

Project Impacts

A. Social and Economic Conditions

Both Callaway and Boone Counties are largely rural with pockets of developed areas. Callaway County's most developed area is Fulton, located in the center of the county, four miles from the I-70 corridor. Boone County's most developed area is in and around Columbia, which is located in the center of Boone County on the I-70 corridor. Neither of these cities is within the Section of Independent Utility (SIU) 5 corridor. No incorporated areas exist in the SIU 5 corridor.

1. Regional Population Trends

As shown in Table III-1, population within Boone and Callaway Counties increased at a rate more than twice that of the State of Missouri from 1990 to 2000.

Table III-1: State and County Population Trends

	1980	1990	2000	% Change 1990-2000
State of Missouri	4,916,766	5,117,073	5,595,211	9.3
Boone County	100,376	112,379	135,454	20.5
Callaway County	32,252	32,809	40,476	24.3

Source: U.S. Department of Commerce, Bureau of the Census

Given the rural nature of the SIU 5 corridor area, population trends within the study corridor were examined at the block group level. Exhibit III-1 shows census tracts and block groups in the study corridor. As shown in Table III-2, population changes between 1990 and 2000 within the individual block groups range from losses of two percent to increases of greater than 20 percent. Overall the total population within all of the block groups increased almost 17 percent from 1990 to 2000.

Table III-2: Population Trends within the Study Area

County	Census Tract	Block Group	Population 1990	Population 2000	% Change 1990-2000
Boone	0016.02	1	1,768	1,733	-2.0
	0016.02	2	1,121	1,398	10.3
Callaway	9701.00	1	1,134	1,500	23.9
	9701.00	4	631	696	21.8
	9705.00	1	695	861	-2.2
	9705.00	2	1,190	1,449	24.7
Total			6,539	7,637	16.8

Source: U.S. Department of Commerce, Bureau of the Census

2. Housing Characteristics

Housing characteristics of the block groups within SIU 5 are shown in Table III-3. Occupancy rates exceed 90 percent in all of the block groups and are consistent with the county and state occupancy rates. As indicated in the table, the majority of housing units in the corridor are owner occupied, with all block groups having an owner occupancy rate greater than 60 percent. The median value of the housing units in the corridor ranges from \$82,000 for census tract 9701 in Callaway County to \$130,800 for census tract 9705 within Callaway County.

Table III-3: Housing Characteristics, 2000

	Housing Units			
	Total	Percent Occupied	Percent Owner Occupied	Median Value
Boone County	56678	94%	54%	\$107,400
Tract 0016.02 BG 1	752	96%	65%	\$89,200
Tract 0016.02 BG 2	503	96%	83%	\$113,500
Callaway County	16,167	89%	68%	\$85,800
Tract 9701 BG 1	587	94%	81%	\$82,000
Tract 9701 BG 4	288	92%	67%	\$101,500
Tract 9705 BG 1	327	92%	79%	\$130,800
Tract 9705 BG 2	648	93%	81%	\$99,400
State of Missouri	2,442,017	90%	63%	\$89,900
<i>Source: U.S. Department of Commerce, Bureau of the Census</i>				

3. Age Characteristics

Age characteristics vary between both Boone and Callaway Counties and the state. As indicated in Table III-4, the population aged 65 and older in Boone County is significantly lower than that of either Callaway County or the state. This reflects the fact that the University of Missouri is located in Boone County and the student population skews this number. The percentage of the population aged 65 and older in Callaway County is slightly less than the state, and almost two percentage points greater than that in Boone County.

Table III-4: Age Characteristics, 2000

	Year	Median Age	Percent Age 17 & Under	Percent Age 65 and Older
Boone County	1990	27.8	22.6	8.4
	2000	29.5	22.8	8.6
Callaway County	1990	32.6	18.9	12.4
	2000	34.7	25.4	10.9
State of Missouri	1990	33.5	25.6	14.0
	2000	36.1	25.5	13.5
<i>Source: U.S. Department of Commerce, Bureau of the Census</i>				

4. Racial Characteristics

In terms of racial characteristics, the study area can be described as predominantly white. All of the block groups are less diverse than the county they are located in and than the state as a whole. Table III-5 presents racial characteristics in the SIU 5 study corridor.

Table III-5: Racial Characteristics, 2000

	White	Black	American Indian	Asian/ Pacific Islander	Other	% Minority	% Hispanic
Missouri	4,746,952	622,087	26,200	63,500	45,524	13.3	2.1
Boone County	116,335	11,351	663	3,899	719	14.9	1.9
Tract 0016.02 BG 1	1,568	118	0	11	51	10.4	0.9
Tract 0016.02 BG 2	1,338	21	0	0	39	4.3	0.0
Callaway County	37,420	2,307	210	215	121	8.2	1.0
Tract 9701 BG 1	1,385	15	38	6	17	8.1	1.5
Tract 9701 BG 4	678	16	2	0	0	2.6	0.0
Tract 9705 BG 1	835	0	13	6	7	3.0	0.0
Tract 9705 BG 2	1,406	0	0	0	55	3.8	0.8

Source: U.S. Department of Commerce, Bureau of the Census

5. Economic and Labor Force Characteristics

Per capita income is an indicator of the economic condition of an area. Within the project area all block groups have a median household income greater than that of the state. Poverty levels generally track income levels, with all of the block groups having a percentage of persons below poverty level lower than that of the state, as shown in Table III-6.

Table III-6: Income Characteristics, 2000

	Per Capita Income	Median Household Income	% Persons Below Poverty Level
State of Missouri	\$19,936	\$37,934	11.7
Boone County	\$19,844	\$37,485	14.5
Tract 0016.02 BG 1	\$23,929	\$49,139	3.3
Tract 0016.02 BG 2	\$29,676	\$55,391	1.1
Callaway County	\$15,648	\$35,313	10.7
Tract 9701 BG 1	\$19,478	\$44,511	6.9
Tract 9701 BG 4	\$18,321	\$38,750	6.6
Tract 9705 BG 1	\$22,205	\$44,464	2.8
Tract 9705 BG 2	\$20,348	\$42,381	5.8

Source: U.S. Department of Commerce, Bureau of the Census

Although there are no large employment generators within the project area, concentrations of service-oriented businesses are located in Columbia and Kingdom City. Table III-7 presents data on employment by industry within the region.

Columbia serves as an employment, retail and service center for central Missouri. The government, retail, health care and accommodation and food service sectors provide the greatest number of jobs in the region. This employment distribution reflects the regional market

associated with Columbia, coupled with the employment associated with the University of Missouri and ancillary services.

Table III-7: Employment by Job Type, 2001

Sector	Boone County No. of Employ.	Callaway County No. of Employ.
Total	102,127	19,553
Forestry, Fishing, Hunting, Ag Support	133	87
Mining	192	86
Construction	5,141	1,133
Manufacturing	5,721	1,901
Utilities	(D)	(D)
Wholesale Trade	2,844	(D)
Retail Trade	11,448	1,904
Finance & Insurance	4,013	533
Services (except Public Admin)	4,345	1,045
Transportation & Warehousing	(D)	918
Real Estate	2,904	457
Information	1,763	215
Prof., Science & Tech. Services	3,799	396
Healthcare & Social Assistance	8,941	1,159
Arts, Entertainment, & Rec.	1,513	221
Accommodation & Food Services	7,027	868
Mgt. Of Cos. & Enterprises	2,440	14
Admin, Support, Waste Mgt. & Remedial Services	3,853	492
Educational Services	1,443	708
Government and Government Enterprises	31,266	4,596
<i>Source: U.S. Department of Commerce, Bureau of Economic Analysis</i>		

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the total.

The limited business development in the corridor is concentrated near the two interchanges. The primary tax revenue for the taxing districts that include the corridor is attributable to commercial development located outside of the corridor.

6. Community Facilities

Due to the rural nature of the corridor, the community facilities which serve the study area population are located outside of the corridor. Community facilities within the corridor include the Yahweh New Covenant Assembly Church located on the north side of I-70 just east of the Missouri Route M interchange, and the Victory Baptist Church located on the north side of I-70, just east of the Route Z interchange. There are no bicycle/pedestrian trails in the SIU 5 corridor, nor any planning efforts to construct this type of facility.

7. Summary of Socioeconomic Conditions

Population growth within Boone and Callaway Counties has exceeded that of the state of Missouri from 1990 to 2000. The percent of increase in both counties is over twice that of the state. The rate of change within the census block groups that include the corridor has been more varied than that of each county overall. These variations are due in part to the fact that the block groups have much smaller populations, and relatively small numerical changes result

in percentage changes ranging from a two percent decrease to a 20 percent or more in population. Over 90 percent of the housing units in the corridor are occupied, with the majority being owner occupied. The majority of the residents are white, and the percentage of minority population within all of the block groups is lower than the overall percent for the state. Income characteristics for the area reflect higher incomes and lower poverty rates than the state. The vast majority of jobs are located in Boone County, with the primary employment sectors being government, retail, health care and accommodation and food service.

B. Social and Economic Impacts

1. Residential and Business Relocations

The proposed improvements in the SIU 5 corridor would require widening of the existing highway. Additional right of way needed for these improvements would necessitate the relocation of some existing households, businesses and other facilities along the corridor. Exhibits III-2A through III-2J show the proposed alignment in relation to existing buildings and land uses. Buildings located within the approximate new right of way were considered to be displacements. The number of residences and individuals that would be displaced, the number of properties to be acquired and the types of property acquisitions for the proposed improvements are presented in Table III-8. Property acquisition would include the purchase of vacant land, farmland, residential land, homes, businesses and land associated with public uses.

Table III-8: Displacements, Property Acquisitions and Costs Associated with the SIU 5 Proposed Action

	Impacts
Residential Displacements ¹	14
Estimated Number of Residents ²	35
Business Displacements ³	16
Estimated Number of Employees Affected	80-120
Total Acres Impacted	439.6
Parcels Impacted	92
Total Parcel Acquisitions	21
Partial Parcel Acquisitions	71
Total Right of Way Cost	\$13,028,612
Land Cost	\$4,783,680
Structure Cost ⁴	\$5,384,404
Relocation Cost	\$2,860,528
<i>Source: Zambrana Engineering, Inc., 2003</i>	

¹The number of homes, including seven mobile homes, that would require relocation.

²Based on the estimated average household size in the project area of 2.5 persons per household.

³The number of businesses that would be impacted, not necessarily requiring relocation. This total includes three industrial buildings.

⁴The cost of acquiring any impacted businesses.

Potentially displaced businesses associated with the approximate new right of way are shown in Table III-9 and displayed in Exhibits III-2A through III-2J. For business owners that choose to be relocated, adequate vacant land area exists throughout the corridor. Businesses may choose to locate outside the project area, elsewhere along the corridor, or not to reopen.

Reestablishment of commercial uses would most likely occur on vacant land along the frontage roads and at interchanges.

Table III-9: Business Displacements *

Business Name	County (<i>Exhibit Number</i>)
Show-Me Outdoors, Inc.	Callaway (III-2C)
Bed & Biscuit Pet Boarding	Callaway (III-2C)
White Knight Limo & Coach	Callaway (III-2C)
Mid-America Plastic Systems	Callaway (III-2C)
United Rentals	Callaway (III-2C)
Walnut Bowl Store (Missouri River Outfitters)	Callaway (III-2C)
Step of Faith Bookstore	Callaway (III-2C)
Weldrite, Inc.	Callaway (III-2C)
offices (for rent)	Callaway (III-2D)
storage	Callaway (III-2D)
A-1 Auto Recyclers	Callaway (III-2E)
Gygar Gas Plant #8	Callaway (III-2E)
Midway Farm Supply	Callaway (III-2H)
Gastineau Log Homes	Callaway (III-2H)
Fireworks Supermarket	Callaway (III-2H)
Mobile Home Sales	Callaway (III-2H)
<i>Source: Zambrana Engineering, Inc., 2003</i>	

*Business and property ownership names were obtained in 2002. Name changes that the study team was made aware of in 2004 are shown in parentheses.

In addition to land acquisition, the project may require temporary or permanent easements for construction or utility location. Property acquisitions include purchases of entire parcels as well as partial property purchases. Parcel sizes along the corridor vary in size from small residential lots to large undeveloped or agricultural tracts. In some cases existing structures are set back from the existing right of way by a large distance and would not necessitate building acquisition for the approximate new right of way. In many of these situations, only a portion of land (or partial acquisition), would be required. The remaining useable land would be retained by the property owner.

In some cases, after required right of way is purchased from a parcel, the remaining property may not be feasible for development due to lack of access or deficient size. A parcel of the real property in which the owner is left with an interest after the partial acquisition of the property, and which the acquiring agency has determined to have little or no value or utility to the property owner, is called an uneconomic remnant. If acquisition of only a portion of property leaves the owner with a remnant, the Missouri Department of Transportation (MoDOT) will determine whether the remnant maintains utility or value to the present owner. If MoDOT determines that the portion of property is an uneconomic remnant, they will offer to acquire the remnant along with the portion of property needed for the project. The owner would retain the choice to sell the uneconomic remnant. The creation of uneconomic remnants of land by the proposed action would not cause further impacts to environmental or social resources of concern in the corridor.

Acquisition for the project would be accomplished in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and amendments. This act, as well as Missouri state law, requires that just compensation be paid to the owner of private property taken for public use. The appraisal of fair market value is the basis of determining just

compensation to be offered to the owner for property to be acquired. An appraisal is defined in the act as a written statement independently and impartially prepared by a qualified appraiser setting forth an opinion of defined value of an adequately described property as of a specific date, and supported by the presentation and analysis of relevant market information.

This act is carried out without discrimination and in compliance with Title VI (Civil Rights Act of 1964), the President's Executive Order on Environmental Justice and the Americans with Disabilities Act. Relocation assistance under this program is made available to all affected parties without discrimination.

During the relocation phase, MoDOT is responsible for assuring that a displaced person will not be required to move unless the agency has made comparable, decent, safe and sanitary housing available and that the displacee will not be required to move without at least a 90-day notice in writing. The act requires that comparable, decent, safe and sanitary replacement housing within a person's financial means be made available before that person may be displaced. Should this project include persons who cannot readily be moved using the regular relocation program benefits and/or procedures (i.e., when there is a unique housing need or when the cost of available comparable housing would result in payments in excess of statutory payment limits [\$22,500 or \$5,250]), MoDOT's relocation policy commits to utilizing housing of last resort. Housing of last resort involves the use of payments in excess of statutory maximums or the use of other unusual methods of providing comparable housing.

Any displaced owner-occupant or tenant of a dwelling who qualifies as a displaced person is entitled to payment of his or her actual moving and related expenses, as MoDOT determines to be reasonable and necessary. A displaced owner-occupant who has occupied a displacement dwelling for at least 180 days is also eligible to receive up to \$22,500 for a replacement housing payment which includes the amount by which the cost of a replacement dwelling exceeds the acquisition cost of the displacement dwelling, increased interest costs and incidental costs. A displaced owner-occupant who has occupied a displacement dwelling for at least 90 days but less than 180 days and a tenant who has occupied a displacement dwelling for at least 90 days, is entitled to a payment not to exceed \$5,250 for either a rental or down payment assistance.

The MoDOT Right of Way Division would carry out the acquisition and relocation of commercial and industrial properties in accordance with the act of 1970, as amended. Business owners would be paid fair market value for the real property to be acquired and for relocation costs. Acquisition of commercial properties would not involve relocation of businesses if no operating business is located on the property.

