

Kansas Expressway Extension Project Environmental Assessment



**Missouri Department of Transportation
Federal Highway Administration**

Kansas Extension Project

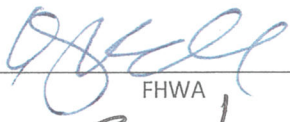



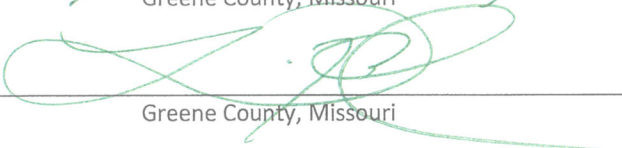
March 2017

KANSAS EXTENSION PROJECT

Greene County, Missouri
Federal Aid No. STP-5909 (802)

ENVIRONMENTAL ASSESSMENT

Submitted pursuant to 42 U.S.C. 4332(2)(c)
and 49 U.S.C. 303 by the
U.S. Department of Transportation
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The MoDOT signatures indicate verification that the content of this document and scope of the project are accurate. The FHWA signature gives approval to distribute this information for public and agency review and comment. Such approval does not commit FHWA to approve any future grant requests to fund the preferred alternative.

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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
APE	Area of Potential Effect
AADT	average annual daily traffic
ATMS	Advanced Traffic Management System
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNE	Common Noise Environment
CODP	Community Olympic Development Program
dbh	diameter at breast height
DOT	Department of Transportation
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FPPA	Farmland Policy Protection Act
GIS	Geographic Information System
GCHD	Greene County Highway Department

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
GHG	greenhouse gas
HOA	Home Owners Association
HMVMT	Hundred Million Vehicle Miles of Travel
IPaC	Information for Planning and Conservation
LWCF	Land and Water Conservation Fund
LTA	Land Type Association
LOS	levels of service
LPA	Local Public Agency
MBTA	Migratory Bird Treaty Act
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MOA	Memorandum of Agreement
MoDOT	Missouri Department of Transportation
MSAT	Mobile Source Air Toxic
MSS	Missouri Speleological Survey
MAP	Moving Ahead for Progress
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NPS	National Park Service

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OHWM	Ordinary High Water Mark
OTO	Ozarks Transportation Organization
PA District	Plot Assignment District
PDO	Property Damage Only
PFO	Palustrine Forested Wetland
PPI	Palmerton & Parrish, Inc.
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SEMA	State Emergency Management Agency
SHPO	State Historic Preservation Office
SIPs	State Implementation Plans
SSURGO	NRCS Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TVMT	total vehicle hours travelled
TDM	Transportation Demand Management
TMC	Transportation Management Center
TNM	Traffic Noise Model

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
TSM	Transportation Systems Management
THPO	Tribal Historic Preservation Office
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VMT	vehicle-miles travelled

1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

Greene County, Missouri, in cooperation with the Federal Highway Administration (FHWA) and the Missouri Department of Transportation (MoDOT), has completed the Environmental Assessment (EA) for a proposed extension of the Kansas Expressway from Republic Road to Farm Road 190. The Kansas Expressway Extension Study (Project) is located in the City of Springfield and in unincorporated portions of Greene County, Missouri (Figure 1-1). The existing Kansas Expressway, extending from approximately Interstate 44 (I-44) in Springfield to Republic Road, is classified as an urban primary arterial roadway, with two travel lanes in each direction separated by a grass median. The Study Corridor, a 200-foot wide area was used for the wetland survey, geological survey, and threatened and endangered species survey. The surrounding area (Study Area) extends from the northern terminus at the intersection of Kansas Expressway and Republic Road approximately 2.3 miles south to the southern terminus at Farm Road 190, including an east-west connection between Cox Road and the Kansas Expressway at the southern Study limit. The Study Corridor and Study Area are illustrated in Figure 1-2.

The Study is sponsored by Greene County and the Project is using Federal transportation funds provided under the Moving Ahead for Progress in the 21st Century (MAP-21), passed in July 2012. MoDOT, FHWA, and Greene County are co-leads for the preparation of an Environmental Assessment (EA). Due to the use of federal funding for this Project, the project sponsor and agencies are required to evaluate the effects of the Project on the human and natural environments in accordance with the National Environmental Policy Act (NEPA). Depending upon the anticipated extent of an action's impacts to the human environment, NEPA compliance can take the form of a Categorical Exclusion, an EA, or an Environmental Impact Statement. Greene County, in consultation with MoDOT and FHWA, decided to conduct an EA for this Study.

1.2 Study Corridor History

In the early 1980s, the Greene County Commission began planning the extension of the existing Kansas Expressway south into southern Greene County as a way to improve connectivity, reduce traffic congestion, and improve safety on other existing north-south primary arterials in this rapidly developing area. Greene County studied various alignments for the extension of the Kansas Expressway from Republic Road to Steinert Road. The future arterial was planned to have limited access from adjacent properties in a 110-foot-wide ROW. Three alternate routes were presented to the public for comment, with one of the three alternates selected to move forward. Through negotiations with property owners and developers working through the Greene County Subdivision process, more than 90 percent of the mapped

corridor from Republic Road south to Steinert Road (Farm Road 186) was acquired by Greene County between 1995 and 2005. The planning history of the Study Corridor is depicted in Figure 1-3.

In 2007, the North-South Corridor Study was completed by the Ozark Transportation Organization (OTO), the Metropolitan Planning Organization for portions of Greene and Christian Counties. The corridor study prioritized transportation options to improve regional travel. The corridor study looked at the work completed in relation to the Kansas Expressway and identified the extension of the Kansas Expressway as one of four high priority north-south corridors – South Kansas Expressway, Campbell Avenue, National Avenue, and Route FF – for implementation to improve north-south traffic movements throughout the OTO region.

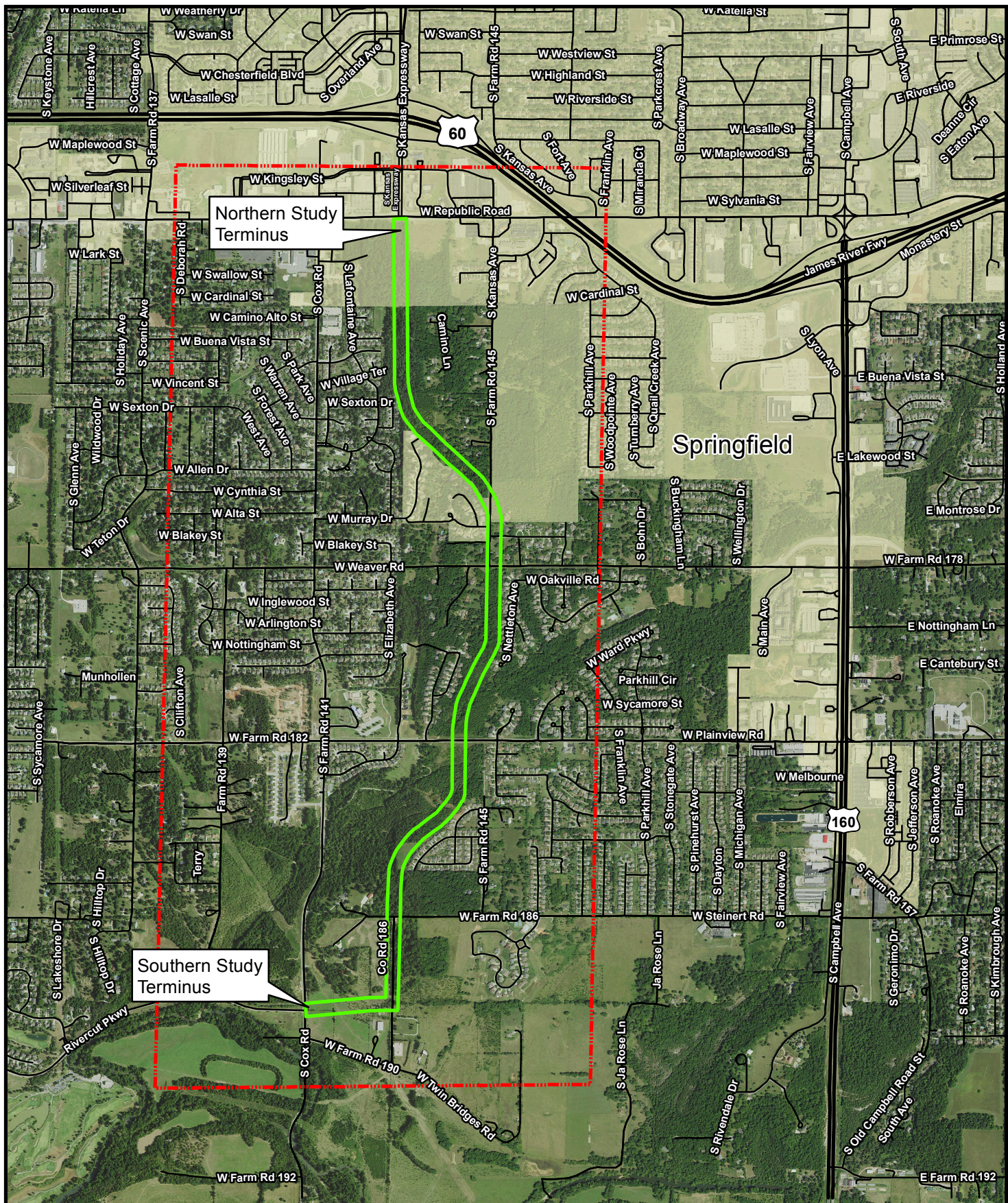
1.3 Study Purpose

The study purpose is to improve north/south connectivity for area residents from the growing areas in southern Greene County and northern Christian County to the employment centers, recreational areas, and retail centers in the City of Springfield. More specifically, the issues that the Study is meant to address include:

1. Improve the functionality of the Cox Road corridor by reducing the amount of commuter traffic along this primarily residential, “secondary arterial” street
2. Improve the regional transportation network by adding an additional north-south corridor, improving system-wide travel times, reducing travel delays, and improving safety
3. Provide needed network improvements to accommodate existing and projected growth in the southern Springfield/Greene County area

Secondary objectives of the Study include improving non-motorized connections and advancing recommendations included in previously adopted regional transportation plans.





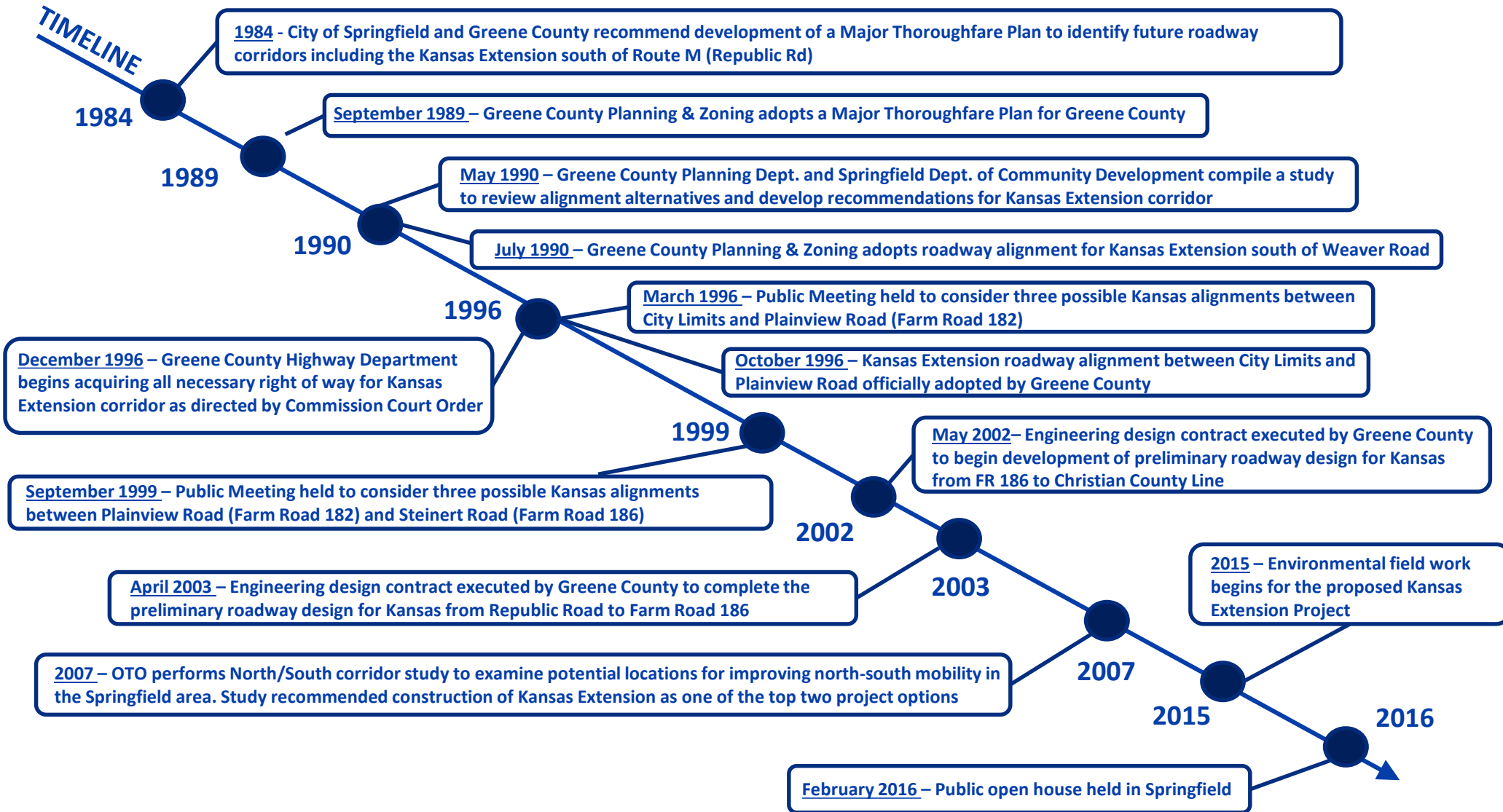
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- Study Corridor
- Municipal Area
- Study Area



Figure 1-2
Study Corridor

Figure 1-3 Previous Planning Timeline



1.4 Need for the Study

The following sections discuss each of the needs identified in the Study.

1.4.1 Improve the Function of the South Cox Road Corridor

As development continues south of Springfield, the demand on existing north-south corridors grows. For example, along Campbell Avenue, the traffic demand has resulted in increased congestion, especially during the peak travel periods. Commuters are looking for alternative north-south corridors to more efficiently access their travel destinations. One alternative to a congested Campbell Avenue has been the Cox Road corridor, a primarily residential roadway never intended to serve as a primary north/south route (OTO, 2016).

1.4.1.1 *Functionality of Cox Road*

The Cox Road corridor is classified as a “secondary arterial” – primarily residential with direct access from numerous residential driveways. Secondary arterials, as outlined in the OTO Journey 2035 – Long Range Transportation Plan, 2011 (OTO, 2011), are intended for moderate traffic volumes traveling at moderate speeds, usually less than 35 miles per hour. The OTO Plan designates secondary arterials as having two to three lanes with turning lanes added at intersecting streets as traffic volumes increase. Secondary arterials are further defined in the OTO Plan to serve travel needs between and within major activity centers with a trip distance of 1 to 4 miles.

Cox Road was not intended to serve as a high volume and longer-distance commuter facility. Traffic volumes during the morning and evening peak periods are heavy, with little spacing between vehicles (Figure 1-4). Existing residences accessed directly from Cox Road have limited opportunities to access Cox Road directly from their driveways, particularly during peak periods. Access to and from the existing cross-streets of Weaver Road and Plainview Road will continue to degrade as traffic volumes increase along Cox Road. Finally, Gray Elementary School has its access directly onto Cox Road, creating additional congestion and safety concerns during morning drop-off and afternoon pick-up for both school buses and parents.

Figure 1-4: Peak Hour Traffic Along Cox Road

1.4.1.2 Travel Volumes and Traffic Congestion

By the year 2040, traffic volumes in and around the Study Area are expected to increase dramatically. As illustrated in Table 1-1 and Figure 1-5, traffic along Cox Road is expected to grow to between 7,000 and 13,000 vehicles per day. This represents a 20 to 56 percent increase in the annual average daily traffic (AADT) along Cox Road from 2015 to 2040.

Table 1-1: Existing and Projected Daily Traffic Volumes Along Cox Road (2015–2040)

Location	Average Number of Vehicles per Day		Percent Growth (%)
	Existing (2015)	Future (2040)	
South of Republic Road	10,630	12,970	22
South of Weaver Road	8,910	10,650	20
South of Plainview Road	4,650	7,270	56

Source: OTO Travel Demand Model, 2015

As daily traffic volumes increase, traffic congestion at the Republic Road, Weaver Road, and Plainview Road intersections with Cox Road are expected to increase. By the year 2040, traffic congestion, represented by levels of service (LOS) as described in Table 1-2, is expected to reach LOS D/E (stable/unstable flow) on a scale of A to F (Table 1-2).

Table 1-2: Level of Service (LOS) Descriptions

LOS	Description
A	Free flow. Low volumes and no delays.
B	Stable flow. Speeds restricted by travel conditions. Minor delays.
C	Stable flow. Speeds and maneuverability closely controlled due to higher volumes.
D	Stable flow. Speeds affected by change in operating conditions. High-density traffic restricts maneuverability.
E	Unstable flow. Low speeds, considerable delay, volumes at or near capacity.
F	Forced flow. Very low speeds, volumes exceed capacity, long delays with stop-and-go traffic.

Source: Transportation Research Board, 2010

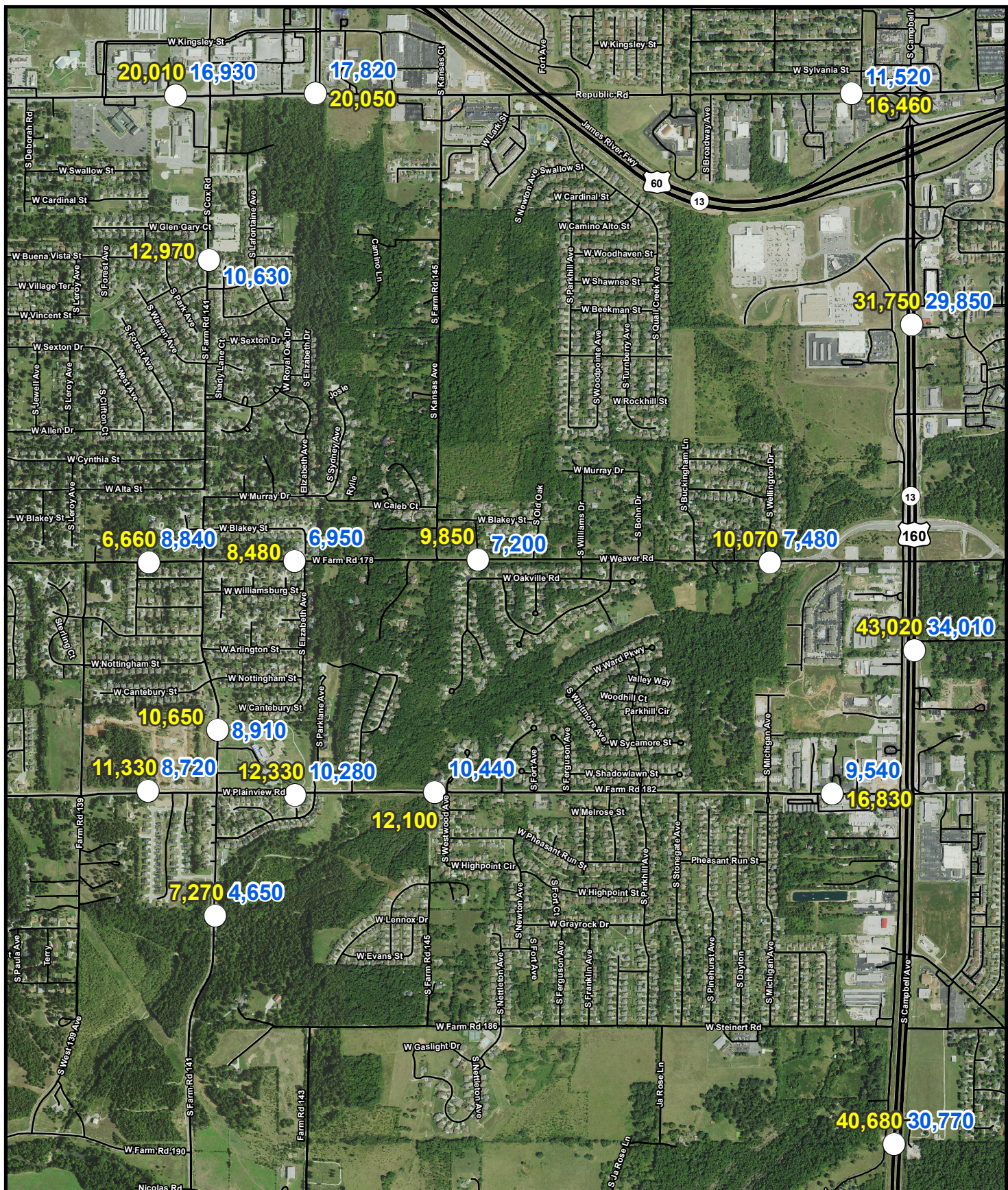
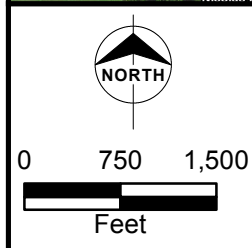


Figure 1-5
Existing and Projected
Traffic Volumes
(2040 AADT)



2015 = 2015 AADT
2040 = 2040 AADT



1.4.1.3 Travel Safety

Actual historical crash rates are difficult to estimate along Cox Road because the roadway is not on the statewide network of MoDOT, and data records are incomplete. Based on partial records from the County Sheriff's office, there were a total of 23 crashes along Cox Road from 2012 to 2014. Using crash rates for similar three-lane arterial roadways across Missouri (MoDOT, 2012) and based on traffic volumes expected in 2040, the total number of crashes along Cox Road is expected to grow to 30 crashes per year — 23 property damage only crashes and 7 injury crashes (Table 1-3). The assumption is that traffic safety along Cox Road has and will continue to be jeopardized as local residences access the street from their driveways into greater volumes of traffic. This is consistent with national studies that compare accident rates of three lane arterials, similar to Cox Road. Arterial roadways with direct access via driveways tend to have a higher accident rate than those without direct access (Highway Safety Manual, 2010).

Table 1-3: Projected Crashes Along Cox Road (No Build Alternative – 2040)

Location	AADT ^a	HMVMT ^b	Accident Rate ^c	Total Accidents	Crash Type: PDO ^d /Injury/Fatal
South of Republic Road	12,970	0.024	363.8	8.6	6.7/1.9/0.01
North of Weaver Road	10,280	0.019	363.8	6.8	5.3/4.5/0.01
South of Weaver Road	10,650	0.010	363.8	3.5	2.7/0.8/0.01
North of Plainview Road	8,570	0.008	363.8	2.8	2.2/0.6/0.01
South of Plainview Road	7,270	0.021	363.8	7.6	5.9/1.7/0.01
Totals	--	0.081	--	29.4	22.7/6.6/0.05

Source: OTO Travel Demand Model, 2015; MoDOT, 2012; Greene County, 2015

(a) AADT – Average Annual Daily Traffic

(b) HMVMT – Hundred Million Vehicle Miles of Travel

(c) Number of accidents per year; Statewide Accident Rate for Secondary Arterials

(d) PDO – Property Damage Only

1.4.2 Improve the Regional Transportation Network

According to a Missouri Economic Research Information Center newsletter, for the 5-year period from 2009-2013, the average percent of residents employed outside their home county in Missouri was relatively high south of Greene County, with 56.2 percent and 67.8 percent for Stone and Christian Counties, respectively. The majority of these workers traveled alone to work by car, truck, or van (Missouri Economic Research Information Center, 2013). While some of these workers were commuting to jobs in the Branson area, many were commuting to jobs in the Springfield area.

In addition, the southern portion of Greene County has been experiencing substantial residential and commercial growth over the last decade. In 2014, the area northeast of Nixa and south of the Study Area generated the largest number of housing permits of any region in Springfield. Within the census tract that includes the Study Corridor, a total of 1,213 housing permits were issued between 2000 and 2014 (OTO, 2014a).

1.4.2.1 *Campbell Avenue*

The existing and projected growth in southern Greene County and northern Christian County has created a substantial increase in travel demand on Campbell Avenue, the primary north-south highway on the southwest side of Springfield. As indicated in Table 1-4, traffic along Campbell Avenue, with the exception of the segment just south of James River Freeway, is expected to grow between 25 and 35 percent over the next 25 years. In addition, the LOS is expected to continue to degrade, as shown in Table 1-5, from LOS C to LOS D.

Table 1-4: Existing and Forecasted Traffic (AADT) Along Campbell Avenue

Location	Average Number of Vehicles per Day		% Growth
	Existing (2015)	Future (2040)	
South of James River Freeway	29,850	31,750	6.4
South of Weaver Road	34,010	43,020	26.5
South of Plainview Road	30,770	40,680	32.2

Source: OTO Travel Demand Model, 2015

Table 1-5: Existing and Forecasted Level of Service Along Campbell Avenue (2015–2040)

Intersection	Existing LOS – AM (PM)	Future LOS – AM (PM)
Republic Road	C (C)	D (D)
Weaver Road	C (C)	C (D)
Plainview Road	D (C)	D (D)

Source: OTO Travel Demand Model, 2015

While traffic volumes along Campbell Avenue are expected to grow by approximately 25 to 35 percent, the segment of Campbell Avenue just south of James River Freeway only shows a 6 percent increase in traffic. This segment is already approaching capacity and can handle only minimal additional traffic growth. As traffic grows and congestion increases, commuters are finding alternative routes to get to their destinations, which explains in part why the increase in traffic just south of the James River Expressway is less than the increases along other sections of Campbell Avenue. As shown in Table 1-6, traffic is diverting both east and west of Campbell Avenue on both Weaver Road and Plainview Road. Vehicles

diverting west are using Cox Road or Kansas Avenue to then go north on the Kansas Expressway. Vehicles diverting east are heading north on National Avenue.

Table 1-6: Existing and Forecasted Diversion of Traffic from Campbell Avenue (AADT)

Location	Average Number of Vehicles per Day		Avg. Growth (%)
	Existing (2015)	Future (2040)	
West on Weaver Road	7,480	10,070	34.6
East on Weaver Road	4,360	6,860	57.3
West on Plainview Road	9,540	16,830	76.4
East on Plainview Road	6,370	9,680	52.0

Source: OTO Travel Demand Model, 2015

The increased travel demand along Campbell Avenue is also resulting in incident rates much higher than the statewide averages for similar types of facilities. In the 3-year period from 2012 to 2014, 312 crashes occurred along Campbell Avenue between the Christian County line and the James River Freeway, including two fatality crashes. Rear-end type crashes were the most common crash type, which typically occur in highly congested corridors. As depicted in Table 1-7, the crash rates along Campbell Avenue are over twice the statewide average for similar types of roadways.

Table 1-7: Traffic Incidents by Type Along Campbell Avenue (2012–2014)

Location	Crashes per Year			Incidents / HMVMT ^b	% Above Statewide Average
	PDO ^a	Injury Only	Fatality		
Campbell Ave., Northbound	118	45	0	317	125
Campbell Ave., Southbound	102	45	2	290	107

Source: MoDOT, 2015; City of Springfield, 2015 (Crash statistics and safety data summarized or presented in this EA are protected under Federal law.)

(a) PDO – Property Damage Only

(b) HMVMT – Hundred Million Vehicle Miles of Travel; Statewide Incident Rates for Expressway Facilities in Missouri is 141.23 Incidents per HMVMT (MoDOT, 2015)

1.4.3 Accommodate Existing and Projected Growth

The Study Area is located within the OTO planning area that experienced substantial growth during the 1990s and continues to experience relatively high population growth rates compared to the rest of the State of Missouri (Section 3.2). The two-county area grew by over 22 percent between 1990 and 2000. Between 2000 and 2014, the area experienced over 15 percent growth (Missouri Office of Administration 2015). In particular, the area of Springfield south of the James River Freeway has seen a concentration of new growth that creates a need for infrastructure to serve current and future development.

The 2009 Greene County Land Use Plan identifies Future Land Use in the Study Area and surrounding area to the Christian County line as Urban Residential. It is likely that those areas in and near the Study Area not already occupied by urban residential development will be fully developed in the next 10 to 20 years.

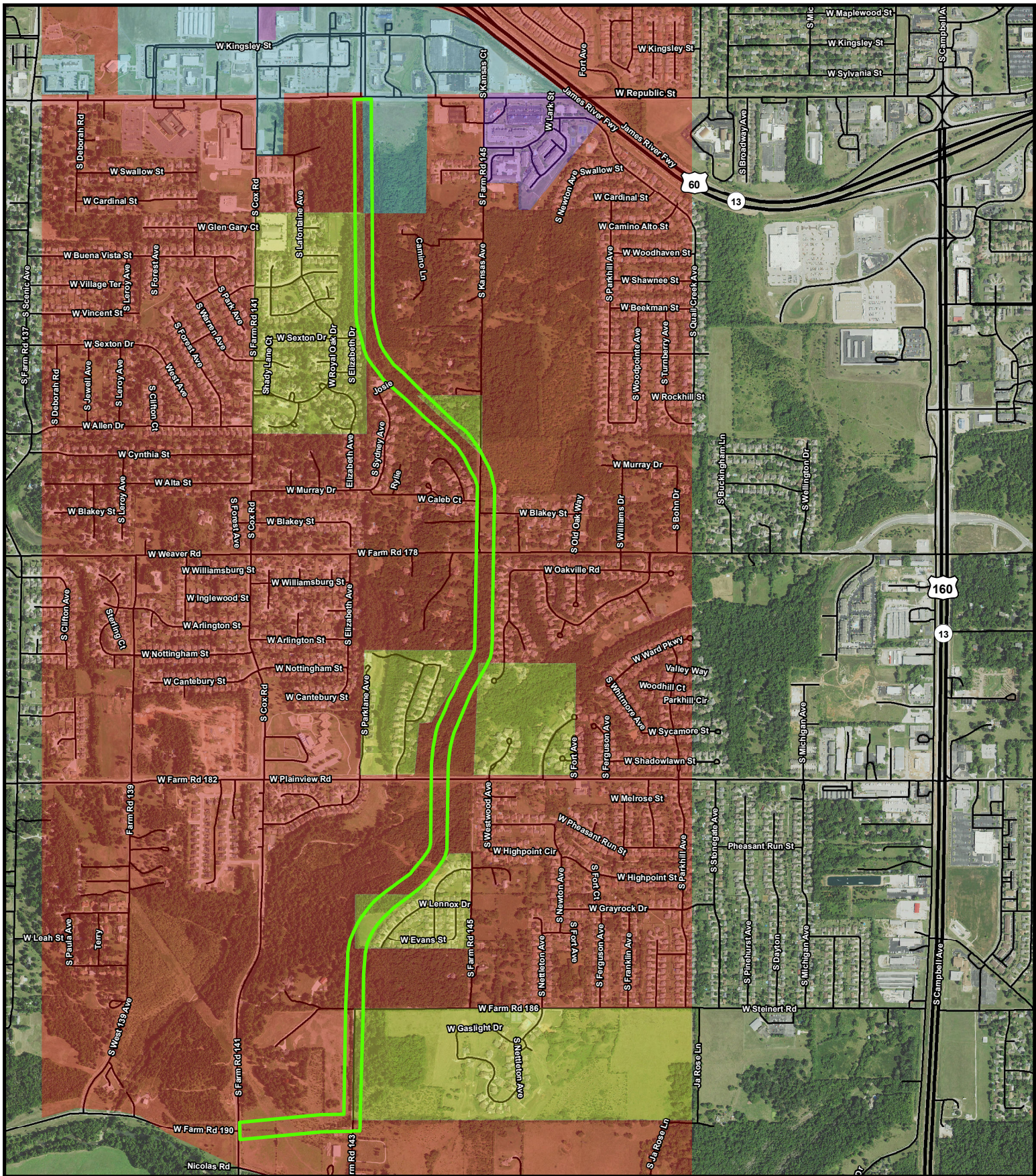
A 2014 growth trends report issued by the OTO indicates that, when compared to other census tracts in the Springfield area, a relatively high number of housing units (1,230) were constructed from 2000 to 2014 in the census tract that includes the Study Corridor Area. In addition, the report further illustrates that in 2014, the greatest number of residential permits were issued in the northeast part of Nixa, just south of the Study Area. The projected growth of the area south of the James River Freeway is expected to result in even higher traffic volumes and slower travel times.

Based on the City of Springfield and Greene County land use plans, it is projected that additional commercial/office development will occur along Republic Road at the north end of the corridor and near the south end of the Study Area (City of Springfield, 2011; Greene County, 2009). Additional residential development and the conversion of agricultural land uses to residential will also occur in the future.

Figure 1-6 provides additional details regarding where existing development has occurred and where future growth is planned to occur.

1.5 Purpose and Need Summary

Due to historical and continued development in southern Springfield, Greene County, and in northern Christian County, a large number of commuters are coming into Springfield from the south. The relative lack of sufficient north-south routes into the area results in increased traffic congestion and a higher crash rate compared to statewide averages. Congestion and higher crash rates are expected to continue to increase over the next 20 to 30 years.



