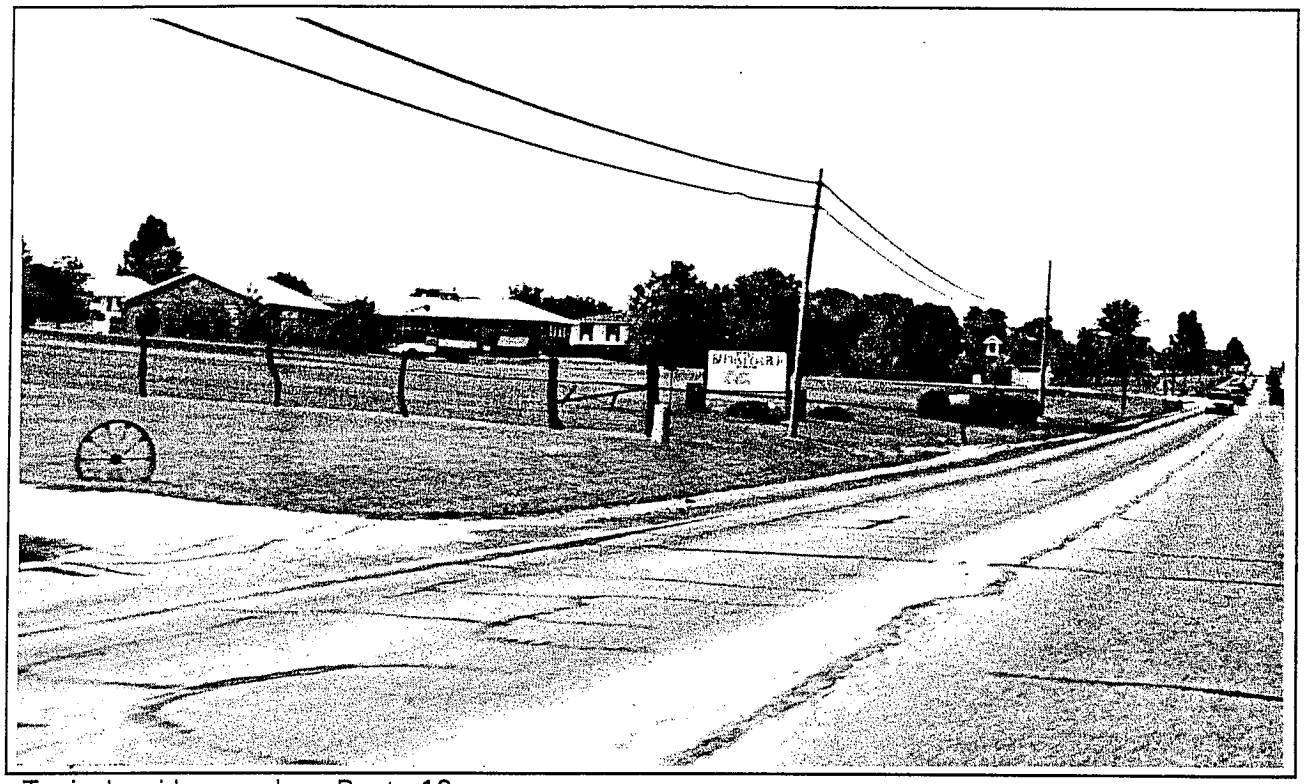
Harry S. Truman Reservoir near Clinton

EXHIBIT III.B.8-4 Lake Environments

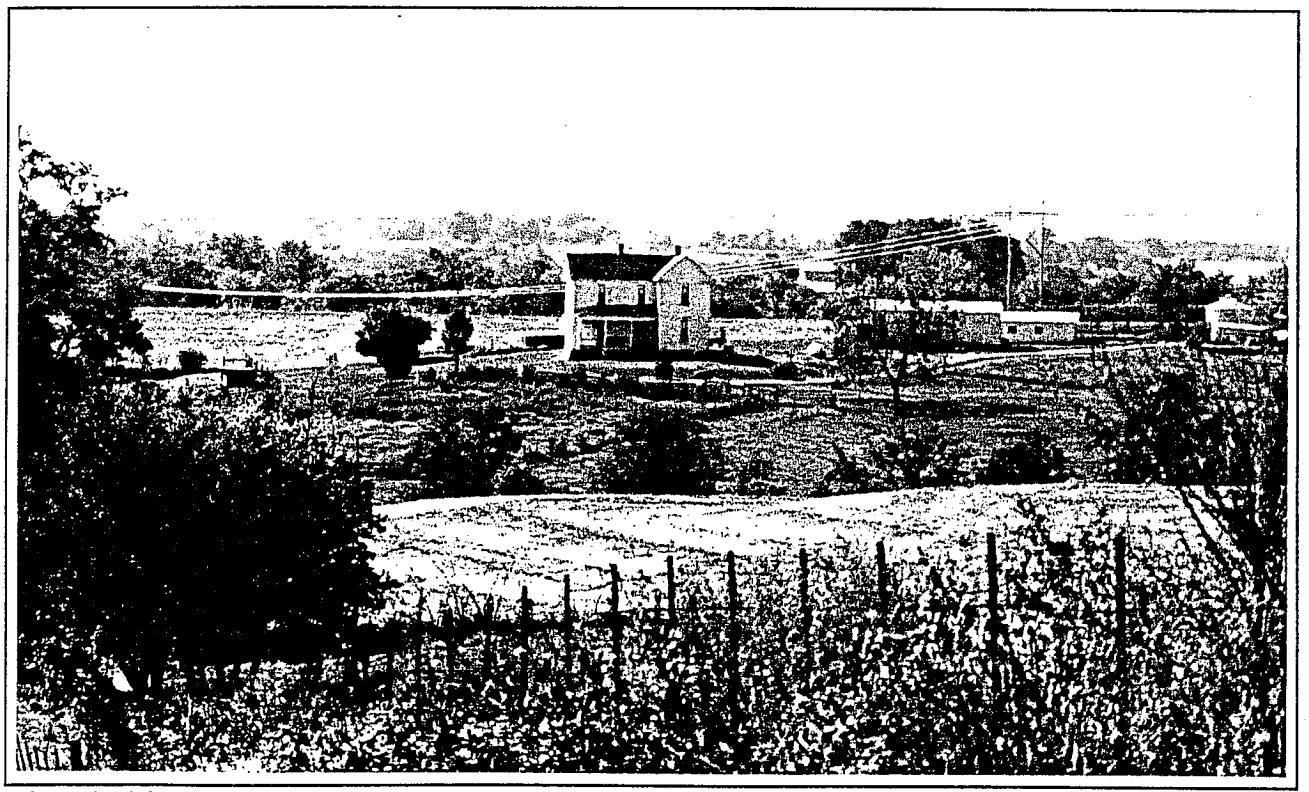
Commercial strip development (Warrensburg)

Small town commercial/business area (Leeton)