Any displaced business, farm operation, or nonprofit organization which qualifies as a displaced person is entitled to payment of their actual moving and related expenses, as MoDOT determines to be reasonable and necessary. In addition, a business, farm, or non-profit organization may be eligible to receive a payment, not to exceed \$10,000 for expenses incurred in reestablishing their business, farm operation, or non-profit organization at a replacement site.

A displaced business may be eligible to choose to receive a fixed payment in lieu of the payments for actual moving and related expenses, and actual reasonable reestablishment expenses. The payment amount of this entitlement alternative is based on the average net earnings of the business. This fixed payment amount cannot be less than \$1,000 or more than \$20,000.

2. Availability of Housing

As indicated in Table III-3, the housing vacancy rate for the block groups within the corridor ranges from four to eight percent. This equates to 124 to 248 vacant housing units at the time the 2000 Census occurred. This, coupled with available housing units located elsewhere in Boone or Callaway Counties, is an indication that adequate available housing exists to meet the needs associated with any relocations that would occur as a result of this project.

3. Environmental Justice

Project team members displayed exhibits while attending public meetings for adjacent SIUs. These public information meetings were held to gather feedback from the residents of the area. Notification of the public meetings was made through news releases, advertisements in the local newspapers and newsletters distributed to property owners in the project area. Throughout this public involvement process and field work in the corridor, project team members observed no concentration of minority population in the SIU 5 corridor.

The 2000 population in the project area shown in Section III.A.4 indicates a minority percentage for the study area lower than that of Boone and Callaway Counties and the state of Missouri. Census data on income also indicates that the block groups in the study area have higher average incomes and a lower proportion of persons below poverty level compared to both Boone and Callaway Counties. None of the 14 residential displacements are in a concentrated area, but are generally spread out over the 13-mile corridor. Given the lower proportion of minority and low-income characteristics of the study area and the broad area of impacts, the proposed action would not have disproportionate adverse impacts on minority and/or low-income populations as defined by Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations) and Federal Highway Administration (FHWA) Order 6640.23.

4. Employment

Employment impacts are measured by jobs lost and jobs generated by the proposed improvements. No major employers in the corridor would be displaced and no significant job losses would occur. Based on the businesses that would be displaced as shown in Table III-8, it is estimated that between 80 and 120 jobs would be directly impacted by the proposed project. It is likely that job losses would be offset by businesses relocating elsewhere in Boone or Callaway County.

Employment would occur during the construction of the proposed improvements. Employment generated by the construction of the project is based on construction cost estimates. While construction employment would be a direct impact from construction of the proposed facility, construction employment and payroll would also generate induced impacts as a result of payroll dollars being spent.

5. Tax Impacts

The acquisition of land and improvements for right of way associated with highway improvements would result in the direct loss of property that is subject to property taxes by local taxing districts. The reduction of assessed valuation as a result of the proposed improvements within the SIU 5 corridor is shown in Table III-10. Reduction in assessed valuation would be minimal in each county. Tax revenue loss as a result of converting taxable land into tax exempt is expected to be short-term as most displaced residents would likely relocate within Boone or Callaway County.

Table III-10: Potential Reduction of 2001 Assessed Value Associated with the Proposed Improvements

	Total Assessed Value	Estimated Reduction of County Assessed Value	Percentage Reduction of County Assessed Value
Boone County	\$1,399,989,128	\$ 26,720	.002
Callaway County	\$566,247,570	\$120,721	.021

Source: Zambrana Engineering, Inc., 2003 and county assessors' offices in Boone County Cooper County.

6. Community Cohesion

Community Cohesion is commonly defined as "those behaviors or perceptual relationships that are shared among residents of a community that cause the community to be identifiable as a discrete, distinctive geographic entity within the urban pattern. These shared behaviors and feelings bind the community together as a cohesive grouping. Cohesion manifests itself in such behavior as: (1) participation in community organizations, (2) neighborhood socializing and (3) by the use of community facilities. Perceptual manifestations of cohesion include: (1) psychological identification with the neighborhood or community, (2) commitment to it over time and (3) positive feelings or evaluations concerning it" (FHWA, 1977).

Because the proposed project would not affect the use of community facilities, and would not physically divide or disrupt neighborhoods, there would be no impact to community cohesion.

C. Land Use and Zoning

1. Land Use Characteristics

The project is located in central Missouri where regional land uses generally consist of rural residential with some agricultural and scattered commercial uses. A field inventory of existing land uses in the SIU 5 corridor was conducted in 2002. This inventory utilized aerial photography and a windshield survey. Land uses adjacent to the existing alignment were mapped and are shown in the previous chapter on Exhibit II-1. Public lands within the study corridor include Tucker Prairie, which is owned and managed by the University of Missouri.

Commercial development in the SIU 5 corridor is limited and is primarily located near the interchanges. Residential development in the area generally consists of small single-family housing with some mobile home development located along the I-70 frontage roads, particularly along old U.S. 40 east of the J/DD interchange.

2. Land Use Planning

Comprehensive land use plans are adopted by communities to direct growth and ensure their diversity, efficiency and balance of land uses. Within the study corridor, only Boone County has adopted land use planning or zoning regulations. Planned land uses in the SIU 5 corridor are agricultural/rural with the exception of the Route Z interchange area where commercial uses are proposed.

3. Land Use Impacts

Impacts to existing land uses are through direct acquisition of right of way for highway construction. Land use impacts, therefore, reflect the acquisition and conversion of land uses outside of the existing highway right of way. The amount and type of land that would be acquired by land use classification and/or ownership as a result of the proposed improvements are presented in Table III-11.

Land use impacts are classified as agricultural/undeveloped, residential, commercial, industrial and public/semi-public. Agricultural/undeveloped land use includes farmland or vacant areas that have been cleared for agricultural purposes or those properties where no development exists. The majority of the SIU 5 corridor is in agricultural uses or is undeveloped. Consequently, the largest land use impact is in this combined category. The proposed improvements would require the acquisition of 440 acres (178 hectares) of land along existing I-70.

Table III-11: Potential Existing Land Use Impacts Associated with the Proposed Improvements in the SIU5 Corridor

	Acres Impacted
Agricultural/Undeveloped	392.9
Residential	18.6
Commercial	25.0
Industrial	1.8
Church	0.8
Utility	0.5
Total Existing Land Use Impact Area	439.6
<i>Source: Zambrana Engineering, Inc., 2003</i>	

4. Future Land Use

The proposed improvements are not expected to cause substantial amounts of growth in the region or study corridor. Existing development in the area is scattered with limited commercial

development concentrated near the interchanges. The lack of infrastructure in the corridor limits the potential for future commercial, industrial and higher density uses.

D. Natural Environment

1. Air Quality

The Federal Clean Air Act Amendments (CAAA) of 1970 required the adoption of air quality standards. These were established in order to protect public health, safety and welfare from known or anticipated effects of sulfur dioxide (SO₂), particulates (PM-10, 10-micron and smaller; PM-2.5, 2.5 micron and smaller), carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃) and lead (Pb). In addition to these pollutants, the state of Missouri has established additional criteria for hydrogen sulfide (H₂S) and sulfuric acid (H₂SO₄).

The CAAA of 1977 required all states to submit to the U.S. Environmental Protection Agency (EPA) a list identifying those air quality control regions, or portions thereof, which meet or exceed the National Ambient Air Quality Standards (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 “nonattainment” areas for that pollutant.

The 1990 Clean Air Act established procedures for determining the conformity of state implementation plans with the requirements of the federal regulations. These procedures are published in 40 CFR Parts 51 and 93.

The project falls within the Northern Missouri Intrastate Air Quality Control Region (AQCR) #137. This AQCR has a designation of better than national standards for total suspended particles (TSP) and SO₂, unclassifiable/attainment for CO, cannot be classified or better than national standards for NO₂, and no designation for Pb.

Table III-12: Missouri and National Ambient Air Quality Standards

Pollutant	Averaging Time	Concentration
Sulfur Dioxide (SO ₂)	Annual Arithmetic Mean: Primary Twenty-Four Hour ⁽¹⁾ : Primary Three Hour ⁽¹⁾ : Secondary	80 ug/m ³ (0.03 ppm) 365 ug/m ³ (0.14 ppm) 1300 ug/m ³ (0.50 ppm)
Particulate (PM-10)	Annual Arithmetic Mean: Primary & Secondary Twenty-Four Hour: ⁽²⁾ Primary & Secondary	50 ug/m ³ 150 ug/m ³
Particulate (PM-2.5)	Annual Arithmetic Mean: Primary & Secondary Twenty-Four Hour: ⁽²⁾ Primary & Secondary	15 ug/m ³ 65 ug/m ³
Carbon Monoxide (CO)	One Hour ⁽¹⁾ : Primary Eight Hour ⁽¹⁾ : Primary	40 mg/m ³ (35 ppm) 10 mg/m ³ (9 ppm)
Ozone (O ₃)	Eight Hour ⁽¹⁾ : Primary & Secondary	150 ug/m ³
Nitrogen Dioxide (NO ₂)	Annual Arithmetic Mean: Primary & Secondary	100 ug/m ³ (0.053 ppm)
Lead (PB)	Calendar Quarter Arithmetic Mean: Primary & Secondary	1.5 ug/m ³
Hydrogen Sulfide (H ₂ S)	One-Half Hour ⁽³⁾	70 ug/m ³ (0.05 ppm) ⁽⁸⁾ 42 ug/m ³ (0.05 ppm) ⁽⁸⁾
Sulfuric Acid (H ₂ SO ₄)	Twenty-Four Hour One Hour	10 ug/m ³ ^(B) 30 ug/m ³ ^(B)
⁽¹⁾ = Not to be exceeded more than one per year. ⁽²⁾ = Statistically estimated number of days with exceedances is not to be more than one per year. ⁽³⁾ = Not to be exceeded more than twice per year. ⁽⁴⁾ = Not to be exceeded more than twice in any 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 25oC. ug/m3 = Micrograms of Pollutant per cubic meter of air.		
<i>Source: MDNR Division 10-Air Conservation Commission</i>		

An Air Quality Analysis Agreement executed in March 1988 by FHWA, the Missouri Department of Natural Resources (MDNR) and MoDOT states that a detailed air quality analysis for inclusion in an environmental document will only be prepared on federally funded highway projects when the present or predicted average daily traffic (ADT) volume on the project exceeds 54,000 vehicles in the year of project construction or 72,700 vehicles in the 20th year following the project construction. The projected ADT for the SIU 5 corridor in 2030 with the proposed improvements is 76,960. The most likely occurrence for exceeding the NAAQS is at a controlled intersection which has the potential to create excessive traffic queues. Since there are no controlled intersections with congestion along this section of the corridor, it is exceedingly unlikely that in the presence of free flow I-70 traffic that a detailed air quality analysis would project a violation. This project is not located in an air quality non-attainment area; therefore, no detailed air quality analysis is required at this time for the SIU 5 corridor.

Construction methods and operations for the project will be conducted in accordance with MDNR and MoDOT regulations, particularly concerning batch plant operations and clearing and

grubbing functions. Standard construction specifications incorporate provisions for minimizing air quality impacts during construction.

2. Geology and Soils

a. Existing Conditions

The study area is located within the Central Dissected Till Plains of the Missouri and Mississippi River Border Provinces. The area is described as highly dissected with isolated rolling plains in the western part and gently sloping ridgetops and valley bottoms occurring throughout. Local relief in the area is relatively flat with sloping areas near stream banks. The highest elevation of the study area is 921 feet in the eastern portion of the section in a farmed area. The lowest point in the study area is 781 feet at Cedar Creek.

Carbonate rocks such as limestone can be dissolved by natural chemical processes which may form small caves, springs and sinkholes which are collectively known as Karst features. Several prominent caves, springs and sinkholes can be found in Boone County; however, none are located within the SIU 5 Corridor. No Karst features were observed during field investigations.

The area is underlain by lower Pennsylvanian Age rock – Cherokee and Marmaton Formations. The Cherokee Formation predominately consists of shale and sandstone along with the most mineable coal beds in Missouri. The overlying Marmaton Formation is also predominately shale and sandstone with minor amounts of limestone and a few coal beds.

Currently, there is no coal mining in or around the project corridor. There has been, however, historic surface mining just north of I-70 at Cedar Creek and the boundary of Boone and Callaway Counties. Strip mining in this area has caused poor water quality in Cedar Creek (see Section D.4.a). In addition, there has been surface coal mining just north of the interchange at Route J on the east side.

A large majority of soils within the study corridor are prime farmland or hydric soils. Detailed descriptions of these soils are located in the “Wetland Summary Report, Section of Independent Utility #5” submitted as a separate document on this project. These soils are typically deep, very gently sloping to strongly sloping, somewhat poorly drained soils formed in loess, pedisements and glacial till. They are composed of silt loam or clay loam.

b. Impacts

Only minor impacts to the study corridor soils would occur during construction activities. Soils would be disrupted and partially removed as a result of the proposed improvements. Erosion of the site soils would be controlled using best management practices. No lasting impacts to the soils and geologic features of the study corridor are anticipated.

3. Prime Farmland

a. Existing Conditions

The landscape cover in Boone and Callaway Counties within the SIU 5 corridor consists predominately of agricultural uses. The type of agriculture usage, however, differs considerably in Boone and Callaway Counties. In the eastern half of the SIU 5 corridor, farmland is primarily used as cropland. The most typical crops, observed in field investigations, were corn, winter wheat and soybeans. In Boone County farmland usage is primarily open grassland and pasture for the purpose of haying. According to the United States Department of Agriculture Farm Service Agency, no Conservation Reserve Program land is within the study area. Table III-13 lists the types of prime farmland soils found in the SIU 5 corridor.

Table III-13: Prime Farmland Soil Types within SIU 5

Soil Name	County
Belkamp silt loam (where drained)	Callaway
Haynie silt loam, 0-2% slopes, occasionally flooded	Boone
Hatton silt loam, 2-5% slopes, eroded	Boone
Mexico silt loam, 1-3% slopes	Boone
Mexico silt loam, 1-3% slopes, eroded	Boone
Mexico silt loam, 1-5% slopes	Callaway
Mexico silt loam, 1-5% slopes, eroded	Callaway
Moniteau silt loam, 0-3% slopes	Callaway
Perche silt loam, 0-2% slopes, frequently flooded	Boone
Putnam silt loam (where drained)	Callaway
Sandover sand, 0-2% slopes, occasionally flooded	Boone
<i>Source: NRCS, 1992(Callaway) & 2001 (Boone)</i>	

Mexico silt loam is the prevalent soil in Callaway County, consisting of a deep soil that drains somewhat poorly, and is more conducive for croplands. In Boone County, Mexico silt loam is still a deep soil, but is moderately well drained due to a slightly sloping or moderately sloping upland setting. This soil condition is more conducive to pasture and grassland production.

b. Impacts

The utilization of existing farmland for the proposed improvements would convert agricultural land to non-agricultural purposes resulting in a loss of prime farmland and a reduction in agricultural production and income. Prime farmland impacts were analyzed by the Natural Resource Conservation Service (NRCS).

Coordination with the NRCS was conducted pursuant to the Farmland Protection Policy Act of 1981 (FPPA). The NRCS is responsible for evaluating the conversion of prime and unique farmland and statewide and locally important farmland to nonagricultural use. Requests for an evaluation were submitted to the NRCS on the Farmland Conversion Impact Rating, Form AD-1006 (see Appendix C). Potential impacts to farmland in Boone and Callaway Counties and conversion impact ratings as a result of the SIU 5 corridor impacts are shown in Table III-14. According to the FPPA, sites receiving low scores are least suitable for protection. Sites that receive a total score of 160 or less are given a minimal level of consideration for protection and no additional sites need to be evaluated.