<p>0 750 1,500 Feet</p>	<div> <div></div> Study Corridor </div> <div> <div></div> Commercial/Office District </div> <div> <div></div> Planned Development </div> <div> <div></div> Plot Assignment District </div> <div> <div></div> Residential District </div>		<p>Figure 1-6 Existing and Forecasted Residential and Commercial Development</p>
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2.0 ALTERNATIVES CONSIDERED

This chapter provides a description of the alternatives identified and evaluated to address the transportation needs in the Study Area and surrounding areas. Each of these alternatives was evaluated through a coordinated assessment of engineering, environmental, and socioeconomic attributes. Through collaboration and input received from agencies and the public, a preferred alternative has been identified.

2.1 Alternatives Considered

In addition to the No Build Alternative, a variety of build alternatives were initially considered in order to meet the Purpose and Need.

2.1.1 No Build Alternative

Under the No Build Alternative, the extension of the existing Kansas Expressway would not be constructed. Under the No Build Alternative, routine maintenance activities and other planned projects in the Study Area, such as what is shown in the OTO 2017-2020 TIP (see Table 2-1) would be completed. No construction or other transportation improvements associated with the Project would be made within the Study Corridor designated for the Kansas Extension.

According to the OTO 2017-2020 Transportation Improvement Program (TIP) a number of pavement improvement projects on other existing corridors within and near the Study Area will be made along with two capacity projects (Table 2-1).

Table 2-1: Other Planned Transportation Capacity Improvements Within or Near the Study Corridor

TIP Number	Name	From	To	Description
SP1405	Scoping for James River Freeway Capacity Improvements	Route 13	Route.65	Scoping for capacity improvements on James River Freeway from Kansas Expressway (Rte. 13) to Rte. 65
GR1502	East-West Arterial (Riverbluff Blvd) Phase I	Farm Road 141	Campbell Avenue	Design/Environmental Approval from Farm Road 141 to Campbell Avenue
SP1711	James River Freeway	Kansas Expressway	0.7 miles west of Route 65	Pavement improvements on disconnected sections of James River Freeway (Rte. 60) from Kansas Expressway (Rte. 13) to 0.7 miles west of Rte. 65 in Springfield.

TIP Number	Name	From	To	Description
SP1712	James River Freeway Guardrail Improvements	0.3 miles south of I-44	Rte. 65	Guardrail improvements on the James River Freeway from 0.3 miles south of I-44 to Rte. 65
SP1701	Route 160 Pavement Improvements JRF to Plainview	James River Freeway	North of Plainview Rd.	Pavement improvements on various sections of Rte. 160 from James River Freeway (Rte. 60) to north of Plainview Rd.
CC1702	Route JJ and Route AA Pavement and Safety Improvements	-	-	Pavement and safety improvements on Rte. JJ from Rte. 14 to Rte. 125 and on Rte. AA from Rte. 160 to end of route.
CC1601	Route 160 Safety Improvements	Rte. 160	0.15 mile south of Rte. AA	High friction surface treatment on the westbound lanes of Rte. 160 south of Rte. AA

Source: OTO FY 2017-2020, Transportation Improvement Program, Approved by the Board of Directors 8/18/2016.

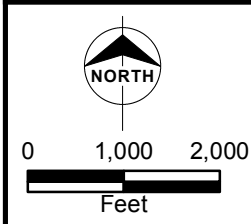
Neither the No Build Alternative nor the east-west capacity improvements described above will satisfy the Purpose and Need. Although the No Build Alternative does not satisfy the Purpose and Need, it will be carried forward to serve as a comparison with the other alternatives.

2.1.2 Build Alternatives

As described in Section 1.2, the Project has a long history dating back to the late 1980s, including the development and screening of a number of alternatives during the planning process. Documentation in Appendix A describes how the Project was identified as the preferred corridor to address north/south travel in the Springfield/Greene County region, including detailed evaluations of the various other build alternatives evaluated and dismissed. It also addresses a range of potential Build Alternatives.

2.2 Preferred Alternative

Based on the results of previous planning efforts and the screening process described in Appendix A, the current Build Alternative (Alternative 15-1), is recommended as the preferred alternative (Figure 2-1). This alternative best addresses the Purpose and Need for the Project, limits disruption to the natural and social environment, and was developed in consideration of input received from the public and environmental resource agencies.



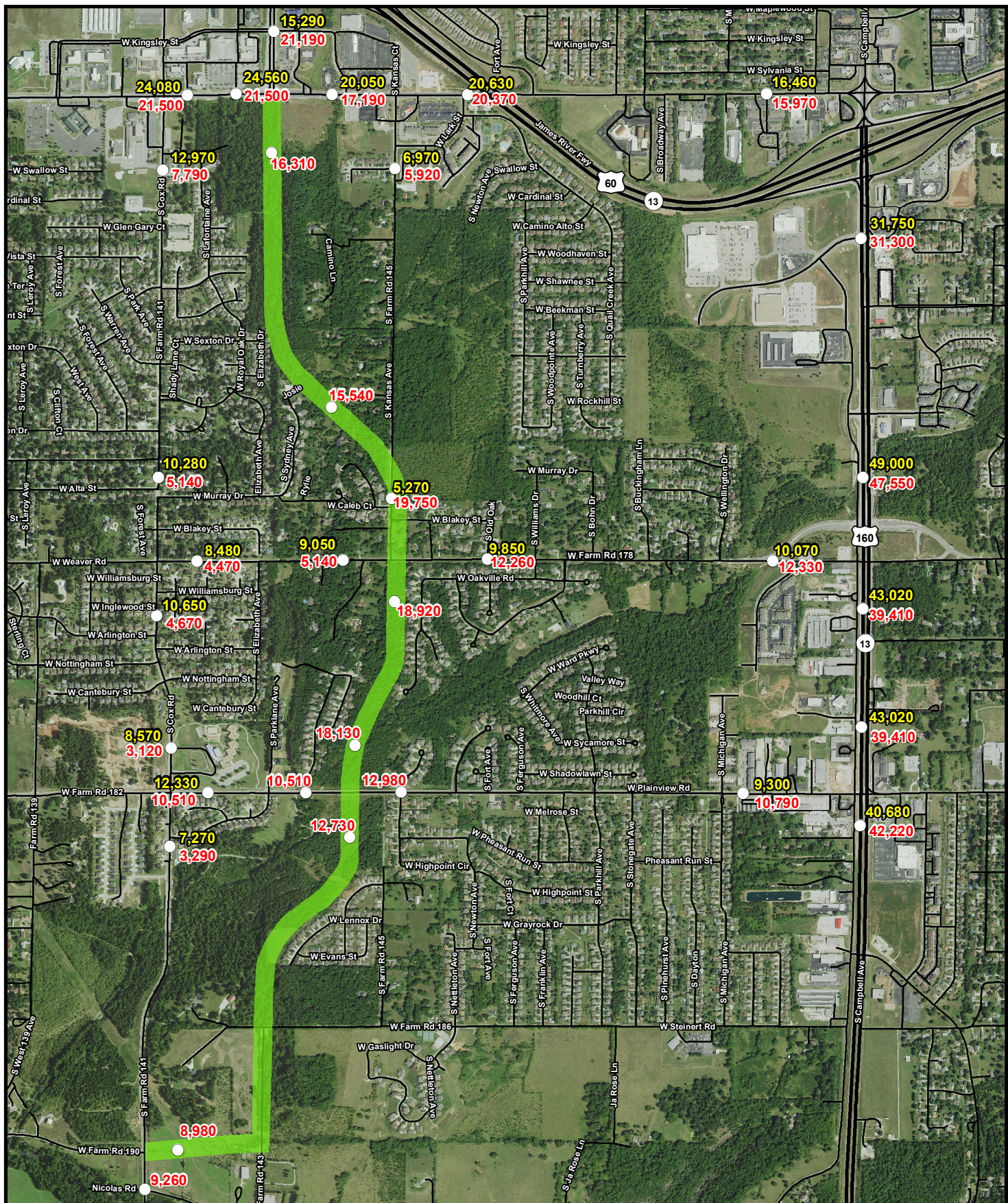
Source: USDA NAIP Greene Co Aerial Photography; ESRI; TIGER Roads; Greene County, MO; OTO; Energy Velocity.

The preferred alternative would extend from the northern terminus at the intersection of Kansas Expressway and Republic Road to the southern terminus at Farm Road 190, including an east-west connection between Cox Road and the Kansas Expressway at the southern Study limit. Initially, the preferred alternative would be constructed as a two lane facility and eventually expanded to a four lane facility once traffic conditions warrant.

2.2.1 Ability to Address the Purpose & Need

The Study Corridor would result in a substantial diversion of traffic from both Cox Road and from Campbell Avenue. As illustrated in Figure 2-2, 11,000 to 17,000 vehicles per day are expected to divert from existing facilities to the Study Corridor by the year 2040. The trips generated along the Study Corridor would primarily consist of:

1. Current trips diverting from Cox Road – 5,000 to 6,000 trips per day
2. Current trips diverting from Campbell Avenue – 3,000 to 4,000 trips per day
3. Current trips diverting from National Avenue – 1,000 to 2,000 trips per day
4. New trips diverting from other locations – 2,000 to 5,000 trips per day



0 750 1,500
Feet

█ Study Corridor

█ 2040 = 2040 AADT - Build
█ 2040 = 2040 AADT - No Build



Figure 2-2
No Build and Build Traffic
Forecasts (2040 AADT)

The primary north-south arterial in northern Greene County and southern Christian County is, and will continue to be, Campbell Avenue. The travel demand model shows a substantial diversion of traffic from Campbell Avenue to the Study Corridor, but traffic is also diverting from other north-south arterials, such as National Avenue, back to the Campbell Avenue corridor. As Table 2-2 illustrates, commuters will continue to use Campbell Avenue until it reaches capacity.

Table 2-2: Forecasted Level of Service on Campbell Avenue – No Build and Build (2040)

Location	No Build LOS – AM (PM)	Build LOS – AM (PM)
Republic Road	D (D)	D (D)
Weaver Road	C (D)	C (C)
Plainview Road	D (D)	D (D)

Source: OTO Travel Demand Model, 2015

Therefore, while the congestion levels along Campbell Avenue are not projected to improve dramatically, the models are showing improvement in the transportation network as a whole. More specifically, the Study Corridor is expected to create substantial improvements in two criteria used to evaluate the regional travel demand benefits – total regional VMT and total vehicle hours travelled (VHT).

As identified in Table 2-3, adding a roadway in the Study Corridor is expected to result in a reduction in the total miles travelled and total number of hours travelled. More specifically, by 2040, commuters in southern Springfield, southern Greene County, and northern Christian County would expect to save a combined 17,800 miles and 1,100 hours of travel per day.

Table 2-3: Reduction in Daily VMT and VHT (2040)

Daily Totals	Average Number of Vehicles per Day		Reduction
	No Build (2040)	Build (2040)	
Total Daily VMT	12,282,200	12,264,400	17,800
Total Daily VHT	372,870	371,770	1,100

Source: OTO Travel Demand Model, 2015

Shifting a large percentage of the traffic from the three-lane Cox Road secondary arterial would result in an overall reduction in crashes along South Cox Road by 31 percent – an annual reduction of seven property damage only and two injury accidents (Table 2-4). The reduction in accidents is based on moving a significant amount of traffic to the new facility, which would have a much lower expected accident rate. The accident rate on Cox Road is 360 accidents per hundred million vehicle miles traveled compared to an accident rate of 141 for a four-lane principal arterial. As the third column of Table 2-4 indicates, the average daily traffic on Cox Road is expected to decline between 40% and 60%, dropping

from average traffic volume in 2040 of between 7,200 and 13,000 vehicles per day to only 3,100 to 7,790 per day should a new facility be constructed.

Table 2-4: Reduction in Crashes Along Cox Road (Build Alternative – 2040)

Alternative	Location	AADT^a	Accident Rate^b	Annual Total Crashes	Crash Type: PDO%/Injury/Fatal
No Build	Cox Road	7,200 to 13,000	363.8	29.4	22.7/6.6/0.05
Build	Cox Road	3,100 to 7,790	363.8	14.6	11.3/3.3/0.02
	Kansas Extension	4,000 to 5,200	141.2	5.7	4.2/1.5/0.03
	Total Build	--	363.8	20.3	15.5/4.7/0.05
Reduction in crashes		--	--	9.0	7.2/1.9/0.00

Source: OTO Travel Demand Model, 2015; Greene County, 2015

(a) AADT – Average Annual Daily Traffic

(b) Statewide Accident Rate for Secondary Arterials

(c) PDO – Property Damage Only

The reduction in the total amount of miles travelled and the reduced amount of hours driving in congestion has a positive impact on the safety of the travelling public. As indicated in Table 2-5, the reduced VMT is expected to reduce the total number of traffic crashes in the region by approximately 10 crashes per year.

Table 2-5: Reduction in Annual Traffic Crashes (2040)

	Annual VMT Reduction (HMVMT)	Overall Crash Rate (HMVMT)	Annual Crash Reduction
Regional Network	0.06497	148.7	9.7

Source: MoDOT, 2015; Burns & McDonnell, 2015

2.2.2 Fiscally Constrained

The Kansas Expressway was identified by the OTO Board of Directors on April 17, 2014, as a “Priority Project of Regional Significance” (OTO, 2014). OTO identified in Chapter 6 of their current Long Range Transportation Plan, “Transportation Plan 2040”, a prioritized list of projects to be funded, if approved, using currently projected financial resources (Table 2-6). Construction of the Kansas Expressway, listed as projects G6, G7, and G8, is included in the fiscally constrained project implementation plan. Project G6 (Republic Avenue to Weaver Road), is shown in the 2018 – 2022 period, while projects G7 and G8 (Weaver Road to Plainview Road and Plainview Road to Farm Road 190), are shown in the 2023 to 2030 period.

Table 2-6 Roadways Constrained List

Project ID ^a	Name	Roadway	Location	Description	2018-2022	2023-2030	2031-2040	Total	Constraint
G6	Kansas Expressway Extension – Republic Road to Weaver Road	Kansas Expressway from Republic Road to Weaver Road	Springfield, Greene County	New roadway with bicycle and pedestrian accommodations	\$19,592,595	\$-	\$-	\$19,592,595	\$199,102,185
G7	Kansas Expressway Extension – Weaver Road to Plainview Road	Kansas Expressway from Weaver Road to Plainview Road	Greene County	New roadway with bicycle and pedestrian accommodation	\$-	\$7,748,205	\$-	\$7,748,205	\$206,850,390
G8	Kansas Expressway Extension – Plainview Road to Cox	Kansas Expressway from Plainview Road to East/West Arterial (Farm Road 190)	Greene County	New roadway with bicycle and pedestrian accommodation	\$-	\$9,224,054	\$-	\$9,224,054	\$216,074,444

Source: OTO Transportation Plan 2040, 2016

^a Project costs are shown based on the estimated year of completion, with an annual inflation factor of 3 percent based on the estimated year of completion.

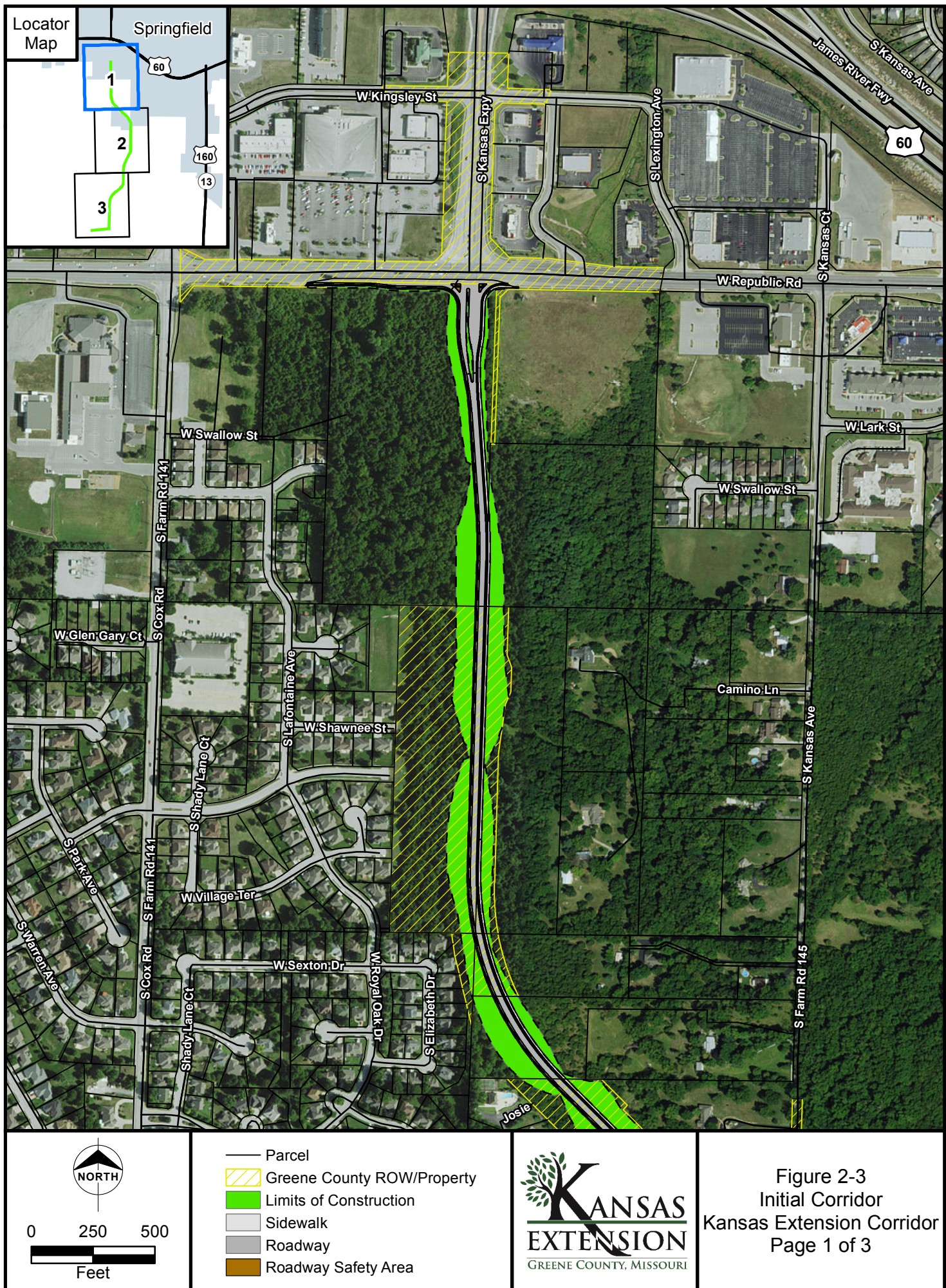
2.2.3 Phased Implementation

To meet the purpose and need through the design year, the preferred alternative would involve constructing a four-lane divided parkway extension of the Kansas Expressway south from Republic Road to Farm Route 190 along the alignment previously identified and preserved by Greene County. However, based on traffic forecasts, a full four lane facility would not be necessary for fifteen to twenty years. In consideration of when funding has been identified to be available and when traffic conditions warrant, the initial construction phase would include two travel lanes built within the ROW (Figure 2-3). Construction of the ultimate four-lane divided primary arterial would be completed in the future as traffic volumes increase and the level of service being provided by the initial two-lane construction declines (Figure 2-4). The final configuration would also include a 10-foot-wide trail along one side of the extension with a 5-foot-wide sidewalk on the opposite side of the roadway (Figure 2-5). Access would be limited to the existing cross-streets, each with an at-grade signalized intersection.

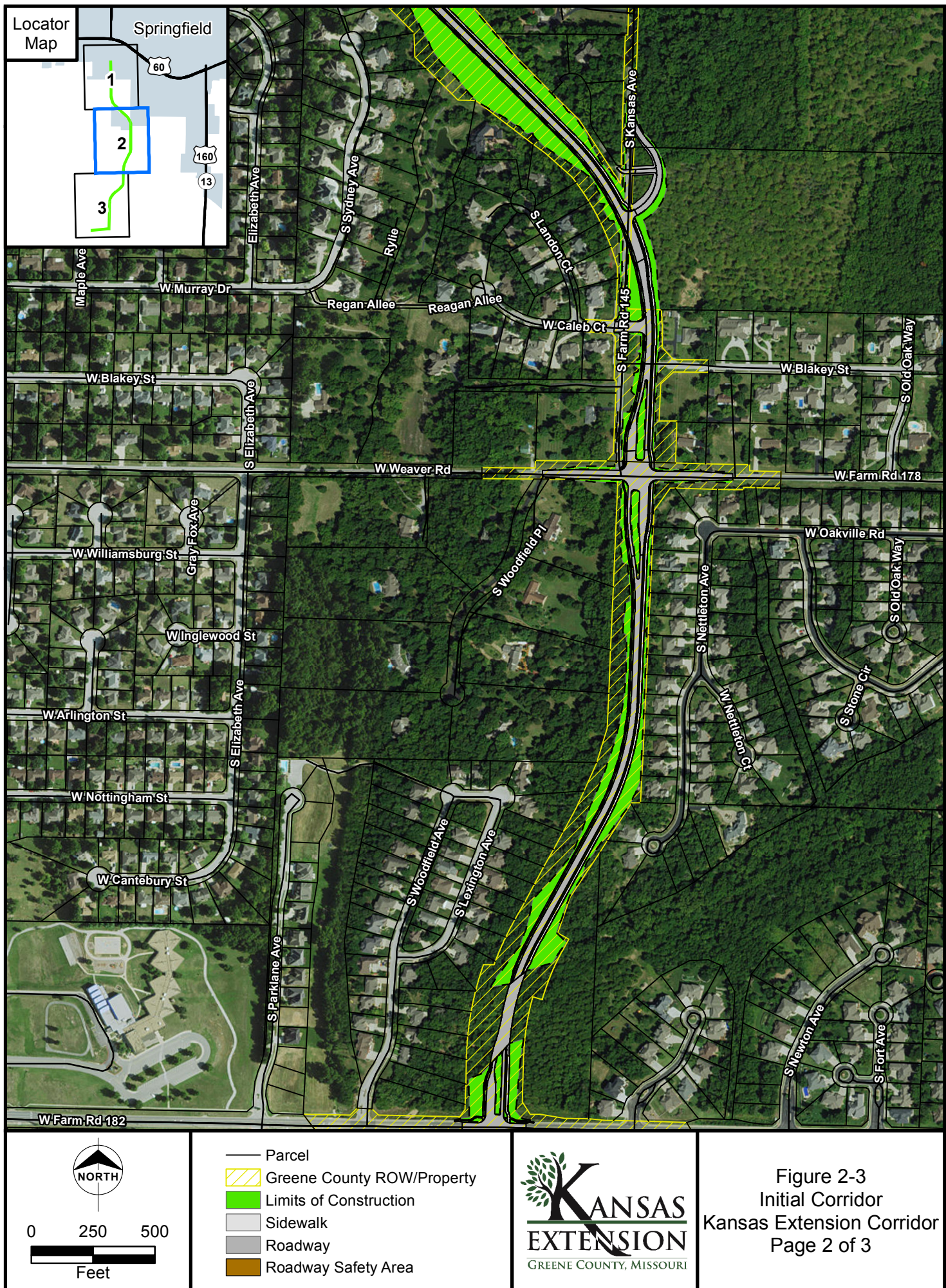
2.2.4 Summary of Preferred Alternative

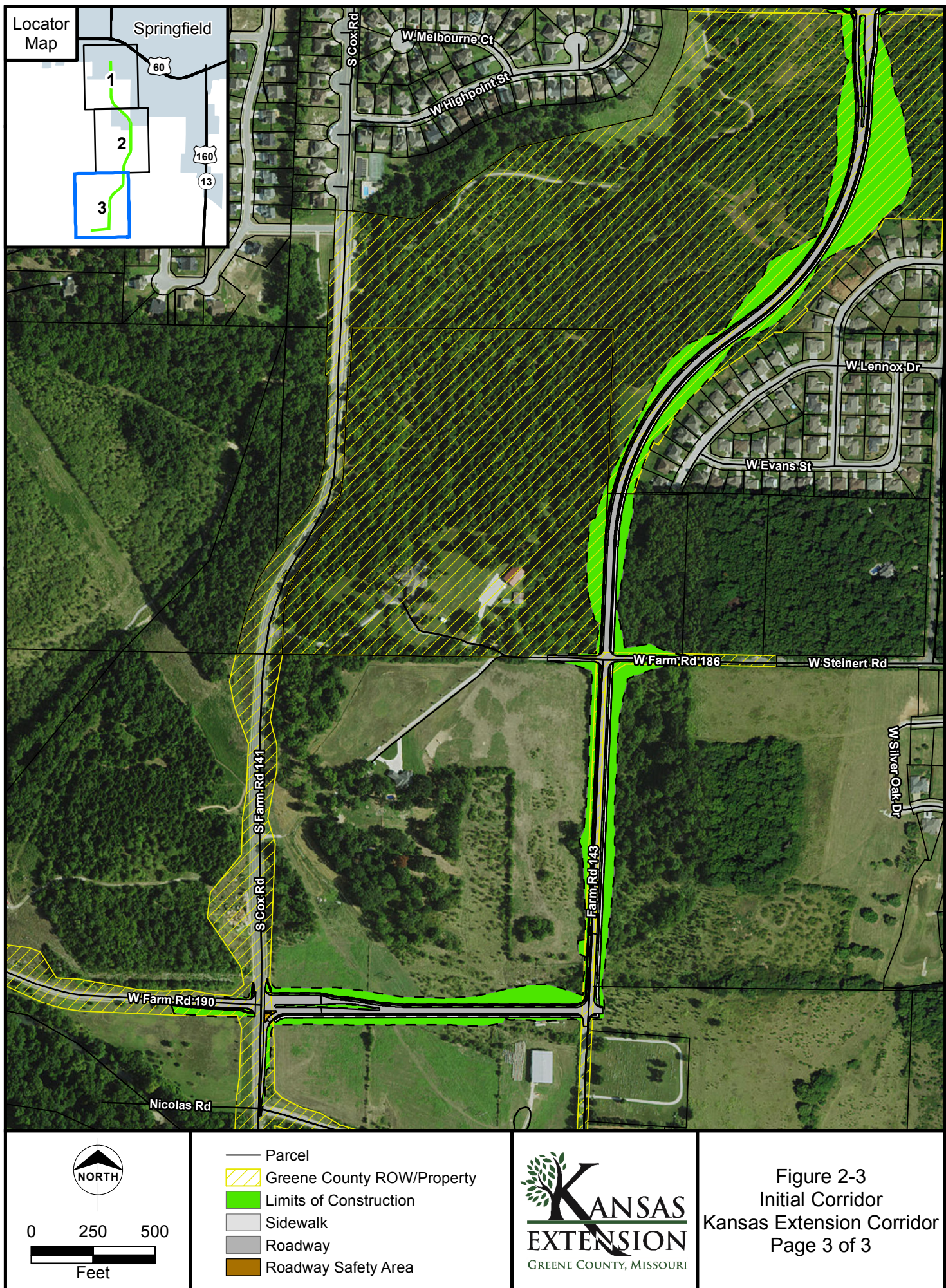
The preferred alternative (Alternative 15-1) would extend from the northern terminus at the intersection of Kansas Expressway and Republic Road south to the southern terminus at Farm Road 190, including an east-west connection between Cox Road and the Kansas Expressway at the southern Study limit. This alternative would solve the transportation problems identified in the Purpose and Need section of this document by shifting more traffic from the Cox Road corridor, provide a newer, safer relief route for existing and future traffic; provide a better transportation network to accommodate existing and projected growth; as well as provide improve linkages to the area trail networks. Initially, the preferred alternative would be constructed as a two lane facility and eventually a four lane facility once traffic conditions warrant.

Selection of a preferred alternative will not be finalized until substantive comments from resource agencies and the public hearing are fully evaluated and addressed.

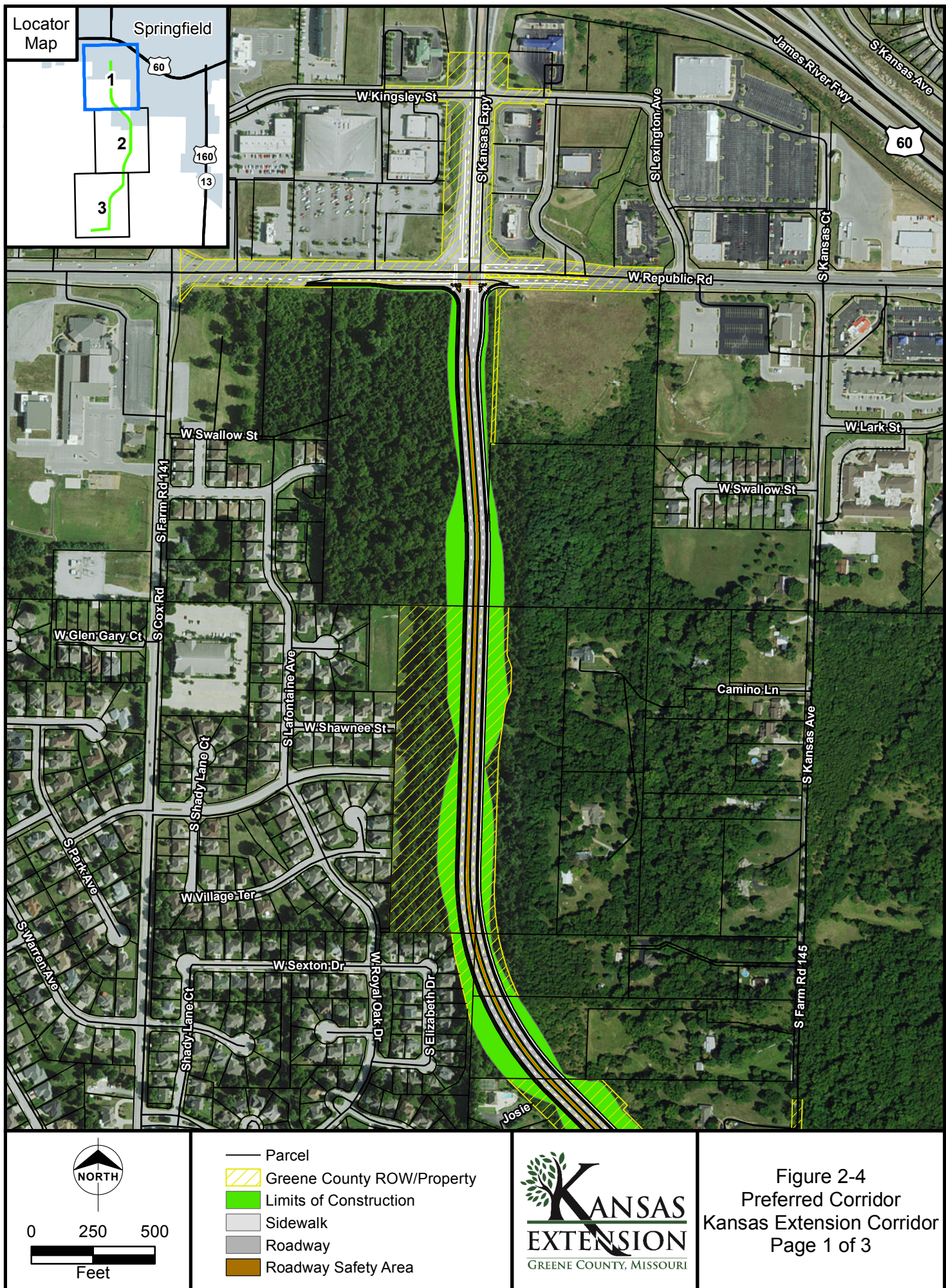


Source: Greene County; Esri Aerial Photography; Burns & McDonnell Engineering Company.