EXHIBIT III.B.8-5 Cities and Towns



Typical residences along Route 13



A typical farmstead

EXHIBIT III.B.8-6 The Residential Environment

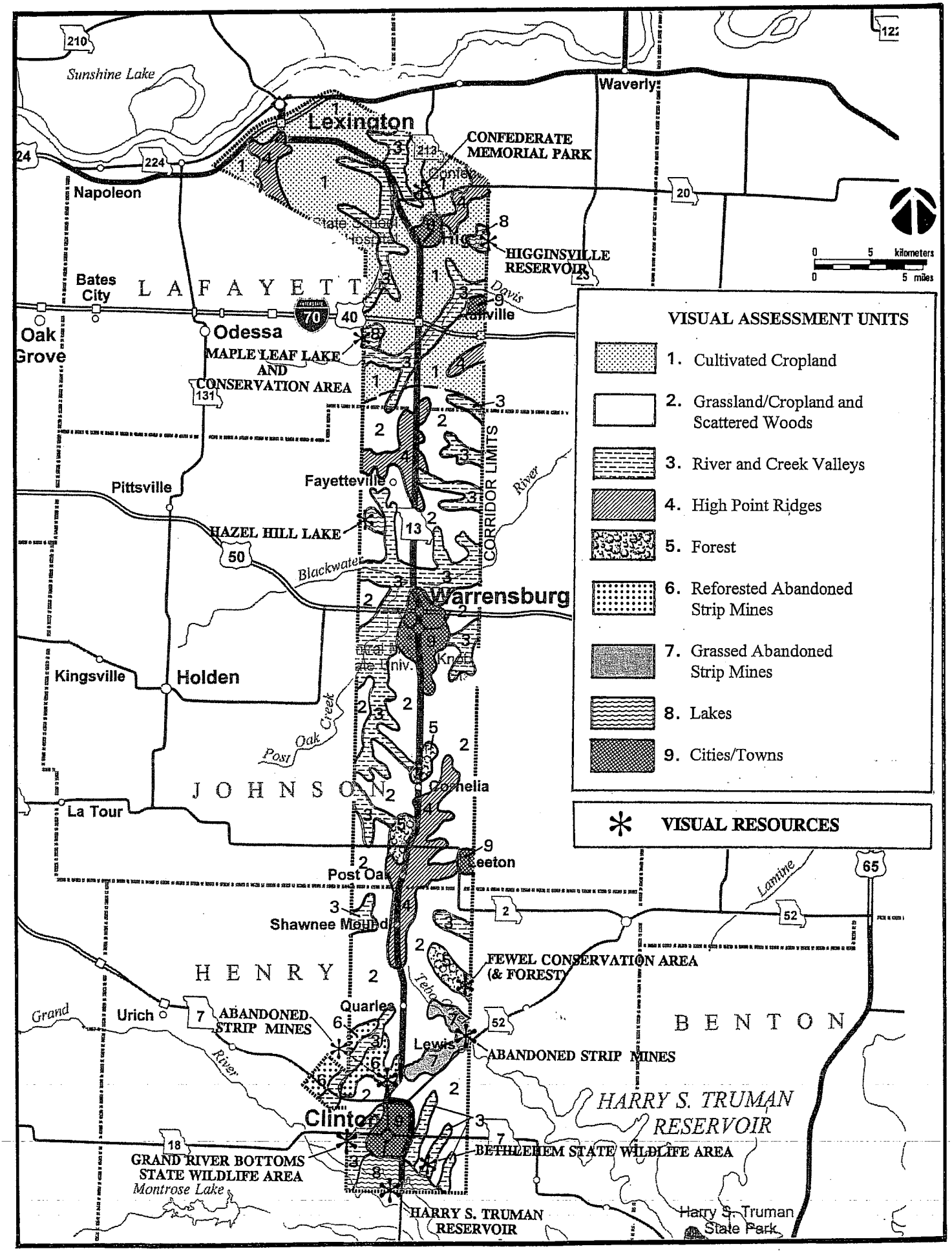


EXHIBIT III.B.8-7 Visual Assessment Units

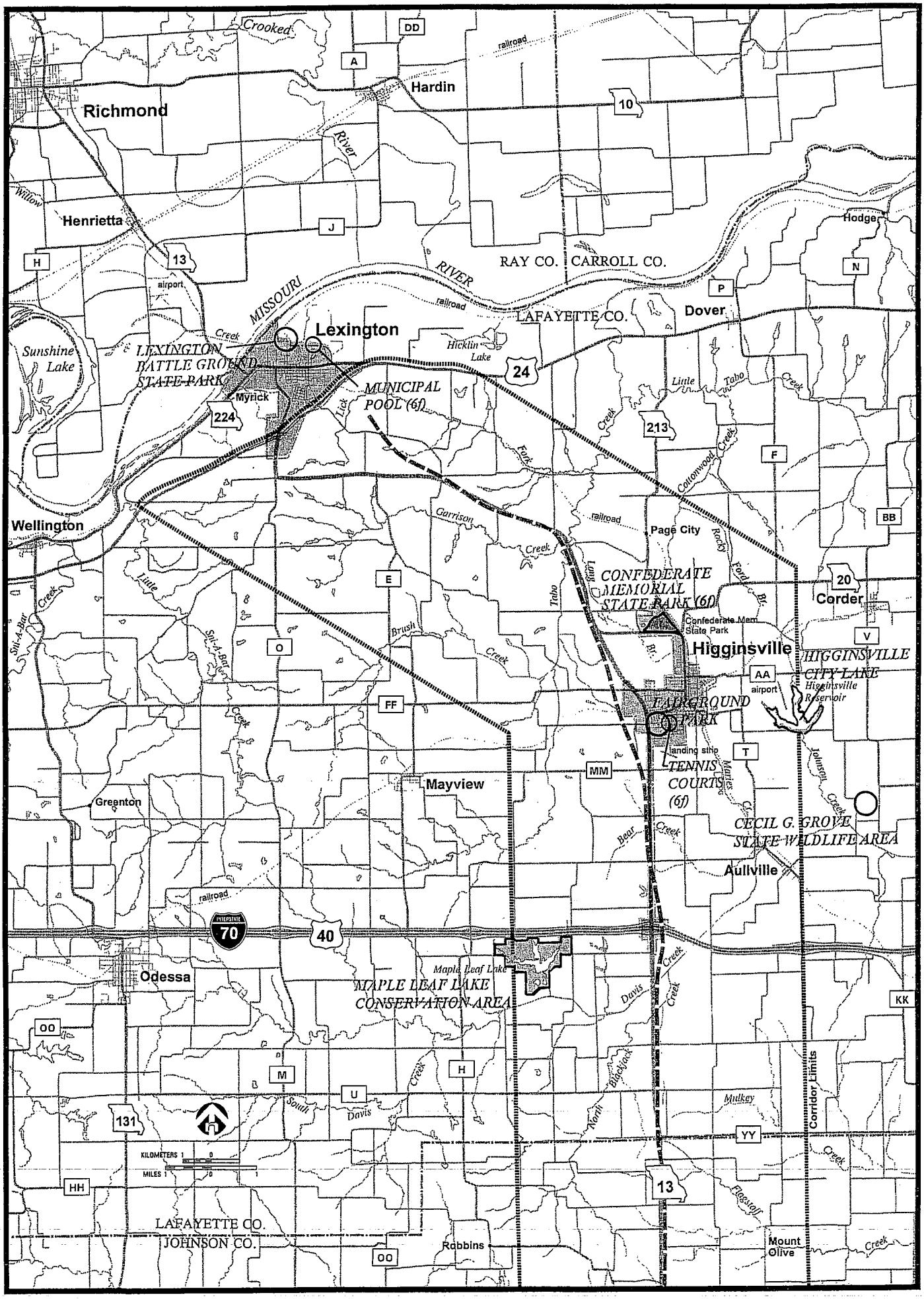