Table III-14: Potential Prime Farmland Impacts within SIU 5

County	Total Agricultural Land in County (acres)	Prime Farmland Acreage Impacted (acres)	Percent of Farmland Converted	Farmland Conversion Impact Rating
Boone	357,631	59.6	.017	129
Callaway	393,425	391.3	.10	146

Source: NRCS, 2003

Management and design practices would be incorporated into the project to minimize disruptions to agricultural lands and to limit adverse effects to designated soils. These practices include:

- Minimize acquisition of new right of way wherever possible.
- Parallel property lines to the greatest extent possible.
- Control sedimentation and erosion during construction to minimize loss of topsoil into streams and roadside ditches in accordance with MoDOT's Temporary Erosion and Sedimentation Control program.

4. Water Quality

a. Existing Conditions

The SIU 5 corridor is located in the Lower Missouri-Moreau Watershed. Most pollutants within the SIU 5 corridor are caused by agricultural runoff or pollutants caused by agricultural practices, except for Cedar Creek. Within the SIU 5 corridor, Cedar Creek has historically been of low water quality due to strip mining of coal north of I-70. Prior to the reclamation of mined lands by the MDNR in the early 1980s, the entire 42 miles of Cedar Creek suffered periodic acid mine drainage problems and fish kills. Since reclamation, no fish kills have occurred, and pH has increased from about 3.0 to 5.9. Currently, Cedar Creek is classified as a Class C stream. A Class C stream may cease to flow in dry periods by maintaining permanent pools that support aquatic life. This class of stream supports "limited" warmwater fisheries.

The MDNR has been monitoring Cedar Creek since 1981 for the pollutants of low pH and sulfate. Currently, pH and sulfate levels have been acceptable indicating that the reclamation has successfully restored Cedar Creek to acceptable water quality and increased aquatic life.

Surface water features within the study corridor include streams and ponds. There are 13 streams within the corridor. These ponds consist of variably sized impoundments and farm ponds. In addition, two forested wetlands and two emergent wetlands were identified within the corridor near Little Cedar and Cedar Creek.

No public water sources, sole source aquifers and wellhead protection areas are located within SIU 5. Municipal water supplies were not located immediately adjacent to the corridor and only sporadic private wells were noted.

b. Impacts to Surface Water and Ground Water Resources

Potential impacts to surface water resources resulting from roadway construction activities may be short-term or long-term in nature. Short-term impacts are primarily related to the construction, operation and maintenance phases. Potential impacts during the construction phase may be overall habitat loss (drainage of impoundments, culverting streams) as well as sedimentation and siltation effects. In addition, pollutants (toxic heavy metals, petroleum products, etc.) associated with erosion, sedimentation and siltation during the operation and maintenance phases may also impact water quality. Short term impacts would be controlled to a great extent by following MoDOT's Temporary Erosion and Sedimentation Control Program as approved by the MDNR. Such measures include the use of temporary berms, slope drains, sediment basins, seeding and mulching, straw bales and silt fences. In accordance with the National Pollutant Discharge Elimination System requirements (NPDES) of the Clean Water Act, MoDOT also operates under the provisions of the NPDES permit number MO-R100007, a general permit issued for road construction projects statewide for a term from April 19, 2002 to April 18, 2007. A copy of this permit is included in Appendix D. No impacts to groundwater resources are expected.

5. Water Resources/Wetlands

a. Existing Conditions - Streams and Ponds

In the preliminary inventory of existing water resources within the study corridor, data was gathered from United States Geological Survey (USGS) quadrangle maps, the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) Maps, the NRCS for hydric soils and aerial photography. A more detailed description of protocol and information gathered is contained in the "*Wetland Summary Report, Section of Independent Utility #5,*" submitted as a separate report with this project.

The NWI Maps are based on a classification system known as the Cowardian System. This system classifies the types of ecosystems related to water resources, which include streams, lakes and ponds, in addition to vegetated wetlands. After a review of the water resource data gathered and field observations, it was determined that the following Cowardian Systems are represented in the study corridor.

- The *Riverine* System, including lower perennial-R2, represents the rivers and streams.
- The *Palustrine* System, including unconsolidated bottom-PUB, represents the upland ponds.
- The *Palustrine* System, including emergent-PEM and forested-PFO, represents the vegetated wetlands.

The study corridor is located in the Missouri River section of the Ozark Border Natural Division of Missouri in the Lower Missouri River Basin. The area is characterized by isolated rolling plains and gently sloping ridgetops and valley bottoms. All streams within this section flow to the south into the Missouri River except for the tributaries of Manacle Creek which drain to the north. Most of the stream corridors within the study corridor are slightly sloping to moderately sloping. All of these streams are characterized as low gradient streams with certain stream reaches having year round pooling of water.

Nearly all of the classified streams within the study corridor are not classified as riverine on NWI maps, but are shown as blue line perennial or intermittent streams on USGS quadrangle maps. All streams were found to be natural. These streams identified within the corridor are Little Cedar Creek, unnamed tributaries to Manacle Creek, unnamed tributaries to Richland Creek and Sallees Branch of Richland Creek. Many drainage ditches within agricultural fields are also located in the SIU 5 corridor, but are manmade and lack established bed and bank or ordinary high water mark.

The *Palustrine* “unconsolidated bottom” (PUB) system within the study corridor includes several upland ponds scattered throughout. Most are either historical livestock ponds based on upland site location or recreational fishing ponds recently built and located adjacent to residential homes. In all cases, these PUB designated ponds are isolated with no inflow or significant outflow (not part of a surface tributary system or its drainage basin) and the only source of hydrology is immediate runoff from earthen berms or small-scale dams. Because many are isolated and man-made, these ponds would not be considered jurisdictional. Several of the previously designated NWI ponds had been filled over time as determined from field investigations. The five NWI designated PUB habitats were actually sewage treatment ponds and are also non-jurisdictional.

No springs or water outfall from springs were field identified. Correspondence from the MDNR indicates that no springs are present in the vicinity of the proposed improvements.

b. Existing Conditions - Wetlands

Within the study corridor, the areas shown on the NWI maps that are classified as vegetated wetlands include the *Palustrine* “forested” (PFO) and *Palustrine* “emergent” (PEM). No Wetland Reserve Program areas were located in the study corridor. These potential wetlands were evaluated using the “Routine Wetland Determination” procedures of the 1987 Corps of Engineers Manual. Determinations were made by meeting all three wetland criteria of hydrophytic vegetation, wetland hydrology and hydric soils.

Four wetlands were identified in the area, two *Palustrine* “forested” (PFO) and two *Palustrine* “emergent” (PEM) wetlands. Little Cedar Creek has forested wetland habitat on the western side of the creek. The forested wetland habitat is above the ordinary high water mark and is contiguous as far south as the limits of construction. Long duration ponding and saturation of soils was apparent throughout the forested wetland habitat. West of Cedar Creek, an area not classified by NWI maps, but classified by Food Security Act (FSA) mapping as wet (W) was identified. This habitat is above the ordinary high water mark and is contiguous to a pronounced ridge boundary just south of the limits of construction. Braided stream channels, ponding and saturation of soils were apparent throughout.

Two areas of *Palustrine* “emergent” wetlands are located within the SIU 5 corridor. An emergent wetland is located on the eastern side of Little Cedar Creek. This wetland was previously NWI designated as a forested (PFO1) wetland, but recent tree removal by the current land owner has converted this back into an emergent wetland. It is above ordinary high water mark and has long duration ponding and saturated soils throughout. The second emergent wetland was located on the west side of Cedar Creek, and is above the ordinary high water mark and normally farmed. No previous NWI designation had been noted for this area. However, FSA wetland classification classified this area as farmed wet (FW).

Two isolated emergent wetlands were found at the far northern area of the M/HH interchange near the frontage road connection with Route M. These are NWI designated emergent (PEM) wetlands and have since been farmed. Since they are isolated wetlands, they are not jurisdictional.

The overall plant diversity of the wetlands found within the study area was subjectively rated at a low to medium level of quality. General assessments were made on wetlands found within the study area by evaluating the presence of noxious and invasive species, by determining species diversity and composition and by recording any special features.

Common species within the study corridor vary between habitats. Along riparian corridors, typical vegetation composition is pin oak (*Quercus palustris*), silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), sycamore (*Platanus occidentalis*) and honey-locust (*Gledista triacanthos*) for tree canopy. An understory within the riparian corridor is mostly composed of the same species, which includes coral-berry (*Symphoricarpos orbiculatus*), poison ivy (*Toxicodendron radicans*), pale touch-me-not (*Impatiens pallida*), wild black currant (*Ribes americanum*) and great ragweed (*Ambrosia trifida*). Within emergent wetlands and along wetland fringe areas on banks of man-made ponds, a prevalence of tree species includes black willow (*Salix nigra*), river birch (*Betula nigra*) and pin oak (*Quercus palustris*).

Wetland fringe plants in the understory of vegetated wetlands or on banks of man-made ponds largely were composed of the following: daisy fleabane (*Erigeron annuus*), pinkweed (*Polygonum pennsylvanica*), common milkweed (*Asclepias speciosa*), beggar-ticks (*Bidens aristosa*), cattail (*Typha latifolia*), Missouri ironweed (*Vernonia missurica*) and curly dock (*Rumex crispus*). A more detailed summary of plant species can be found in a separate report titled "Wetland Summary Report, Section of Independent Utility #5," on request from MoDOT.

c. Impacts

As shown in the Table III-15, the total potential linear impact to all streams collectively would be 4,968 lineal feet (1,514 meters) for a total acreage impact of 0.8 acres (0.32 hectare). Exhibit III-3 provides the identifying number and location for each stream, pond and wetland evaluated. An individual 404 permit from the U.S. Army Corps of Engineers would be required for impacts to jurisdictional waterbodies including wetlands.

Table III-15: Potential Impacts to Jurisdictional Waterbodies within the SIU 5 Proposed Corridor

Stream Number	Stream Name	USGS/NWI	Soil Mapping	Water of U.S.	Impact Type	Ordinary High Water Mark Width (feet)	Channel Impact Length (feet)	Channel Impact Area (acres)
1	Tributary to Little Cedar Creek	Intermittent	Hydric	Yes	Culvert	4	260	0.02
2	Little Cedar Creek	Perennial	Hydric*	Yes	Bridge	15	0	0
3	Tributary to Little Cedar Creek	Intermittent	Hydric*	Yes	Culvert/Fill	6	391	0.05
4	Tributary to Cedar Creek	Intermittent	Non-Hydric	Yes	Relocate Stream	8	1579	0.29
5	Cedar Creek	Perennial	Hydric*	Yes	Bridge	75	0	0
6	Tributary to Cedar Creek	Intermittent	Non-Hydric	Yes	Culvert/Fill	10	443	0.1
7	Tributary to Manacle Creek	None	Non-Hydric	Yes	Culvert/Fill	5.5	283	0.04
8	Tributary to Manacle Creek	Intermittent	Non-Hydric	Yes	Culvert	10	251	0.06
9	Tributary to Manacle Creek	Intermittent	Non-Hydric	Yes	Culvert/Fill	5.5	696	0.09
10	Richland Creek	Intermittent	Hydric	Yes	Culvert/Fill	8	312	0.06
11	Tributary to Richland Creek	None	Non-Hydric	Yes	Culvert/Fill	6.5	256	0.04
12	Tributary to Richland Creek	Intermittent	Non-Hydric	Yes	Culvert	3	313	0.02
13	Sallees Branch of Richland Creek	Intermittent	Hydric*	Yes	Culvert	6.5	184	0.03
TOTAL							4,968	0.8

Source: Zambrana Engineering, Inc., 2003

*hydric inclusions

As shown in the Table III-16, the total impact to all ponds collectively would be 2.38 acres (0.96 hectare).

Table III-16: Potential Impacts to Ponds within the SIU 5 Proposed Corridor

Pond Number	NWI/FSA Designation	Impact Type	Impacted Area (ac)	Isolated	Jurisdictional	Description
1	PUBGh	Fill	0.10	Yes	No	Stock Pond
2	None	Fill	1.09	Yes	No	Recreational Pond
3a	None	Fill	0.06	Yes	No	Septic Lagoon
3b	None	Fill	0.06	Yes	No	Septic Lagoon
4	PUBFh	Fill	0.02	Yes	No	Septic Lagoon
5	PUBGh	Fill	0.08	Yes	No	Stock Pond
6	PUBGh	Fill	0.24	Yes	No	Stock Pond
7	PUBGx	Fill	0.15	Yes	No	Septic Lagoon
8	PUBGh	Fill	0.24	Yes	No	Septic Lagoon
9	None	Fill	0.08	Yes	No	Septic Lagoon
10	PUBGh	Fill	0.09	Yes	No	Septic Lagoon
11	PUBGh	Fill	0.07	Yes	No	Septic Lagoon
12a	PUBGh	Fill	0	Yes	No	Filled Pond
12b	PUBGh	Fill	0	Yes	No	Filled Pond
13	PUBGh	Fill	0	Yes	No	Filled Pond
14	PUBGh	Fill	0.10	Yes	No	Farm Pond
TOTAL			2.38			

Source: Zambrana Engineering, Inc., 2003

As shown in Table III-17, potential total impacts to wetlands by habitat type are 3.27 acres (1.3 hectares) of emergent wetland and 1.58 acres (0.64 hectare) of forested wetland.

Table III-17: Potential Impacts to Wetlands within the SIU 5 Proposed Corridor

Wetland Number	NWI/FSA Designation	Soil Mapping	Impact Type	Impacted Area (ac)	Isolated	Jurisdictional	Description
1	PF01A	Hydric	Bridge	0.60	No	Yes	Forested Wetland
2	PF01C	Hydric*	Fill	0.53	No	Yes	Emergent Wetland
3	W	Non-Hydric	Fill	0.98	No	Yes	Forested Wetland
4	FW	Hydric*	Fill	2.74	No	Yes	Emergent Wetland
5	PEMA	Hydric	Fill	-	Yes	No	Farmed Emergent
6	PEMC	Hydric	Fill	-	Yes	No	Farmed Emergent
TOTAL				4.85			

Source: Zambrana Engineering, Inc., 2003

*hydric inclusions

6. Water Body Modification and Wildlife Impacts

a. Existing Conditions

Transportation improvement projects impact aquatic and terrestrial habitat directly through right of way acquisition and indirectly through wildlife habitat modification. Right of way acquisition results in a direct loss of acreage and a reduction of habitat size. The streams, lakes and ponds within the study corridor were identified in section 5.a. These waterbodies not only serve as habitats for aquatic species, but they also provide drinking water for terrestrial wildlife, in addition to food and cover where adjacent vegetation occurs.