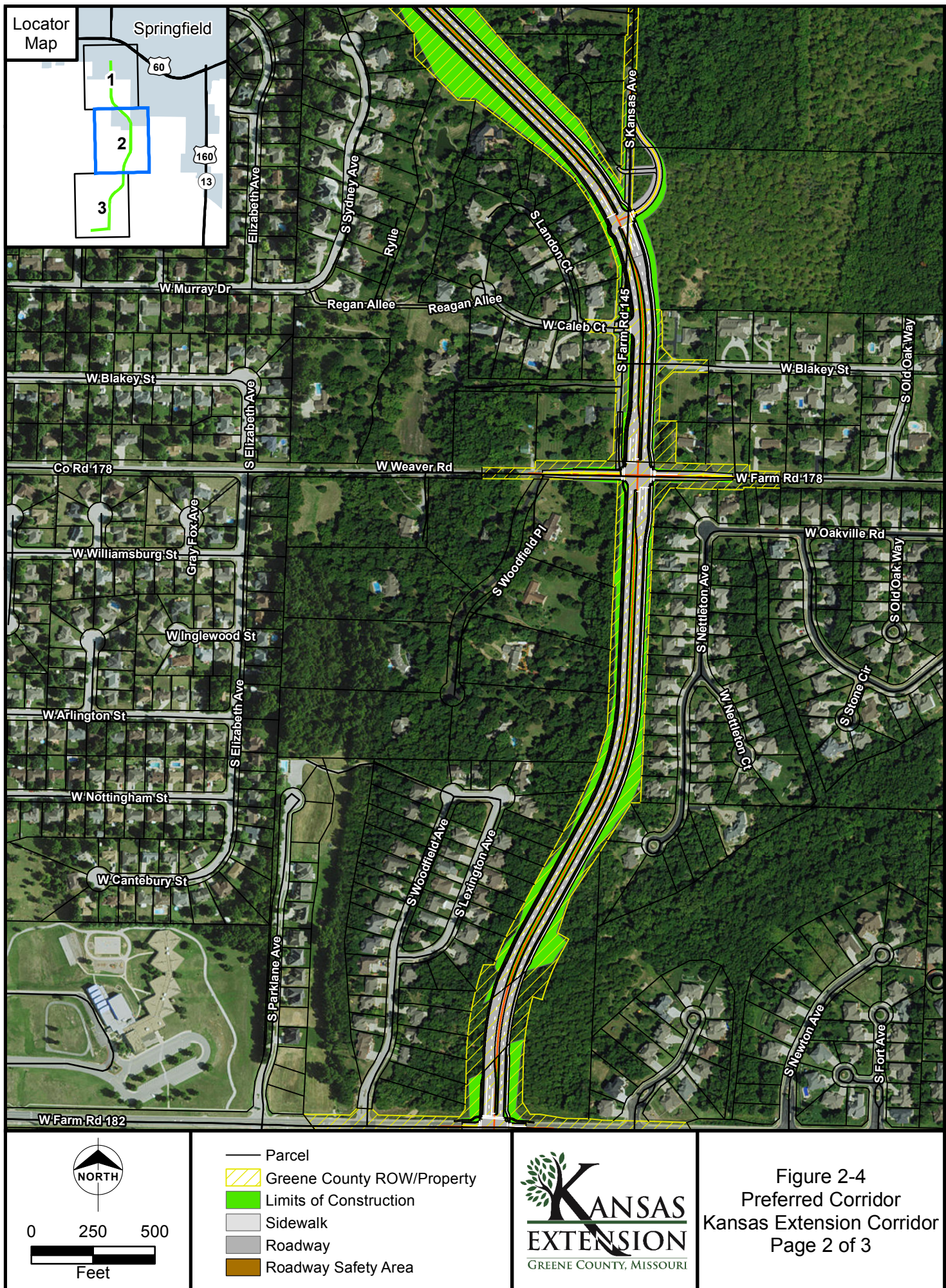


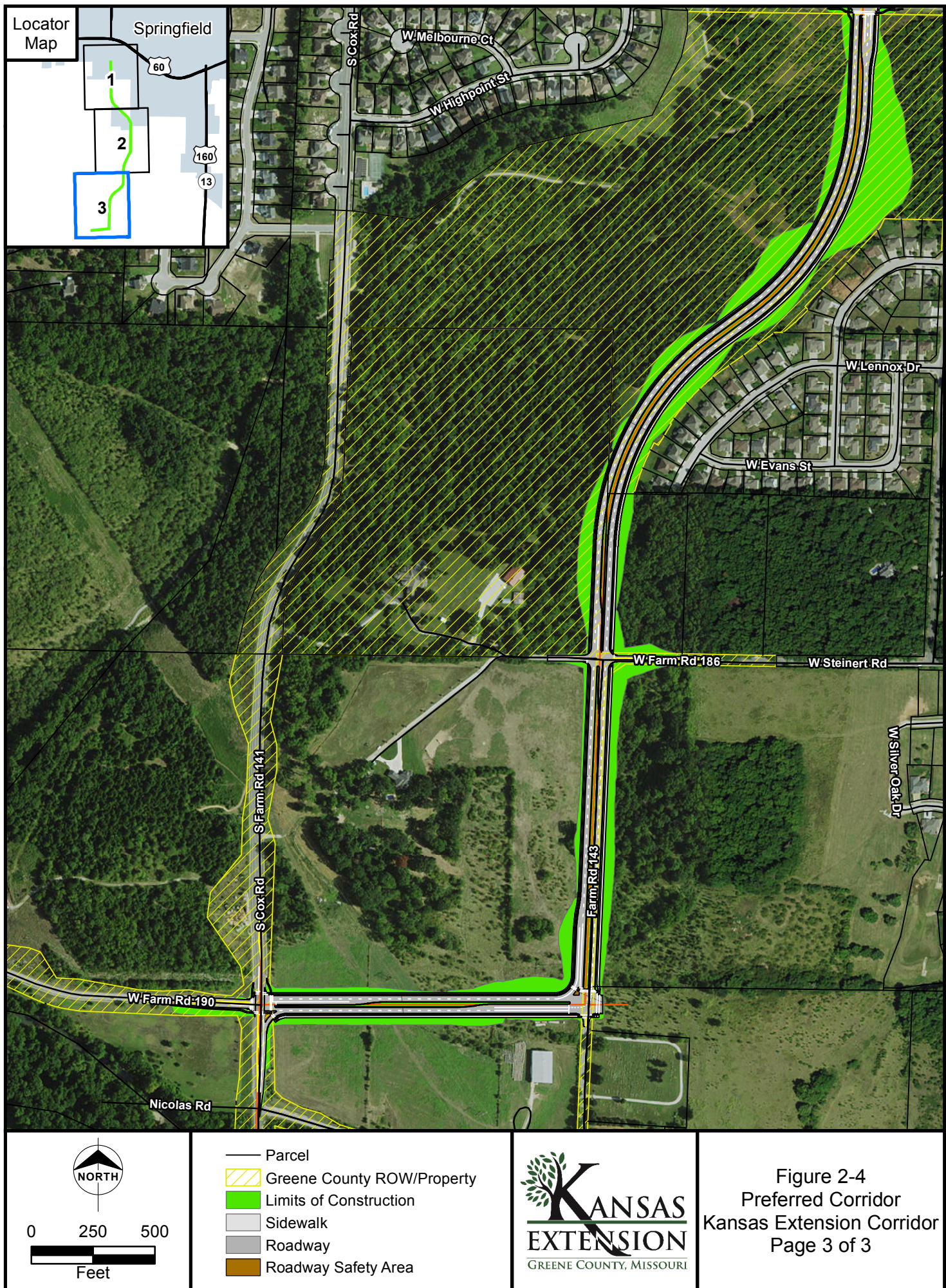


Source: Greene County; Esri Aerial Photography; Burns & McDonnell Engineering Company.



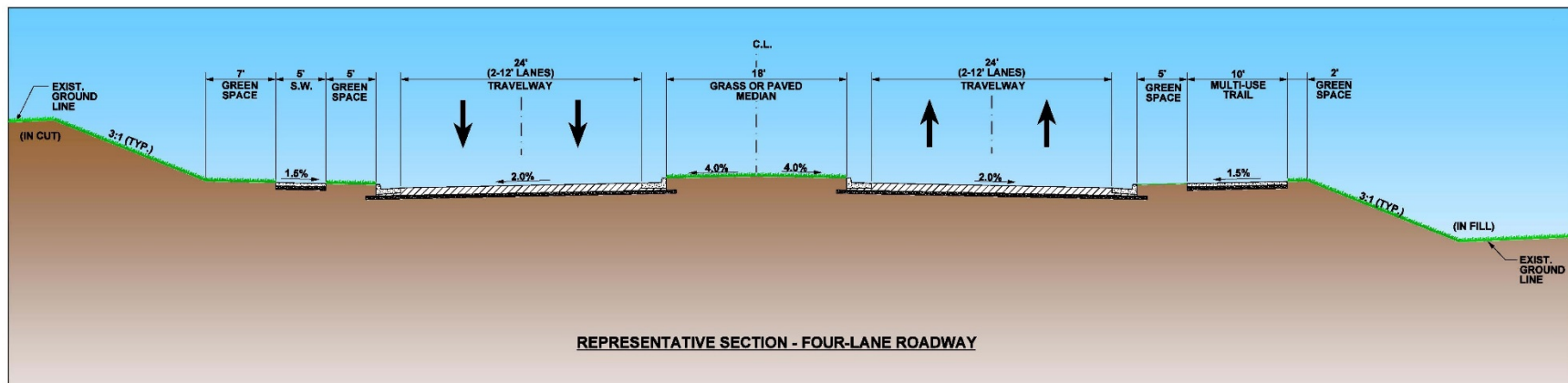
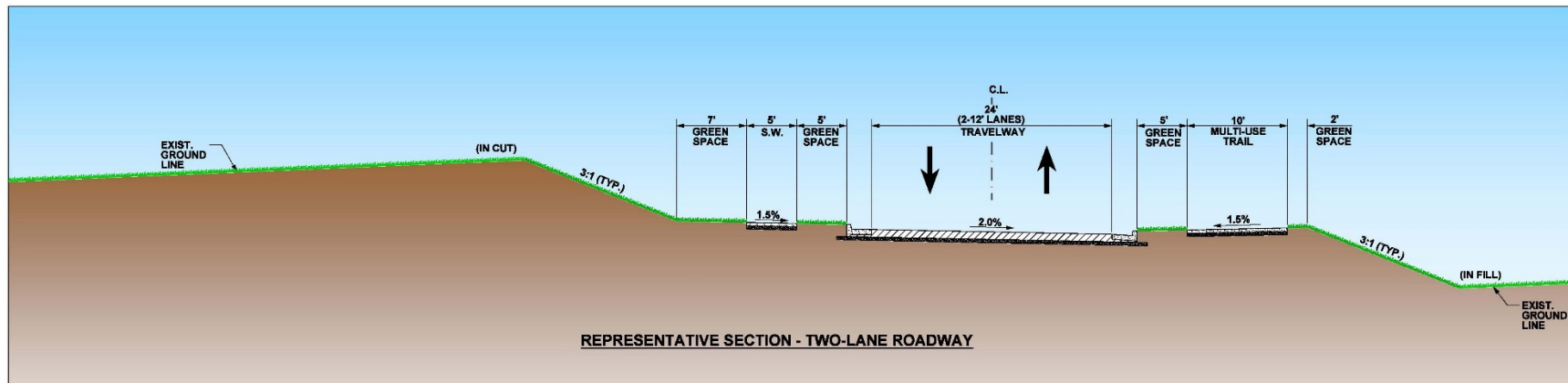
Source: Greene County; Esri Aerial Photography; Burns & McDonnell.





Source: Greene County; Esri Aerial Photography; Burns & McDonnell.

Figure 2-5: Representative Section Showing Trail and Sidewalk Improvements



Source: Burns & McDonnell, 2015

3.0 IMPACTS OF THE PROPOSED ACTION

This chapter describes the existing social, economic, and environmental conditions in the Study Area and surrounding communities and the potential effects the proposed action would have upon them. The evaluation of impacts is based upon the Study Corridor identified as the preferred alternative and the completed four-lane roadway build-out. Direct Project impacts, such as clearing and earth disturbance, would be limited to the 200-foot-wide Study Corridor. Other impacts such as traffic volumes and socioeconomics, would extend beyond the 200-foot Study Corridor and were evaluated for the identified Study Area (Figure 1-2). Existing conditions serve as a baseline for evaluating the potential beneficial and adverse social, economic, and environmental effects of the No Build and Build Alternatives. Until final design, it is difficult to determine what level of impact would be associated with only the two-lane build out, with the two-lane build out but to facilitate the later four-lane build out, or just the four-lane build out. Therefore, as the Project seeks approval for the complete four-lane build out, the potential impacts have been conservatively estimated to include those within the entire Study Corridor and associated with the full four-lane build-out (Figure 2-4). While all these impacts may not occur initially, approval of the Project will result in the complete build-out of the Study Corridor. Table 3-1 summarizes the anticipated impacts of the proposed action.

Table 3-1: Summary of Features and Potential Impacts of the No Build and Build Alternatives

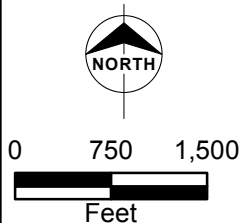
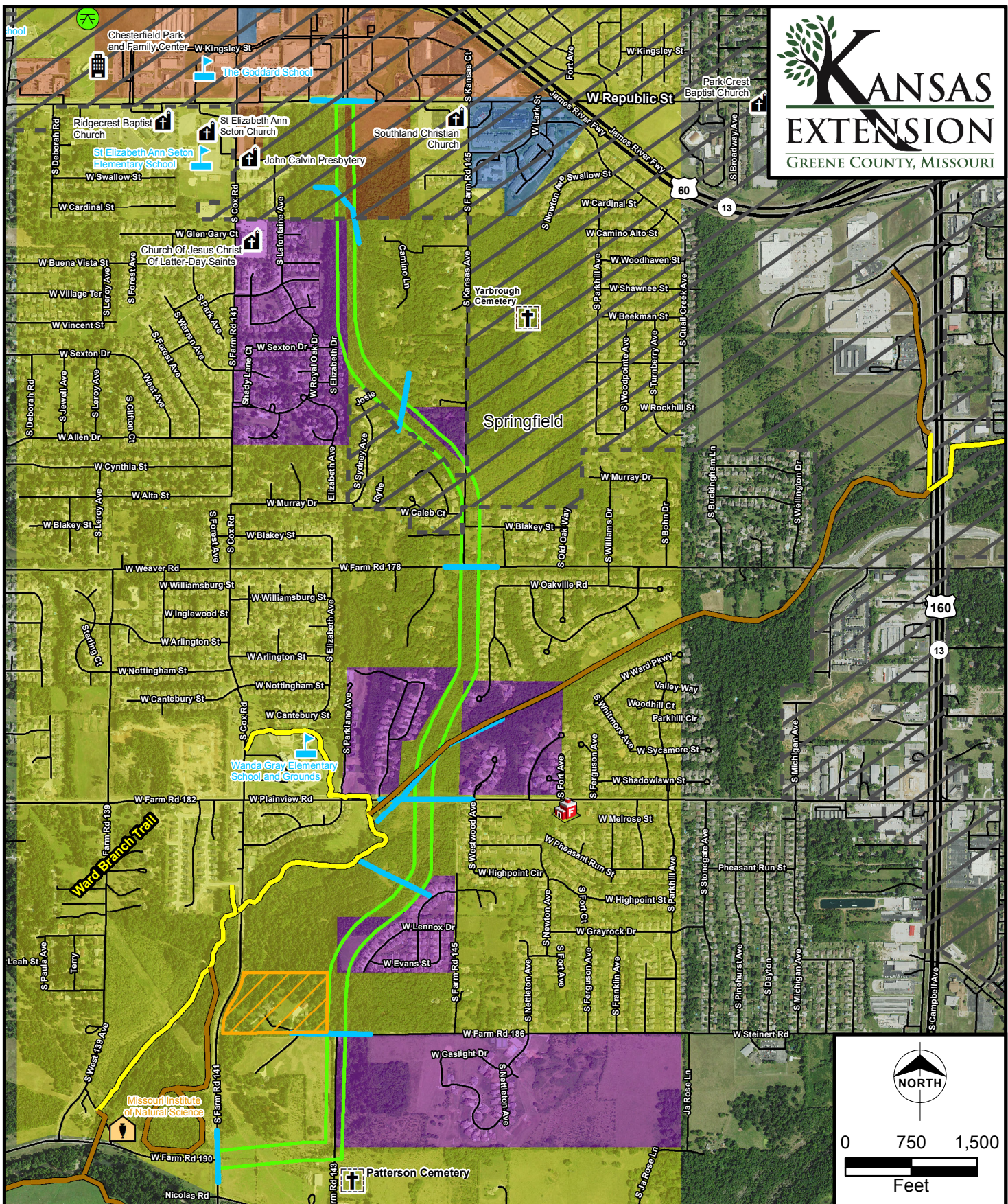
Features	No Build	Build
Socioeconomic and community considerations		
Future travel time and capacity (reduced/same as today/some benefit/improved)	Same as today	Improved
Emergency access and circulation (reduced/same as today/some benefit/improved)	Same as today	Improved
Consistent with existing and proposed land use/local regional plans	No	Yes
Provides linkages to local and regional bicycle and pedestrian trails	No	Yes
Right-of-way to be acquired	None	10 parcels/19 acres
Potential environmental impacts within the corridor		
Noise impacts	Same as today	Four areas will likely be impacted. Two of these areas have feasible and reasonable barrier designs. The barrier designs for the other two do not have barrier designs that meet the feasible and reasonable criteria.
Wetlands and waters of the U.S.	None	Permanent and temporary impacts to streams

Features	No Build	Build
Floodplains – 100-year floodplain crossing in linear feet	None	1,313 feet
Karst Topography	None	Variety of karst features in corridor to be subject to detailed geotechnical investigations for avoidance or mitigation during design and construction
Biological resources	None	3.9 acres riparian forest, 40.4 acres upland forest habitat
Farmland	None	19.95 acres prime farmland, 0.05 acre farmland of statewide importance
Potential hazardous waste sites	None	None-to-Low
Threatened and endangered species and/or habitat		
Gray bat	None	No summer or winter roosting habitat affected; alteration of 44.3 acres of potential foraging habitat
Indiana bat	None	No winter roosting habitat affected; alteration of 44.3 acres of potential roosting and foraging habitat
Missouri bladder-pod	None	No suitable habitat present
Northern long-eared bat	None	No winter roosting habitat affected; alteration of 44.3 acres of potential roosting and foraging habitat
Ozark cave fish	None	No populations known from the Project area, or in close proximity to it; no known groundwater connections to any occupied cavefish sites
Cultural resources		
Impacts (direct or indirect) to NRHP-eligible properties	None	No adverse effect to non-archaeological historic-age resources. Archaeological survey has not been conducted.

3.1 Land Use

Current land use (Figure 3-1), within the Study Area consists primarily of residential development, with some commercial/office areas, planned development, and other areas classified as plot assignment districts (PA Districts¹). Commercial/office land uses are at the northern end of the Study Corridor. Residential land uses and residential PA Districts are common throughout most of the Study Area.

¹ PA Districts are specific use zones in unincorporated areas of Greene County that are regulated on a lot-by-lot basis, which promotes flexibility and inventive design more than is generally possible under the customary zoning regulations.



- | | | | |
|----------------|--------------------------------|--------------------|----------------------------|
| Study Corridor | Future City Park | Museum | Municipal Area |
| Existing Trail | Cemetery | Religious Facility | Commercial/Office District |
| Proposed Trail | Government/Community Structure | School | Planned Development |
| Utility Line | Fire Station | Park | Plot Assignment District |
| | | | Residential District |

Figure 3-1
Land Use
Categories

The desktop review of available data (Google Earth and Geographic Information System [GIS] data) and field reconnaissance identified public facilities in the Study Area including schools, religious facilities, parks and recreational facilities, transit, cemeteries, and emergency services (Figure 3-1 and described below).

Schools

Three schools were identified within the Study Area:

- **Wanda Gray Elementary:** Located at the northeast corner of Cox and Plainview Roads. It opened in 1985 (Springfield Public School District) and serves kindergarten through fourth grade.
- **The Goddard School:** Located in the northwest corner of the Cox Road and Republic Road intersection. The Goddard School is privately run and serves children from infants to school age.
- **St. Elizabeth Ann Seton Elementary School:** Located on Cox Road just south of Republic Road next to St. Elizabeth Ann Seton Catholic Church. The school is the newest in the Springfield Catholic School system and serves preschool through eighth grade students.

Parks and Recreation

Public parks, trails, and other recreational facilities were identified in the Study Area.

Chesterfield Park and Family Center is located northwest of the Study Corridor between James River Freeway and Republic Road. The park is managed by the City of Springfield. Recreational amenities at the park include a gymnasium, indoor track, cardio exercise and free weight rooms, childcare, game room, rock climbing wall, and community room. The Chesterfield Indoor Aquatics Center is also onsite.

Missouri Institute of Natural Science is located in the northwest corner of the intersection of Cox Road and Farm Road 190. The Missouri Institute of Natural Science was established in 2003 following the discovery of the River Bluff Cave on September 11, 2001. Approximately 50 acres were acquired around River Bluff Cave for the purpose of preservation and protection. In 2005, an office, geologic library, and lab facility were constructed near the cave. A natural history museum was added in 2009.

Springfield-Greene County Community Olympic Development Program (CODP) Archery Range is located on the east side of Cox Road between Plainview Road and Farm Road 190. Recreational amenities include indoor and outdoor ranges for archery. The CODP Archery Range property is part of a larger property of 37 acres purchased by Greene County in 2010. Over two acres of the property is designated for ROW for the Project. The land, aside from the acreage set aside for ROW, is leased to the

Springfield-Greene County Parks Department. The lease is a 10-year arrangement with the County that includes options at the end of the 10 years for the Parks department to purchase the land, extend the lease or extinguish the lease. This portion of the property is, as mentioned above, separate from the ROW necessary for the Project.

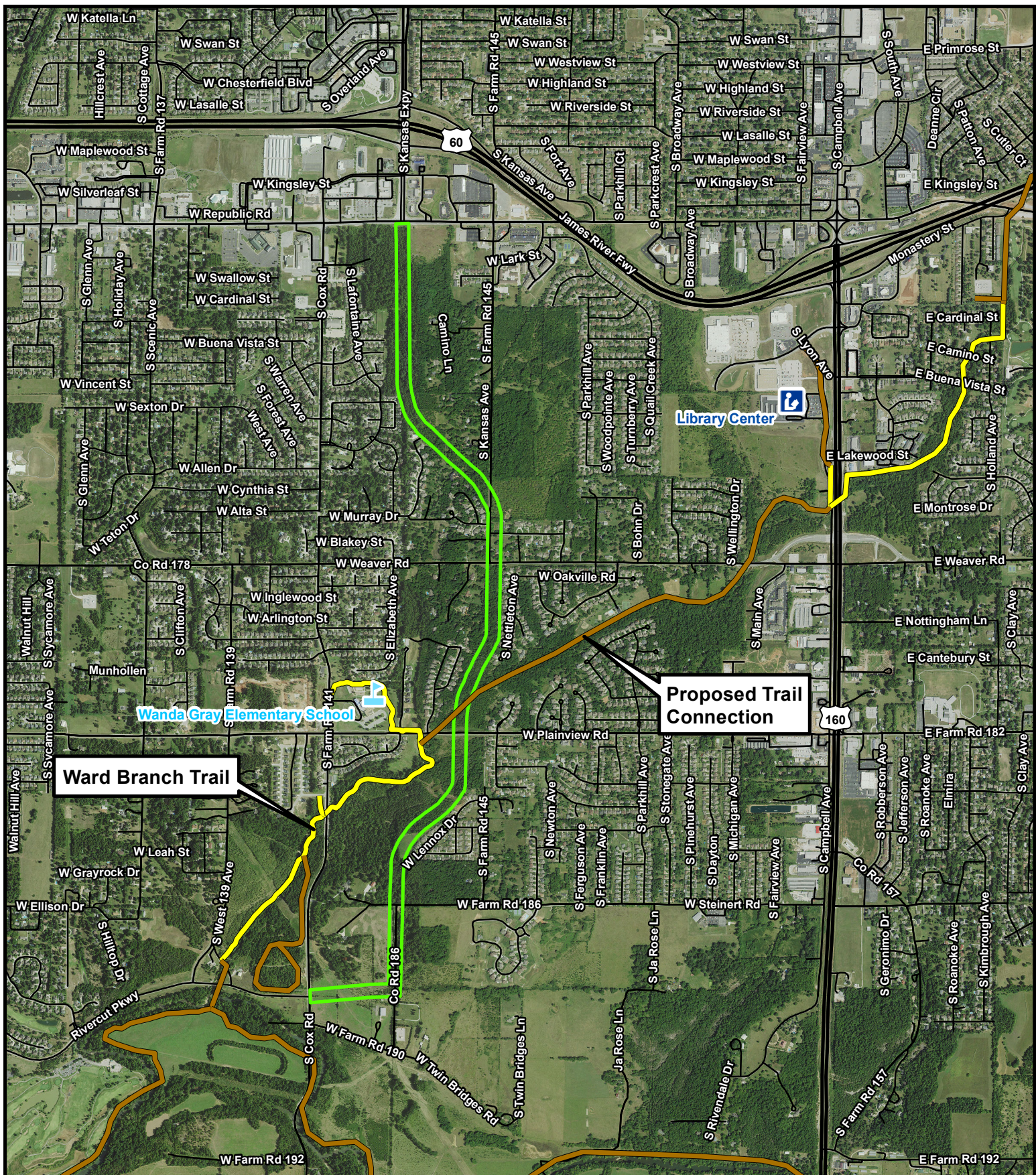
Ward Branch Trail is a 4-mile paved, multi-use trail along Ward Branch and is currently in three discrete sections that are planned to eventually connect (Figure 3-2). The section near the Study Corridor is 2-miles long and connects Wanda Gray Elementary School to the Missouri Institute of Natural Science. The other two sections of the Ward Branch Trail are northeast of the Study Corridor.

Bicycle and Pedestrian Systems

Pursuant to 23 CFR Part 652,² an inventory and analysis of existing bicycle routes and pedestrian walkways was conducted within the Study Corridor. The Bicycle and Pedestrian Plan Report, developed by the OTO in June 2014, identifies the existing bicycle and pedestrian system and development priorities in the City of Springfield and Greene County (OTO, 2014b). The report is revisited yearly to identify new projects and any changes in priorities. Existing or planned facilities in the Study Corridor include:

- **On-street facilities:** Many of the existing roadways in the Survey Area do not accommodate bicycle or pedestrian traffic because of their narrowness or lack of shoulders. On-street bicycle lanes are located along Republic Road at the north end of the Study Corridor.
- **Trail facilities:** The Ward Branch Trail located south of Plainview Road crosses the Study Corridor (Figure 3-2). Future connections of the three existing sections of the Ward Branch Trail include the area from the existing trail near the Library Center west of Campbell Avenue to the existing section at Plainview Road east of Wanda Gray Elementary School.

² 23 CFR Part 652 – Federal Aid Policy Guide regarding Pedestrian and Bicycle Accommodations and Projects.



Ward Branch Trail

Wanda Gray Elementary School

Proposed Trail Connection

Library Center



0 1,000 2,000
Feet

- ▬ Study Corridor
- ▬ Existing Trail
- ▬ OTO Proposed Trail Connection



Figure 3-2
Existing and Proposed
Ward Branch Trail

Emergency Services

The Greene County Sheriff's Department and the City of Springfield Police Department serve the Study Area. Cox Health and Mercy Emergency Medical Service provide ambulance service throughout Springfield and Greene County. The City of Springfield and the Battlefield Fire Protection District provide emergency fire services in the Study Area. The Battlefield Fire Protection District Station 4 is the only fire station in the Study Area and is located east of the Study Corridor on Plainview Road.

Transit Services

City Utilities is a community-owned utility that serves southwest Missouri with utilities, broadband, and transit and paratransit services. City Utilities runs fixed transit routes to the north end of the Study Area along Republic Road during all hours of operation. During the day, City Utilities also runs a fixed route north and south along Campbell Avenue, with a stop at Library Center.

Religious Institutions and Facilities

Seven churches and one cemetery are located within the Project Vicinity:

- **Ridgecrest Baptist Church:** Primary location just west of the intersection at Kansas Expressway and Republic Road.
- **St. Elizabeth Ann Seton Catholic Church:** Located at the southwest corner of the intersection of Cox Road and Republic Road. The parish has grown at this location since 1981.
- **Southland Christian Church:** Located in the southwest corner of the intersection of Kansas Avenue and Republic Road.
- **Church of Jesus Christ of Latter-Day Saints:** Located on Cox Road south of the intersection with Republic Road. This is one of three locations in Springfield.
- **John Calvin Presbytery:** Located in the southeast corner of the intersection of Cox Road and Republic Road. This church has over 5,500 members serving six counties in southeast Kansas and 27 counties in southwest Missouri through 51 congregations.
- **Patterson Cemetery:** Located just east of Farm Road 143, south of the intersection with Farm Road 190. This cemetery began as a burial place for descendants of Thomas Patterson who settled in this area in the early 1800s.
- **Yarbrough Cemetery:** Located East of Kansas Avenue, closer to Parkhill Avenue, within an undeveloped property between Republic and Weaver Roads. The headstones from the Yarbrough

Cemetery were donated by the Gray family and moved to the Gray-Campbell Farmstead which is north of the Study Area.

3.1.1 No Build Alternative

The No Build Alternative would result in no impact to public facilities. Emergency services could experience additional delays as congestion continues to increase within the surrounding area. Existing or planned bicycle or pedestrian facilities would not be impacted.

3.1.2 Build Alternative

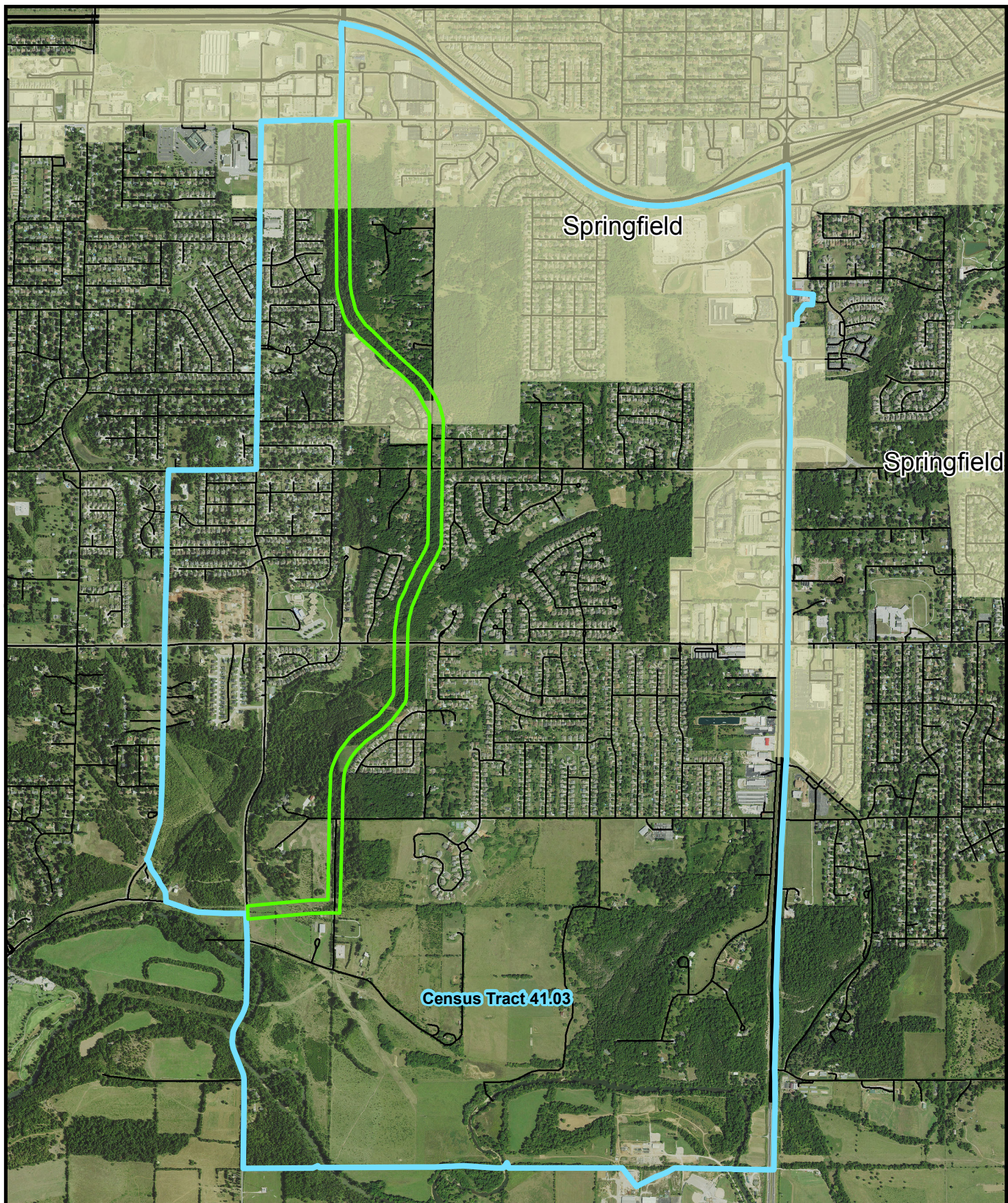
The Build Alternative will not directly impact any identified public facility or service, including schools, religious facilities, parks, recreational facilities or transit services.

Because much of the Study Corridor is on new alignment, temporary disruptions in travel patterns and travel time during construction would occur but would not be anticipated to substantially affect access to public facilities or bus routes. The Build Alternative would enhance emergency services by reducing traffic delays and providing an additional north-south roadway that improves access to the area.

The Build Alternative would include a multi-use trail on one side of the roadway and a sidewalk on the other, which would improve both bicycle and pedestrian connectivity, especially to the existing Ward Branch Trail. The Build Alternative would also accommodate the future needs of the Ward Branch Trail. Currently, a trailhead for the Ward Branch Trail is located immediately west of the Study Corridor on the north side of Plainview Road. Kansas Expressway would intersect at grade with Plainview and provide a connection to the existing sidewalks and trailhead along Plainview and subsequently the existing Ward Branch Trail (Figure 3-2).

3.2 Socioeconomics and Environmental Justice

As discussed in Section 3.1, the Project is located in an area that is primarily residential. Demographic data for the residential population within the Study Area, Greene County, the City of Springfield, the Springfield Metropolitan Area, and the State of Missouri is presented below, including data on population, race and ethnicity, employment, and income. U.S. Census Bureau data is used extensively in this analysis, and the Study Area is located in Census Tract 41.03, as shown in Figure 3-3.