EXHIBIT III.B.10-1 Public Lands - Lafayette Co.

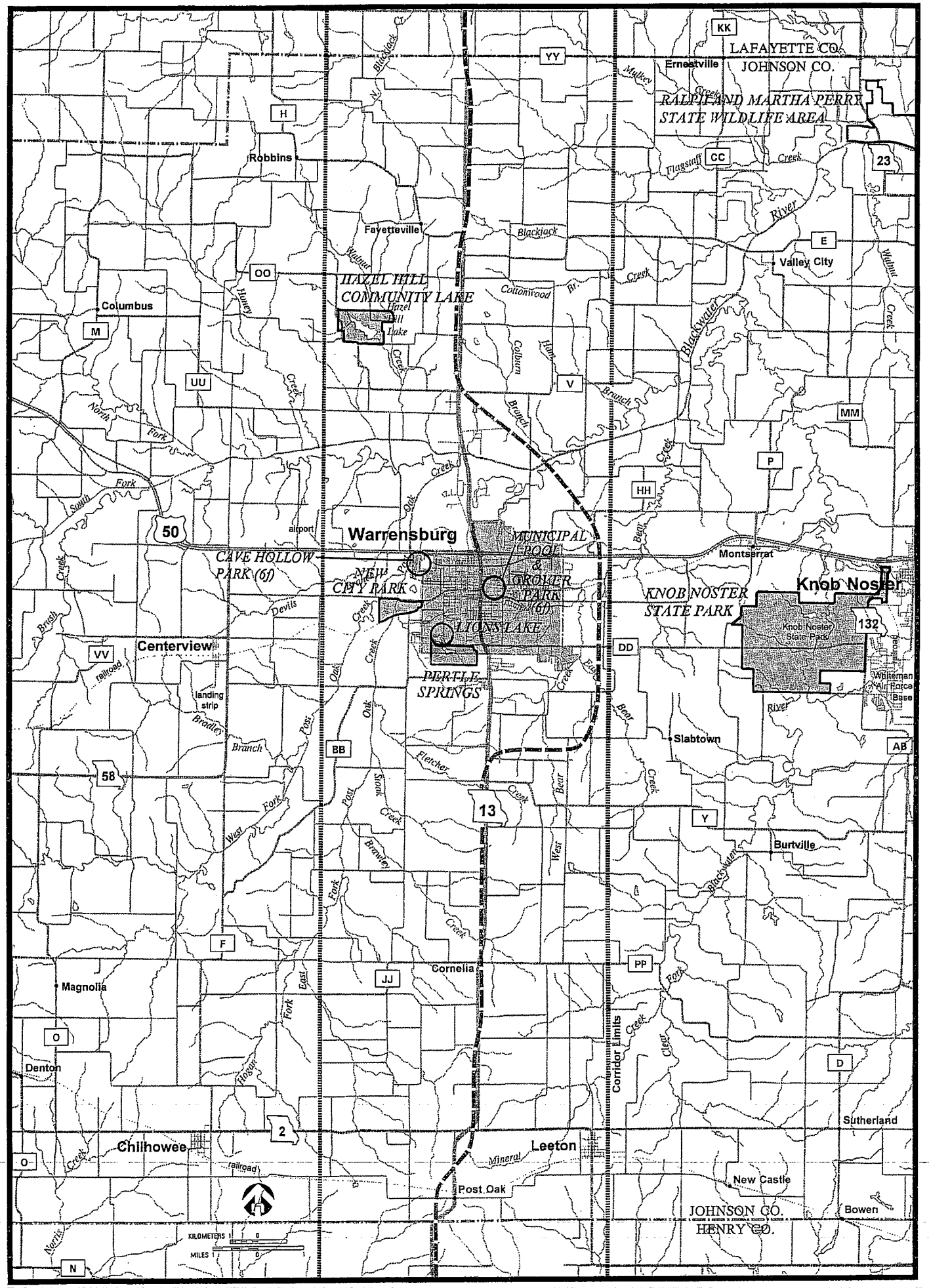


EXHIBIT III.B.10-1 Public Lands - Johnson Co.