A large block (approximately 8.5 acres) of upland forest is located west of Cedar Creek on the south side of I-70. This block of forest is a maple-oak-hickory forest, with varied vegetation depending on the slope of the terrain, and begins at the end of the south frontage road and slopes down to the tributary of Cedar Creek. Typical vegetation in this area includes red oak (*Quercus rubra*), white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), sugar maple (*Acer saccharinum*), Virginia creeper (*Parthenocissus quinquefolia*), buckbrush (*Symphoricarpos orbiculatus*) and bedstraw (*Galium aparine*). Also observed in this area were many snags measuring 24 to 30 inches in diameter. Because this area is the only area within the SIU 5 corridor that has a large block of habitat, field verification identified a diversity of wildlife. This habitat is associated with foraging and summer maternal roost sites for the Indiana bat (*Myotis sodalis*). No recorded information, however, was found that documents the presence of maternal roost sites in this area. Except for this area, all upland forests and riparian forests are associated with the stream channels.

b. Impacts

Impacts on streams would be minimal because widening the current bridges avoids or minimizes permanent discharges of fill material into the stream. Best management practices, as recommended by Missouri Department of Conservation (see 6/3/02 MDC letter in Chapter IV) should be followed during project design and construction to ensure water quality is maintained in affected streams. Because all of the ponds affected are man-made farm or stock ponds, impacts on native wildlife would not be significant. Aquatic and terrestrial habitat modification includes filled-in ponds and removal of a portion of established riparian and upland forested areas. These areas would be partially impacted as a result of construction; however, these impacts are not expected to be significant as they represent a small portion of the adjoining forested area. Potential impacts to the Indiana Bat are addressed in Section D.8. of this chapter.

7. Floodplains

a. Existing Conditions

The Federal Emergency Management Agency (FEMA) and the FHWA guidelines 23 CFR 650 have identified the base (100-year) flood as the flood having a one-percent probability of being equaled or exceeded in any given year. The base floodplain is the area of 100-year flood hazard within a county or community. The regulatory floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood

discharge can be conveyed without increasing the base flood elevation more than a specified amount. The Federal Emergency Management Agency has mandated that projects can cause no rise in the regulatory floodway, and a one-foot cumulative rise for all projects in the base (100-year) floodplain. For projects that involve the state of Missouri, the State Emergency Management Agency issues floodplain development permits. In the case of projects proposed within regulatory floodways, a “no-rise” certificate, if applicable, should be obtained prior to issuance of a permit.

The Federal Emergency Management Agency (FEMA) has published Flood Insurance Rate Maps (FIRM) for both Boone and Callaway Counties; however, no detailed National Flood Insurance Program studies have been conducted in the SIU 5 corridor for these counties. The FIRM maps show assumed flood hazard boundaries, noted as Zone A floodplain, which are an approximation of areas of frequent flooding. No floodways were identified in the SIU 5 corridor.

In Boone County, two floodplains are shown on the FIRM maps in the SIU 5 corridor. These include Little Cedar Creek and Cedar Creek. Cedar Creek is the largest floodplain area in the corridor and is also the boundary between Boone and Callaway Counties. The floodplain is located in both counties. In Callaway County, two floodplains were identified in addition to Cedar Creek – a tributary of Manacle Creek and Sallees Branch of Richland Creek. These floodplain areas are shown in Exhibit III-2. There are no FEMA buyout properties in the project area.

b. Project Impacts

The area of floodplain that would be impacted from the SIU 5 approximate new right of way is shown in Table III-18. The proposed improvements would not encourage incompatible floodplain development. Risks of flooding to users of the roadway and potential property loss and hazard would be minimized. Because the amount of impacted floodplain areas and riparian corridors is relatively small and the existing floodplain is predominantly undeveloped, there would be little or no impact on wildlife habitat or storage capabilities.

Floodplain impacts would be minimized by following standard stream crossing design criteria and by minimizing direct impacts on stream channels. Roadway crossing structures would be designed for passing anticipated future runoff conditions within the acceptable backwater limits.

Table III-18: Potential Floodplain Impacts within the SIU 5 Corridor

Floodplain Area	County	Impacted Area (acres)
Little Cedar Creek	Boone	0.8
Cedar Creek	Boone/Callaway	7.9
Tributary to Manacle Creek	Callaway	2.4
Sallees Branch of Richland Creek	Callaway	1.5
<i>Source: Flood Insurance Rate Maps for Boone and Callaway Counties</i>		

8. Natural Communities and Threatened and Endangered Species

a. Existing Conditions

Under the Endangered Species Act, the USFWS has primary responsibility in the protection of threatened and endangered species and conservation of the critical habitats upon which they rely. At the state level, the Missouri Department of Conservation (MDC) determines species status under the Missouri State Endangered Species Law and constitutional authority (3CSR10-4.111 Endangered Species). The USFWS and the MDC were contacted to determine if any local occurrence of threatened or endangered species within the project corridor had been reported. Correspondence with MDC resulted in the identification of several listed species as potentially occurring in the study corridor. These are shown in Table III-19 below.

Table III-19: Threatened and Endangered Species Occurring or Potentially Occurring within the SIU 5 Corridor

Scientific Name	Common Name	County	Status
<i>Notropis topeka</i>	Topeka Shiner	Boone	Federally endangered/ State endangered
<i>Myotis sodalis</i>	Indiana Bat	Boone/Callaway	Federally endangered/ State endangered
<i>Trifolium Stoloniferum</i>	Running Buffalo Clover	Boone/Callaway	Federally endangered/ State endangered
Source: Missouri Department of Conservation Correspondence, 2002			

Topeka Shiner

Habitat for the Topeka Shiner (*Notropis topeka*) consists of upper reaches of small prairie streams, clear water, streambeds of sand, gravel or bedrock. The two creeks were analyzed due to adequate year round flow with proper in-stream aquatic habitat and recently improved water quality.

Indiana Bat

Indiana Bats (*Myotis sodalis*) may be found throughout the state. The wintering range is generally south of the Missouri River and the summer range generally north. According to the MDC, there are fewer than 30 caves or mines which are known to have sizable Indiana Bat colonies. The bats have very specific habitat requirements for their winter hibernation sites.

The Indiana Bats are known to inhabit Rocheport (Boone) Cave during the winter months. The Indiana Bats come into the cave shortly after the Gray Bats have left, generally in October and stay until March. According to a recent MDC census, approximately 200 Indiana Bats are present over the winter months. Not all the bats will leave the cave vicinity during the summer instead some of them will stay and continue foraging near the cave.

The females and their young spend the summer months in maternity colonies in both riparian and upland woodlands where suitable roost trees are present. The preferred roost trees have exfoliating, loose or platy bark, or scars from fire or lightning strikes or other damage that allow the bats entry in a hollow or cavity in the tree. The tree could also be dead or declining vigor and the bark is in the process of sloughing off. Female maternity colonies prefer to roost under the sloughing bark.

There are likely additional areas within the I-70 corridor that provide seasonal habitat to the Indiana Bat. The Missouri Department of Transportation recognizes the importance of minimizing the effects of habitat loss, especially with respect to habitats that could be used by threatened and endangered species. The Indiana Bat does prefer woodlands with a variety of species and age classes.

The USFWS previously used a guidance that focused on not cutting suitable roost trees during the breeding season (April 1 through September 30) to avoid negative impacts on the species. The USFWS now advocates reviewing projects on a case by case basis focusing on the following criteria: the projects proximity to known hibernacula; maternity, male roosts and/or important foraging areas; the composition of the woodland; the land use of the area after the project is complete; and consideration of the magnitude, scope, frequency, and duration of the proposed action with regard to the importance of the area to the Indiana Bat.

Running Buffalo Clover

Running Buffalo Clover (*Trifolium stoloniferum*) is a native clover of Missouri and was thought to be gone from the state until 1989, when it was rediscovered. It is a perennial that grows from 4 to 20 inches tall, blooming generally from mid-May through June.

Running Buffalo Clover was recently discovered along the Loutre River, near the existing I-70 crossing. The sites where the plants were found appear to be in or adjacent to disturbed areas as well as in riverine settings, along the first wooded terrace or bench above the river. It has been thought that disturbance, such as that provided by the herds of buffalo in Missouri, were instrumental in the species propagation and distribution. Running Buffalo Clover does not appear to compete well with other species of clover. Currently, mowing and grazing can provide that disturbance which appears to be necessary for the plant's distribution.

The I-70 Improvement Corridor crosses the Loutre River, near the site of the most recent discovery of Running Buffalo Clover. The I-70 Improvement Corridor's proposed right-of-way along the Loutre River crossing was surveyed by a local botanist consultant hired by MoDOT and no plants were located in the area of direct effect, i.e. anticipated right of way and construction easement area.

Field Investigation

Field investigations for the Indiana Bat and Topeka Shiner focused on both descending banks and the riparian corridors south of the existing I-70 bridges over Little Cedar Creek and Cedar Creek. These investigations consisted of straight line transects throughout the riparian corridors and associated forested areas. Special consideration was made to identify any species and size of trees within the corridors that are preferred by the Indiana Bat. Potential habitats were noted in field notes and photographed. Indiana Bat habitats were not noted at Little Cedar Creek and Cedar Creek, the two perennial streams within the project corridor; however, an intermittent tributary to Cedar Creek 0.3 miles west of Cedar Creek was of special concern due to the frequency and size of dead snags and mature trees within the riparian corridor. The Topeka Shiner habitat was analyzed due to adequate year round flow with proper in-stream aquatic habitat and recently improved water quality.

Natural Communities

Three types of natural communities exist within the SIU 5 corridor. Most of what constitutes natural habitats for a diverse range of wildlife species within the area is restricted to the upland and riparian forest corridors along the Cedar Creek and Little Cedar Creek watersheds. Straight

line transects were utilized to characterize the upland forest made up mostly of Mesic upland forest and Dry-mesic upland forest. The second natural community is the aquatic community in and around emergent wetlands and isolated man-made impoundments along the entire SIU 5 corridor. In these areas, a higher degree of habitat needs are met (i.e. nesting, food, escape cover) for a higher number of species.

A third type of wildlife habitat existing within the corridor, considered to be of a higher quality, is a remnant hardpan prairie (Tucker Prairie) which has been preserved since pre-European settlement in the area. Tucker Prairie is classified as a Natural Area by the MDC and a National Natural Landmark by the U.S. Department of the Interior. Diversity here is extraordinary, with over 250 species of wildflowers and grasses, some found nowhere else in the state. Species considered threatened or endangered within Tucker Prairie are an amphibian and several bird species. None of these species are under federal protection. Table III-20 lists natural communities or sensitive species from the Natural Heritage Database that are known to exist within the corridor.

Table III-20: Sensitive Species and Habitats within the SIU 5 Project Area

Tucker Prairie		
Scientific Name	Common Name	State Rank*
<i>Carex conoidea</i>	Field sedge	S1
<i>Carex triangularis</i>	Triangular sedge	S1
<i>Carex trichocarpa</i>	Hairy-fruited sedge	S1
<i>Eleocharis wolfii</i>	Wolf's Spike Rush	S2
<i>Spiranthes lacera var gracilis</i>	Slender Ladies' Tresses	S3
<i>Speyeria idalia</i>	Regal fritillary	S3
<i>Rana areolata circulosa</i>	Northern crawfish frog	S3
<i>Ammodramus henslowii</i>	Henslow's sparrow	S2
	Hardpan Prairie	
North of Cedar Creek		
<i>Rana areolata circulosa</i>	Northern crawfish frog	S3
<i>Pyganodon grandis corpulentua</i>	Giant floater	S3/S4
Source: Missouri Department of Conservation, Correspondence 2002		

* S1- Critically imperiled in the state S2- Imperiled in the state S3- Rare and Uncommon in the state

b. Impacts

Based on literature review and field investigations using straight line transects within the riparian corridors it was determined that none of the species listed as threatened or endangered exist within the project corridor other than the protected Tucker Prairie. Based on correspondence from MDC and field investigations, no impacts to high quality natural communities and threatened, endangered and sensitive species would occur as a result of the proposed improvements. Tucker Prairie would be avoided as widening to this section of I-70 would occur to the north side of the existing alignment.

To address USFWS and MDC concerns regarding the Indiana Bat, MoDOT will review the Natural Heritage Data Base periodically during the project development process to identify any new locations of Indiana Bat activity. MoDOT will conduct field investigations in woodlands where large groups of trees will be cleared to determine the relative suitability of the woodland

habitat for the bats. These field reviews for suitable habitat would be done at least one year prior to the clearing and construction activity. As appropriate, MoDOT would then review the affected woodland habitat with USFWS to determine the need for and the protocol to be used in any sampling activity that would appear to be warranted. MoDOT will continue consultation with the USFWS to avoid or minimize potential impacts to this species.

Since it will likely be a number of years before the SIU 5 improvements are constructed, the distribution of the Running Buffalo Clover could change over time. MoDOT will commit to reviewing the Natural Heritage Database periodically for new locations of this plant species and will then field check for it at least one year prior to right of way acquisition and clearing activities at the Cedar Creek crossing and any new areas identified from the Natural Heritage Database.

MoDOT will also continue consulting with the USFWS and MDC on the Running Buffalo Clover and will develop or improve habitat for the plant when feasible to do so as part of construction activities. MoDOT recognizes the importance of riverine corridors for a variety of benefits, including habitats suitable for endangered species such as the Indiana Bat and Running Buffalo Clover. It has developed a stream mitigation and enhancement plan for the major river crossings, including those noted above.

9. Cultural Resources

a. The Interstate System and Interstate 70

The methodology used to conduct the cultural resources analysis for the SIU 5 corridor is available upon request. Cultural resources evaluated and discussed include interstates and Interstate 70, architectural and bridge resources and archaeological resources.

As early as 1938 consideration was given by the federal government to an interstate highway network. A report resulting from the Federal Highway Act (FHA) of that year recommended construction of a 26,000-mile (41,843 km) inter-regional system consisting of two- or four-lane highways, some with controlled access. The plan remained dormant until the FHA of 1944 authorized the designation of select existing highways as part of an interstate system. The act called for improvement of these designated roads, but made no provision for increased federal funding. Lack of money and lack of uniform design standards slowed progress on the project over the following years. Although funding increased with the FHA of 1952, only 6,000 miles (9,656 km) of highway had been completed by 1953.

In an address prepared for a governors' conference in 1954, President Dwight Eisenhower declared that the highway system then in place was totally inadequate, causing needless death and injury, creating delay in the transportation of goods and placing the nation at risk in the event of major disaster or war. He called for federal and state cooperation in the creation of a modern interstate network, paid for by a revamped system of financing that would avoid debt.

The FHA of 1956 substantially enacted Eisenhower's proposal and initiated the current interstate highway system. The act instituted construction on a network 39,000 miles (63,730 km) in extent and authorized \$25 billion for the project, to be spent over the period 1957 to 1969. Existing toll roads meeting system standards could be integrated into the interstate system. Inherent in the terms of the act was the idea that the interstate system should evolve

and improve over time and that initial construction would be altered or replaced in the future as need arose. The original act permitted two-lane interstate segments with at-grade intersections in low traffic rural areas, but called for the adoption of minimum standards aimed at the eventual elimination of these segments. Legislation passed in 1966 ultimately did require all interstates to be at least four lanes and have no at-grade intersections. According to the 1956 act, interstates were to be constructed according to standards accommodating traffic forecasted for 1975. Subsequent legislation amended this requirement so that highway design would tolerate traffic estimates for a maximum of 20 years.

The 1956 act started a public works project that was the most expensive and wide-scale in United States history, surpassing any program undertaken during the New Deal era, with approximately 75 percent of the new interstate system constructed on new right of way. Initial construction of the interstate system was greeted with wide-ranging support. It was not until the 1960s that significant opposition to the program mounted, with criticisms centering on the displacement of residents and the destruction of urban neighborhoods caused by highway construction.

When finished, I-70 extended from Baltimore, Maryland, through the Alleghenies of Pennsylvania, and across the Ohio River at Wheeling, West Virginia. From there it passed through Indianapolis, St. Louis and Kansas City, toward its original western terminus at Denver. In 1957 it was decided to extend I-70 west from Denver to a junction of I-15 in south central Utah.