0 1,000 2,000
Feet

- Study Corridor
- Municipal Area
- Census Tract



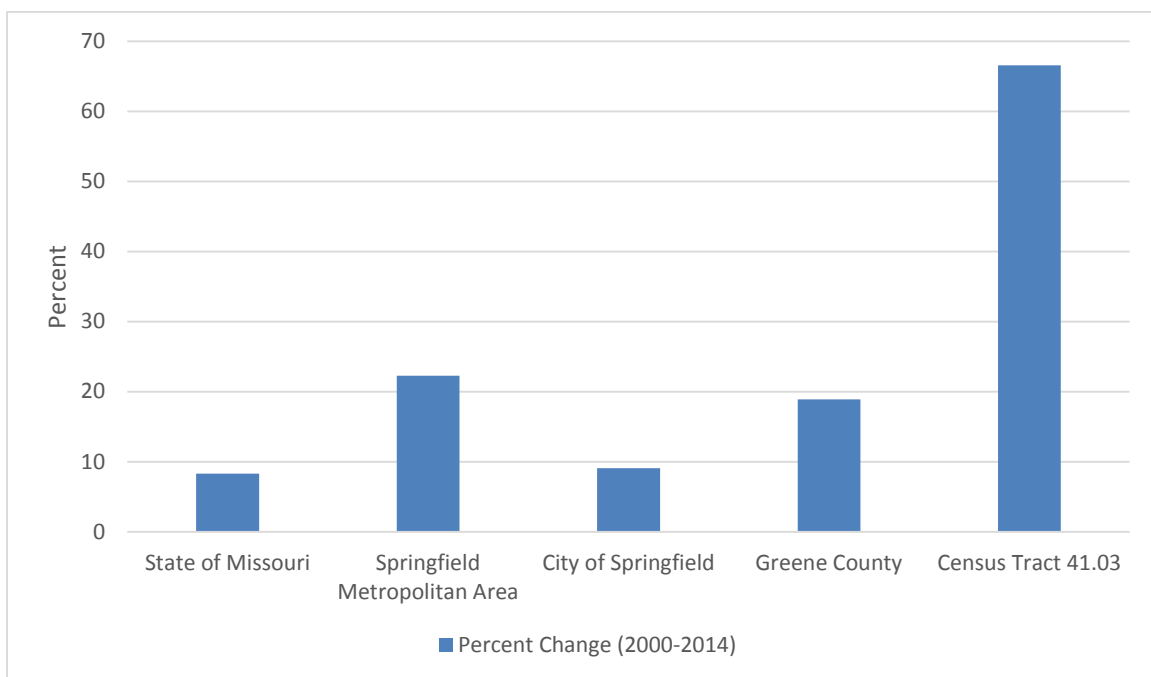
Figure 3-3
Census Tract
41.03

Census Tract 41.03 is bounded by Highway 160 to the north, Campbell Avenue to the east, and the Greene County line to the south. The western boundary of Census Tract 41.03 extends along the existing Kansas Expressway, turns and extends along Republic Road until Cox Road, where it extends south to Weaver Road. At Weaver Road, the boundary extends west to Farm Road 139, at which point the Census Tract boundary extends along until Rivercut Parkway. The boundary then extends over to Cox Road and extends south to the Greene County line.

Population Trends

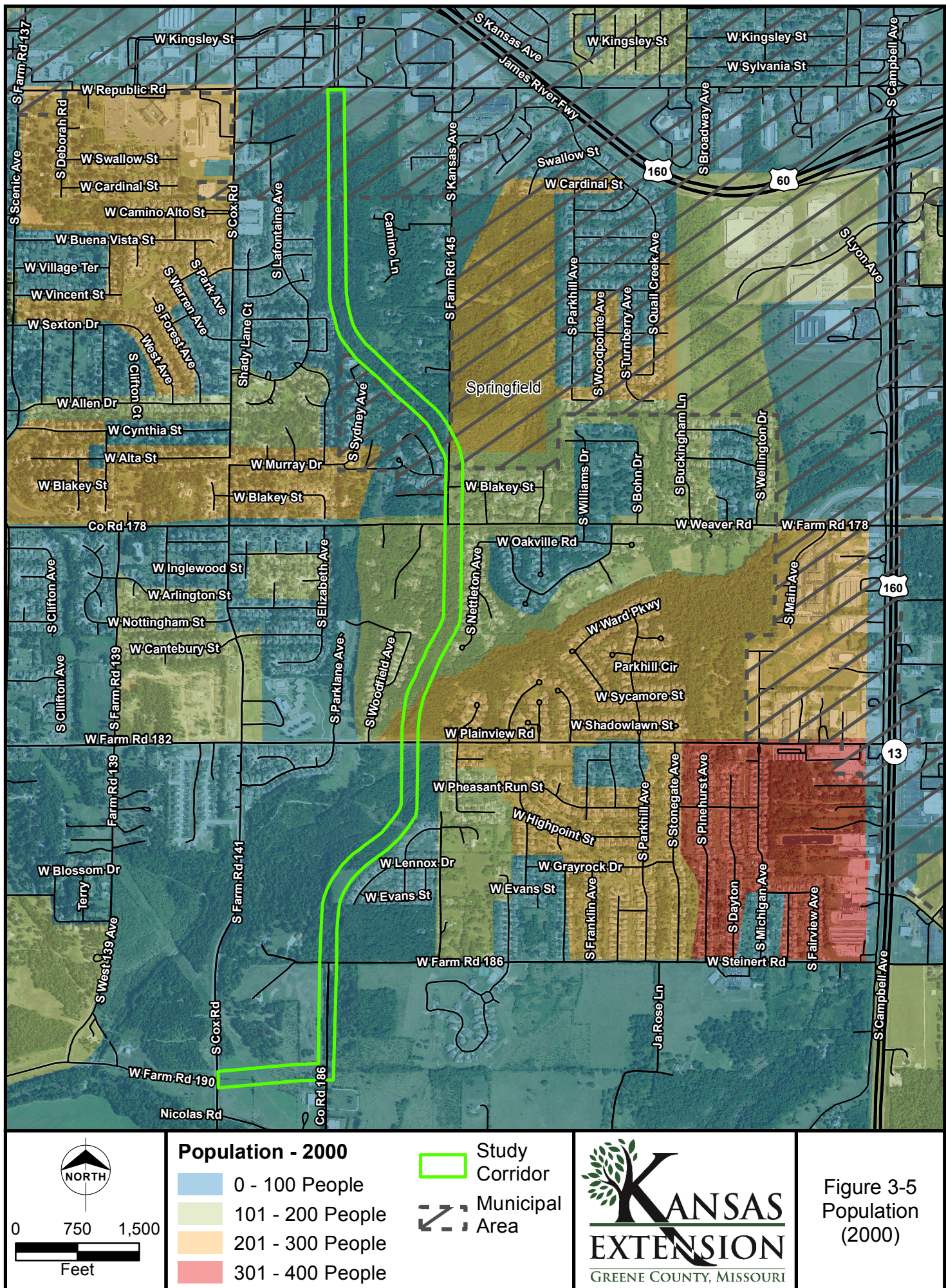
The U.S. Census Bureau's 2000 Census data, 2010 Census data, American Community Survey (ACS) data for 2014, and ACS 5-Year Estimates data for the 2010-2014 as well as OTO population projections were obtained in order to characterize demographic trends in the Study Area. Between 2000 and 2014, the populations of Missouri and the City of Springfield grew similar rates of 8 to 9 percent (Figure 3-4). The Springfield Metropolitan Area grew at a faster rate of 38 percent. Population in Greene County grew by almost 19 percent, and population in the Study Area Census Tract 41.03 grew by over 66 percent. Detailed census population information is shown in Figures 3-5 and 3-6.

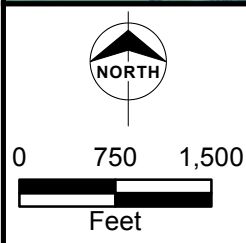
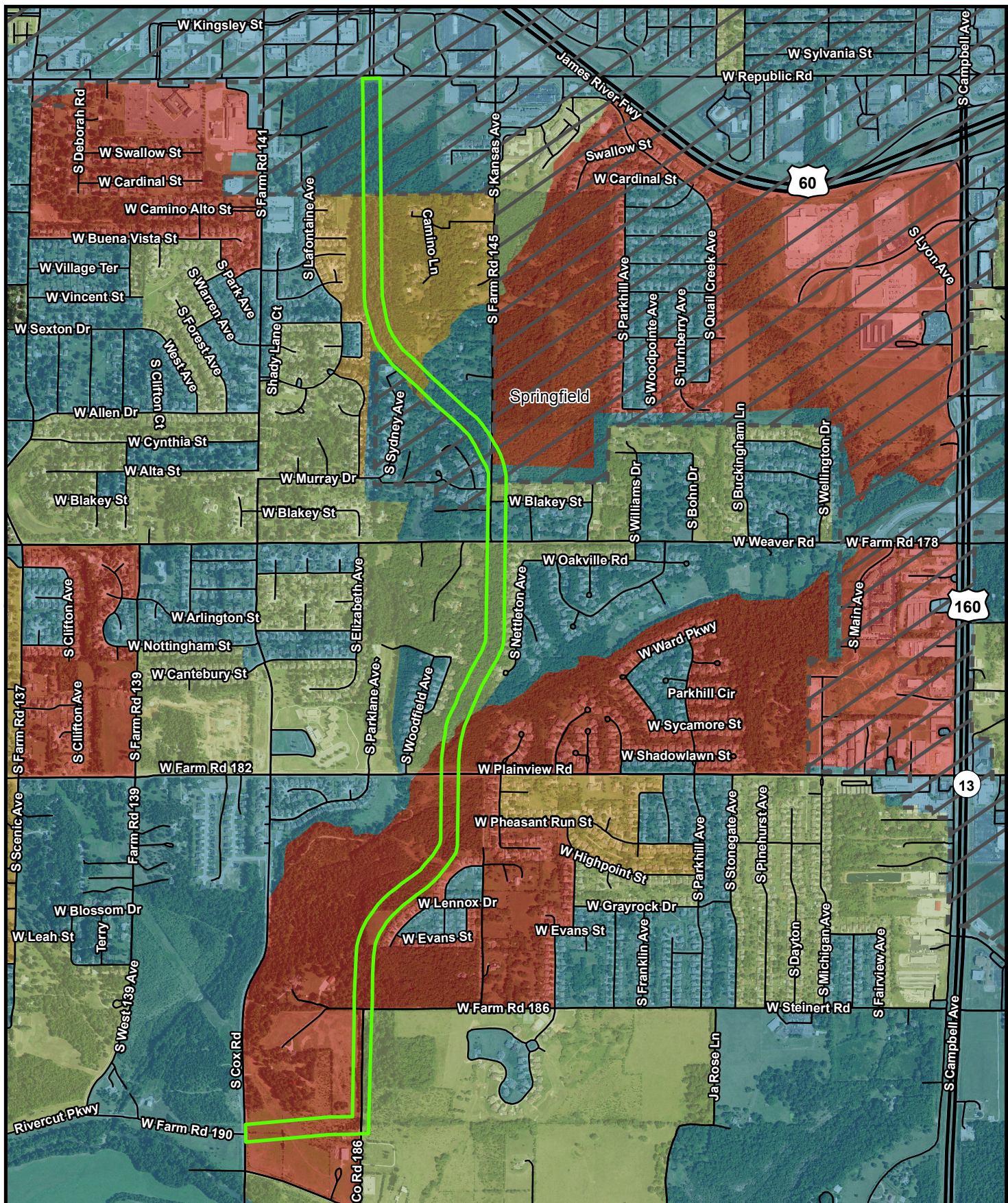
Figure 3-4: Percent Population Change (2000–2014)^{a,b}



Source: U.S. Census Bureau, 2000; U.S. Census Bureau, 2010; ACS Profile Reports 2014 and 2010-2014
(a) 2010 Census included five-county MSA (Christian, Dallas, Greene, Polk, Webster), but 2000 Census included three-county MSA (Greene, Christian, Webster). In order to get comparable 2000 population, the population of each of the five counties was added together.

(b) 2010-2014 ACS 5-Year Estimate, which provides an estimate for 2014.





Population - 2010

- 0 - 100 People
- 101 - 200 People
- 201 - 300 People
- 301 - 400 People

- Study Corridor
- Municipal Area



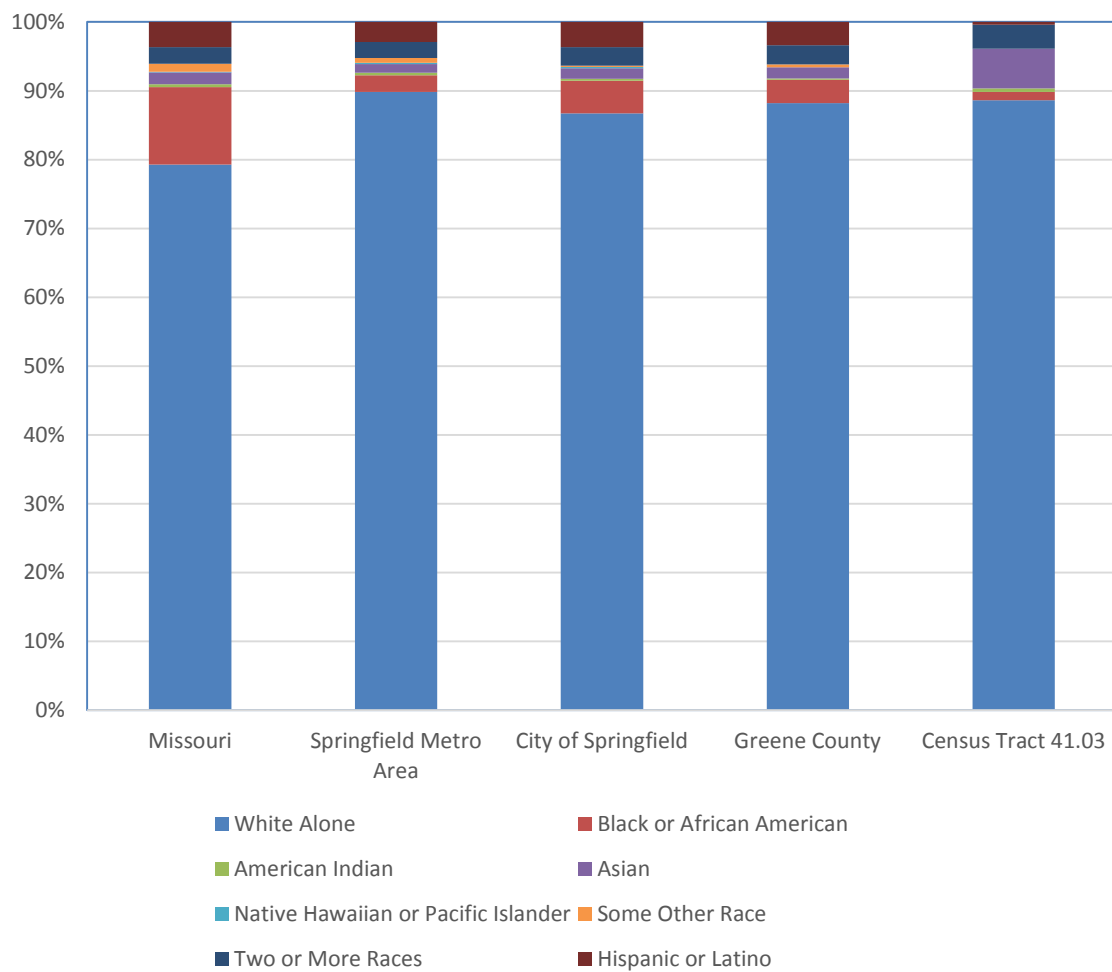
Figure 3-6
Population
(2010)

According to *Journey 2035 – OTO Long Range Transportation Plan*, population growth is expected to continue through 2035 (OTO 2012). The City of Springfield is expected to grow around 11 percent between 2010 and 2035. Unincorporated portions of Greene County are anticipated to grow at about 27 percent. The surrounding communities of Battlefield, Nixa, and Republic are all expected to grow between 100 and 177 percent during that same period.

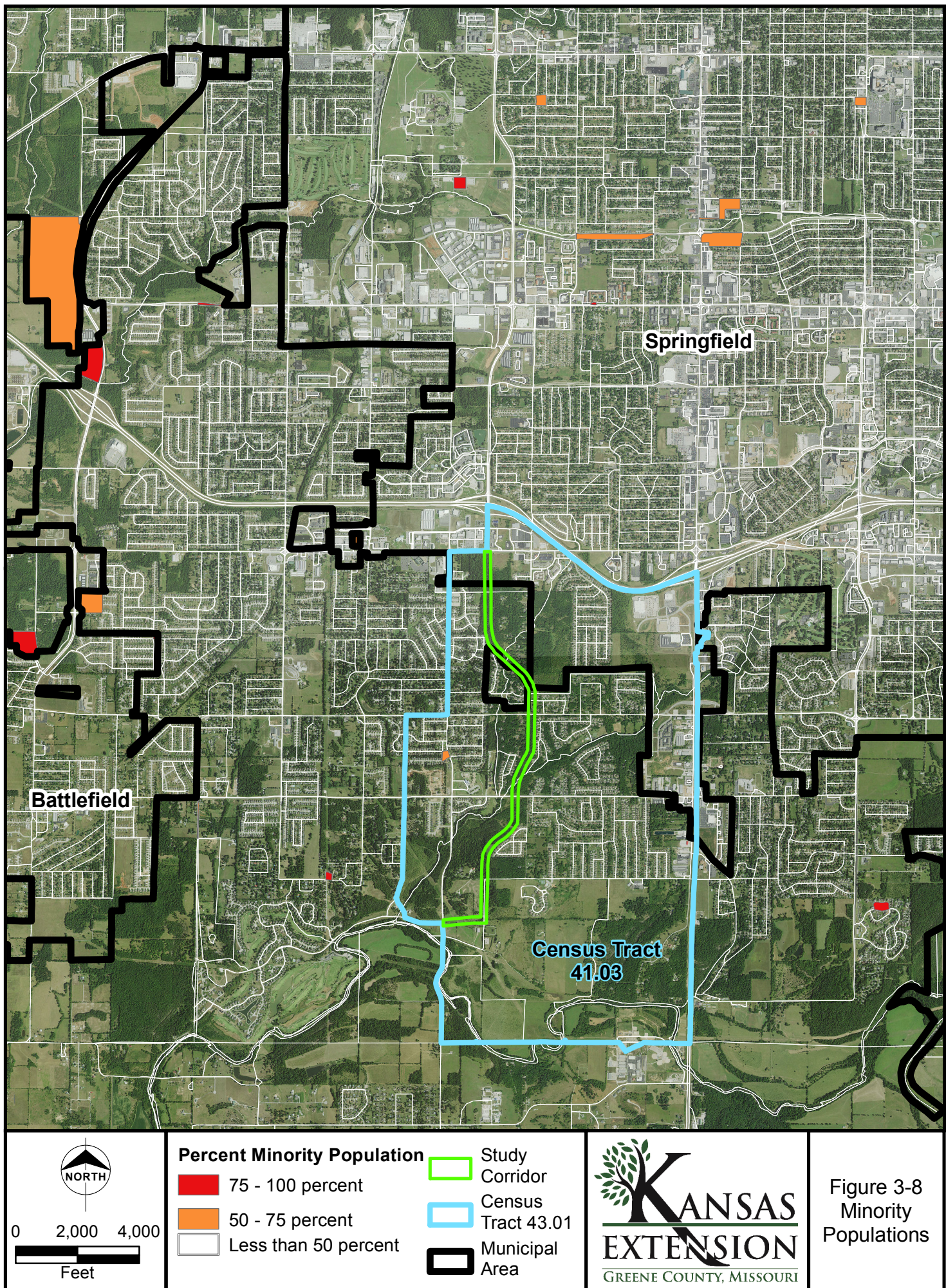
Race and Ethnicity

Figure 3-7 includes data on race and ethnicity for Census Tract 41.03, the Metropolitan Area, Greene County, as well as the City of Springfield. The data was obtained from the U.S. Census Bureau, 2014 and 2010-14 ACS 5-Year Estimates, which provide an estimate for the year 2014.

The majority of residents in the Study Area are white and not Hispanic or Latino. The Study Area has a much lower percentage of minority residents than the State of Missouri. Census Tract 41.03 has a slightly higher minority population than the City of Springfield or Greene County, with 11.0 percent compared with 9.7 percent and 8.7 percent respectively (Figure 3-7). The minority population in Census Tract 41.03 is not clustered all in one area but is dispersed throughout the blocks that make up this census tract (Figure 3-8).

Figure 3-7: Race in the Project Vicinity and Region

Source: ACS Profile Report for 2014; 2010-2014 ACS 5-Year Estimate



Income and Employment

Based on the U.S. Census Bureau's ACS data, the percent of the civilian labor force that is unemployed within Census Tract 41.03 is 4.7 percent (Table 3-2). Compared to the State of Missouri, City of Springfield, and Greene County, the unemployment rate is lower in Census Tract 41.03.

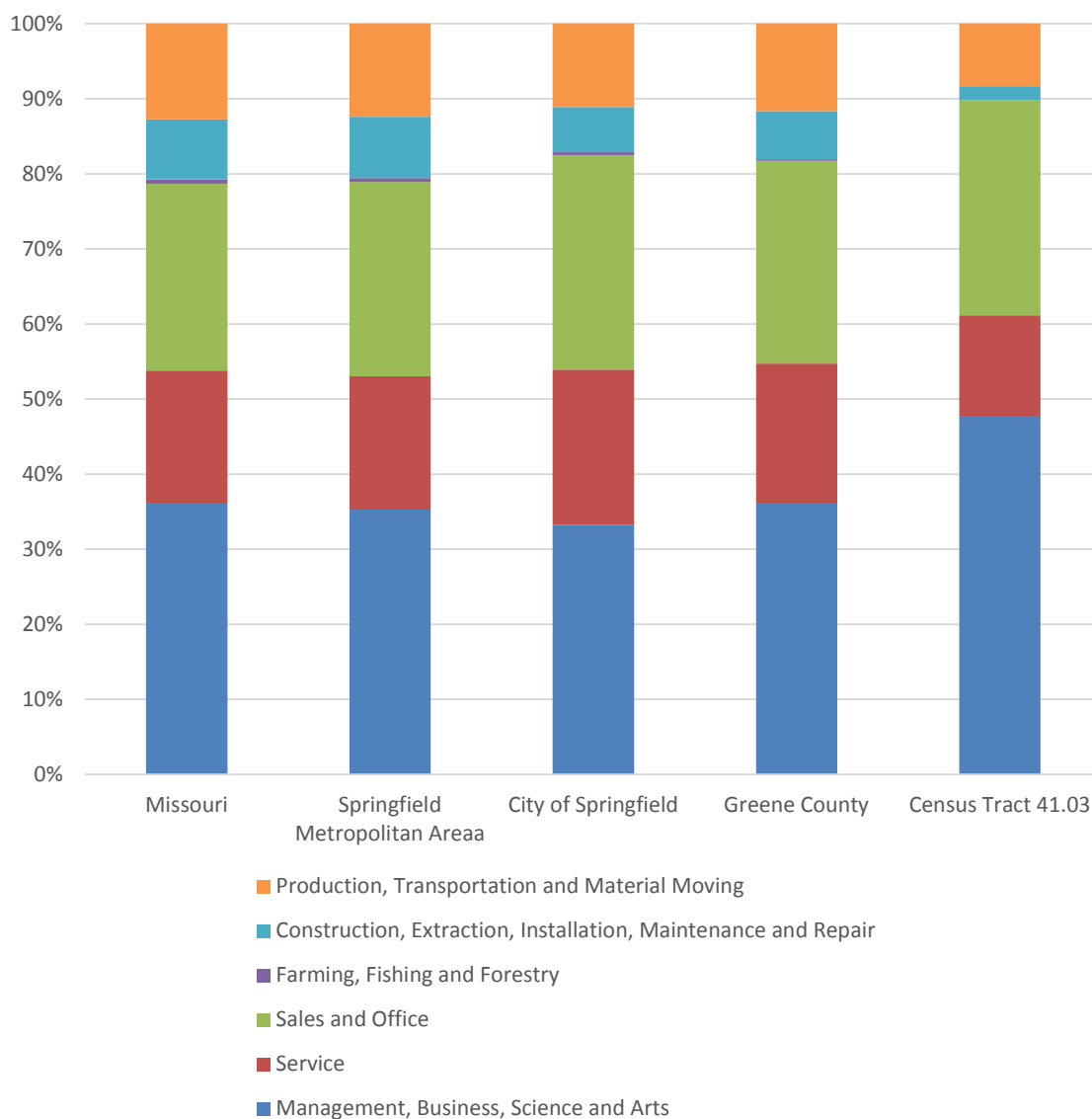
Median household income in Census Tract 41.03 is double that of Springfield and much higher than those of Greene County and the State of Missouri (Table 3-2). Poverty rates in the Springfield Metropolitan Area, the City of Springfield, and Greene County are higher than the State of Missouri. However, poverty rates are lower in the Census Tract 41.03 than in the city, county, metropolitan area, and state (Table 3-2).

Table 3-2: Economic Indicators (2014)

Location	Civilian Labor Force	Percent Unemployed	Median Household Income	Percent of Population Below Poverty
Missouri	3,009,857	6.8	\$48,363	15.5
Springfield Metropolitan Area ^a	219,268	6.4	\$55,604	18.8
City of Springfield	83,486	6.8	\$32,030	28.6
Greene County	143,098	6.3	\$39,611	21.4
Census Tract 41.03	4,076	4.7	\$70,887	10.7

Source: ACS Profile Report for 2014; 2010-2014 ACS 5-Year Estimate

Census Tract 41.03 has comparatively low numbers of jobs as this area is comprised of primarily residential neighborhoods. The majority of the residents in Census Tract 41.03 are employed in Management, Business, Science and Arts employment categories, followed by Sales and Office occupations. This is consistent with the City of Springfield and Greene County, as well (Figure 3-9).

Figure 3-9: Employment by Occupation Category

Source: ACS Profile Report for 2014; 2010-2014 ACS 5-Year Estimate

Environmental Justice and Title VI Considerations

Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, issued in 1994, directs Federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

FHWA Order 6640.23A, issued June 14, 2012, defines a minority or low-income population as any readily identifiable group of minority or low-income persons who lives in close geographic proximity to the proposed action. The FHWA Order defines “minority” as a person who is Black, Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or Hispanic or Latino. The FHWA Order defines “low-income” as a person whose median household income is at or below the Department of Health and Human Services poverty guidelines.

Based on the data presented above, minority and low-income populations are a small percentage of the population in Census Tract 41.03. The Study Area census tract has a slightly higher minority population than does the City of Springfield or Greene County, with 11.0 percent compared with 9.7 percent and 8.7 percent respectively (Figure 3-7). However, the Study Area has lower poverty rates and higher median income than does the City of Springfield or Greene County.

Economic Growth and Development

Because much of the Study Area is dominated by residential land uses, areas with the opportunity for economic growth and development are located at the north and south ends of the Study Corridor. At the north end, along Republic Road, there are existing commercial and office developments. Business types in this area are predominantly banks, grocery stores, pharmacies, and restaurants. The southern portion of the corridor is currently zoned as residential. This portion of the corridor contains open space that would be available for additional development.

Community Cohesion

The Study Area is currently made up of a number of distinct neighborhoods. There is not currently connectivity between these neighborhoods or between the neighborhoods and other facilities and services beyond the existing road network. Transit service currently only runs at the north end of the Study Corridor, along Republic Road, and does not extend to any other portions of the Study Area.

3.2.1 No Build Alternative

The No Build Alternative would have no impact on employment or environmental justice communities. The No Build Alternative may have negative economic consequences. Under the No Build Alternative, traffic operations would not be improved, and capacity within the existing transportation system would not be improved. Current and future growth and economic development in the Springfield metro area may be constrained. The No Build Alternative would not improve or negatively affect community cohesion.

Under the No Build Alternative, no new transportation corridors would be developed that would bisect or be perceived as a potential barrier between adjacent neighborhoods.

3.2.2 Build Alternative

The Build Alternative would provide direct economic benefits to the community by temporarily creating construction-related jobs and resulting in expenditures on construction materials for the Project within the Springfield and Greene County area. The level of such economic impacts is dependent upon the extent that contractors utilize local labor and purchase construction materials locally. Businesses in the Study Area and surrounding communities may see an increase in revenue from the sale of goods and services (e.g., food, fuel, lodging, and vehicle and equipment repairs) that support the workforce for the Project.

Construction of the Kansas Extension would require acquisition of a limited amount of new ROW and would not require acquisition of residences or businesses. Public involvement activities such as letters to property owners adjacent to the Project ROW and flyers were circulated to notify community members to attend the public meeting and invite comment throughout the process. No minority or low-income populations have been identified that would be adversely impacted or displaced by the Kansas Extension. Therefore, in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23A, no further environmental justice analysis is required.

The Build Alternative would have no permanent, adverse impact on economic growth and development, nor would the Build Alternative negatively impact the region's competitive position. The Build Alternative would support continued economic vitality south of Springfield and provide access and capacity to serve current and planned growth and development.

It is anticipated that the Project will support planned development along the south side of Republic Road near the intersection of the Kansas Expressway and Republic Road. One development is a new, 68,000 square foot Veterans Affairs clinic. In February 2016, it was announced by the Department of Veterans Affairs that an undeveloped 20-acre site at this location was selected from three previously identified options (Gounley, 2016). The development would offer more services to the veterans in the Springfield area who are now commuting out of the area to obtain such services.

The Project would connect neighborhoods and include the development of new bicycle and pedestrian facilities. The capacity provided along the Project would alleviate congestion along Cox Road. Neighborhoods within the Study Area would remain intact and would continue to be served by existing transit, public, and emergency services.

3.3 Right-of-Way Acquisition

Over the past 20 years, most of the ROW to be used for the Project has been acquired by Greene County. Additional ROW (both permanent, i.e., fee title, and temporary, i.e., easements) may need to be acquired in some areas to accommodate construction of the Project. Exact ROW requirements would be determined during final design.

3.3.1 No Build Alternative

Because no improvements would be made, the No Build Alternative would not require the purchase of new ROW.

3.3.2 Build Alternative

Some areas of new, permanent ROW would be needed to construct the Project within Greene County and the Springfield city limits. Property from ten parcels would be needed to construct the Project, resulting in approximately 19 acres of additional ROW being acquired. These parcels are all currently vacant. It is not anticipated that any residences or businesses would need to be acquired.

One of the impacted properties is leased to Greene County and is on the northeast corner of Kansas Ave (Farm Road 145), and Weaver Road is a month-to-month lease. The lease specifies that the County will give 90 days prior to the need to vacate the property for construction. The lessee is fully aware of the Project, and that the property is within ROW acquired for the roadway.

A temporary construction easement will be obtained in a few locations as required to complete construction of the roadway and the relocation of utilities. Temporary construction easements are often used to complete connections to private drives, at locations where construction limits extend slightly beyond existing right of way, and in locations that may require the contractor to work outside of right of way limits on a temporary basis. The acquisition of temporary construction easements is often a more cost effective approach with a lesser impact on the property owner as compared to acquiring additional permanent right of way or easement. This is particularly true in areas that require minor grading during construction but will not be required for future maintenance of the project. It is estimated that less than 0.3 acres of temporary easement will be required for the construction of this project. On parcels that require right of way acquisition, right of way limits will be defined so that they encompass all construction activities and the need for temporary construction easement will likely not be required.

3.4 Air Quality

Under the Clean Air Act (CAA), the Federal government established the National Ambient Air Quality Standards (NAAQS) to protect public health (including the sensitive populations such as asthmatics and

the elderly), safety, and welfare from known or anticipated effects of eight pollutants: sulfur dioxide, particulate matter 10 microns in diameter or less, particulate matter 2.5 microns in diameter or less, carbon monoxide, nitrogen dioxide, ozone, lead, and greenhouse gases (GHGs). Transportation can contribute to several NAAQS pollutants: ozone, carbon monoxide, particulate matter, sulfur dioxide and nitrogen dioxide. Conformity (or compliance) with the NAAQS, as required by the CAA, ensures that Federally funded or approved transportation plans, programs, and projects conform to the air quality objectives established in State Implementation Plans (SIPs). MoDOT is responsible for implementing the conformity regulation in nonattainment and maintenance areas.

The City of Springfield is currently designated an attainment area for air quality, indicating that the region complies with Federal clean air standards (the Environmental Protection Agency [EPA], 2015).

Therefore, the conformity requirements of 40 Code of Federal Regulations (CFR) Part 93 do not apply to this Project. No further action is required.

In 2007, the EPA expanded the requirements of the CAA to reduce toxic emissions by mobile sources by publishing a rule on the Control of Hazardous Air Pollutants from Mobile Sources (National Archives and Records Administration, 2007). The rule identifies a number of compounds that are emitted from mobile sources. Seven of these compounds have been selected as priority mobile source air toxic (MSAT) pollutants by the FHWA. This rule requires nationwide controls that will dramatically decrease MSAT emissions through the development and use of cleaner fuels and more efficient vehicle engines. On October 18, 2016, the FHWA issued the *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents* (FHWA, 2016). This memorandum discusses a tiered approach for discussing MSAT emissions for NEPA evaluations. Based on the guidance in the memo, since the design year annual average daily traffic is projected to be below 140,000, a qualitative MSAT analysis was not required to be performed for the Project, and impacts from MSAT pollutants will be less than significant for both scenarios. The air quality analysis is summarized in the sections below. Please see Appendix B for a more detailed discussion of the air quality analysis performed for the Project.