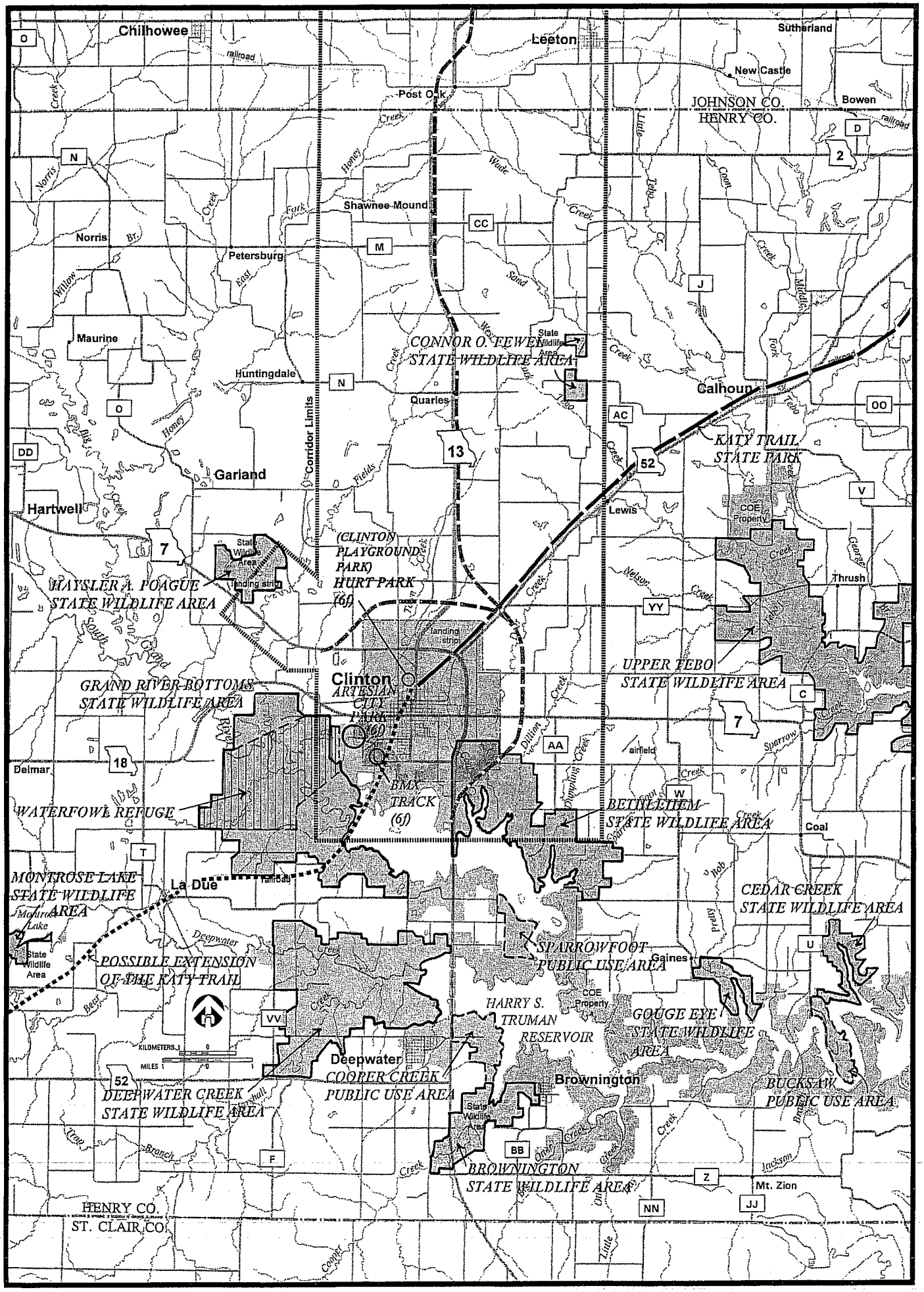


EXHIBIT III.B.10-1 Public Lands - Henry Co.