As one of the interstates built in the immediate aftermath of the FHA of 1956, I-70 was designated by federal legislation in 1990 as part of the Dwight D. Eisenhower System of Interstate and Defense Highways. In February, 1994, this system was named by the American Society of Civil Engineers as one of the “Seven Wonders of the United States”, along with other notable engineering accomplishments including the Golden Gate Bridge, the Panama Canal and Hoover Dam.

Missouri Interstate 70 Memorandum of Understanding

Missouri is sometimes credited as the first state to initiate interstate highway construction, breaking ground on a 2.6 mile (4.2 km) section of Interstate 70 in St. Charles County, after the state signed the first contracts under the new interstate program on August 2, 1956. Beginning in 1956, construction of I-70 across Missouri took nine years to complete. Work on the last sections, in Jackson and Lafayette counties, was completed in August of 1965. Extending 251 miles (403.9 km), the Missouri section of I-70 was designed to meet the 20-year tolerance standard established by federal legislation.

During the First Tier Study, discussions began with the Missouri State Historic Preservation Office (SHPO), within the MDNR, and the FHWA. These discussions were regarding the potential historic significance of I-70 in view of the National Historic Preservation Act of 1966 and its possible eligibility for the National Register of Historic Places (NRHP). The interstate system is approaching the 50 year old threshold for consideration of eligibility, and as a result, the national interstate system is currently being studied by a national task force including representatives of the National Conference of State Historic Preservation Officers, the FHWA, select state Departments of Transportation, the Advisory Council on Historic Preservation (ACHP), the NRHP and other interested parties. The discussions within Missouri led to the

development of a Memorandum of Understanding (MOU) that outlines a course of action to be followed with regard to I-70. The agreed action is the following:

1. A formal assessment of the eligibility of the section of Interstate 70 addressed in the First Tier EIS and in the Second Tier environmental documents will be prepared by the FHWA at such time that the interstate has reached 50 years of age, or the national task force has reached an opinion regarding the eligibility of the interstate system.
2. In the interim, the FHWA and MoDOT will proceed in good faith to gather documentation on the history and development of this important interstate highway (Interstate 70) in Missouri.
3. Should Interstate 70 or any part thereof be determined eligible at a later date, the FHWA and MoDOT shall enter into consultation with the SHPO and the ACHP pursuant to 36 CFR 800.

The MOU has been signed by the FHWA, MoDOT and MDNR. It is included in Appendix D.

b. Architectural Resource Impacts

A historic and architectural investigation was conducted to identify all historical, architectural and bridge resources within the SIU 5 project area in conjunction with the I-70 Second Tier environmental studies. The investigation provides an evaluation and assessment of identified properties as they relate to their eligibility for listing on the NRHP. A report for this investigation, "Interstate 70, SIU 5, Historical and Architectural Survey, Vol.11," was prepared and submitted for review by the SHPO.

There are 114 parcels in the project area; however, less than half of these parcels have architecture that is situated in the area of potential effect (APE). Following field investigations, 63 of the parcels in the study were eliminated from further consideration because they did not present architectural resources in the APE. The architectural survey yielded 51 properties with architectural resources in the APE. Of these 51 properties, 30 were contemporary in nature reflecting the recent development of this section of the I-70 corridor. This group of 30 parcels with only recent architectural resources was classified in the category of resources that post-date 1970. Architectural resources built before 1970 account for 21 of the 114 surveyed properties. The majority of these properties are complexes with multiple architectural resources resulting in a total of 67 buildings and structures surveyed at these properties. Fifteen parcels presented architectural resources in the APE with construction dates estimated between 1945 and 1970. The remaining six parcels in the study involve at least one architectural resource that is believed to pre-date 1945. Ten bridges and culverts are located in the APE. With construction dates ranging from 1925 to 1983, only three bridges and one culvert are older than 50 years in age.

During the investigation one property, the Shryrock Farm (5CY0079), was further investigated. This property is located in the southwest quadrant of the Route J/Route DD interchange. Investigators determined that this property appears to fulfill at least one of the NRHP eligibility criteria. At the time of this investigation, the property was located within a previous interchange design proposal which would have bisected the farm, dividing the northeastern corner from the southwestern half. Because this encroachment could have had an adverse effect on the property, avoidance alternatives were developed to limit any impact to the farm. The

interchange concept developed and evaluated in this documented Categorical Exclusion (CE) completely avoids the farm, thereby eliminating further need to evaluate the property.

Following application of the NRHP criteria, MoDOT concludes that none of the architectural resources in the APE possess architectural and historical significance necessary to be eligible for listing as a historic property in the NRHP. All of the bridges in the survey area are excluded from further consideration for NRHP-eligibility in Fraser's 1996 draft *Missouri Historic Bridge Inventory* and MoDOT considers none eligible for listing in the NRHP. Because no properties in the APE are recommended eligible for listing on the NRHP, it is not necessary to evaluate the proposed project's effects to the properties or recommend measures to mitigate harm.

Based on the results of the investigation, MoDOT concludes that the proposed project will have no effect on any significant architectural or historical resources listed on or eligible for listing on the NRHP and that no additional architectural/historical investigations are necessary for Job Number J4I1341H. On October 17, 2003, the SHPO issued a letter concurring with the MoDOT findings that no historic architectural properties would be affected by the proposed project. (See Chapter IV for copy of letter.)

c. Archaeological Resource Impacts

The University of Iowa's Office of the State Archaeologist conducted a Phase I archaeological survey for the proposed improvements in the SIU 5 corridor. The results of this investigation are detailed in the "Phase I Archaeological Investigations for Interstate 70 Improvements, SIU 5, T48N-R9-11W, Boone and Callaway Counties, Missouri, Cultural Resources Volume 12." The project area consisted of 775 acres (310 hectares) along I-70. A total of 15 archaeological sites was documented, including two historic, 11 prehistoric and two mixed historic and prehistoric sites. A total of 11 sites lack the potential for substantial intact subsurface prehistoric deposits and no further archaeological work is recommended at these sites. Four sites are believed to have a potential for intact subsurface deposits. These sites are 5-BO-B05 and 5-BO-B10 (both large prehistoric scatters west of Cedar Creek in Boone County) and sites 5-CY-A05 and 5-CY-A08 (two large upland prehistoric scatters in Callaway County).

Site 5-BO-B05 consists of flaking debris in drainages, eroding from cutbanks, and in auger tests; a modified Late Archaic point was recovered. This site is situated in a complex depositional environment which has a potential for intact buried deposits. Site 5-BO-B10 is a large surface scatter located in the Cedar Creek floodplain in an area which was previously determined to have a high potential for buried deposits (*Hajic, Edwin R.*). The University of Iowa's Office of the State Archaeologist recommended that both of these sites be avoided by construction or investigated through Phase II investigations to determine their eligibility for listing on the NRHP.

The quantity and diversity of lithic materials at sites 5-CY-A05 and 5-CY-A08 suggest they may have some intact deposits. Because these sites would be impacted by the proposed widening, it is recommended that they be investigated through additional intensive Phase I investigations to determine their eligibility for listing on the NRHP.

Because the proposed improvements may have an effect on properties that may be included in or eligible for inclusion in the NRHP, a Programmatic Agreement (PA) will be executed between ACHP, FHWA, SHPO and MoDOT. The draft PA, included in Appendix D, outlines assurances

regarding further investigation of all four archaeological sites prior to construction, as well as protocol for agency consultation and processing of collected materials.

10. Hazardous Waste Sites

a. Existing Conditions

The identification of potential hazardous waste site locations was made through review of environmental regulatory databases and a windshield survey of the project corridor. The purpose of the review was to identify sites within the study area that potentially would result in health concerns and high remediation and clean-up costs. Based on the information collected from the federal and state database searches, three underground storage tanks (UST) were identified at the interchanges within the corridor.

Route J/DD Interchange

Two USTs were identified at this location. They include the Stuckey's Dairy Queen and a former Phillips 66 gas station, both shown on Exhibit III-2C. The Stuckey's Dairy Queen site is a UST and Leaking UST site located on the south side of the J/DD interchange within the 180 feet of the approximate right of way. Three tanks were removed from this site in March 2001; however, some contaminated soil was found. The site is currently under mitigation and being checked for groundwater contamination. A former Phillips 66 gas station is a UST site located in the southwest quadrant of this interchange. According to the MDNR, five USTs were removed from this site in 1977, but it may have operated with USTs following this removal.

Route M/HH Interchange

An abandoned gas station identified as Ratliff Towing is located in the southwest quadrant of the M/HH interchange. One UST was removed from this location in 1995.

Two other sites, shown on Exhibit III-2E, have potential to impact the proposed transportation facility. A-1 Auto Recyclers located on the south side of I-70 contains numerous scrap automobiles, and therefore, has the potential to generate waste fuels, solvents, oil/lubricants and other materials generated from automotive operations. The Gygr Gas Plant #8 is a propane gas supplier and is located just east of the A-1 Auto Recyclers site. This site would require relocation due to the proposed improvements, but is not listed as a hazardous waste generator.

b. Impacts

Three UST sites were identified within the corridor. Stuckey's Dairy Queen and a former Phillips 66 gas station, on the south side of the J/DD Interchange, and a former gas station at the M/HH interchange would be affected by the proposed improvements. Although mitigation has occurred at the Stuckey's site and tanks have been removed from the remaining two sites, each of these sites represents a potential source of contamination and has the potential to require remediation of contaminated soil or groundwater prior to construction. Further investigation of all three sites to determine the extent of contamination, if any, and estimated clean-up requirements and costs would need to be conducted to prior to right of way acquisition.

11. Noise Impacts

a. Noise Analysis

MoDOT's Traffic Noise Policy developed in accordance with FHWA procedures for highway noise analysis and abatement contained in 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise", was used to identify and evaluate potential noise impacts associated with this project. Analysis of the traffic noise impacts expected from construction of a highway involves a number of technical steps. The traffic noise analysis includes the following:

1. Identification of existing activities and developed lands which may be affected by traffic noise from the highway;
2. Prediction of traffic noise levels;
3. Determination of existing noise levels;
4. Determination of traffic noise impacts; and
5. Examination and evaluation of alternative noise abatement measures for reducing or eliminating noise impacts.

When potential noise impacts are identified, noise abatement is considered and implemented if it is found to be both reasonable and feasible. When noise abatement measures are being considered, every reasonable effort is made to obtain substantial noise reductions.

Reasonableness factors include, but are not limited to:

- Noise wall must provide noise reduction of at least 5 dBA.
- Noise wall must provide attenuation for more than one receptor.
- Noise wall must be 18 feet (5.5 meters) or less in height above normal grade.
- Noise wall must not interfere with normal access to the property.
- Noise wall must not pose a traffic safety hazard.
- Noise wall must not exceed a cost of \$30,000 per receptor.

A traffic noise impact occurs when the predicted levels approach or exceed the Noise Abatement Criteria (NAC) or when predicted traffic noise levels substantially, by 15 dBA, exceed the existing noise level, even though the predicted levels may not exceed the NAC. The following table identifies established NAC:

Table III-21: Noise Abatement Criteria, Hourly A-Weighted Sound Level - decibels (dBA)

Activity Category	L_{eq} (1 Hour)	Description of Activity Category
A	57 dBA (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the lands are to continue to serve their intended purpose.
B	67 dBA (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 dBA (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: Code of Federal Regulations, Title 23 Part 772, Revised October 1997.

b. Impacts

The SIU 5 proposed improvements follow the existing alignment closely. Consequently, the receptors that are likely to be impacted are located in the vicinity of existing I-70. Existing noise levels are fairly consistent throughout the section. Not every residence was chosen to be a receptor. Receptors were chosen to represent a broader area. They are shown on Exhibit III-2.

Table III-22: Design Hour Noise Levels, dBA $L_{eq}(h)$, SIU 5 Corridor

				Noise Level (L_{eq}) (Design Hour)				
Receptor	Land Use ¹	No. of Units Represented	NAC Category and Level	2000 Existing (dBA)	2030 Build (dBA)	dB Increase over Existing	Impacts ²	2030 No-Build (dBA)
1	SF	5	B (67dba)	76	80	4	5	80
2	SF	3	B (67dba)	68	75	8	3	72
3	SF	3	B (67dba)	74	78	4	3	78
4	MH	15	B (67dba)	74	77	3	15	78
5	SF	2	B (67dba)	68	75	7	2	72
6	SF	8	B (67dba)	73	77	4	8	77
7	Church	1	B (67dba)	66	74	8	1	71

¹SF= Single-Family Residence, MH= Mobile Home

²Impacts are defined as approaching or exceeding the Noise Abatement Criteria.

The Traffic Noise Model (TNM)[®] was used to determine existing and projected noise levels in the SIU 5 corridor under a no build and a build scenario. The TNM[®] analysis indicates that existing

noise levels exceed the NAC at every receptor. Analysis results for proposed noise levels indicate that the receptors would exceed the NAC criteria in the future, both under a build and no build scenario. The TNM[®] was also used to develop a 66 dBA contour using design hour traffic, grade and natural barriers. Table III-23 presents the setback distances to the 66 dBA contour, measured perpendicular to the centerline, of both the build and the no build alternatives in the year 2030. Within these setbacks, the noise level would be 66dBA or greater for residential receptors.

Table III-23: Setback Distances, from Centerline, for Residential (66 dBA) Receptors

Location	Setback Distances (feet) From Centerline to 66 dBA			
	2030 Build		2030 No Build	
	North	South	North	South
Subsection 1	835	825	865	790
Subsection 2	900	945	815	1035
Subsection 3	980	870	1000	870

Using TNM[®], abatement measures were considered for each of the areas represented by the seven receptors. The area around receptor four had 15 single-family residences and might benefit from a noise wall. Using TNM[®], a 12' high sound noise wall was modeled in the existing right of way encompassing the residences north-east of the J/DD interchange (Exhibit III-4). A benefited receptor is defined as a receptor which receives a noise reduction of five dBA or more. Noise walls must not exceed a cost of \$30,000 per benefited receptor. The receptors would only receive an average two dBA reduction, and only one was able to receive a five dBA reduction. The cost of the noise wall would be approximately \$680,400 based on \$18 per square foot, or \$45,360 per benefited receptor. Therefore, a noise wall is not feasible or reasonable due to the cost and the benefit to only one receptor.

Based on the study completed, mitigation of noise impacts for the proposed project does not meet all of MoDOT's definitions for reasonableness. Therefore, no noise mitigation measures are being considered for the proposed improvement. If substantial changes in horizontal or vertical alignment occur during the remaining stages of design and construction, noise abatement measures will be reviewed.

c. Construction Noise

The major construction elements of this project are expected to be demolition, earth moving, hauling, grading, paving and bridge construction. General construction noise impacts for passersby and those individuals living or working near the project can be expected particularly from demolition, earth moving and paving operations. MoDOT has special provisions for construction which require that all contractors comply with all applicable local, state and federal laws and regulations relating to noise levels permissible with and adjacent to the project construction site. Construction equipment is required to have mufflers and constructed in accordance with the equipment manufacturer's specifications. Considering the relatively short-term nature of construction noise, impacts are not expected to be substantial.

12. Public Lands

The only public land in the SIU 5 corridor is Tucker Prairie which is owned and managed by the University of Missouri-Columbia. Tucker Prairie is a 163-acre relict patch of tall grass prairie located near the eastern end of the corridor on the south side of existing I-70. It is designated as a Registered National Landmark by the U.S. National Park Service. The site has been managed to maintain the prairie flora by the University's biological sciences group for over 40 years.