3.4.1 No Build Alternative

The number of vehicles travelling on roads in the Study Area and surrounding communities are projected to increase over the next 25 years. This increase would contribute to congestion and to further delays along already congested Cox Road, Campbell Avenue, and at the existing intersections of Cox Road and Campbell Avenue at Plainview and Weaver Roads. Combustion of fossil fuels in vehicles creates emissions of criteria pollutants both during travel and idling. Therefore, emissions of criteria pollutants are expected to rise in the Study Area due to increased vehicle exhaust from vehicles idling and delayed

by traffic congestion. Under congested traffic conditions, more vehicles spend more time in a given geographic area, contributing to increased emissions. Increasing emissions over time could affect the regions continued air quality attainment status.

3.4.2 Build Alternative

In order to qualitatively analyze the impacts of NAAQS pollutants and MSAT emissions from the Build Alternative, the daily value for vehicle-miles travelled (VMT), which represents the distance the traffic is expected to travel instead of the number of vehicles passing through the area, for both the Build and the No Build Alternatives was compared. Emissions (on a pound per hour and tons per year basis) from vehicles may be estimated using the VMT. Emission factors exist for NAAQS and MSAT pollutants that utilize the VMT; therefore, comparing the VMT of each option is a way to estimate the increase or decrease in these pollutants.

The Project is expected to reduce congestion along Cox Road, as well as reduce traffic on Campbell Avenue. Existing and projected traffic along Cox Road and Campbell Avenue would most likely be redirected to the Kansas Extension. While the number of vehicles in the area is expected to increase with the Project over the No Build Alternative, the daily value for VMT estimated for the No Build Alternative is higher than that of the Build Alternative. By reducing congestion on surrounding roads and shortening the distance vehicles will be travelling, cars are expected to move more quickly through the area and idle less at intersections. Therefore, the NAAQS and MSAT emissions from the Build Alternative are expected to be the same or lower in the design year (2040) than those from the No Build Alternative in the Project area. It is important to note that there could be increases in NAAQS and MSAT emissions in a few localized areas; however, the area as whole is not expected to see a detrimental impact to the air quality between the Build and No Build Alternatives.

3.5 Climate Change

In December 2014, the President of the United States and the Council on Environmental Quality (CEQ) published guidance on analyzing the impacts of GHG emissions for NEPA evaluations. Combustion of fossil fuels in vehicles creates GHG emissions in the form of carbon dioxide, volatile organic compounds (specifically methane), and nitrous oxides.

3.5.1 No Build Alternative

As stated in Section 3.4, the number of vehicles travelling on roads in the Study Area and surrounding communities are projected to increase over the next 25 years. This increase would contribute to congestion and to further delays along already congested Cox Road, Campbell Avenue, and at the existing intersections of Cox Road and Campbell Avenue at Plainview and Weaver Roads. Combustion of

fossil fuels in vehicles creates GHG emissions both during travel and idling. Therefore, emissions of GHGs are expected to rise in the Study Area due to increased vehicle exhaust from vehicles idling and delayed by traffic congestion. Under congested traffic conditions, more vehicles spend more time in a given geographic area, contributing to increased emissions.

3.5.2 **Build Alternative**

The Project is being proposed in order to reduce congestion on local roads, and while the number of vehicles is expected to increase with the Project, the projected VMT is expected to drop with the Build Alternative. The new alignment will also reduce idling times of vehicles as congestion on nearby roads is reduced, which will in turn reduce the idling emissions of GHGs. Since the Project will reduce the miles travelled and idling times from the No Build Alternative to the Build Alternative in the design year (2040), GHG emissions are also expected to be reduced from the No Build Alternative to the Build Alternative in the design year (2040).

3.6 **Noise**

Greene County does not have a County-specific noise policy. Therefore, the MoDOT Noise Policy Guide was used for the Project. The MoDOT Noise Policy Guide describes MoDOT's procedure for implementing requirements of the FHWA Traffic Noise Analysis and Abatement Policy and Guidance (Title 23, Article 722, Code of Federal Regulations, June 2013) and the noise-related NEPA requirements. These policies require an investigation of potential noise impacts for Type I projects. Type I projects involve construction of new highways or new alignments, land additions, or substantial changes in vertical or horizontal alignments of existing facilities. The FHWA has also established Noise Abatement Criteria (NAC) for different land uses. Each activity category is given an activity criteria sound level. These values are shown in Table 3-3.

Table 3-3: Noise Activity Categories

Activity Category	Activity Criteria (dBA) ^a		Evaluation Location	Activity Description
	L _{eq} (h) ^b	L ₁₀ (h)		
A	57	60	Exterior	Lands on which serenity and quiet are extraordinary significance and serve an important public need and where the prevention of those qualities is essential if the area is to continue to serve its intended purpose
B	67	70	Exterior	Residential

Activity Category	Activity Criteria (dBA) ^a		Evaluation Location	Activity Description
	L _{eq} (h) ^b	L ₁₀ (h)		
C	67	70	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails and trail crossings
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and televisions studios
E	72	75	Exterior	Hotels, motels, offices, restaurants, and other developed lands, properties or activities not included in A through D or F
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical) and warehousing
G	--	--	--	Undeveloped lands that are not permitted for development

Source: MoDOT, 2014a

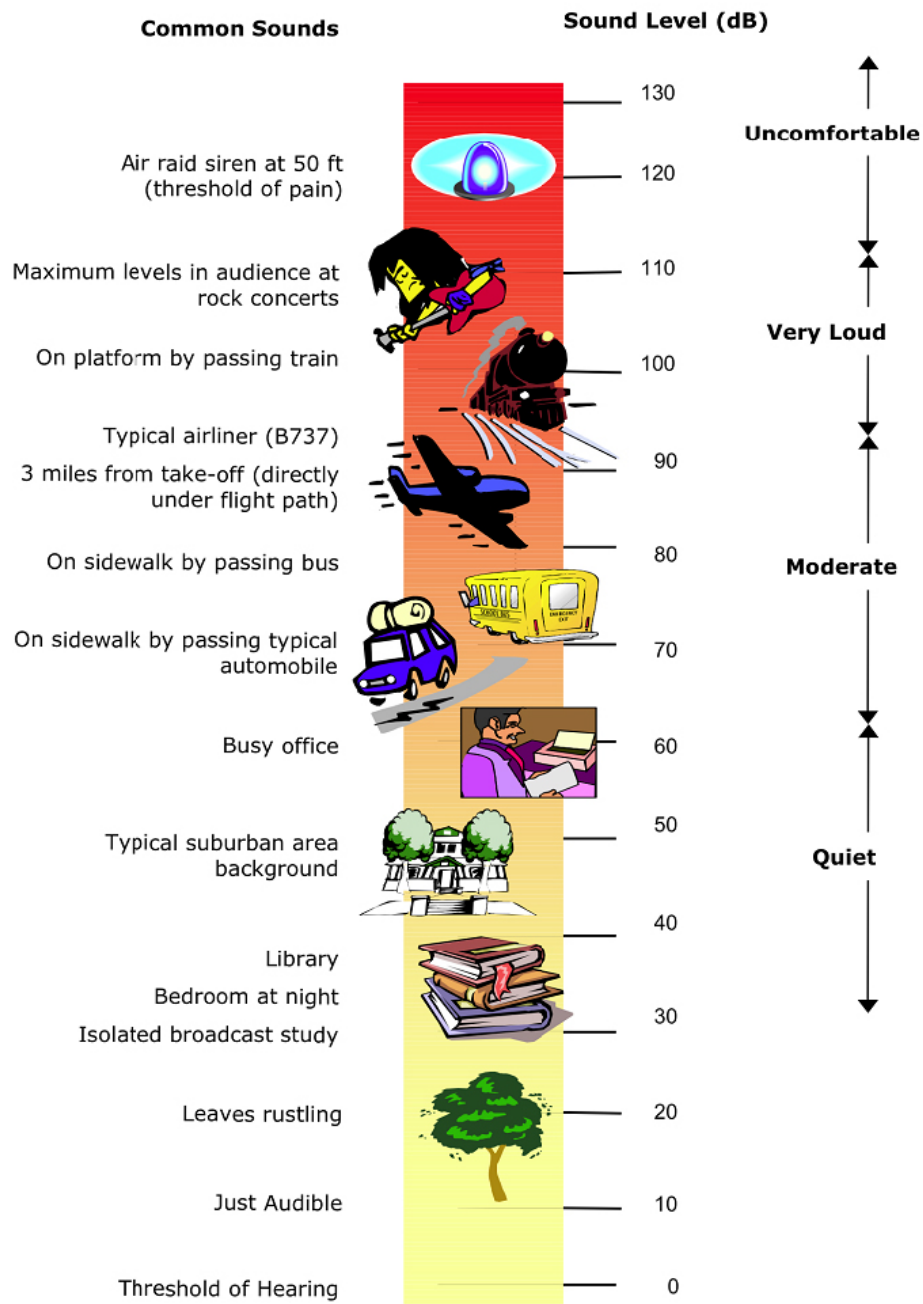
(a) dBA = A-weighted decibels, L_{eq}(h) = the hourly equivalent steady-state sound level, L₁₀(h) = the hourly sound level exceeded 10 percent of the time

(b) Within this study, the L_{eq}(h) will be analyzed.

To conduct the noise analysis, the Study Corridor was divided into 22 common noise environments (CNEs), based on land use and proximity to local roads and intersections. Fourteen of the CNEs had Activity Criteria limits, as defined in Table 3-3, and the majority of those were residential, and thus fell into Category B. In order to predict impacts, at least one sensitive noise receptor was selected as a representative receptor for each of these CNEs. These CNEs and representative receptors are shown in Appendix C. A series of ambient measurements (i.e., noise levels recorded in the field) were taken in late October 2015 in the residential areas surrounding the corridor and were used to approximate the existing sound levels for each of the 16 representative receptors used in the modeling analysis. For more information on the ambient measurements and representative receptors, see Appendix C.

3.6.1 No Build Alternative

The No Build Alternative would result in no roadway development or future vehicle traffic within the corridor. No traffic noise would be generated within the preserved corridor. Any changes in sound levels to receptors along the corridor would be due to activities unrelated to this Project. The measured existing sound levels in the area ranged between 44.7 and 57.6 dBA, and it is not expected that the normal increases in traffic in the surrounding areas would cause a substantial increase in sound levels (i.e., an increase of 15 decibels or more over existing measured sound levels) or “approach” the NAC level for the CNE (i.e., 67 dBA). MoDOT defines “approach” as 1 decibel below the levels defined in the noise abatement criteria table (Table 3-3). Since the residences, park areas, and cemetery that currently lie along the corridor have been categorized as activity categories B and C, the approach sound level for these areas has been determined to be 66 dBA. For reference, Figure 3-10 depicts various common sounds and their corresponding sound level.

Figure 3-10: Common Sounds and Corresponding Sound Levels (Decibels)

Source: Handbook of Environmental Acoustics, 1994

3.6.2 Build Alternative

To predict future noise levels from the Build Alternative, each of the 16 representative receptors were modeled in the FHWA's Traffic Noise Model (TNM), Version 2.5. This modeling was used to determine which, if any, areas are predicted to be impacted by the Project and would need further investigation and a noise abatement analysis. To determine future sound levels at specific receptors, the anticipated horizontal and vertical layout of the proposed roadway, projected traffic volumes and travel speeds, signal information, and vehicle types (i.e., cars, light trucks, heavy trucks) are added to the model to predict sound levels for the four-lane future build. A list of model inputs used in this modeling analysis is shown in Table 3-4. The future traffic volumes (2040) shown below represent the worst case peak hourly traffic volume (either the a.m. or p.m. rush hour traffic volumes) for each road, and were modeled simultaneously. While the future noise analysis was completed for the full-build four-lane alignment, initially the Project will be built as a two-lane roadway. Since the Study Corridor is a greenfield site, it is unlikely that predicted increase in noise levels generated from the initial, two-lane roadway will greatly differ from the four-lane alignment that was analyzed. Thus, the results for the four-lane design should reasonably approximate the results from the initial two-lane alignment.

Table 3-4: Federal Highway Administration Traffic Noise Model Inputs^a

Segment	Automobiles (vehicles per hour)		Heavy Trucks (vehicles per hour)		Operating Speed (miles per hour)
	Northbound	Southbound	Northbound	Southbound	
Republic to S Farm Road 145	852	988	9	11	50
S Farm Road 145to Weaver	781	871	9	11	50
Weaver to Plainview Road	451	491	5	5	50
Plainview Road to FR190	505	561	5	7	50
S Farm Road 145	180	181	2	2	30
Weaver Road (East of Kansas Extension)	388	389	4	4	30
Weaver Road (West of Kansas Extension)	224	225	3	3	30
Plainview Road (east of Kansas Extension)	543	543	6	6	40
Plainview Road (west of Kansas Extension)	440	440	5	5	40

(a) Traffic counts shown from the OTO Regional Demand Model, Operating speed was determined by Burns & McDonnell. Data in this table is for the full, four-lane build out.

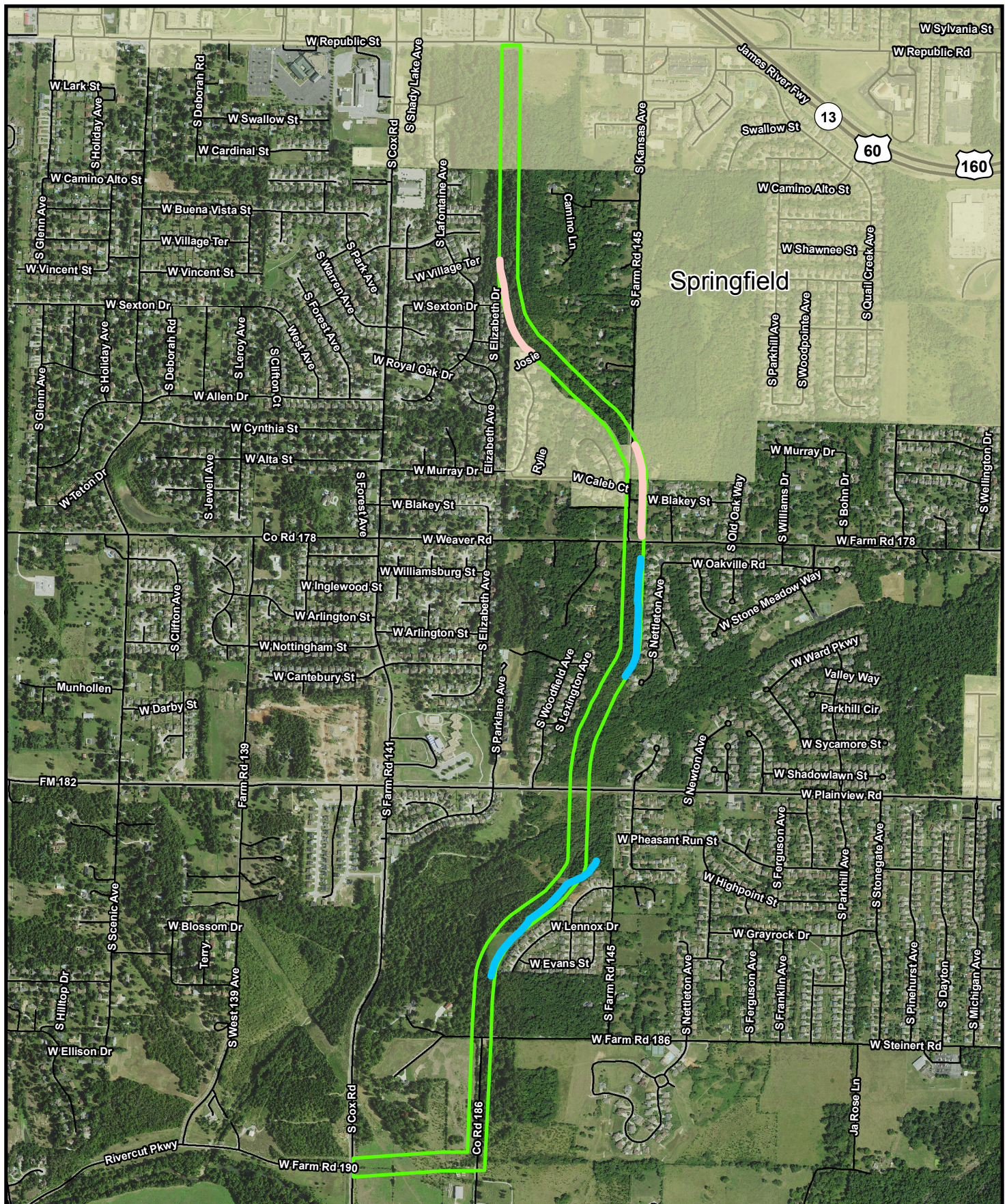
Following the MoDOT Noise Policy, a receptor was determined to be impacted if the predicted sound levels increased 15 decibels or more from the existing ambient sound levels or if the predicted sound level approaches (falls within 1 decibel) of the applicable NAC.

Based on the modeling results, as well as the MoDOT Noise Policy, it was determined that 4 of the 16 representative receptors are expected to be impacted by the Build Alternative. Since the Build Alternative would be constructed in a currently undeveloped corridor, all four of the impacted representative receptors are predicted to experience increases of 15 dBA or more, while only one of the four is expected to approach the applicable NAC. A noise abatement analysis was performed for each of these four areas that are predicted to be impacted. Based on this analysis, two noise walls that would likely be feasible and reasonable would be located in the area of Rep8, with the noise wall located between stations 75+00 and 91+00 and should average 10 feet in height. The noise walls would attenuate noise on the east side of the highway. A noise wall would also be likely in the area around impacted receptor Rep12. The noise wall is likely to be located between stations 108+00 and 112+40, with an average height of 13 feet, and would attenuate noise the east side of the highway. The locations of the analyzed barriers are shown in Figure 3-11. Final recommendations would be made after final design and public involvement are complete.

3.7 Water Resources

Water quality is defined for a particular body of water by comparing the physical, chemical, and biological characteristics of the water with a set of standards. The EPA sets water quality standards based on the use of a waterbody.

Under Section 303(d) of the Federal Clean Water Act, each state is required to identify waters not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (e.g., swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The waterbodies located in or adjacent to the Study Corridor include the James River, Ward Branch, and Workman Branch. The Ward and Workman Branches both flow southwesterly into the James River. None of these waterbodies are on the 2014 EPA Approved Missouri 303(d) List as impaired waterbodies (MDNR, 2014). The Study Corridor is located within the James River Total Maximum Daily Load (TMDL) protection area. The TMDL was approved in 2001 to manage nutrient (nitrogen and phosphorus) concerns.



3.7.1 Surface Water - Section 402 Permitting

Section 402 of the Clean Water Act provides for the regulation of pollutant discharges into waters of the U.S. The EPA has authorized states to issue permits under the National Pollutant Discharge Elimination System (NPDES) program provided for under Section 402.

3.7.1.1 *Project Construction*

The Missouri Department of Natural Resources (MDNR) would regulate stormwater discharges from construction activities within the Study Corridor through the issuance of a NPDES Land Disturbance Permit. Prior to permit issuance a Stormwater Pollution Prevention Plan must be developed for construction activities within the Study Corridor that includes the installation of best management practices to limit the discharge of sediment and other potential construction-related pollutants to surrounding surface waters.

The majority of the Study Corridor is located within the jurisdictional limits of Greene County, Missouri. To meet the requirements of Greene County Zoning Regulations Article IV, Section 27, anyone proposing to develop land in Greene County must apply for a Grading Permit prior to commencing land disturbance activities and must develop a Stormwater Pollution Prevention Plan that meets both State and county requirements. Any project that requires a Grading Permit must comply with the design standards set forth in the *Greene County Design Standards* (adopted April 5, 1999) for the design of storm drainage facilities on public right-of-way and private property in the unincorporated areas of Greene County.

Additionally, if the area of soil disturbance within the limits of the City of Springfield will total 1 or more acres, then the Project would be required to obtain a separate Land Disturbance Permit from the City of Springfield. The City of Springfield's Land Disturbance Permit requires the development of a Stormwater Pollution Prevention Plan that complies with the City's 2015 *Best Management Practices (BMP) Manual for Land Disturbance Activity*. All land disturbance within City limits is required to comply with City Code Chapter 96-Stormwater regardless of the area of disturbance.

3.7.1.2 *Project Use*

During Project use, stormwater runoff from those portions of the Study Corridor that will drain to the City of Springfield's municipal separate storm sewer system (MS4) must adhere to the requirements in Article II of City Code Chapter 96-Stormwater, including keeping the Study Corridor reasonably free of trash, debris, excessive vegetation, and other obstacles that would pollute, contaminate, or obstruct the flow of water through the MS4. The Study Corridor must also be maintained to protect against erosion and other degradation of the MS4.

3.7.2 Groundwater

The Study Corridor crosses an unconfined area of the Springfield Plateau aquifer, which resides in the southwestern portion of Missouri, and is the uppermost aquifer in the Ozark Plateaus aquifer system. The Springfield Plateau aquifer is composed of chert and limestone with local cavernous zones. It has the lowest levels of mineralization for Ozark Plateau aquifers and, due to the water's contact with limestone, is a calcium-bicarbonate type of water (MDNR, 2005). Within the Study Corridor, groundwater generally flows southwest toward the James River. The Springfield Plateau aquifer is primarily used as a source of drinking water in the southwestern Missouri area. Groundwater recharge in the region occurs from precipitation, and, due to the ease of recharge in this aquifer, water is more likely to be affected by waste products that contaminate surface waters. Cased water supply wells are less likely to undergo water-quality issues from surface activities. Cased wells are abundant in public supply wells as compared to private wells (MDNR, 2005). Based on information reviewed for the Study Corridor, no groundwater contamination is likely to be present within the Study Corridor. There are no public water supply wells within or adjacent to the Study Corridor (MDNR, 2008).

3.7.3 No Build Alternative

Existing water quality conditions would continue under the No Build Alternative. Since no roadway currently exists in the Study Corridor, no changes in surface or subsurface water drainage patterns would occur. Current land use practices would persist with no surface disturbance from grading or other construction activities that would have the potential to affect water quality. Continued high volumes of traffic on Cox Road and associated high crash rates would increase the opportunity for accidental releases of fuel and petroleum products during incidents and the introduction of those materials into the natural water system if not properly contained and cleaned up.

3.7.4 Build Alternative

The Build Alternative would result in the construction of 2.3 miles of new highway between Republic Road and West Farm Road 190. Construction-related impacts to water quality would be primarily the result of stormwater runoff.

Water quality impacts resulting from construction of the new roadway would be relatively short-term due to the nature of the construction process. Construction near streams and rivers makes it possible for soil to wash into an adjacent the water body. Over time, increased amounts of sediment can damage the river ecosystem by lowering oxygen levels and covering food sources and fish spawning areas. Soil and rock that is washed away can change the river bottom, affecting those species that use the bottom for food or habitat. Without onsite pollution controls, sediment-laden runoff from construction sites could degrade

water quality. In addition, stormwater could pick up other pollutants such as concrete washout, paint, used oil, pesticides, or other debris, potentially harming or killing fish and wildlife, degrading aquatic habitat, and affecting drinking water quality.

To protect water quality and reduce impacts during construction and after Project completion, construction of the roadway would be completed in conformance with Missouri State Operating Permit. MoDOT would require the contractor to implement Best Management Practices (BMPs) to reduce erosion and provide sediment and stormwater management during construction. These measures are described in Section 3.16. A Project-specific Stormwater Pollution Prevention Plan (SWPPP) to describe the BMPs to be implemented during construction would be prepared for the Project. The SWPPP would include MDNR-approved components to reduce suspended solids, turbidity, and downstream sedimentation that may degrade water quality and adversely impact aquatic life.

The Build Alternative would increase stormwater runoff after construction as the area of impermeable pavement would increase. Also, there would be application of compounds used to de-ice roadway surfaces in the Study Corridor once the Project is completed. Use of these chemicals takes place primarily during wet seasons when precipitation dilutes their concentration.

Accidental spills of fuels or hazardous chemicals could occur during construction. The contractor would be required to limit the potential for spills and accidental releases through development and implementation of spill prevention plans and by responding quickly to spills when they occur. Section 3.11 addresses the potential impacts to groundwater in a karst setting.

3.8 Aquatic Resources

Section 404 of the Clean Water Act authorizes the USACE to regulate impacts to wetlands and waters of the U.S. through a permitting process. Waters of the U.S. is an inclusive term that covers streams, rivers, wetlands, and other aquatic sites that are under USACE jurisdiction.

3.8.1 Wetlands

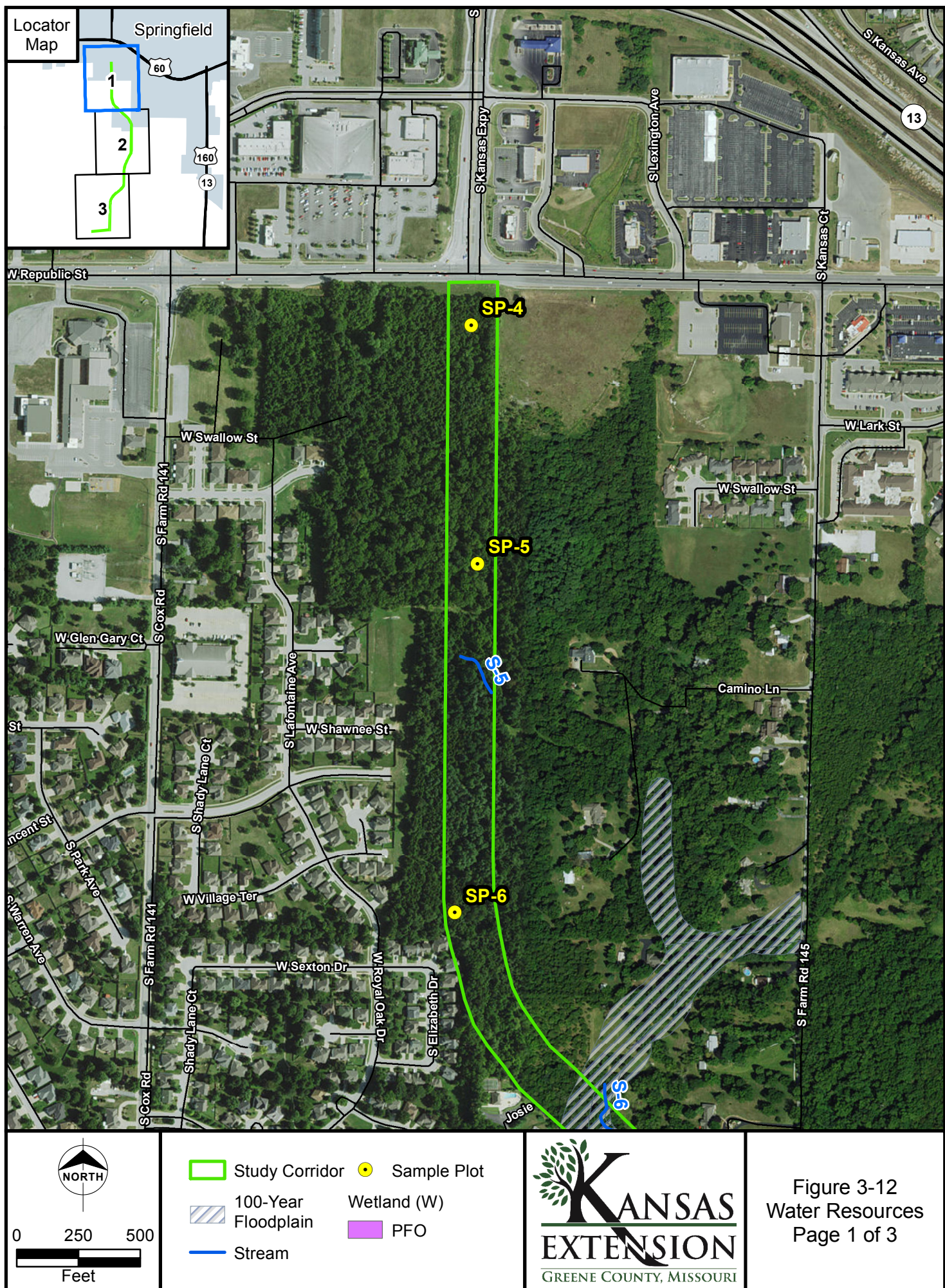
Wetlands serve a variety of beneficial uses such as floodwater retention, groundwater recharge, and providing essential fish and wildlife habitat. Executive Order 11990, *Wetlands Protection*, established a “no net loss policy” requiring Federal agencies to avoid destruction or modification of wetlands unless there are no practicable alternatives, and all practicable measures to minimize harm to wetlands have been implemented. Missouri’s Executive Order 96-03 calls for similar wetland protection at the State level. An Only Practicable Alternative Finding in response to Executive Order 11990 would be included in the decision document published by the FHWA.

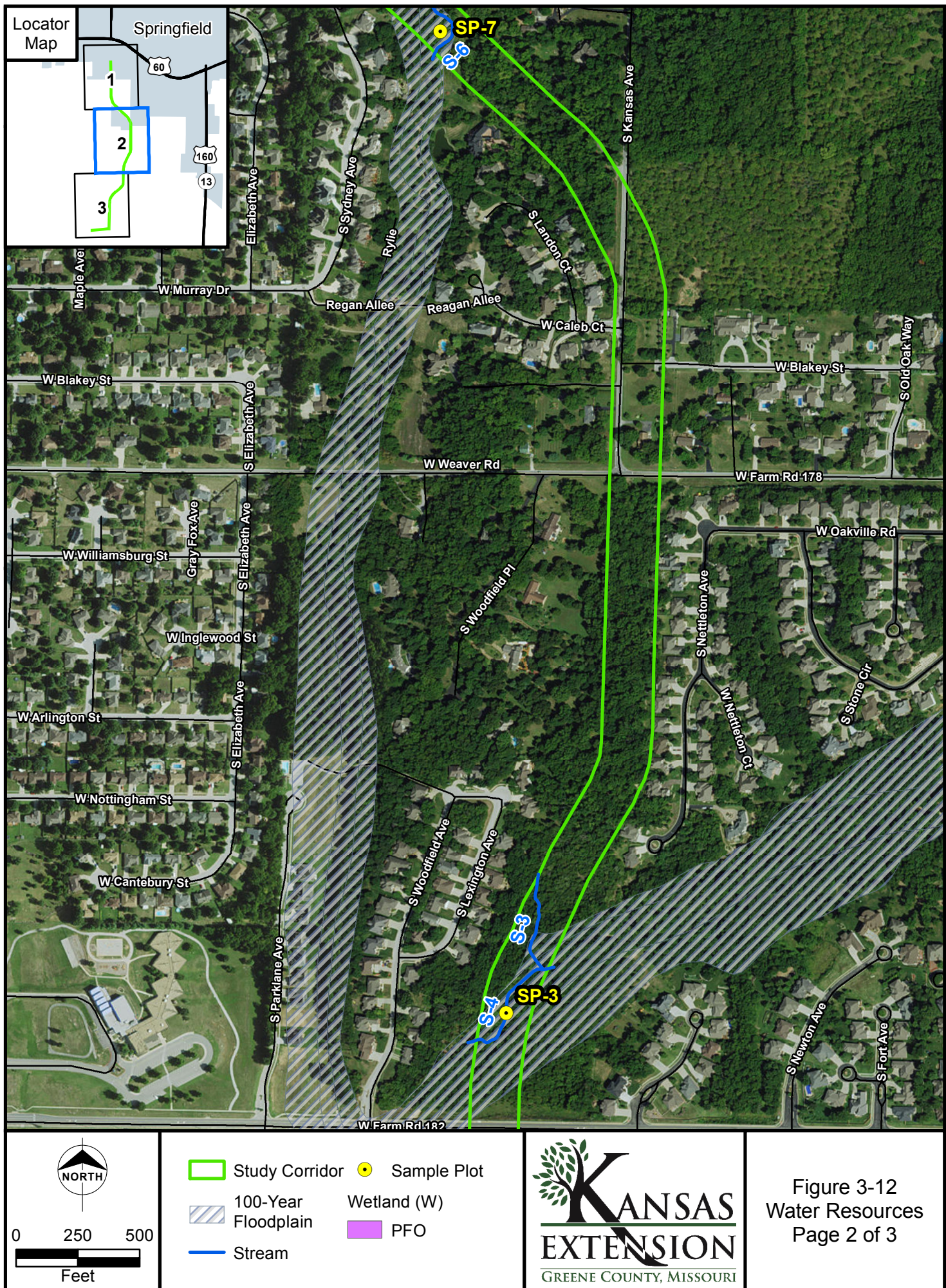
Under Section 404 of the Clean Water Act, if permanent impacts to wetlands are greater than one-tenth of an acre, mitigation is generally required as part of the Section 404 permit. No wetlands were identified within the Study Corridor during a wetland delineation conducted in October and November 2016 (reference Appendix D for the complete study). However, a wetland was mapped adjacent to the Study Corridor.

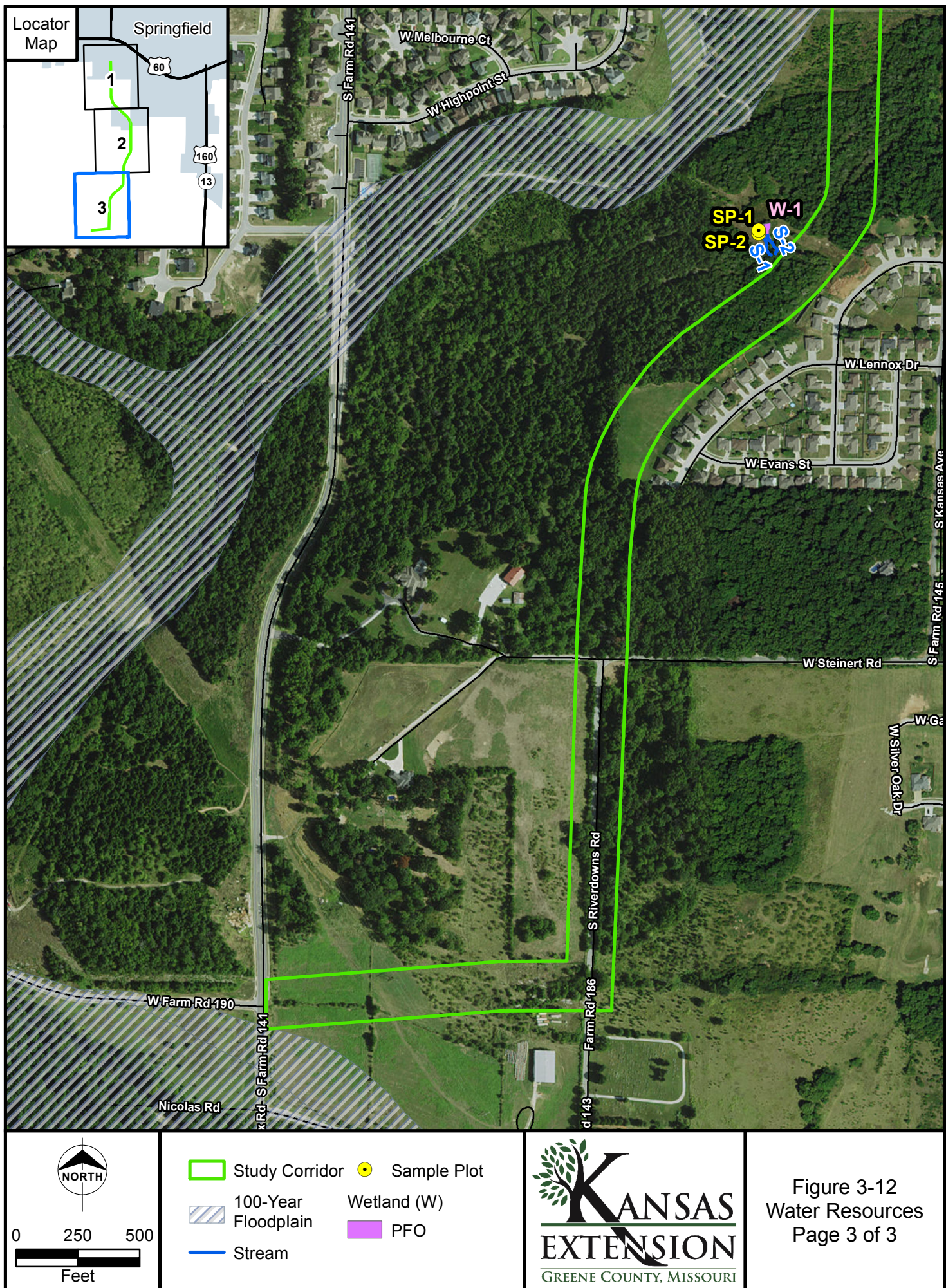
3.8.2 Rivers

Prominent rivers and streams intersecting the Study Corridor are the Ward Branch (Stream 4 [S-4]) and Workman Branch (S-6) (Figure 3-12; Appendix D). Both water resources are classified as “perennial,” which means they maintain permanent flow during drought conditions.

Based on the wetland and stream delineation conducted in October and November 2015, the Ward Branch is approximately 8 feet wide, and the Workman Branch is approximately 15 feet wide. The determination of the jurisdictional limit of a river or stream is based upon the presence of an Ordinary High Water Mark (OHWM). The OHWM for a river or stream is usually determined through examination of recent physical evidence of surface flow in the stream channel. The OHWM is visible on both banks of the Ward Branch and Workman Branch. Additional water resources that intersect the Study Corridor include two ephemeral unnamed streams (S-3 and S-5). Two more ephemeral streams (S-1 and S-2) are located adjacent to the Study Corridor.







3.8.3 Ponds

There are no ponds identified within the Study Corridor. However, an NWI map indicated a pond located adjacent to the Study Corridor. The pond was noted during a wetland delineation conducted in October and November 2015. It was not mapped due to its distance from the Study Corridor.

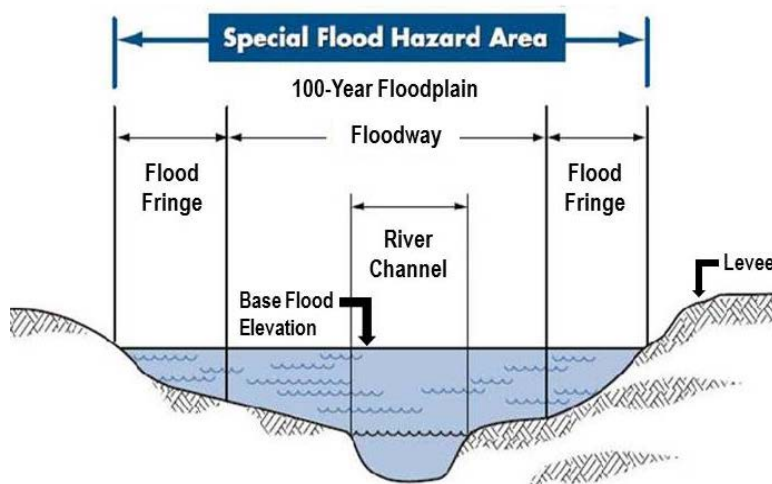
3.8.4 Navigable Waterways

There are no navigable waterways within the Study Corridor (USACE, 2004).

3.8.5 Floodplains

Floodplains are low-lying, flat, or nearly flat areas of land adjacent to rivers, streams, and other water courses (Figure 3-13). They are periodically inundated with water due to natural precipitation events. In natural systems, floodplains provide a number of important functions, including providing temporary storage of flood water, providing wildlife habitat, buffering heavy erosion caused by fast moving water, recharging and protecting groundwater, supporting vegetative buffers to filter contaminants, and accommodating the natural movement of stream flows. Federal Emergency Management Agency (FEMA) and FHWA guidelines (23 CFR 650) identify the base (100-year) flood as the flood having a 1-percent probability of being equaled or exceeded in any given year. The 100-year floodplain is any area that would be covered by water during a 100-year flood event. The 500-year floodplain designates the area that would be inundated by a flood that has a 0.2 percent chance of being equaled or exceeded in magnitude in any given year.

Figure 3-13: Diagram of a Floodplain



FEMA under the National Flood Insurance Program (NFIP) prepared Flood Insurance Rate Maps (FIRM) for areas prone to flooding. These maps are used to identify special flood hazard areas and determine the limits of the 100-year (base) floodplain and the extent of possible floodplain encroachment.

A regulatory floodway is defined as the channel of a stream plus the adjacent area that would be inundated with water during a 100-year flood event and must remain free of encroachment to avoid increasing the base flood elevation during a 100-year flood event. FEMA has mandated that projects can cause “no rise” in the flow within the regulatory floodway, and they cannot cause more than a 1-foot cumulative rise in the flood elevation within the 100-year floodplain.

In Missouri, the State Emergency Management Agency (SEMA) issues a floodplain development permit for any project located within a special flood hazard area. This permit requires a “no rise” certification. The certification indicates that a project would cause no rise in the regulatory floodway of a given flooding source. There are no SEMA flood buyout properties in the Study Corridor.

Executive Order 11988, *Floodplain Management*, directs Federal agencies to take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Federal agencies are to provide public notice of proposed actions in floodplains and make a finding that there is no practicable alternative before taking action that would encroach on a 100-year floodplain. U.S. Department of Transportation (DOT) Order 5650.2, *Floodplain Management and Protection*, outlines the DOT policies and procedures for implementing Executive Order 11988.

The FHWA floodplain encroachment policy requires the avoidance of longitudinal encroachments wherever practicable. If longitudinal floodplain encroachments cannot be avoided, the degree of encroachment should be minimized to the extent practicable. Generally, any increase in the 100-year water-surface elevation produced by a longitudinal encroachment on the NFIP-mapped floodplain should not exceed the 1 foot allowed by Federal standards. Obtaining appropriate floodplain permits from SEMA is an environmental commitment of this Project.

3.8.6 No Build Alternative

Under the No Build Alternative, no construction would occur within or adjacent to wetlands. No fill would be placed in wetlands, and no materials would be dredged or excavated from wetlands or waters of the U.S. Existing drainage patterns would remain unchanged. The No Build Alternative would result in no impact on the mapped floodplain and floodway because no construction activities would occur. The No Build Alternative would have no effect on long-term or beneficial floodplain values.

3.8.7 **Build Alternative**

Under the Build Alternative, construction of the roadway would result in temporary impacts to two ephemeral streams and two perennial streams that cross the Study Corridor, as discussed in the following subsections.

3.8.7.1 ***Wetlands and Rivers***

Culverts would be placed in ephemeral streams (S-3 and S-5) intersecting the corridor. One bridge would be constructed for a perennial stream, Ward Branch (S-4), and one box culvert would be constructed for a perennial stream, Workman Branch (S-6), within the Study Corridor. Additionally, a Palustrine Forested Wetland (PFO) wetland (W-1) is 75 feet west of the Study Corridor, and two ephemeral streams (S-1 and S-2) are 23 feet west of the Study Corridor (Appendix D). Avoidance of W-1, S-1, and S-2 should be taken into consideration when designing access roadways. If access roadways do not avoid impacts to these areas, further Section 404 permitting would be required, and mitigation may be necessary.

Greene County completed field delineations in October and November 2015. Once the construction plans are finalized, the anticipated impacts of the Build Alternative would be finalized. The assessment of impacts presented in Table 3-5 represents the anticipated worst case scenario.

Table 3-5 : Potential Impacts to Wetlands and Waters of the U.S.

Alternative	Wetland Impacts by Type^{a, b}		Streams and Rivers Impacts^b		
	PFO (acres)	PEM (acres)	Type	Length (feet)	Surface Area (acres)
No Build Alternative	N/A	N/A	N/A	N/A	N/A
Build Alternative	N/A	N/A	Ephemeral (S-3)	0	0.04
Build Alternative	N/A	N/A	Perennial (S-4)	0	0.14
Build Alternative	N/A	N/A	Ephemeral (S-5)	0	0.05
Build Alternative	N/A	N/A	Perennial (S-6)	0	0.21

Source: National Wetlands Inventory, 2015; Burns & McDonnell, 2015

(a) PFO = palustrine forested wetland; PEM = Palustrine emergent wetland

(b) Impacts are based on preliminary design plans. Impact calculations will be revised following completion of final designs.

Through coordination with the USACE, it is anticipated that a Nationwide Permit #14 (Linear Transportation Projects) would be issued to authorize construction of the stream crossing features. Furthermore, issuance of the Section 404 permits by the USACE is contingent on obtaining water quality certification issued under Section 401 of the Clean Water Act from MDNR. Once roadway design has determined the final alignment and field and jurisdictional limits of wetlands have been established, permit applications would be prepared and submitted to obtain permits prior to Project construction.

3.8.7.2 Mitigation

Following completion of additional studies, the potential impacts to streams and wetlands would determine any need and further course of action for mitigation. The recommended mitigation action for all Section 404 permits is avoidance. However, if total avoidance is not practicable, the Project should be designed to limit impacts, and compensatory mitigation would be required. During the Section 404 Permit process, Greene County would coordinate directly with the USACE, EPA, and MDNR to determine the appropriate mitigation for any unavoidable impacts to jurisdictional wetlands and other waters of the U.S., including use of in-lieu fee programs or purchase into a mitigation bank.

3.8.7.3 Floodplains

The Build Alternative would have limited impact on the existing floodplain and floodways (Table 3-6). Implementation of the Project may require construction of bridge piers, abutments, or other improvements within the 100-year floodplains mapped along the Ward Branch and the Workman Branch. Greene County would conduct a hydraulic analysis during final design to document that the new roadway would result in “no rise” in the flow within the regulatory floodway. An Only Practicable Alternative Finding in response to Executive Order 11988 would be included in the decision document published by the FHWA. Greene County would also obtain required floodplain development permits prior to initiating construction.

Table 3-6: 100-Year Floodplain and Floodway Encroachments

Build	100-Year Floodplain Crossing (linear feet)	100-Year Floodplain (acres)	Floodway (acres)	Floodway (linear feet)
No Build	N/A	N/A	N/A	N/A
Build Alternative	1,313	3.93	2.01	988

Source: FEMA, 2015

During construction, the size and duration of temporary obstructions within the floodplains and floodway would be limited by effective construction sequencing and construction methodology.

3.9 Biological Resources and Threatened and Endangered Species

The Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.) affords legal protection for the continued existence of any threatened or endangered species and requires that proposed activities do not jeopardize that existence or result in the destruction or adverse modification of designated critical habitat. The Fish and Wildlife Coordination Act (16 U.S.C. 661-667e) also applies to projects that affect water resources. The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668) and the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703) provide protection for eagles and most avian species. The U.S. Fish and

Wildlife Service (USFWS) administers each of these acts. The Missouri Department of Conservation (MDC) has jurisdiction over species protected at the state level (Missouri Statute 252.002-252.333) and tracks Federal threatened and endangered species, state endangered species, and species of conservation concern (Missouri Natural Heritage Program, 2016).

A review of USFWS's Information for Planning and Conservation (IPaC) system and MDC's Natural Heritage Database (i.e., Natural Heritage Review Report) was completed, and onsite visits were conducted to review the Study Corridor (reference Appendix E for the threatened and endangered species study). Topographic maps indicate the Study Corridor occurs in an area of rolling hills with minor topographic relief, and crosses two perennial streams (Workman Branch and Ward Branch) that are tributaries to the James River. Review of aerial photography shows that the Study Corridor generally extends through a strip of undeveloped, wooded area adjacent to developed housing subdivisions. GIS analyses show the location of several sinkholes within and adjacent to the Study Corridor. Field investigation within the Study Corridor identified several karst features (sinkhole collapses, springs, and depressions) but no cave entrances within the Study Corridor (reference Appendix G for the geological study and Section 3.11 of this document for further discussion of geology and soils).

3.9.1 Terrestrial and Aquatic Habitats

Historically, the proposed Study Corridor is within the Lockwood Smooth Prairie Plain Land Type Association (LTA) within the Springfield Plain Ecological Subsection (Cleland et al., 2007). This area is characterized by deep and poorly drained soils. Historically, this area was almost completely covered by tallgrass prairie and woodlands, but today it is mainly fescue (*Festuca* spp.) pasture and hay meadows with scattered cropland. Intact, natural savannas and woodlands are virtually unknown. Within the Study Corridor, existing habitat is a mosaic of undeveloped, open grasslands, riparian corridors, degraded timber stands on the slopes adjacent to riparian areas, and road and utility rights-of-way. The majority, approximately two miles, of the Study Corridor is wooded with small portions of it associated with Ward Branch and Workman Branch. Common tree communities included mixed oak-hickory woods, stands of eastern red cedar, and mixed riparian corridor hardwoods. Many of the areas within the Study corridor included dense thickets of bush honeysuckle. Photographs throughout the Study Corridor are included as part of the wetland appendix (Appendix D). A list of representative species in the Study Area and anticipated to occur within the Study Corridor is in Appendix E. Tree sizes in the Study Corridor ranged mostly from small to medium (approximately 3 inches diameter at breast height [dbh] to 15 inches dbh), with some larger representatives and a few snags (i.e., standing dead trees) in the riparian area. Dense underbrush is present in many areas. Periodically maintained open space (i.e., existing ROWs along roads, mowed and hay areas) are present in existing ROWs within the corridor and adjacent developed

areas along with ornamental herbaceous and wood plantings. Managed grassy areas are dominated by fescue and brome (*Bromus* spp.). There are numerous annual weed species present during the growing season in the open areas and woodlands (Appendix E). These terrestrial habitats in the Study Corridor are common throughout the region and can provide habitat for a variety of species (Appendix E). The largely undeveloped corridor contrasts greatly with the dense residential and commercial developments immediately adjacent to the majority of the corridor.

The stream communities of the larger Lockwood LTA are some of the most distinctive in the state, but all are threatened to some degree by development, mining, and groundwater pollution. Two drainages within the Study Corridor were investigated during the wetland delineation survey conducted on October 13 and November 17, 2015. These streams primarily contain seasonal flows and are dry for the majority of the year. Their configurations and substrates of silt and cobble are highly affected by runoff from the surrounding residential and commercial developments. Construction of two bridge structures would be required as part of the Project, but they would be designed and constructed not to result in blockage, or alteration of flow regimes. Some small, seasonal populations of fishes could potentially inhabit the lower, perennial portions of Ward Branch, but there are no endangered or threatened species, or species of conservation concern, known to inhabit these drainages. The ephemeral and perennial streams identified during wetland delineation efforts are summarized in Section 3.8.

3.9.2 Threatened and Endangered Species and Species of Conservation Concern

Based on the Natural Heritage Review Report from MDC and IPaC searches in 2015 and updated in 2016, eight federally listed species may occur within or near the Study Corridor (Table 3-7). A habitat assessment field survey was completed during October and November 2015 to determine if any current habitat conditions for protected species occur within the Study Corridor. Additionally, potential habitat for the bald eagle (*Haliaeetus leucocephalus*), protected under the BGEPA and the MBTA, was evaluated within the Study Corridor. Information regarding the likelihood of these species occurring within the Study Corridor and potential affects during construction is provided under Section 3.9.

Table 3-7: Protected Species Known or Likely to Occur within the Study Corridor

Species	State Status	Federal Status	Designated Critical Habitat in Greene County
Indiana bat (<i>Myotis sodalis</i>)	Endangered	Endangered	No
Northern long-eared bat (<i>Myotis septentrionalis</i>)	None	Threatened	No
Gray bat (<i>Myotis grisescens</i>)	Endangered	Endangered	No
Ozark cave fish (<i>Amblyopsis rosae</i>)	Endangered	Threatened	No
Missouri bladder-pod (<i>Physaria filiformis</i>)	Endangered	Threatened	No
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Endangered	None	No
Geocarpon (<i>Geocarpon minimum</i>)	Endangered	Threatened	No
Niangua darter (<i>Etheostoma nianguae</i>)	Endangered	Threatened	Yes: Pomme de Terre River, Greene County
Western prairie fringed orchid (<i>Platanthera praeclara</i>)	Endangered	Threatened	No

Source: Missouri Natural Heritage Program, 2016; USFWS, 2015

3.9.3 No Build Alternative

The No Build Alternative would have no impacts on biological resources or threatened, endangered, and rare species or their habitats that may be present within the Study Corridor and Greene County.

3.9.4 Build Alternative

Because terrestrial habitats are present within and adjacent to the Study Corridor, temporary displacement of bird, mammal, and other wildlife species common to the area would occur during construction. Based on the Build Alternative corridor evaluated, approximately 3.9 acres of riparian forest and approximately 40.4 acres of upland forest habitat would be removed if the entire corridor were cleared (USACE, 2013; USGS, 2006). By comparison, there are 84,793 acres of oak/hickory forest type and 6,780 acres of the elm/ash/cottonwood type (i.e., primarily riparian forest type species) in Greene County, Missouri (U.S. Forest Service, 2015). Therefore, this Project would result in <0.04 percent loss of upland forest habitat and <0.06 percent loss of riparian forest habitat within Greene County. Although human activity and noise generated during construction could temporarily displace resident wildlife and fish, similar adjacent and unaffected upland and riparian habitats in the Study Area would be available.

Clearing of vegetation, including both standing and downed timber, would be limited to that which is necessary for construction of the Project. Riparian areas disturbed during construction would be restored following or concurrent with Project implementation, and follow-up efforts would be implemented to establish permanent vegetation. Sediment runoff and soil erosion would be limited in order to reduce

suspended solids, turbidity, and downstream sedimentation that may degrade water quality and negatively impact aquatic life. Strict adherence to MoDOT and local standards for the design, placement, and maintenance of temporary and permanent erosion control measures and seed mixes would be required as part of the SWPPP approved for the Project. The continued and long-term use of de-icing compounds on the road would not adversely affect the quality or use of aquatic habitats within or adjacent to the Study Corridor due to infrequent use and only substances approved for such use being applied.

An acoustic survey was conducted in August 2015 within a portion of the corridor along Workman Branch near South Kansas Avenue (Armstrong and Robbins, 2015). The survey, submitted to the Project team, detected the presence of the gray and northern long-eared bat, but did not detect the presence of the Indiana bat. However, suitable summer roosting and foraging habitat for the Indiana bat and northern long-eared bat was determined to be present within the Study Corridor during additional bat habitat assessments conducted by the Project sponsor (Greene County) in 2015 (Appendix E). Summer foraging habitat is present for all three species within the Study Corridor. The forested riparian and upland habitats examined within the Study Corridor were determined to be marginally suitable to these species for reasons discussed in the following subsections. These species foraging in the Project area would experience a loss of foraging habitat from woodland clearing. However, measures, such as clearing during hibernation season, to avoid and minimize potential harm to these species would be implemented as discussed below, thereby avoiding adverse effects. A geotechnical survey was done in January 2016 to identify karst features within the Study Corridor (see Section 3.11, Geology and Soils, for a detailed discussion of the geotechnical survey). This study and future geotechnical and other investigations within the Study Corridor necessary for final design and construction will be used to identify karst features. Known caves in proximity to the Study Corridor (0.5 mile) that could be indirectly disturbed or affected by construction activity, as well as potentially suitable karst features identified within the Study Corridor, will be investigated for the presence of protected bats. If appropriate, conservation measures will be implemented under consultation with USFWS to protect any karst habitats shown to be used by protected species.

A letter was sent to USFWS on January 10, 2017, regarding the Project. The letter provided information about the Project, future proposed coordination, an effects analysis, and proposed conservation measures, as well as the Project team's determination that the Project may affect, but would not likely adversely affect the Indiana bat, gray bat, northern long-eared bat, and Ozark Cavefish. USFWS responded on January 26, 2017, via email concurring with this determination. The information sent to USFWS and the email received from USFWS is provided in Appendix E.

3.9.4.1 Karst Habitat

A Preliminary Geologic Evaluation of the Project Corridor was performed by Palmerton & Parrish, Inc. (PPI) in January 2016. A total of 23 karst features were visually identified within or in the vicinity of the Project. Karst features identified included 16 depressions (shallow and deep), 3 open voids, 1 collapse, 1 surface opening, 1 spring, and 1 cave. A copy of PPI's Preliminary Geologic Evaluation is provided in Appendix G.

Some karst features, such as caves and mines, can be used by Indiana and northern long-eared bats for hibernation and by gray bats throughout the year. Ozark cavefish are also known to inhabit caves, streams, and springs in Greene County. There are no known mines in or near the project area. Information provided by MoDOT in December 2016 (Missouri Speleological Survey [MSS] database, 2015 data) indicated four to six known caves within 0.5 miles of the Study Corridor. There is some information available at this time for two of those features, one of which is the cave feature described in the PPI geologic evaluation.

The one cave feature identified in the PPI geologic investigation (Appendix G; KE21) coincides with a known cave in the MSS database (MSS, 2016). The entrance to this cave is outside and adjacent to the Study Corridor near the proposed crossing of Ward Branch. MSS conducted an investigation of this cave in February 2016. It has a mapped passage that extends approximately 140 feet and crosses under the proposed alignment. There is a stream flowing at the far end of the passage and there were no signs of winter bat use by any common or protected bat species or cavefish at the time of the investigation. A follow-up survey in the summer to determine any use by northern long-eared bats, gray bats, or Ozark cavefish is warranted.

Outside the Study Corridor to the southwest an opening into a cave (subsequently named Riverbluff Cave) was accidentally uncovered on September 11, 2001, during construction of Cox Road in Greene County which is near the proposed southern terminus of the Project at Farm Road 190. Excavation of the roadway created a 40-foot wide by 20-foot high fissure that led into a large cave. Five days later, the cave was sealed off with plate steel, and three airtight lockable gates were installed to control access to the cave and maintain the cave's natural environmental conditions. Seven months later, after road construction was completed and the last section of the access tunnel was installed, the cave was reopened for mapping and scientific study. The system was completed in April 2002, and the cave became open to the public for tours, but access is controlled by the Missouri Institute of Natural Science. Since the cave entrance is permanently sealed off, bats cannot use the cave for roosting.

Riverbluff Cave is approximately 2,000 feet long from the entrance to the back room. The main passageway trends in a north-northeast direction from the entrance. There is one short side passageway, which extends northward away from the current Project Study Corridor southern terminus. Given the location of the protected and managed entrance outside of the Study Corridor and that the cave passages extend away from the Project area, the construction of this Project is not anticipated to impact Riverbluff Cave.

Although there were numerous other sinkholes and collapsed areas noted in the PPI geologic investigation, no additional cave features were identified with entrances in the 2.3-mile long, 200-foot wide Study Corridor. This project is expected to avoid direct adverse impacts to caves which could be used by protected bat species. During future geotechnical and subsequent investigations necessary for final design and construction, any karst features identified as possible cave habitat in or near the Project will be investigated for the potential use by any protected bat species or cavefish. Known caves within 0.5 miles of the Study Corridor that could provide habitat for protected bats or Ozark cavefish that could be indirectly disturbed or affected by construction activity will also be investigated. If appropriate, conservation measures will be implemented under consultation with USFWS to protect any karst habitats shown to be used by protected species. Such conservation measures for caves could include blasting restrictions or alignment adjustments if deemed appropriate in consultation with USFWS.

3.9.4.2 *Indiana Bat*

Summer roosting sites for the Indiana bat include dead or dying trees with loose bark (i.e., live trees and/or snags greater than 5 inches dbh that have exfoliating bark, cracks, crevices, and/or hollows) and tree cavities, with mature trees greater than 9 inches dbh more likely to provide optimal roosting sites. Foraging habitat includes riparian areas, upland forests, fencerows, linear corridors, ponds, fields, and even developed areas (e.g., Indianapolis International Airport area). Indiana bats have been reported foraging in a wide variety of habitat throughout their range. It is commonly accepted among Indiana bat authorities that bats may have several foraging areas that they move sequentially between, depending upon food availability and their current roost location. In areas of new construction, temporary effects (e.g., displacement and loss of foraging habitat) may occur during construction and vegetation clearing. However, one conservation measure that could be employed is to only clear potentially suitable bat roost trees for Indiana bats and northern long-eared bats between November 1 and March 31 to avoid direct mortality of females and non-flying juveniles in maternity roosts (USFWS, 2009).

Within karst regions, limestone caves or mines with pools of water are the preferred hibernacula for this bat species. Bats occupying winter hibernacula or transient spring or fall caves could be affected by the

removal of suitable roost or foraging habitat within 0.5 mile of the resource. Information provided by MoDOT in December 2016 do not indicate any known Indiana bat cave resources within 5.0 miles of the Project. There are several known caves features within 0.5 mile of the Study Corridor, however, none of these are known to shelter protected bat species. Riverbluff Cave is not suitable habitat for bats. The cave identified adjacent to the Study Corridor had no signs of winter bat use in February 2016. There are no known cave entrances in the limits of the Study Corridor, though there are several sinkholes in addition to the adjacent cave feature. During future investigations during Project design, these features and known caves within 0.5 mile of the Study Corridor that could be indirectly disturbed or affected by construction activity will be evaluated for potential use by Indiana bats. Appropriate conservation measures will be implemented under consultation with USFWS to protect any karst habitats shown to be used by protected species.

Although August 2015 acoustic surveys did not show the Indiana bat to be present in the Study Corridor at Workman Branch, there is still suitable roost and foraging habitat in the Project limits. There are also karst features that need to be investigated further for the presence or absence of bat use near the Study Corridor. At this time, with no known Indiana bat hibernacula, summer roost, or maternity sites within several miles of the Project area and the commitment to only remove suitable summer roost habitat during the hibernation season, Greene County and FHWA have determined this Project may affect, but is not likely to adversely affect, the Indiana bat. Further karst investigations and consultation with USFWS will be coordinated by Greene County, FHWA, and MoDOT.

3.9.4.3 *Northern Long-Eared Bat*

There is much similarity in summer habitat use between the northern long-eared bat and the Indiana bat. Summer roost sites for the northern long-eared bat include live and dead or dying trees with loose bark, cavities, or crevices, but they seem to prefer trees that have hollows and larger crevices. During summer, northern long-eared bats roost singly or in colonies. Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, and is known to use anthropogenic structures such as old buildings and tight spaces such as behind shutters and signage (roost sites not typically used by Indiana bats). Similar to the Indiana bat, this species' foraging sites include riparian areas, upland forests, fencerows, linear corridors, ponds, and fields. The northern long-eared bat also forages within the understory of forested hillsides and ridges. In areas of new construction, temporary effects (e.g., displacement from foraging habitat) may occur during construction and vegetation clearing. Northern long-eared bat were detected during acoustic surveys within the Study Corridor in the summer of 2015 (Armstrong and Robbins, 2015). Bats present in the Study Corridor could be foraging for food in the corridor as well as using areas of suitable habitat identified within the corridor

during field surveys in 2015. Like the Indiana bat, one conservation measure that could be employed is to only clear potentially suitable bat roost trees for Indiana bats and northern long-eared bats between November 1 and March 31 to avoid direct mortality of females and non-flying juveniles in maternity roosts (USFWS, 2009)

Within karst regions, caves are used for both summer and winter roosts. Bats occupying winter hibernacula or non-breeding caves at any time of the year could be affected by the removal of suitable roost or foraging habitat within 0.5 mile of the resource. Information provided by MoDOT in December 2016 indicate one known northern long-eared bat cave resources within 5.0 miles of the Project. There are several known caves features within 0.5 mile of the Study Corridor, however, none of these are known to shelter protected bat species. Riverbluff Cave is not suitable habitat for bats. The cave identified adjacent to the Study Corridor had no signs of winter bat use in February 2016. There are no known mines or cave entrances present within the Study Corridor, though there are several sinkholes in addition to the adjacent cave feature. During future investigations for design, these features and known caves within 0.5 mile of the Study Corridor that could be indirectly disturbed or affected by construction activity will be evaluated for potential use by northern long-eared bats. Appropriate conservation measures will be implemented under consultation with USFWS to protect any karst habitats shown to be used by protected species.

As noted, August 2015 acoustic surveys identified northern long-eared bats in the Study Corridor at Workman Branch. Suitable roost and foraging habitat was identified within the Study Corridor limits. There are also karst features that need to be investigated further for the presence or absence of bat use near the Study Corridor. At this time, with no known northern long-eared bat hibernacula or other cave use, summer roosts, or maternity sites within several miles of the Project area and the commitment to only remove suitable summer roost habitat during the hibernation season, Greene County and FHWA have determined this Project may affect, but is not likely to adversely affect, the northern long-eared bat. Further karst investigations and consultation with USFWS will be coordinated by Greene County, FHWA, and MoDOT.

3.9.4.4 *Gray Bat*

Gray bats live in caves year-round. During the winter, gray bats hibernate in deep, vertical caves. In the summer, they roost in caves with domed ceilings that allow clustering of large maternity colonies or smaller bachelor and non-breeding colonies which can be scattered along rivers. Gray bats eat a variety of flying aquatic and terrestrial insects present along rivers or lakes, and occasionally forage within forested areas on ridgetops and slopes. Bats present in the Study Corridor are likely foraging for food in the corridor. Removal of riparian forest could affect the amount of cover and indirectly affect diversity of

aquatic insects available by degrading stream quality. To provide cover and protection between known bat caves and aquatic foraging sites, mature forested corridors should be maintained. Riparian areas disturbed during construction would be restored following or concurrent with Project implementation, and follow-up efforts would be implemented to establish permanent vegetation.

Within karst regions, caves are used for both summer and winter roosts. Bats occupying caves at any time of the year could be affected by forest removal and construction within 0.5 mile of the resource.

Information provided by MoDOT in December 2016 indicate two known gray bat cave resources within 5.0 miles of the Project. There are several known caves features within 0.5 mile of the Study Corridor, however, none of these are known to shelter protected bat species. Riverbluff Cave is not suitable habitat for bats. The cave identified adjacent to the Study Corridor had no signs of winter bat use in February 2016. There are no known mines or cave entrances present within the Study Corridor, though there are several sinkholes and at least one adjacent cave feature. During future investigations for design, these features and known caves within 0.5 mile of the Study Corridor that could be indirectly disturbed or affected by construction activity will be evaluated for potential use by gray bats. Although not specific to gray bats, the potential conservation measure for Indiana and northern-long eared bats to clear potentially suitable foraging areas between November 1 and March 31 would avoid loss of foraging habitat during summer activity also for gray bats. Other appropriate conservation measures will be implemented under consultation with USFWS to protect any karst habitats shown to be used by protected species.

August 2015 acoustic surveys identified the presence of gray bats in the Study Corridor. Suitable foraging habitat likely occurs within the Study Corridor limits. There are also karst features that need to be investigated further for the presence or absence of bat use adjacent to and near the Study Corridor. At this time, with no known gray bat cave sites within several miles of the Study Corridor and the commitment to limit tree clearing and revegetate riparian areas as soon as possible (at Ward Branch and Workman Branch bridge locations), Greene County and FHWA have determined this Project may affect, but is not likely to adversely affect the gray bat. Further karst investigations and consultation with USFWS will be coordinated by Greene County, FHWA, and MoDOT.