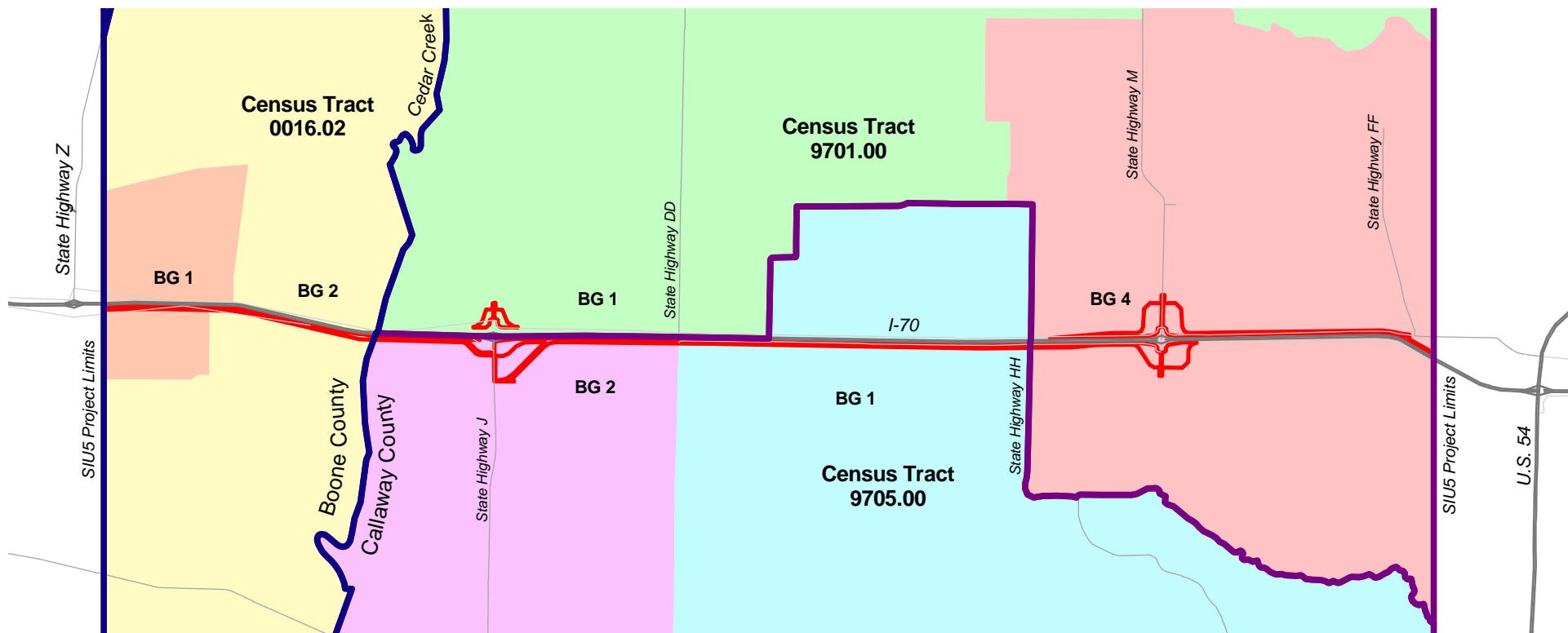
The proposed improvements in the SIU 5 corridor would not impact Tucker Prairie as the improvements would be located on the north side of the existing I-70 right of way. Tucker Prairie would be avoided. In addition, no frontage road will be located on the south side of I-70 in this area.

13. Secondary and Cumulative Impacts

Secondary impacts associated with a given action are generally considered to be those impacts that are linked to the proposed action, but are removed in distance and/or in time. Secondary impacts due to the proposed action in SIU 5 include infill and replacement of displaced businesses at interchanges. Land use planning in the project area is limited to the Boone County portion of the corridor. No development activities are scheduled to occur as a result of the corridor improvements, however, new development is likely to occur as access at interchanges would be changed.

Cumulative impacts, as defined by 40 CFR §1508.7, are those impacts which result "...from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." Past, present and future actions in the I-70 corridor include the conversion of forested and agricultural land to residential, commercial and industrial uses. This development has been primarily limited to commercially developed interchange areas, although rural residential development has occurred throughout the area. This type of development will most likely continue, however, the absence of necessary services such as sewer and water will continue to limit the extent of land changes in the area. No significant contribution to cumulative impacts in the study area are expected from proposed action.

Appendix E provides a discussion of corridor-wide secondary and cumulative impacts along the entire Improve I-70 corridor.



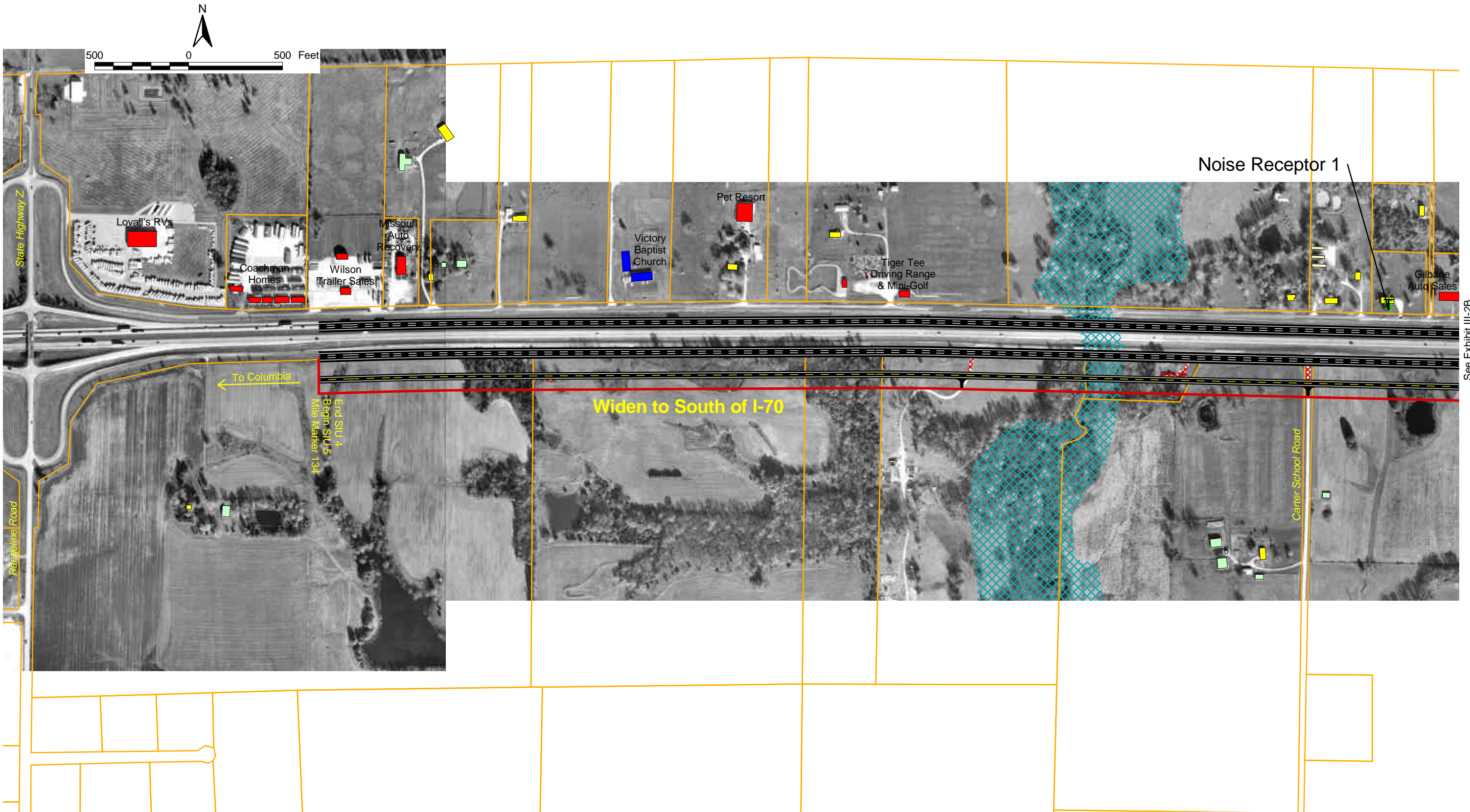
**SECTION
5**
Route Z
to
U.S. 54

Legend

- Boone County Census Tracts
- Callaway County Census Tracts
- ~ Approximate I-70 Improvements

Census Tracts and Block Groups (BG)

EXHIBIT
III-1



See Exhibit III-2B



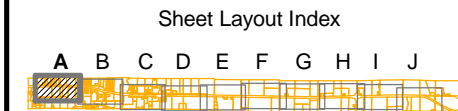
SECTION 5
Route Z
to
U.S. 54

Legend

- Agricultural Structure
- Church Structure
- Commercial Structure
- Industrial Structure

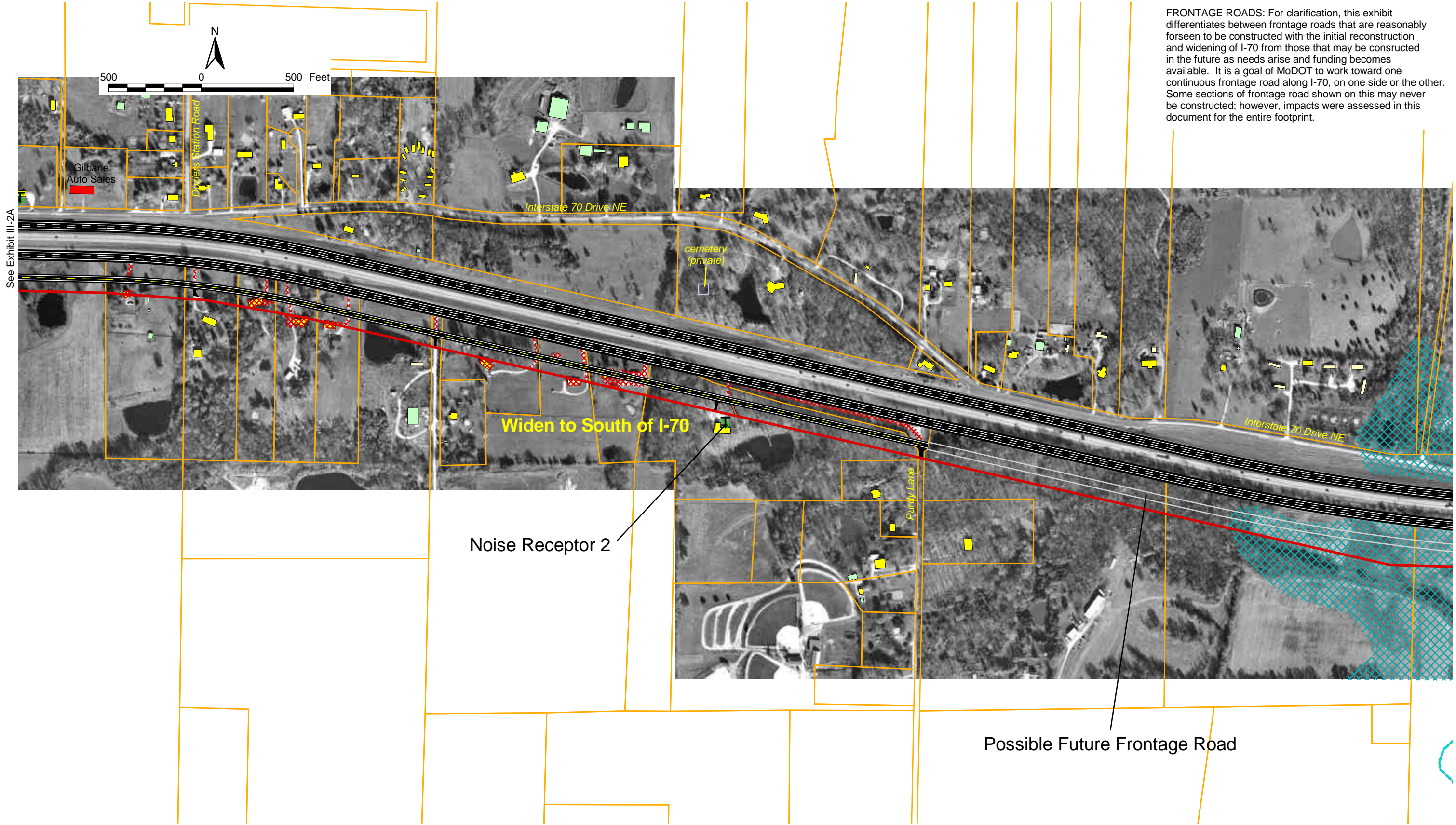
- Public/Semi-Public Structure
- Residential Structure
- Utility Structure
- Mobile Home Structure

- Existing Property Lines
- Proposed Roadway
- Noise Receptor
- Approximate Right of Way Limits
- To Be Removed
- Floodplain



Detailed Layout

**EXHIBIT
III-2A**



FRONTAGE ROADS: For clarification, this exhibit differentiates between frontage roads that are reasonably foreseen to be constructed with the initial reconstruction and widening of I-70 from those that may be constructed in the future as needs arise and funding becomes available. It is a goal of MoDOT to work toward one continuous frontage road along I-70, on one side or the other. Some sections of frontage road shown on this may never be constructed; however, impacts were assessed in this document for the entire footprint.

See Exhibit III-2A

See Exhibit III-2C

SECTION 5
Route Z to U.S. 54

Legend

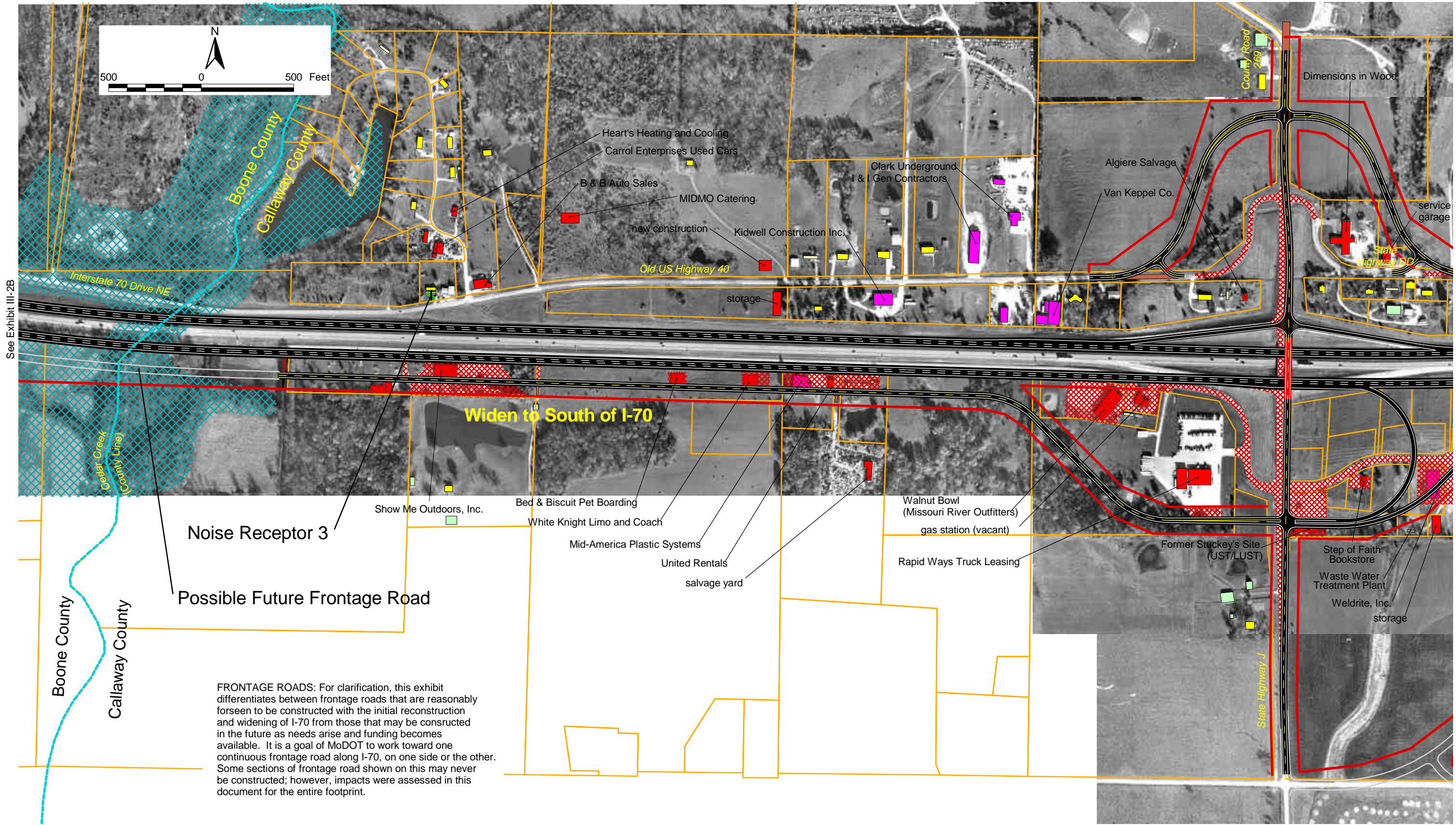
Agricultural Structure	Public/Semi-Public Structure	Existing Property Lines	To Be Removed
Church Structure	Residential Structure	Proposed Roadway	Floodplain
Commercial Structure	Utility Structure	Noise Receptor	
Industrial Structure	Mobile Home Structure	Approximate Right of Way Limits	