3.9.4.5 *Ozark Cavefish*

The Project is not anticipated to adversely affect the Ozark cavefish. The Ozark cavefish occurs in caves within the Springfield Plateau of the Ozark Highlands in northwest Arkansas, southwest Missouri, and northeast Oklahoma. They occur in cave streams with chert rubble substrate and pool areas that receive groundwater recharge, but have also been collected from springs and wells. Ozark cavefish require a pristine water source, so they typically occupy caves whose water source comes from swelling

groundwater, as opposed to surface-running streams. The Ozark cavefish was listed as threatened on November 1, 1984, due to habitat alteration and over-collecting. Conservation efforts include protecting caves and adopting land management practices that protect groundwater quality in the recharge area of caves, springs, and wells they inhabit.

The Study Corridor occurs within the Springfield Plain Ecological Subsection, which is a large, smooth plain that is underlain by Mississippian cherty limestones characterized by areas of well-developed karst and numerous springs. Sinkholes, springs, and caves are especially prominent in the Springfield area. Groundwater is very abundant and generally of high quality, although the urbanized Springfield area experiences serious problems with groundwater contamination that are complicated by well-developed underground karst with rapid groundwater movement. Of the seven caves, one spring, and three wells in Greene County where this species has been historically reported, only four sites still contain cavefish (Graening et al., 2010). Although there is one spring identified from the PPI geologic evaluation near the Project area, none of the known protected recharge areas or species records are within the Study Corridor, or in close proximity to it. The nearest protected area is just under 2.0 miles to the southeast of the Project in Christian County, across the James River floodplain (MoDOT Environmental, 2016). There are no known groundwater connections from either Workman Branch or Ward Branch to any occupied cavefish sites.

As a precaution during construction, appropriate containment basins, silt fences, filter strips, and other appropriate measures as outlined in the SWPPP approved for the Project would be employed for retention of stormwater runoff as a means of avoiding and reducing sedimentation introduction into karst features (e.g., caves, springs, and sinkholes) and associated groundwater. Construction debris would be contained and disposed of properly to prevent accidental introduction into karst features as a result of clean-up activities, run-off, flooding, wind, or other natural forces. Excess concrete and wash water from trucks and other concrete mixing equipment would be disposed of in an area well away from karst features, streams, and wetlands. Disturbed areas would be revegetated promptly to limit erosion. Stationary fuel and oil storage containers would remain within a staging area or another confined area to avoid accidental introduction into the groundwater. In the event that roadway construction requires filling a sinkhole, guidelines from Greene County would be employed (Greene County, 1999). Therefore, as proposed, the Project will not adversely affect the Ozark cavefish. At this time, with no known Ozark cavefish recharge protection areas delineated near the Project area and the commitment to incorporate appropriate erosion and sediment controls in karst areas, Greene County and FHWA have determined this Project may affect, but is not likely to adversely affect, the Ozark cavefish. Consultation with USFWS will be coordinated by Greene County, FHWA, and MoDOT.

3.9.4.6 *Missouri Bladderpod*

The Missouri bladderpod, a non-woody flowering plant, is restricted to southern Missouri and northern Arkansas, and is known from only nine sites in three counties. It was first federally listed as endangered in 1987. After additional surveys were conducted and actions undertaken to conserve the bladderpod, the number of documented populations increased to 61 sites in 4 counties in Missouri and 2 sites in 2 counties in Arkansas. Natural habitat for the Missouri bladderpod is primarily open limestone glades that are naturally dry, treeless areas with shallow, loose soil and areas of exposed rock. However, this species has been found on one dolomite glade in Arkansas. Sometimes the bladderpod is found on highway ROW and pastures where mowing and grazing have kept vegetation low and the ground area open. Occasionally, it is found in open rocky woods. Missouri bladderpod has not been reported from within the Study Corridor, and there is no suitable habitat for this species within the existing or proposed ROW. Therefore, the Project would have no effect on the Missouri bladderpod.

3.9.4.7 *Black-tailed Jackrabbit*

The black-tailed jackrabbit (*Lepus californicus*) inhabits large contiguous native grasslands and grazed areas with scattered shrubby vegetation. The Study Corridor crosses wooded areas adjacent to residential neighborhoods in the southern section of the City of Springfield. No potential habitat for the black-tailed jackrabbit was observed within the Study Corridor during the habitat assessment field survey. Based on the lack of suitable habitat, it was determined that the Project would have no effect on the black-tailed jackrabbit.

3.9.4.8 *Geocarpon*

Geocarpon (*Geocarpon minimum*) normally inhabits sandstone glades and outcrops, many less than 1 acre in size. Within these glades, geocarpon thrives at the base of slightly tilted rock outcrops where seepage water flows across and forms shallow, sandy or gravelly depressions. No glades or other suitable habitat for geocarpon occur within the Study Corridor; therefore, it was determined that the Project would have no effect on the geocarpon.

3.9.4.9 *Niangua Darter*

The Niangua darter (*Etheostoma nianguae*) is only known to occur in Missouri. It lives in clear, perennial creeks and small to medium sized rivers with slight to moderate currents with silt-free gravel and rock bottoms. The largest remaining populations of the Niangua darter likely occur in the Niangua and Little Niangua Rivers. Elsewhere, they are declining or have disappeared. Although there are two perennial streams mapped within the Study Corridor, both were dry at the time of survey. It was determined that the

Project would have no effect on the Niangua darter, due to the lack of potential habitat within the Study Corridor.

3.9.4.10 Western Prairie Fringed Orchid

The western prairie fringed orchid (*Platanthera praeclara*) occurs in moist native grasslands. The Study Corridor crosses wooded areas adjacent to residential neighborhoods in the southern section of Greene County. No native grasslands or potential habitat for the western prairie fringed orchid occur within the Study Corridor. Based on the lack of suitable habitat, it was determined that the Project would have no effect on the western prairie fringed orchid.

3.9.4.11 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was removed from the state and federal lists of threatened and endangered species; however, bald eagles are still protected by the BGEPA and MBTA. No bald eagles or bald eagle stick nests were observed within the Study Corridor during the habitat assessment field survey. Additionally, no large rivers or reservoirs that would attract roosting or nesting bald eagles occur within or immediately adjacent to the Study Corridor. Based on the lack of suitable bald eagle habitat, it was determined that the Project would have no effect on the bald eagle.

3.9.4.12 Invasive Species

Invasive exotic species are an issue for fish, wildlife, and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. All equipment used during construction of the Project would be inspected and cleaned before moving into the Study Corridor.

3.10 Farmland

The Farmland Policy Protection Act (FPPA) (7 U.S.C. 4201) was enacted in 1981 to address the conversion of farmland to non-agricultural uses for federally funded projects. The purpose of the FPPA is to “minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and to assure that Federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland.” The program is administered by the Natural Resource Conservation Service (NRCS) through U.S. Department of Agriculture regulations 7 CFR 658 and protects prime and/or unique farmland as well as farmland of statewide importance.

To determine whether an effect is adverse, a Farmland Conversion Impact Rating Form for Corridor-Type Projects (Form NRCS-CPA-106) (Appendix F) may be required to be submitted to the appropriate county NRCS office. Portions of the form are completed by NRCS, and portions by the project proponent. The

form uses a scoring system to determine the relative value of the farmland that is proposed to be affected. Information on the form includes land use surrounding the Project, recent history of active farming, acreage that will be converted, farm investments that have been made, and other information. Scores under 160 (out of 260) are not given further consideration. Scores over 160 warrant the study of alternatives that would result in conversion of fewer acres.

The Study Corridor is located in a developing suburban area of Springfield and Greene County that consists of primarily undeveloped woodlands and pasture along with some single family residential development. Historically, the corridor consisted of agricultural land uses and scattered single family residential units, which is still the case near the southern end of the Study Corridor. Prime farmland soils are located within the Study Corridor along the Ward and Workman Branches as well as near the James River as shown on the figure provided in Appendix F.

3.10.1 No Build Alternative

No construction would occur under the No Build Alternative; therefore, the No Build Alternative would have no effect on prime or unique farmland or farmland of statewide importance.

3.10.2 Build Alternative

The Build Alternative would potentially convert up to 19.95 acres of prime farmland and 0.05 acre of farmland of statewide importance to non-agricultural uses. Based on partial completion and submission of the Farmland Conversion Impact Rating Form for Corridor Type Projects to the Greene County NRCS office, the NRCS assigned a total score for the Build Alternative of 110. Since the score is below 160, no adverse effects to prime farmland would occur with implementation of the Build Alternative.

3.11 Geology and Soils

The following subsections describe regional and local geology, hydrogeology, and soils as well as potential impacts from the Project alternatives.

3.11.1 Regional Geology and Hydrogeology

The sedimentary rock sequence in the Springfield Plateau generally consists of dolomitic units ranging in thickness from approximately 100 to 400 feet with intermixed sandstone layers that range in thickness from 5 to 200 feet. The sedimentary rock sequence rests atop Precambrian-age igneous and metamorphic rocks. Thick Mississippian-age limestones and cherty limestones form the bedrock surface in the Springfield Plateau Groundwater Province and overlie Ordovician and Cambrian strata. Mississippian-age units, which crop out across southwestern Missouri, include the Cotter Formation, the Compton Formation, the Sedalia Formation, the Northview Formation, the Pierson Limestone, the Reeds Spring

Formation, the Elsey Formation, and the Burlington-Keokuk Limestone. The Burlington-Keokuk Limestone is the most widespread and thickest Mississippian-age unit in the region and forms the bedrock surface throughout much of the region.

There are three important bedrock aquifers in the Springfield Plateau Groundwater Province: the St. Francois aquifer, the Ozark aquifer, and the Springfield Plateau aquifer. Because of its depth and generally modest yield potential, few wells produce from the St. Francois aquifer in the province; however, a few industrial wells in the Springfield area are open to the St. Francois as well as the Ozark aquifer (MDNR, 2011).

The Davis Formation is present above the St. Francois aquifer and forms the confining unit between the St. Francois and Ozark aquifers. The Ozark aquifer is the most widely used and important groundwater supply in the Springfield Plateau Groundwater Province. The aquifer varies in thickness from 600 to 1,600 feet and is comprised primarily of Cambrian- to Ordovician-aged dolomites and sandstones. Low-permeability units between the Ozark aquifer and the shallower Springfield Plateau aquifer form an aquitard and greatly limit the vertical interchange of water between the two aquifers.

The uppermost aquifer is the Springfield Plateau aquifer. Mississippian-age strata comprise the Springfield Plateau aquifer, which is less commonly used as a private water-supply source in this province. Current well regulations preclude the use of this aquifer as a private water supply. New private water supply wells must draw from the Ozark aquifer and be cased/grouted through the Northview Formation. Yields of wells producing from the Springfield Plateau aquifer are typically less than about 20 gallons per minute.

Dissolution of the limestone bedrock by slightly acidic groundwater has created numerous karst features such as sinkholes, losing streams, caves, and springs. The Springfield Plateau aquifer is chiefly recharged by precipitation, including direct recharge from over-ground flow entering karst features. Some of the recharge is the gradual downward infiltration of water from precipitation through the soil materials, into the shallow bedrock, until it reaches the water table. There are likely few areas left in the province where the water level in the Springfield Plateau aquifer is at a lower elevation than the surface of the Ozark aquifer, so upward leakage of water from the Ozark aquifer into the Springfield Plateau aquifer is not a major source of recharge to the shallower zones.

3.11.2 Project Geology and Soils

The uppermost bedrock in the Study Corridor is Burlington-Keokuk Limestones (Lower Mississippian-Upper Osagean). The Burlington-Keokuk Limestones consist of light- to medium-gray, coarse- to fine-

crystalline, massive-bedded, crinoidal limestone. In the lower portion, white to light-gray nodules and bands of chert are present.

A Preliminary Geologic Evaluation of the Study Corridor was performed by Palmerton & Parrish, Inc. (PPI) in January 2016. A total of 23 karst features were visually identified within or in the vicinity of the Project. Karst features included 16 depressions (shallow and deep), 3 open voids, 1 collapse, 1 surface opening, 1 spring, and 1 cave. The locations of the karst features, along with those previously recorded, are shown on Figure 3-14. A copy of PPI's Preliminary Geologic Evaluation is provided in Appendix G.

Data gathered from the NRCS soil survey maps (2016) for soils in the vicinity of the Kansas Extension indicate more than 10 soil classifications are present. Nearly 70 percent of the soils are classified as Goss gravelly silt loam, Viraton silt loam, Gasconade-Gatewood-Rock outcrop complex, and Goss-Wilderness complex. A soil map of the approximate Study Area along with associated engineering properties reports, particle size and coarse fragments reports, and physical soil properties reports are found in Appendix G.

3.11.3 Riverbluff Cave

An opening into a cave (subsequently called the Riverbluff Cave) was accidentally uncovered on September 11, 2001, during construction of Cox Road in Greene County. Excavation for the roadway created a 40 feet wide by 20 feet high fissure that led into a large cave. Five days later, the cave was sealed off with plate steel, and three air tight lockable gates were installed to control access to the cave and maintain the cave's natural environmental conditions. Seven months later, after road construction was completed and the last section of the access tunnel was installed, the cave was reopened for mapping and scientific study. The system was completed in April 2002, and the cave became open to the public, but access is controlled by the Missouri Institute of Natural Science. Since the cave entrance is permanently sealed off, bats cannot use the cave for roosting.

Riverbluff Cave is approximately 2,000 feet long from the entrance to the back room. The map of the cave indicates that the main passageway trends in a north-northeast direction from the entrance. There is one short side passageway, the East Passage, which extends only a very short distance before becoming blocked. The gated and fenced entrance is approximately 500 feet north of the terminus of the Project ROW at the intersection of Cox Road and Farm Road 190. Given that the mapped passageway extends northward, away from the Project terminus, the Project would not impact Riverbluff Cave.

3.11.4 No Build Alternative

Because no construction would occur under the No Build Alternative, no impacts would result to the geological resources or soils present within the Study Area.

3.11.5 Build Alternative

The Build Alternative could result in potential impacts and hazards associated with geology and soils.

Construction of the Project would disturb soils and bedrock. Topsoil would be removed and stockpiled in an upland area while grading and other construction activities take place. The topsoil would be replaced at finish grades near the end of the construction process. Short-term soil erosion would be managed through the implementation of approved SWPPP BMPs, where feasible. Bedrock material removed during construction activities could be re-used onsite or hauled offsite for proper disposal. If additional borrow materials are required for construction, the contractor would be responsible for locating appropriate sources, conducting the necessary studies, and obtaining all required permits for use of the borrow materials.

Sediment, surface water/construction fluids, and road runoff could be introduced to the Springfield Plateau aquifer. Sinkholes and other karst features (e.g., vanishing streams) may act as a direct conduit for surface water to enter groundwater. As a result, these features must be properly identified and accounted for during the design phase and managed throughout construction and grading activities.

Modifications of the hydrology of the Springfield Plateau aquifer could result in potential impacts. Karst aquifers, particularly when cavernous, are sensitive to changes in overland flow that may cut off recharge to the aquifer through a losing stream or sinkhole. This has potential to alter spring, river, or cave ecology by modifying the existing habitats.

Due to the numerous identified karst features within the Study Area, other unidentified karst features may be encountered during construction of the Project. Portions of the road and ROW that are placed on top of karst features could result in structural instability.

Sinkholes and subsurface soil domes have potential to pose geologic hazards to any structure placed on or immediately adjacent to these features. The presence of sinkholes and soil voids should be determined during geotechnical investigation and taken into account during the design and grading phase.

3.11.5.1 *Mitigation*

To mitigate potential impacts and hazards, karst features should be further identified and investigated. Karst features should be taken into account during the Project design phase, and a karst mitigation plan should be developed prior to construction activities. BMPs that may be used during construction in areas where karst features have been identified include:

- Conducting a geologic subsurface evaluation of Study Corridor using exploratory borings, electrical resistivity, seismic, or ground penetrating radar
- Contacting geotechnical specialists if new karst features are found during construction
- Where permissible, plugging karst features using reverse grade filters, compaction grouting, and cap grouting
- Installing stormwater control measures to provide positive drainage away from karst features
- Monitoring of sediment/erosion control measures throughout construction process and after rain events
- Using additional erosional control techniques, such as two rows of silt fencing, where water flows into karst features
- Positioning of staging areas at least 200 feet away from waterbodies and karst features
- Refueling of equipment at least 200 feet away from waterbodies and karst features
- Applying fertilizers, herbicides, or other chemicals at least 200 feet away from waterbodies and karst features
- Maintaining natural waterbody features
- Minimizing removal of riparian vegetation
- Re-vegetating disturbed areas after construction activities

3.12 Hazardous Wastes

A review of a previous Phase I Environmental Site Assessment for the corridor, historical aerial photographs and topographic maps, a field reconnaissance, resource agency interviews, and a database search of potential hazardous waste sites was performed to evaluate the likelihood of soil and/or groundwater contamination within the Study Corridor. Additional information from the EDR Database and a previous Phase I Environmental Site Assessment is available upon request.

The Study Corridor is located in a developing suburban area of Springfield and Greene County that consists of primarily undeveloped woodlands and pasture along with some single family residential development. Historically, the corridor consisted of agricultural land uses and scattered single family residential units. Given historical uses within the corridor and the relatively recent history of development, documents reviewed and field reconnaissance of the corridor indicate there is a “None-to-Low” likelihood of the potential for historical contamination issues.

3.12.1 Potential Sites

The results of the database search, historical reviews, and field reconnaissance were prioritized as to the likelihood of soil and/or groundwater contamination present on or in the Study Corridor. Potential hazardous waste sites were assigned a priority of “None-to-Low,” “Low-to-Moderate,” or “Moderate-to-High” in accordance with the following definitions:

- **None-to-Low:** After a review of available database information, there is no indication that the hazardous waste site would impact the Project. It is possible that potential contaminants could have been generated or handled on the site; however, information indicates potential impact to the corridor would be limited. These sites include things such as Resource Conservation and Recovery Act (RCRA) small quantity generators or Underground Storage Tank (UST) sites for which releases of hazardous constituents have not been documented.
- **Low-to-Moderate:** These hazardous waste sites include any former or current operations identified as large quantity hazardous waste generators. Also included in the category are locations where releases of hazardous wastes or petroleum products have been reported and remediation has been completed. These sites include leaking UST sites that have been listed in the database as closed following completion of remediation.
- **Moderate-to-High:** A review of available information indicates that known soil and/or groundwater contamination is present and that the site is either undergoing remediation or continued groundwater monitoring. Additional sites may include unmappable sites in close proximity of the Study Corridor listed in the database search. If a “Moderate-to-High” priority site is affected by the selected alternative, further assessment would be required to determine the actual presence and/or levels of contamination, the contaminated medium, and the need for mitigation/remediation.

3.12.2 No Build Alternative

The No Build Alternative does not include any construction activities. Therefore, the No Build Alternative would not be affected by potential hazardous waste sites.

3.12.3 Build Alternative

No known hazardous waste sites are within or immediately adjacent to the Study Corridor. The Build Alternative would not be affected by any known hazardous waste sites. In the event contamination is encountered, Greene County would develop an appropriate course of action and coordinate with the MDNR.

3.13 Architectural, Archaeological, Cultural, and Historic Resources

The following subsections describe the results of an archaeological background study and reconnaissance level historic-age non-archaeological survey to assess project impacts to historic properties in the Study Area. As per the Programmatic Agreement (PA; Appendix H) among the Federal Highway Administration (FHWA), the Missouri Highway and Transportation Commission (aka MoDOT), the Advisory Council on Historic Preservation (ACHP), and the Missouri SHPO for the Phased Identification and Evaluation of Historic Properties, the survey for non-archaeological or architectural resources was completed during the initial phase; however, due to property access issues, the archaeological survey and any related site evaluation or mitigation will be completed at a later date but prior to project construction.

3.13.1 Historic Properties

NEPA requires consideration of important historic, cultural, and natural aspects of our national heritage. Important aspects of our national heritage that may be present in the Study Corridor must also be considered under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and the implementing regulations, 36 CFR 800. This act requires Federal agencies to “take into account” the “effect” that an undertaking would have on “historic properties.” The identification of potential historic properties was conducted for historic-age structures, buildings, objects, and districts found within the proposed ROW and the associated Area of Potential Effect (APE). Additionally, a background review was conducted to identify previously recorded archaeological resources and to determine whether additional archaeological survey of the proposed construction limits, which is the extent of the grading limits, is required.

Section 106 defines “historic properties” as any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). The Federal agency must involve the State Historic Preservation Office (SHPO) and other consulting parties in the Section 106 process.

The NHPA mandates that agencies perform the following actions:

- **Initiate the Section 106 process** by first determining whether the agency has an undertaking that is the type of activity that may affect historic properties. If so, the agency must identify the appropriate SHPO/Tribal Historic Preservation Office (THPO) to consult with during the process. It should also plan to involve the public and identify other potential consulting parties. Letters were sent to the appropriate THPO for the Osage Nation, Miami Tribe of Oklahoma, the Kickapoo Tribe in Kansas, the Eastern Shawnee Tribe of Oklahoma, the Cherokee

Nation, the Kickapoo Tribe of Oklahoma, the Delaware Tribe of Indians, the Delaware Nation, and the Unite Keetoowah Band of Cherokee Indians in Oklahoma. The letters and attachments sent, as well as the responses received at the time of publication of this EA, are included in Appendix H.

- **Identify historic properties** that may be affected by a project, including those either listed in the NRHP or determined through a consensus process to be eligible for listing in the NRHP.
- **Assess adverse effects** including the nature and extent of the expected effects on the qualities of the property that resulted in its listing in the NRHP or the determination that it is eligible for listing in the NRHP.
- **Resolve adverse effects** by considering measures to avoid, minimize, or mitigate those effects.

Compliance with Section 106 for this Project is being undertaken in compliance with the PA between the FHWA, MoDOT, the ACHP, and the Missouri SHPO for the Phased Identification and Evaluation of Historic Properties.

Section 4(f) of the Department of Transportation Act of 1966 (discussed in greater detail in Section 3.14) also protects historic properties. With the exception of archaeological sites that do not warrant preservation in the place, Federal agencies cannot approve the use of land from a Section 4(f) property unless there is no feasible and prudent way to avoid the property and it is determined that the action includes all possible planning to minimize harm to the property resulting from such use. The following sections detail the documentation and coordination efforts to-date conducted to satisfy the requirements of NEPA and Section 106 with regard to historic properties.

3.13.2 Archaeological Resources

The APE for archaeological resources is limited to the footprint of the proposed construction limits. Project archaeologists reviewed previous archaeological site and survey records as well as geologic and soils data to make recommendations regarding the need for archaeological survey, including deep testing, within the archaeological APE.

For the records review effort, archaeological literature relevant to the proposed construction limits and surrounding vicinity was reviewed in October 2015. The review included examination of the site inventory records on file at the Missouri SHPO for previously recorded cultural resources within 1 mile of the Project to gain a greater understanding of the resources located within the region. In addition, the investigation identified previous archaeological investigations conducted within the proposed

construction limits. A more intensive records review focused on an approximately 500-foot area (Cultural Study Area) around the proposed construction limits.

In addition to previously recorded archaeological sites, the locations of previous archaeological investigations in the Cultural Study Area were reviewed. The previous survey data was evaluated in conjunction with analysis of previously recorded sites in the vicinity, soils data from NRCS Soil Survey Geographic Database (SSURGO database), and historic U.S. Geological Survey (USGS) topographic maps. Undisturbed portions of the proposed construction limits on landforms with slopes less than 30 percent were considered areas with potential for cultural resources.

Additionally, a professional geoarchaeologist evaluated the proposed construction limits for their potential to contain deeply buried sites. The evaluation was based on a review of Greene County soil survey data using the SSURGO database and USGS topographic maps. Areas within stream valleys mapped as having Holocene-aged alluvial soils were considered areas with the potential for deeply buried cultural resources.

The archaeological GIS and literature review performed at the Missouri SHPO offices in Jefferson City identified five archaeological sites (Table 3-8) and eight archaeological investigations (Table 3-9) within the Cultural Study Area.

Table 3-8: Previously Recorded Archaeological Sites within the Cultural Study Area

Sites	Site Name	Site Description	Component	Year Recorded	NRHP Status
23GR427	Cactus Glade Site	Lithic scatter	Unknown Prehistoric	2003	Not Eligible
23GR435	Baby Boom Site	Lithic scatter	Unknown Prehistoric	1980	Undetermined
23GR436	Utility Pole Site	Lithic scatter	Unknown Prehistoric	1980	Undetermined
23GR437	Patterson Cemetery	Cemetery	Historic	1980	Undetermined
23GR2085	WO841_01	Farmstead	Historic	2014	Not Eligible

Source: Missouri SHPO, 2015

Table 3-9: Previously Recorded Archaeological Surveys within the Cultural Study Area

Report Title	Missouri SHPO Survey ID	Report Author	Year Report Filed	Number of Sites Recorded
<i>Final Report of Archaeological Investigations of Sites Along the James River Interceptor Sewer, City of Springfield, Greene County, Missouri</i>	GR-28	Douthit, Mary Lee	1979	14
<i>Cultural Resource Investigations, Phase I Survey Proposed City Utilities of Springfield Pipeline Project, Greene County, Missouri</i>	GR-64	Sturdevant, Craig	1988	6
<i>Cultural Resource Investigations, Phase I Survey, Springfield 16" Pipeline, Newton, Lawrence, and Greene Counties, Missouri</i>	GR-77	Sturdevant, Craig	1991	6
<i>Cultural Resource Investigations, Phase I Survey & Phase II Testing Proposed Jane 16" Natural Gas Pipeline Project, James River Valley Component</i>	GR-90	Sturdevant, Craig	1993	--
<i>Phase I Archaeological Survey for Republic Road Improvements, Springfield, Greene County, Missouri</i>	GR-123	Peterson, John	1999	1
<i>Cultural Resource Investigations, Phase I Survey, Kansas Expressway & Farm Road 190 Extension Projects, Greene County, Missouri</i>	GR-198	Sturdevant, Craig	2002	--
<i>Cultural Resource Investigations, Phase II Testing, 23GR-ERC-1, Kansas Expressway Extension Project, Greene County, Missouri</i>	GR-213	Sturdevant, Craig	2003	1
<i>Intensive Archaeological Survey, 50 Acres, Riverbluff Cave Area for Greene County, Missouri</i>	GR-243	Thompson, Dustin	2006	3

Source: Missouri SHPO, 2015

Based on review of topographic maps and soils data, there are two valleys crossed by the Project that may have potential for deeply buried cultural materials: the Ward Branch Creek valley and the James River valley. In the Ward Branch Creek valley, the Project crosses what appears to be the modern floodplain and a low terrace. The floodplains of this valley are mapped as Cedargap soils and the terraces as Secesh soils. Both of these soils appear to have a high potential for containing buried cultural resources. The valley is about 500 feet wide.

In the James River valley, the southern portion of the proposed construction limits that turn abruptly to the west cross an alluvial terrace. This terrace is about 400 feet long. There are two alluvial soils mapped on this terrace (Dapue and Moniteau) and a soil formed in hillslope sediments that cap alluvium (Winnipeg). Dapue soils would have a high potential for buried cultural materials, while the Moniteau

and Winnipeg would have a moderate to high potential. However, the latter soils could be too old to contain buried resources, based on the degree of soil development in the profiles.

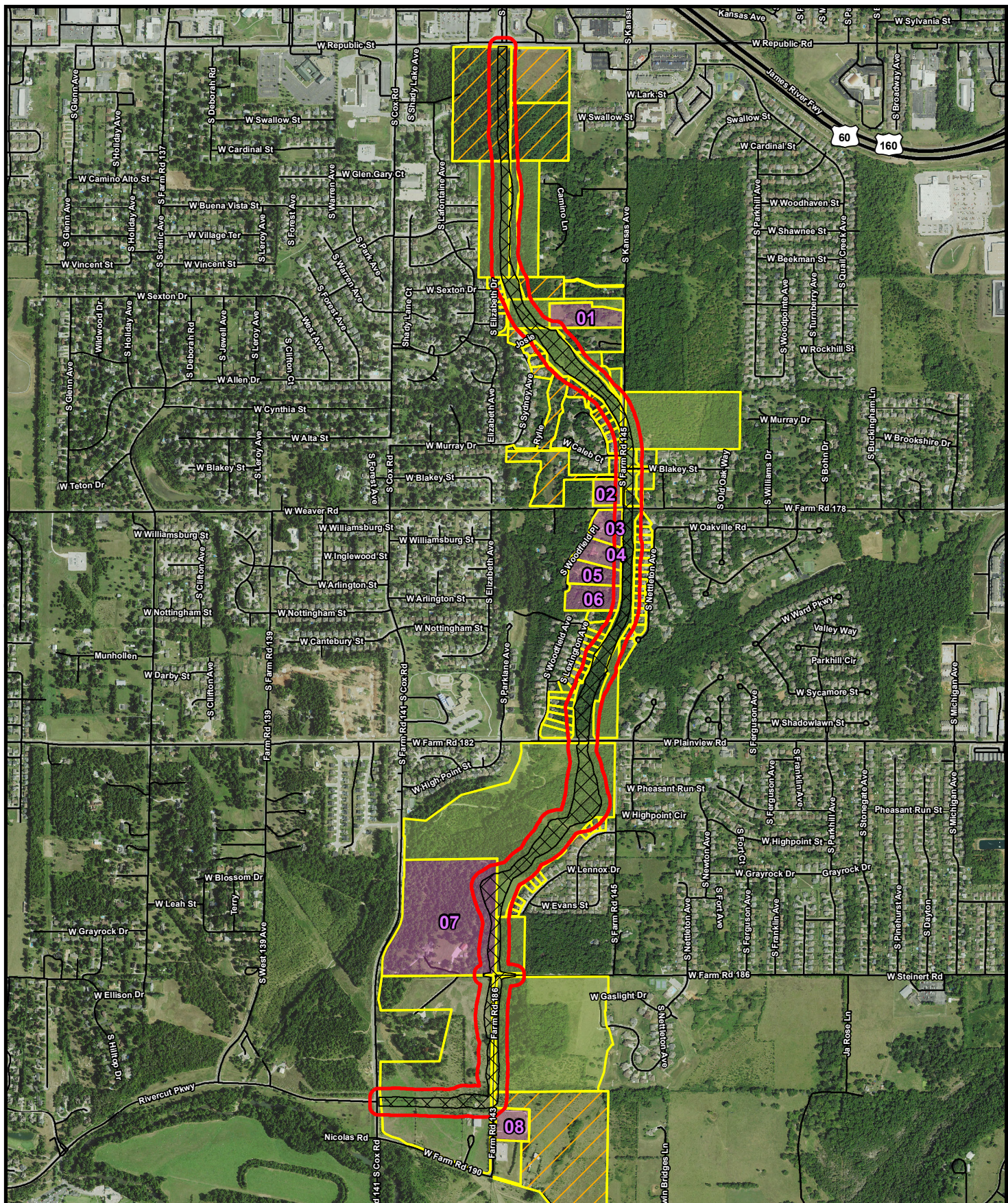
Based on the background review, none of the previous survey investigations within the proposed construction limits appear to meet the current Guidelines for Phase I Archaeological Surveys established by the Missouri SHPO. It was recommended that all portions of the archaeological APE not sloped or inundated or featuring other aspects that make habitation unlikely be surveyed for archaeological resources. Survey would be conducted following the abovementioned guidelines for archaeological surveys under the Phased Section 106 PA. Additionally, if deep impacts are anticipated in the James River valley or the Ward Creek valley, deep testing is recommended at those locations. The Missouri SHPO concurred with these recommendations on August 31, 2016 (see letter in Appendix H).

3.13.3 Historic-Age Non-Archaeological Resources

In accordance with Section 106 of the NHPA of 1966, as amended, and Section 4(f) of the DOT Act, a survey to identify, document, and assess NRHP eligibility for historic-age non-archaeological resources, including buildings, structures, objects, and districts, potentially affected by the Project was conducted. For the purposes of this survey, historic-age was defined as constructed in or before 1970. This 45-year cutoff accounts for the 50-year NRHP age criterion, with a 5-year buffer to allow for potential delays in Project development.

MoDOT defined an APE for historic-age non-archaeological resources for the Project (Figure 3-14). As established, the APE includes the proposed construction limits following the ROW with a western limit at the Kansas Extension and an eastern limit at Campbell Avenue, including an additional 100 feet on both sides of the Study Corridor boundary to account for potential indirect impacts to historic-age non-archaeological resources. The 100-foot-wide APE includes the entirety of intersecting parcels if a historic-age resource associated with the property (i.e., fencing, a driveway, etc.) was located within the established APE.

Per MoDOT's 2014 Built Environment Resource Methods (MoDOT, 2014b), resources 35-years-of-age or older (constructed pre-1980) potentially subject to direct impacts from the Project were documented and assessed. In total, 11 non-archaeological resources constructed in or before 1980 on eight properties were recorded within the APE (Figure 3-14). Additionally, buildings, structures, objects etc. constructed after 1980 and within the APE were photo-documented and keyed to resource location maps, but not assessed with regard to their potential NRHP eligibility as none appeared to meet NRHP eligibility criteria for properties that have achieved significance within the last 50 years.