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Detailed Layout

EXHIBIT III-2B

















See Exhibit III-2B

See Exhibit III-2D




SECTION 5
Route Z to U.S. 54

Legend

 Agricultural Structure	 Public/Semi-Public Structure	 Existing Property Lines	 To Be Removed
 Church Structure	 Residential Structure	 Proposed Roadway	 Floodplain
 Commercial Structure	 Utility Structure	 Noise Receptor	
 Industrial Structure	 Mobile Home Structure	 Approximate Right of Way Limits	

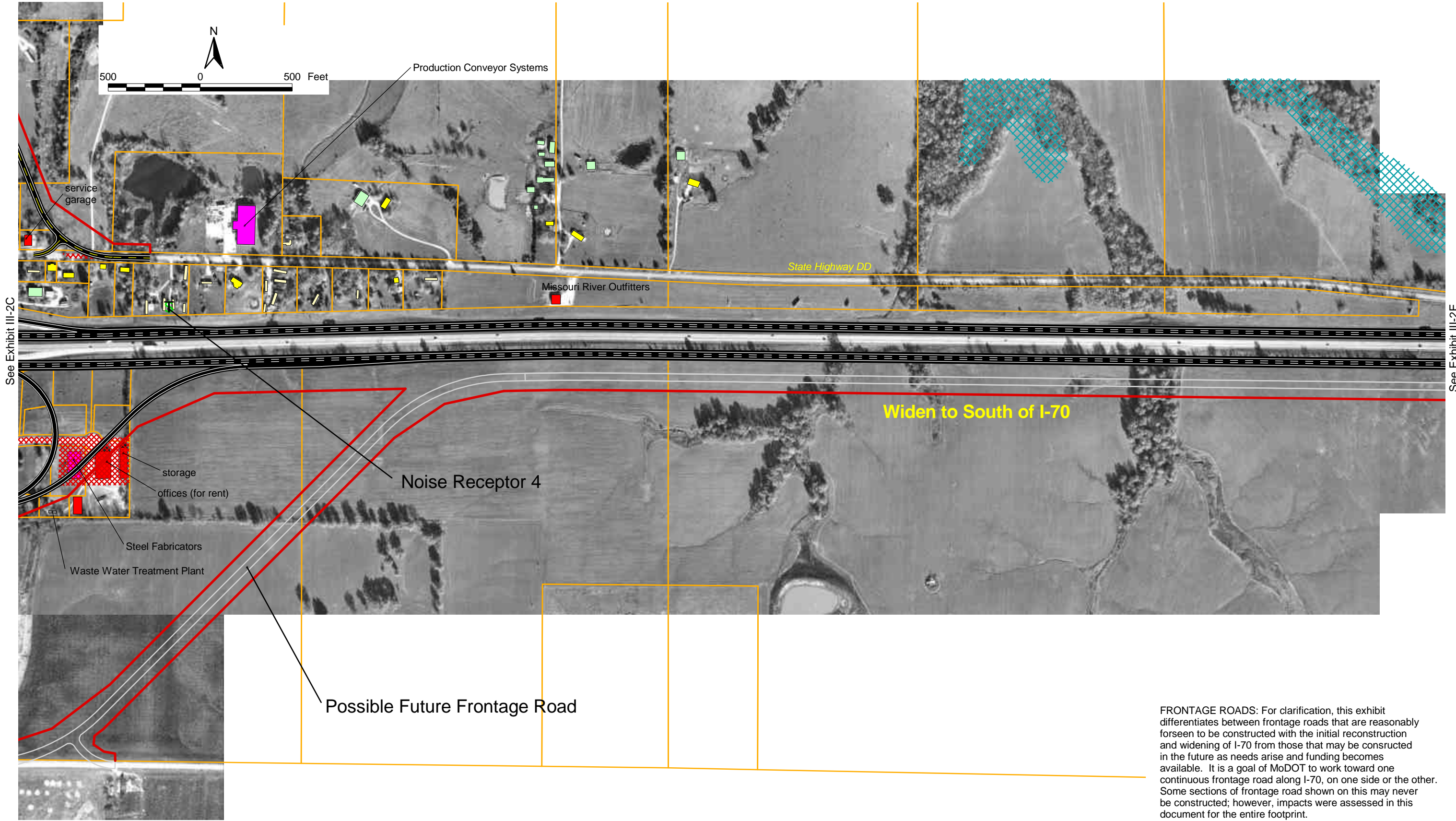
Sheet Layout Index

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Detailed Layout

EXHIBIT III-2C



FRONTAGE ROADS: For clarification, this exhibit differentiates between frontage roads that are reasonably foreseen to be constructed with the initial reconstruction and widening of I-70 from those that may be constructed in the future as needs arise and funding becomes available. It is a goal of MoDOT to work toward one continuous frontage road along I-70, on one side or the other. Some sections of frontage road shown on this may never be constructed; however, impacts were assessed in this document for the entire footprint.




SECTION 5
Route Z to U.S. 54

Legend

Agricultural Structure	Public/Semi-Public Structure	Existing Property Lines	To Be Removed
Church Structure	Residential Structure	Proposed Roadway	Floodplain
Commercial Structure	Utility Structure	Noise Receptor	
Industrial Structure	Mobile Home Structure	Approximate Right of Way Limits	

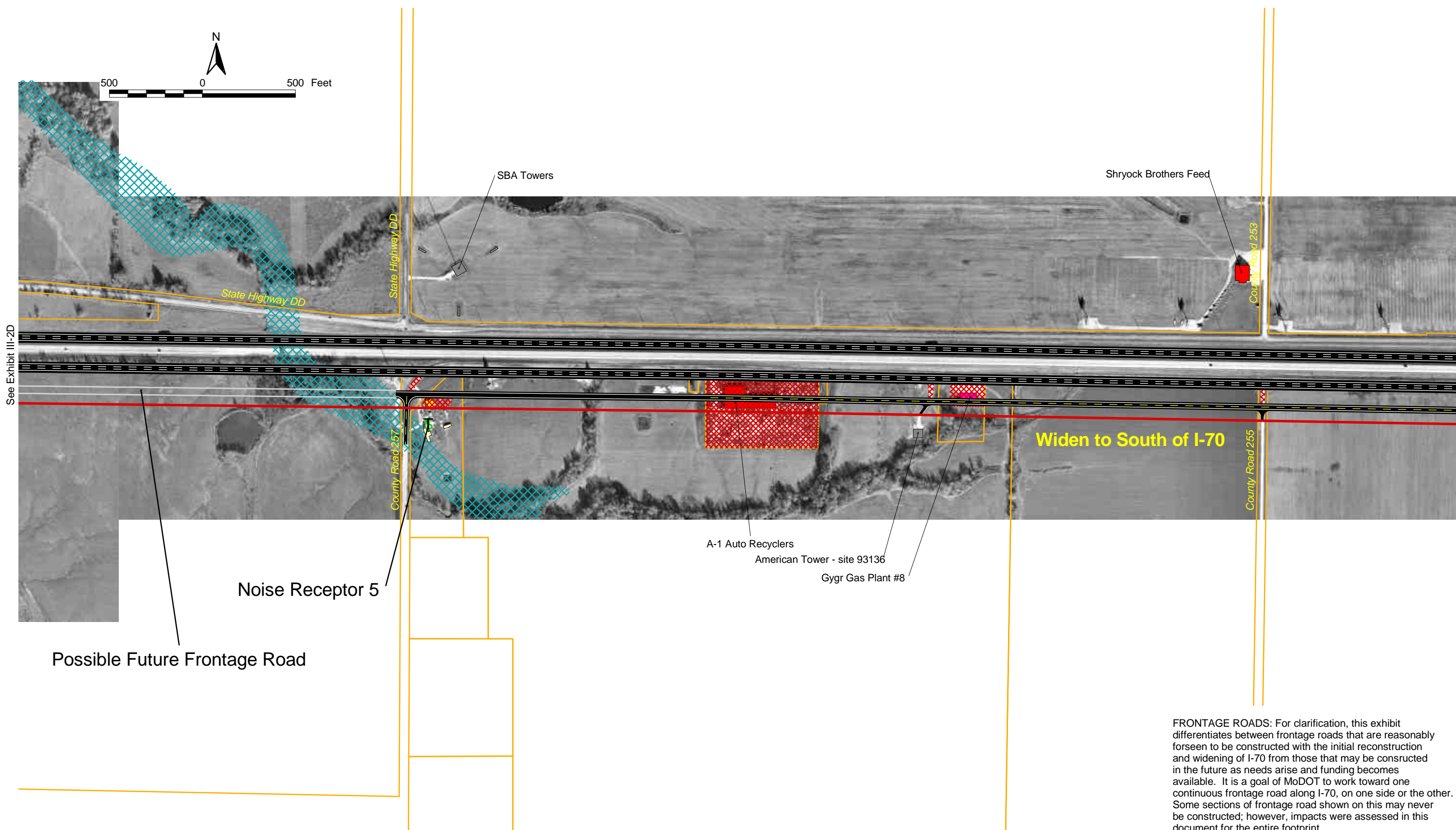
Sheet Layout Index

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Detailed Layout



EXHIBIT III-2D



See Exhibit III-2D

See Exhibit III-2F

FRONTAGE ROADS: For clarification, this exhibit differentiates between frontage roads that are reasonably foreseen to be constructed with the initial reconstruction and widening of I-70 from those that may be constructed in the future as needs arise and funding becomes available. It is a goal of MoDOT to work toward one continuous frontage road along I-70, on one side or the other. Some sections of frontage road shown on this may never be constructed; however, impacts were assessed in this document for the entire footprint.



SECTION 5
Route Z to U.S. 54

Legend

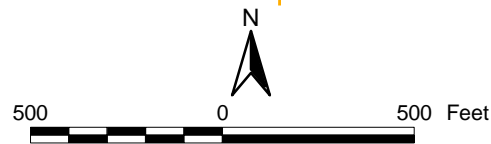
Agricultural Structure	Public/Semi-Public Structure	Existing Property Lines	To Be Removed
Church Structure	Residential Structure	Proposed Roadway	Floodplain
Commercial Structure	Utility Structure	Noise Receptor	
Industrial Structure	Mobile Home Structure	Approximate Right of Way Limits	

Sheet Layout Index

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Detailed Layout

EXHIBIT
III-2E



Widen to South of I-70

Noise Receptor 6



**SECTION
5**
Route Z
to
U.S. 54

Legend

Agricultural Structure
 Church Structure
 Commercial Structure
 Industrial Structure

Public/Semi-Public Structure
 Residential Structure
 Utility Structure
 Mobile Home Structure

Existing Property Lines
 Proposed Roadway
 Noise Receptor
 Approximate Right of Way Limits
 To Be Removed
 Floodplain



Detailed Layout

**EXHIBIT
III-2F**



See Exhibit III-2F

See Exhibit III-2H

Widen to South of I-70



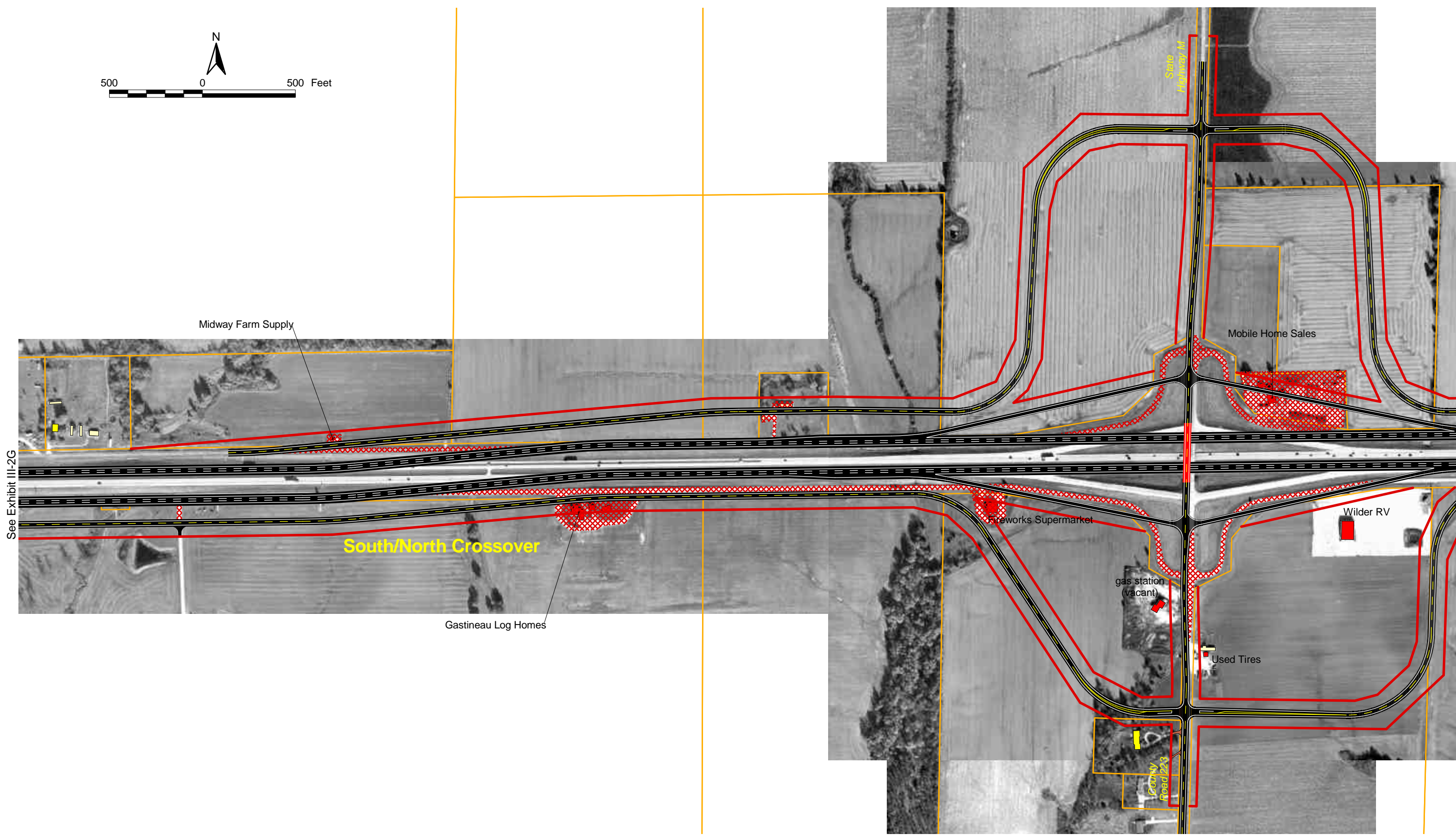
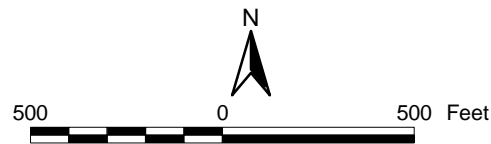
SECTION 5
Route Z
to
U.S. 54

Legend		Agricultural Structure		Public/Semi-Public Structure		Existing Property Lines		To Be Removed
		Church Structure		Residential Structure		Proposed Roadway		Floodplain
		Commercial Structure		Utility Structure		Noise Receptor		
		Industrial Structure		Mobile Home Structure		Approximate Right of Way Limits		

Sheet Layout Index									
A	B	C	D	E	F	G	H	I	J

Detailed Layout

EXHIBIT III-2G



See Exhibit III-2G

See Exhibit III-2I



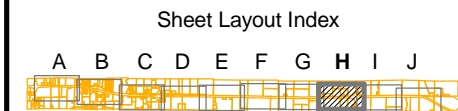
SECTION 5
Route Z
to
U.S. 54

Legend

- Agricultural Structure
- Church Structure
- Commercial Structure
- Industrial Structure

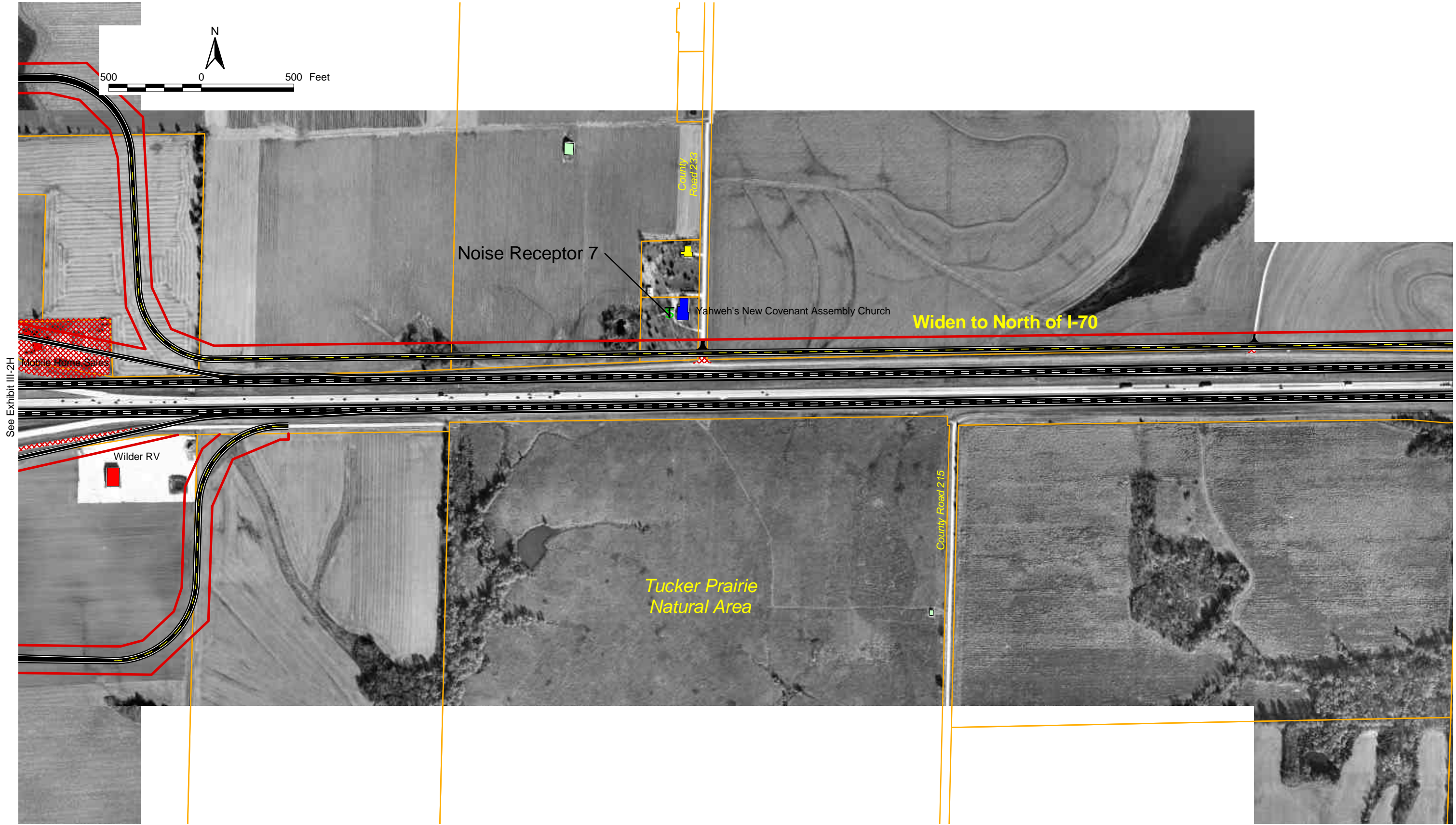
- Public/Semi-Public Structure
- Residential Structure
- Utility Structure
- Mobile Home Structure

- Existing Property Lines
- Proposed Roadway
- Noise Receptor
- Approximate Right of Way Limits
- To Be Removed
- Floodplain





Detailed Layout

EXHIBIT III-2H

















See Exhibit III-2H

See Exhibit III-2J




SECTION 5
Route Z to U.S. 54

Legend

 Agricultural Structure	 Public/Semi-Public Structure	 Existing Property Lines	 To Be Removed
 Church Structure	 Residential Structure	 Proposed Roadway	 Floodplain
 Commercial Structure	 Utility Structure	 Noise Receptor	
 Industrial Structure	 Mobile Home Structure	 Approximate Right of Way Limits	

Sheet Layout Index

A	B	C	D	E	F	G	H	I	J
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Detailed Layout

EXHIBIT
III-2I

See Exhibit III-2I



**SECTION
5**
Route Z
to
U.S. 54

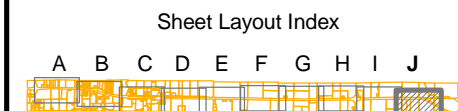
Legend

Agricultural Structure
Church Structure
Commercial Structure
Industrial Structure

Public/Semi-Public Structure
Residential Structure
Utility Structure
Mobile Home Structure

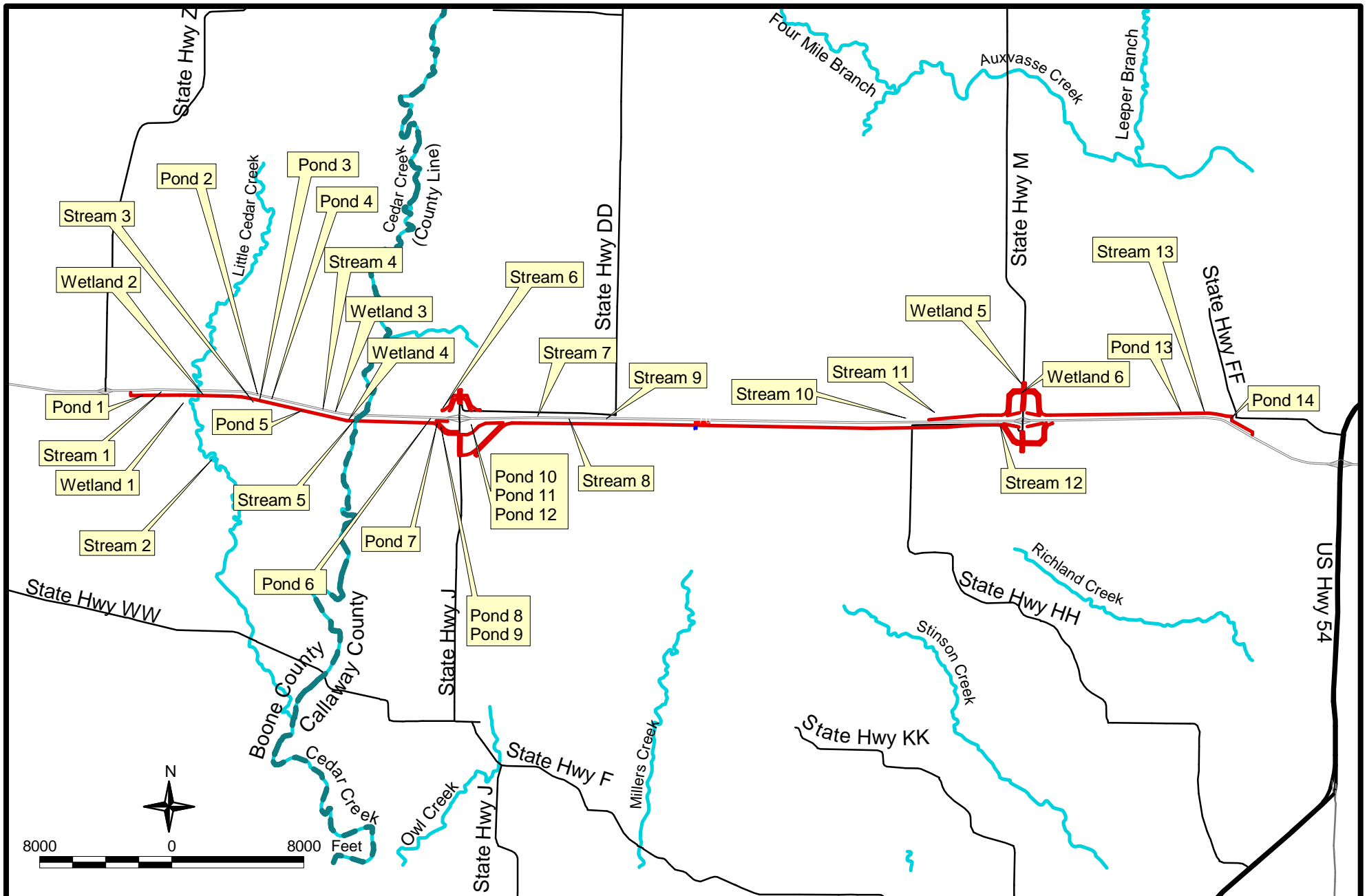
Existing Property Lines
Proposed Roadway
Noise Receptor

To Be Removed
Floodplain
Approximate Right of Way Limits



Detailed Layout

**EXHIBIT
III-2J**



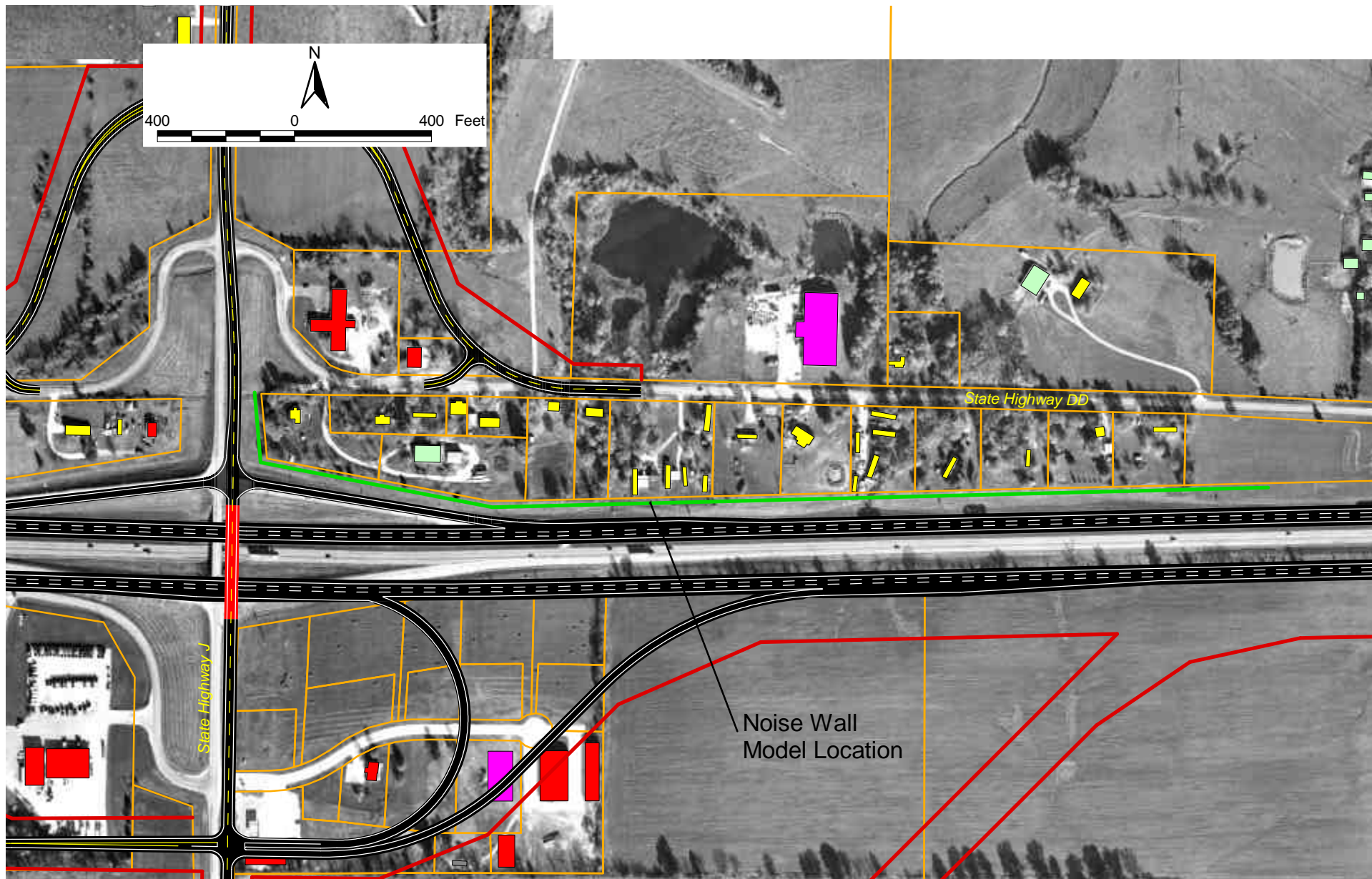
SECTION 5
Route Z
to
U.S. 54

LEGEND

Approximate Right of Way
 Streams


**Streams, Ponds and
Wetlands in the
SIU 5 Corridor**


**EXHIBIT
III-3**



**SECTION
5**
Route Z
to
U.S. 54

Legend

 Noise Wall Model Location

 Approximate Right of Way Limits

**Noise Wall
Model Location**

**EXHIBIT
III-4**