0 750 1,500
Feet






-  Proposed Construction Limit
-  APE
-  Historic-age Resource Parcel
-  Parcel Not Accessible
-  Vacant Parcel



Figure 3-14
Historic-age Resources

Prior to initiating fieldwork, a records review was conducted to identify any previously recorded cultural resources within or adjacent to the historic-age non-archaeological resources APE. This review included examination of the Missouri Cultural Resource Inventory and records on file at the Missouri SHPO relevant to Springfield, Greene County, and the Study Area. In particular, the records review included examination of previous architectural survey and cultural resource management reports, Greene County files, NRHP eligibility assessments, the National Register Database, the Missouri barn and farmstead survey records, and Section 106 Project Logs within a 100-foot-wide APE buffer. Although several archaeological surveys have been conducted in the Study Area, no surveys for architectural resources were identified during the records review effort. Additionally, no previously recorded NRHP-listed or eligible resources were within the APE or Project area.

The historic-age non-archaeological resources survey included photographic documentation of buildings, structures, objects, districts, etc. 45-years-of-age or older within or on parcels extending into the defined APE, as well as those 35-years-of-age or older (pre-1980) subject to potential direct impacts from the Project. With the exception of sections of the proposed ROW where access was available, the survey was conducted from public ROW in October 2015. In addition to historic-age and pre-1980 resources potentially subject to direct impacts, all architectural resources less than 45 years old within the APE were photographed for identification as “modern” on Project mapping. The field data was used to evaluate the eligibility of the recorded resources for NRHP inclusion and to assess potential Project effects to significant properties, where applicable. Though 15 parcels were inaccessible at the time of survey (Figure 3-14), historic and modern map and aerial photograph comparison and central appraisal district research providing approximate year built dates and information regarding existing improvements on each parcel indicates the inaccessible tracts do not contain historic-age resources.

During the survey, eight resources 35-years-of-age or older that could be subject to direct impacts from the Project through acquisition of property were recorded. Two of the resources (Resources 01 and 08) are over 45-years-of-age while the remaining resources were constructed between 1970 and 1980 (Table 3-10). Though the Cultural Study Area itself is undeveloped, it is surrounded by post-1980 subdivisions, many constructed within the last 10 years. In addition to the eight resources constructed before 1980, 62 resources within the APE constructed post-1980 were recorded.

Table 3-10: Historic-age Non-Archaeological Resource Inventory Table

Resource Number	Location	Style	Construction Date (CAD when available)	NRHP Eligibility Recommendation
01	4641 FM 146	Ranch Style	1965	Not Eligible
02	4917 FM 146	Ranch Style	1974	Not Eligible
03	5020 S. Woodfield Place	Contemporary	1974	Not Eligible
04	5040 S. Woodfield Place	Ranch Style/ Neoelectic	1976	Not Eligible
05	5110 S. Woodfield Place	Split-level	1974	Not Eligible
06	5128 S. Woodfield Place	Neoelectic	ca. 1980	Not Eligible
07a (Davis House)	5780 S. FM 141	Vernacular/ Ozark Rock Masonry	ca. 1930	Not Eligible
07b (Davis House)	5780 S. FM 141	No Style	ca. 1960	Not Eligible
07c (Davis House)	5780 S. FM 141	Ozark Rock Masonry	ca. 1930	Not Eligible
07d (Davis House)	5780 S. FM 141	Ozark Rock Masonry	ca. 1930	Not Eligible
08 (Patterson Cemetery)	Intersection of W. FM 190 and S. FM 186, northeast corner	Anglo-American Protestant Cemetery	ca. 1850s to present	Eligible/Criterion A, NRHP Criteria Consideration D

In addition to the 50-year age criterion, NRHP eligibility requires a resource to meet at least one of four primary criteria for significance and to retain sufficient physical integrity (Advisory Council on Historic Preservation 36 CFR 800 2004). More specifically, the criteria state that resources may qualify for NRHP consideration if they meet one or more of the following Criteria for Evaluation:

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

These four Criteria for Evaluation — along with NRHP Criteria Considerations for religious properties (A), relocated resources (B), birthplaces or graves of historical figures (C), cemeteries (D), reconstructed buildings (E), commemorative properties (F), and properties that have achieved significance within the past 50 years (G) — served as the basis for the preliminary NRHP eligibility recommendations presented in the report (National Park Service [NPS], 2015).

In an August 31, 2016, letter, the SHPO determined the Patterson Cemetery (Resource 08) is not eligible for NRHP inclusion due to the presence of a significant number of modern grave markers and alterations to the surrounding landscape. Formal determinations of eligibility and effect for the remaining resources were not provided pending additional survey under the Phased Section 106 PA (Appendix H).

3.13.4 No Build Alternative

The No Build Alternative would have no effect on archaeological, non-archaeological, or historic properties.

3.13.5 Build Alternative

The Build Alternative has the potential to impact as yet unidentified historic properties. Compliance with Section 106 is being conducted under the PA for the phased Identification and Evaluation of Historic Properties (July 2014) among FHWA, MHTC, ACHP, and MoSHPO. Additionally, impacts to archaeological resources will be considered as property access and Project design are finalized.

Construction authorization for the Project cannot be issued until all of the applicable stipulations of the PA for Phased Section 106 evaluations have been satisfied.

3.14 Section 4(f) and Section 6(f) Resources

Section 4(f) is part of the DOT Act of 1966 that was designed to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. A Section 4(f) property must be publicly owned, except for historic sites, which could be either publicly or privately owned. Federally funded DOT actions cannot impact Section 4(f) eligible sites unless there is no feasible and prudent alternative.

Section 6(f) is part of the Land and Water Conservation Fund (LWCF) Act of 1965, which was designed to provide restrictions for public recreation facilities funded with LWCF money. The LWCF Act provides funds for the acquisition and development of public outdoor recreation facilities that could include community, county, and state parks, trails, fairgrounds, conservation areas, boat ramps, shooting ranges, etc. Facilities that are LWCF-assisted must be maintained for outdoor recreation in perpetuity and therefore require mitigation that includes replacement land of at least equal value and recreation utility. Review of National Park Service LWCF listings for Greene County and local Springfield-Greene County Parks did not reveal any properties receiving LWCF funds in the Study Corridor.

Available references indicate two locations where public lands or historic sites eligible for the NRHP located near the Study Corridor: Springfield-Greene County CODP Archery Range and the Ward Branch Trail.

Springfield-Greene County CODP Archery Range is located on the east side of Cox Road between Plainview Road and Farm Road 190. Recreational amenities include indoor and outdoor ranges for archery. The CODP is part of a larger property of 37 acres purchased by Greene County in 2010. More than 2 acres of the property are designated for ROW for the Project. The land, aside from the acreage set aside for ROW, is leased to the Springfield-Greene County Parks Department. The lease is a 10-year arrangement with the County that includes options at the end of the 10 years for the Parks Department to purchase the land, extend the lease, or extinguish the lease.

The Ward Branch Trail is a 4-mile paved, multi-use trail along Ward Branch and is currently in three discrete sections that are planned to eventually connect. The section in the Study Area is 2 miles long and connects Wanda Gray Elementary School to the Missouri Institute of Natural Science. The other two sections of the Ward Branch Trail are east of the Study Area, with the section nearest the Study Corridor proposed for future improvement. The future trail alignment would be spanned by the Project and have access to bicycle/pedestrian facilities along the Study Corridor.

3.14.1 No Build Alternative

There would be no impact to 4(f)/6(f) resources.

3.14.2 Build Alternative

The Project will not impact any identified 4(f)/6(f) resources either directly or indirectly. As previously described, the section of the Ward Branch Trail that would be spanned by the Study Corridor is not currently constructed. In the event that portion of the Ward Branch Trail is constructed before the Project, access to the Ward Branch Trail will be maintained during construction of the Project.

3.15 Visual Resources

This section will discuss the visual characteristics of the Build Alternative and the possible effects of the Project on potential viewers. Currently, the visual landscape in the Study Corridor is undeveloped with woodlands and open space crossed by east-west roadways and surrounded by residential development, parks, schools, and religious facilities. The corridor is also crossed by transmission lines along Weaver Road, Plainview Road, and Farm Road 186. The visual landscape is typical of a high density suburban area.

3.15.1 No Build Alternative

The No Build Alternative would not change the visual character of the Study Corridor or the Study Area. The Study Corridor would remain visually unchanged from its current condition.

3.15.2 Build Alternative

The Build Alternative would introduce a new roadway and pedestrian/bicycle paths along the Study Corridor. It is likely that the new alignment would be visible to many residents in the area, especially those immediately adjacent to the corridor. Open landscape, dominated by open fields and wooded areas, would be replaced by paved travel lanes and associated signage and traffic signals. However, the Study Corridor is wider than required for the travel lanes, and initially only two lanes would be constructed. Wooded areas outside the developed ROW could remain to provide a visual barrier between adjacent residences and the Project. Additional adjacent floodplain areas along Workman and Ward Branches are expected to remain wooded and would screen the Project from adjacent residences. The area surrounding the Project is dominated by residential areas, with smaller, undeveloped areas dispersed throughout the Study Area. The Project would differ somewhat in character with existing roadways in the area as it would include undeveloped median space upon development as a four-lane roadway and would not contain numerous driveway entrances or utilities, contributing to a less developed visual character.

3.16 Construction Impacts

This section will discuss the construction impacts of the No Build and Build Alternatives. During construction of the Build Alternative, there would be short-term, temporary adverse impacts near the proposed action including traffic control/detours, air quality, noise, protected habitat, water quality, floodplains, visual, utilities, as well as borrow and waste site impacts.

3.16.1 No Build Alternative

The No Build Alternative does not include any construction activities and would therefore result in no construction-related impacts.

3.16.2 Build Alternative

The Project would result in short-term and temporary impacts due to construction activities. These would include increases in noise, dust, and pollutants discharged by construction equipment. It would also include temporary disruptions to businesses, residences, and existing traffic patterns with the development of possible travel detours and access modifications. These potential impacts are discussed in the following subsections.

3.16.2.1 *Traffic Control/Detours*

Constructing a new roadway would have some impact on local traffic in the immediate area as the contractor's personnel work around the Project site. Given that the majority of roadway construction for the Project would be in areas where no roads exist currently, the impacts to traffic would be limited.

Additional traffic would be generated by delivery of materials to the Project site. A Traffic Management Plan would be developed as part of the final design activities during Project design. A Traffic Management Plan defines a set of coordinated traffic management alternatives to manage the work zone impacts. As outlined in a Traffic Management Plan, proposed options for managing traffic during construction would include staging construction to impact traffic as little as possible, actively conducting public outreach, scheduling high-impact work for hours of off-peak traffic, installing temporary traffic control devices, and possibly enlisting the help of law enforcement for additional traffic control, if necessary.

3.16.2.2 *Air Quality*

Air quality concerns associated with roadway construction typically arise from the operation of construction equipment such as bulldozers, haul trucks, and pavers. These types of equipment use diesel engines that put out exhaust gases similar to those from over-the-road trucks. The level of contaminants in the exhaust can vary greatly depending on the condition of the equipment, thus making it important to keep equipment in good operating condition. Emissions from construction equipment would be controlled in accordance with emission standards prescribed under state and Federal regulations.

Materials resulting from clearing and grubbing, demolition, or other operations (except materials to be retained) would be removed from the Project site and disposed of by a licensed contractor at a construction landfill. Tree trunks, limbs, and vegetation resulting from clearing and grubbing operations may be disposed of by open burning after obtaining required burning permits from the appropriate city or county office. Open burning in incorporated areas will be permitted only under a permit or waiver from MDNR. The contractor may attempt to harvest any marketable timber, use mulched timber for erosion control, and compost excess mulch. Man-made waste must be hauled to a licensed landfill.

Under dry conditions, heavy traffic or strong winds can cause dust from the soil itself to become airborne (fugitive dust), resulting in air quality impacts. Contractors are required to control this fugitive dust to keep it from leaving the Project limits. Watering the ground or using dust-retarding chemicals and washing vehicles prior to leaving the construction site may be used to reduce the generation and transport of fugitive dust. All methods must comply with applicable Federal, state, and local laws and regulations.

3.16.2.3 *Noise*

Noise is expected from the operation of equipment such as bulldozers, front-end loaders, scrapers, and other typical earth-moving equipment. To reduce the impacts of construction noise, the Greene County Highway Department (GCHD) would include special provisions in the construction contract requiring

that all contractors comply with all applicable local, state, and Federal laws and regulations relating to noise levels permissible within and adjacent to the Project construction site. In compliance with the City of Springfield ordinances, construction would occur only between 7:00 a.m. and one-half hour before sunset, except in a case of urgent necessity. Should such a necessity occur, construction would only occur with a permit from the building inspector (City of Springfield, 2016). Additionally, construction equipment would be required to have noise-reducing mufflers in accordance with the equipment manufacturer's specifications.

3.16.2.4 *Protected Habitat*

Some trees in the Study Corridor undoubtedly provide suitable roosting opportunities for the federally endangered Indiana bat and federally threatened northern long-eared bat in the summer. However, suitable roost trees would be removed during the period between November 1 and March 31 to avoid possible direct impacts to Indiana bats and northern long-eared bats during the summer maternity season. Consultation with USFWS is expected to be coordinated by FHWA and MoDOT. Formal consultation comments, including mitigation requirements for concurrence determination, would occur after USFWS review of the EA.

3.16.2.5 *Water Quality*

Controlling erosion during construction of roadways is important. The MDNR regulates the control of runoff from land disturbance and issues a permit for the work to GCHD, not to the contractor. Erosion control measures must be put in place before land clearing begins and maintained throughout the Project. GCHD's Stormwater Pollution Prevention Plan provides for temporary erosion and sediment control measures that would be included within construction contract specifications. Careful refueling practices would limit spills of gasoline and diesel fuels. Oil spills and leaks can be minimized by frequent checks of construction equipment. At a minimum, the following measures would be included in the SWPPP prepared for the Project:

- Locate and protect all temporary storage facilities for petroleum products, other fuels, and chemicals to prevent accidental spills from entering the streams within the Study Area. Clean-up any such spills that occur within 1,640 feet (500 meters) of any stream within 24 hours of the spill to prevent the possibility of pollution due to runoff.
- Avoid disposing of cement sweepings, washings, concrete wash water from concrete trucks, and other concrete mixing equipment, treatment chemicals, or grouting and bonding materials into streams, wetlands, or into any location where water runoff will wash pollutants into streams or wetlands.

- Reseed all areas within the Project limits denuded of vegetation as a result of construction activities, as specified in the land disturbance permit.
- Protect wetlands in the Study Area from activities that may result in draining or filling them.
- Per Project permits, excavate, dredge, and fill in the watercourses in a manner that will limit increases in suspended solids and turbidity.
- Promptly remove and properly dispose of debris during every phase of the Project in order to prevent the accumulation of unsightly, deleterious, and toxic material in or near area waterbodies.
- Avoid disposing of any construction debris or waste material below the OHWM of any waterbody or at any location where the material could be introduced into the water or an adjacent wetland because of run-off, flood, wind, or other natural forces. The OHWM for a river or stream is usually determined through examination of recent physical evidence of surface flow in the stream channel, such as flow lines and debris.
- In the event that roadway construction requires filling a sinkhole, guidelines from Greene County would be employed (Greene County, 1999)

3.16.2.6 *Impacts to Floodplains/Floodways*

The construction of the Build Alternative would incorporate those features necessary to meet FEMA and SEMA standards. Practical measures to limit impacts to the floodplain would be incorporated into the Project design.

3.16.2.7 *Visual Effects*

During construction of the Build Alternative, both views of and from the Study Corridor would be temporarily degraded due to the construction activities such as earth moving, and roadway and bridge construction.

3.16.2.8 *Utilities*

Major utilities traversing the Study Corridor include large diameter underground sewer and natural gas lines along with overhead high voltage electrical transmission lines. It is anticipated that the construction of the new roadway would have only minor impacts upon these utilities and that GCHD's utility engineer and representatives of the utilities would work out details of individual utility adjustments on a case-by-case basis.

3.16.2.9 *Borrow and Waste Sites*

Suitable materials removed during excavation would be used as practicable in the formation of bridge and roadway embankments, subgrade, shoulders, and other locations requiring fill, as directed on the

construction plans. No excavated materials would be wasted without permission, and when such material is to be wasted, it would be so placed that it would present a neat appearance and not be injurious to abutting property. The construction plans may designate certain materials to be excavated and stockpiled for a specific purpose or for future use. It is the contractor's responsibility to make use of available suitable excavation material within the limits of the Project.

Waste and borrow areas would be identified by the Contractor. The use of borrow pits or waste areas, other than those shown on the construction plans or designated by a field engineer, may be approved, provided the material and area is satisfactory. The contractor would furnish the field engineer a copy of the agreement with the landowner for use of the property as a borrow or waste area. The agreement would contain stipulations about temporary seeding and water pollution control to be implemented during construction. Approval of borrow or waste sites is also contingent upon receiving appropriate wildlife and/or archaeological clearances.

In the event the contractor's excavation operation encounters remains of a prehistoric site or artifacts of historical and/or archaeological significance, all construction activities would be temporarily discontinued. The field engineer will contact the MoDOT Historic Preservation section to allow inspection of the site to determine if further investigation is necessary before construction activities can continue. In order to ensure compliance with applicable state laws the MoDOT Construction Inspector or Resident Engineer cannot release remains or artifacts, or allow the contractor to disturb the area within the 50-foot buffer space around these discovered items until after consultation with MoDOT Historic Preservation staff and until after all applicable requirements from FHWA or SHPO have been addressed.

In the case of archaeological artifacts, MoDOT Historic Preservation staff will contact the appropriate staff at the FHWA and SHPO to report the discovery after a preliminary evaluation of the artifacts is made and reasonable efforts are undertaken to see if the findings represent an archaeological site that can be avoided. If MoDOT determines the site/artifacts are significant and will be adversely affect by the contract work, MoDOT Historic Preservation staff will immediately notify the FHWA and SHPO of this finding and provide recommendations to minimize and/or mitigate the adverse effect.

In the event human remains are encountered, MoDOT Historic Preservation staff will notify the local law enforcement and the SHPO as per state law. If the contractor is unable to contact appropriate MoDOT staff, the contractor shall initiate this involvement by local law enforcement and the SHPO. In this instance, a description of the contractor's actions shall be promptly made to MoDOT.

3.17 Indirect and Cumulative Impacts

Indirect impacts are caused by implementation of a project but occur later in time or are outside of the project boundaries (e.g., changes to surface water flow to wetlands, or development of a gas station near a new highway interchange). The CEQ defines cumulative impacts (40 CFR 1508.7) as the impact on the environment which results 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.

3.17.1 Indirect Impacts

The Project would be consistent with the current comprehensive plans for both the City of Springfield and Greene County. On-going development adjacent to and near the Study Area is indicative of overall economic development that is occurring in the southern portion of Springfield and Greene County. Additional phases of residential development would attract additional businesses to the area. Improvement in the reliability of north/south travel routes through the Study Area would support these on-going development efforts.

Research and empirical evidence support the theory that economic development follows substantial transportation and access improvements. The Project would introduce a new roadway into the region and provide access to areas that are currently inaccessible. The planning authorities have been involved in the development of this Project for many years, and they support the construction of the new roadway. Comprehensive plans and any future planning and zoning ordinances would continue to serve as the appropriate mechanisms to guide land use and development.

There would be both immediate and long-term potential economic impacts in the Study Area and the surrounding communities. Immediate, positive economic impacts would occur during the time required for property acquisition and design and construction of the roadway. These would be generated by the work and incomes provided by construction. In addition to the jobs supported by the direct infusion of construction dollars into the local economy, there would be the secondary effect of those dollars in the economy and the increase in tax monies received.

3.17.2 Cumulative Impacts

The construction of the new roadway would contribute to the cumulative loss of riparian and woodland habitat. Much of the on-going and planned development is occurring in areas already disturbed and dedicated for development in existing land use plans and is not contributing to habitat loss. Cumulative effects on riparian and woodland communities are not considered substantial.

Other reasonably foreseeable projects could contribute to the cumulative effects of this Project including:

- In February 2016, the Department of Veteran Affairs announced their selection of a site located on the southeast corner of the future Kansas Expressway Extension/Republic Road intersection, and north end of the Study Area, for construction of a new regional clinic. The site is 20 acres in size and estimated to open in late 2018 or early 2019.
- An east-west roadway connection between Campbell Avenue and Cox Road tying into the southern portion of the Study Area and Farm Road 190 has been the subject of preliminary study for a future corridor.
- Extending the Kansas Expressway south of the southern terminus at Farm Road 190 across the James River is not anticipated as a future secondary impact. The construction of Cox Road over the James River east of the Kansas Extension corridor negates the need for an additional river crossing in the area.

Overall, no substantial cumulative effects are anticipated as a result of implementation of the Project, other than the positive cumulative effects on regional traffic circulation and safety.

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4.0 COMMITMENTS

4.1 Commitments

The following is a compiled list of Project commitments. Greene County will implement all Project and regulatory commitments.

- Two barriers meet the MoDOT feasibility criteria and two of the three reasonableness criteria for the future full four-lane build out. A noise wall will likely be located between stations 75+00 and 91+00 and should average 10 feet in height. The noise wall would attenuate noise on the east side of the highway. A noise wall would also be likely to be located between stations 108+00 and 112+40, with an average height of 13 feet, and would attenuate noise on the east side of the highway. The locations of these barriers can be seen in Figure 3-11, in Section 3.6. After the model and analysis is updated, the viewpoints of the property owners in these two areas will need to be obtained to meet the third requirement for reasonability. Should all three requirements be met, Greene County will prepare and have incorporated the construction of appropriate barriers in these locations.
- Greene County will include special provisions in the construction contract requiring that all contractors comply with all applicable local, state, and Federal laws and regulations relating to noise levels permissible within and adjacent to the Project construction site to reduce impacts of construction noise.
- Greene County will prepare a Project-specific SWPPP to describe the BMPs to be implemented during construction for the Project. The SWPPP will include MDNR-approved components to reduce suspended solids, turbidity, and downstream sedimentation that may degrade water quality and adversely impact aquatic life.
- Greene County will obtain jurisdictional determinations for wetlands/waters of the U.S. through coordination with the USACE prior to initiating final design. Greene County and its engineer will consider avoidance of W-1, S-1, and S-2 (Figure 3-12) in Project design. This information will be used by Greene County to obtain a Section 404 Permit prior to beginning any construction activities on the Project.
- Greene County and its engineer will conduct a hydraulic analysis during final design to document that the new roadway will result in “no rise” in the flow within the regulatory floodway. During construction, Greene County and its contractor will minimize the size and duration of temporary obstructions within the floodplains by effective construction sequencing and construction methodology.

- Prior to beginning any construction activities on the project, Greene County will obtain necessary floodplain permits from SEMA for the Project.
- Sediment, surface water/construction fluids, and road runoff could be introduced to the Springfield Plateau aquifer. Sinkholes and other karst features (e.g., vanishing streams) may act as a direct conduit for surface water to enter groundwater. As a result, these features will be properly identified and accounted for by Greene County and its engineer during the design phase and managed by the contractor throughout construction and grading activities.
- The presence of sinkholes and soil voids will be determined by Greene County and its engineer during geotechnical investigation and taken into account during the design and grading phase.
- Greene County will require its contractor to inspect and clean all equipment used during construction of the Project before moving into the Study Corridor.
- Greene County will require its contractor to use BMPs during construction in areas where karst features have been identified that will include:
 - Conducting a geologic subsurface evaluation of the Study Corridor using exploratory borings, electrical resistivity, seismic, or ground penetrating radar
 - Contacting geotechnical specialists if new karst features are found during construction
 - Where permissible, plugging karst features using reverse grade filters, compaction grouting, and cap grouting
 - Installing stormwater control measures to provide positive drainage away from karst features
 - Monitoring sediment/erosion control measures throughout the construction process and after rain events
 - Using additional erosional control techniques, such as two rows of silt fencing, where water flows into karst features
 - Positioning of staging areas at least 200 feet away from waterbodies and karst features
 - Refueling of equipment at least 200 feet away from waterbodies and karst features
 - Applying fertilizers, herbicides, or other chemicals at least 200 feet away from waterbodies and karst features
 - Maintaining natural waterbody features
 - Minimizing removal of riparian vegetation
 - Re-vegetating disturbed areas after construction activities
- Any water wells encountered during construction will be appropriately abandoned in accordance with Missouri Well Construction Rules Section 10 CSR 23-3.110 by Greene County and its contractors.

- Greene County and its contractor will remove trade material, demolition materials, or refuse generated during construction from the Project site and supervise the disposal of by a licensed contractor at a construction landfill. Tree trunks, limbs, and vegetation resulting from clearing and grubbing operations may be disposed of by open burning after obtaining required burning permits from the appropriate city or county office. Open burning in incorporated areas will be permitted only under a permit or waiver from MDNR.
- Greene County will require that contractors control fugitive dust to keep it from leaving the Project limits. Watering the ground or using dust-retarding chemicals and washing vehicles prior to leaving the construction site may be used to reduce the generation and transport of fugitive dust. All methods must comply with applicable Federal, state, and local laws and regulations.
- Any previously unknown hazardous waste sites that are found during Project construction will be handled by Greene County and its contractor in accordance with state and Federal laws and regulations.
- Any historical or archaeological impacts will be addressed according to the stipulations outlined in the Phased Section 106 PA (see Appendix H).
- Greene County and its engineer will develop a Traffic Management Plan as part of the final design activities during Project design. A Traffic Management Plan defines a set of coordinated traffic management alternatives to manage the work zone impacts.
- Greene County and its contractor will remove identified suitable roosting trees during the period between November 1 and March 31 to avoid possible direct impacts to Indiana bats and northern long-eared bats during the summer maternity season.
- During future geotechnical and other investigations necessary for final design and construction, any karst features identified will be investigated by Greene County and a qualified biologist for the presence or potential use by protected bat species. Known caves in proximity to the Study Corridor (0.5 mile) that could be indirectly disturbed or affected by construction activity, as well as potentially suitable karst features identified within the Study Corridor, will be investigated by Greene County and a qualified biologist for the presence of protected bats. This investigation and corresponding consultation with USFWS (based on the results of the investigation) will be completed and any mitigation measures resulting from that consultation will be incorporated into the project prior to receiving a federal construction authorization for the project.
- The contractor will identify all borrow and waste sites prior to initiating construction. The contractor shall be responsible for obtaining all necessary environmental clearances, approvals and permits for use of all borrow and/or waste sites.

- The section of the Ward Branch Trail that would be spanned by the Study Corridor is not currently constructed. In the event that portion of the Ward Branch Trail is constructed before the Project, access to the Ward Branch Trail will be maintained by Greene County and its contractors during construction of the Project. Greene County and its engineer will consider the location of the planned trail during Project development so that continuity of the future trail will not be impacted.
- If changes in the Project footprint or scope occur that were not evaluated in this document, Greene County shall re-evaluate the NEPA document to ensure the determinations remain valid.

4.2 Permits Required for Construction

The following permits and approvals will be required for construction of the Project, based on current anticipated impacts:

4.2.1 Section 404 Permit and Section 401 Water Quality Certification under the Clean Water Act

A Section 404 Permit from the USACE and Section 401 Water Quality Certification from MDNR will be required to authorize placement of fill materials within jurisdictional wetlands. Under Section 404 of the Clean Water Act, if permanent impacts to wetlands are greater than one-tenth of an acre, mitigation is generally required as part of the Section 404 permit. If impacts to wetlands cannot be avoided, this information would be used to obtain a Section 404 permit for construction of the Project. Furthermore, Issuance of the Section 404 permits by the USACE is contingent on obtaining water quality certification issued under Section 401 of the Clean Water Act from MDNR.

4.2.2 Section 402 of the Clean Water Act

Authorization for the discharge of stormwater from construction activities is required in Missouri in compliance with the NPDES requirements of Section 402. A Notice of Intent would need to be filed with the MDNR to request authorization under the Missouri State Operating Permit. MDNR requires the development of SWPPP in conjunction with the permit authorization. Once construction is complete, a Notice of Termination will be submitted to MDNR.

4.2.3 Floodplain Development Permit

In Missouri, SEMA issues a floodplain development permit for any project located within a special flood hazard area. This permit requires a “no rise” certification. The certification indicates that a project would cause no rise in the regulatory floodway of a given flooding source.

The FHWA floodplain encroachment policy requires the avoidance of longitudinal encroachments wherever practicable. If longitudinal floodplain encroachments cannot be avoided, the degree of encroachment should be minimized to the extent practicable. Generally, any increase in the 100-year water-surface elevation produced by a longitudinal encroachment on the NFIP-mapped floodplain should not exceed the 1 foot allowed by Federal standards.

4.2.4 USFWS Section 7 Consultation

The ESA of 1973 designates and provides for the protection of threatened and endangered plants and animals and their critical habitat. For the Project, FHWA and MoDOT are acting as the lead agencies for Section 7 consultation under the ESA. It is their responsibility, supported by Greene County, to consult with the USFWS to establish a list of protected species; prepare a Biological Assessment (BA), if required, of the potential for the Project to adversely affect listed species; provide coordination between state and federal biological resource agencies to assess impacts and propose conservation measures; and develop appropriate conservation strategies for all adverse impacts on federally listed species. If FHWA and MoDOT determine in a BA that threatened or endangered species would be adversely affected by the project, they would need to request formal consultation with USFWS. USFWS would review the information in the BA and develop a Biological Opinion as to whether or not the Project would likely result in jeopardy to the species adversely affected or issue a non-jeopardy incidental take statement.

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5.0 COMMENTS AND COORDINATION

5.1 Introduction

The preparation of the EA was initiated by Greene County in 2015. Major Project coordination milestones are shown in Table 5-1.

Table 5-1: Major Project Coordination Milestones

Milestone	Date
Letters sent to property owners adjacent to the Project ROW	October 2015 and November 2015
Invitation letter sent to potential cooperating and participating agencies	November 2015
Project information posted to Greene County website	October 14, 2015
Stakeholder interviews	October 14–16, 2015 and November 10, 2015
Agency coordination meeting	December 1, 2015
Public open house meeting and newsletter published (all information also available online)	February 2, 2016
Project Working Group Meeting #1	March 14, 2016
Project Working Group Meeting #2	TBD

5.2 Agency Coordination

Agencies were sent a letter in November 2015 containing information on the Project and an invitation to the agency coordination meeting. The letter requested assistance in the planning process and in the identification of information about the Study Area that could be useful to the Project team. In December 2015, an agency coordination meeting was held in Jefferson City, Missouri. Representatives from Greene County, MoDOT, FHWA, the City of Springfield, EPA, MDC, MDNR, Burns & McDonnell, Great River Engineering, and Hg Consult were present. The Project team presented an overview of the history of the Project, the draft Purpose and Need, public involvement plans, and environmental studies that were completed or in progress. The Project team reviewed Section 106 requirements as well.

5.3 Informational Public Meeting

An informational public meeting was held on February 2, 2016, from 5 to 7 p.m. at the Library Center Auditorium in Springfield, Missouri. The meeting followed an open house style format, and 229 people attended. Representatives from Greene County, City of Springfield, OTO, and the consultant team staffed the meeting. Displays included an overview of the Project, a timeline of the history of the development of Project alternatives, information on the EA activities, a Project timeline, as well as maps and a video

animation depicting the proposed alignment. Copies of the meeting email notifications, newspaper advertisements, and flyer; sign-in sheets; meeting displays; and meeting handout are provided in Appendix I.

Email invitations were sent to approximately 60 people who had expressed an interest in being on the Project email distribution list. An advertisement was placed online and in print editions of the *Springfield News-Leader*. A flyer advertising the meeting was distributed, and two news releases were sent to area media outlets. Materials from the public meeting were also available for review online at the GCHD website: https://www.greenecountymo.org/highway/future_projects.php.

The comment period was open from February 2 to 19, 2016, and 51 comment cards were received. Comments ranged from support and understanding of the need for the Project to concerns about impacts to the neighborhoods in the area and questioning the need for the Project. A summary of public meeting materials and copies of comments received are included in Appendix I. A summary of common items submitted through comment cards from the public open house, through the mail, and those submitted at other meetings is provided in Table 5-2. Comments and concerns were related to engineering, traffic on other roads in the area, the need for the project, schedule, economic factors, safety, and environmental issues. Responses to these comments are also provided in Table 5-2 and addressed in this EA.

In addition to the public meeting and online materials, a meeting was also held with the Stone Meadows Home Owners Association (HOA) on February 8, 2016, at the Library Center Auditorium in Springfield, Missouri. Around 50 people attended the meeting, which was requested by the HOA. A short overview of the Project was provided by the Project team and then a question and answer session was held. Handouts and comment cards from the public meeting were available to attendees.

Table 5-2: Summary of Comments and Questions from Questionnaire

Question/Concern	Category	Answer
When will the project cross the James River?	Schedule	Extending Kansas Avenue to cross the James River is not anticipated to occur before 2040.
Can the project be two lanes, or does it have to be four lanes?	Engineering	An initial two lane facility will adequately address the travel needs when constructed. It is anticipated that by 2037, the growth of travel in the region will trigger the need to expand Kansas Avenue to four lanes.
Will there be sufficient use of the road to justify its construction?	Need	Traffic projections compiled for the Environmental Assessment forecast that roadway use in this region of Springfield and Greene County will continue to grow. The added capacity provided by extending Kansas Avenue will address current and projected needs for north/south travel.
Will there be increased traffic on Weaver and Plainview? How will this be dealt with? These roads seem busy already. What are their current capacities and what is the anticipated increase from the project?	Traffic on other roads	<p>When looking at 2040 traffic volume projections:</p> <ul style="list-style-type: none"> • Traffic on Plainview Road is anticipated to increase by 650 vehicles per day above what would be expected if Kansas Avenue is not constructed. • Traffic on Weaver Road is anticipated to increase by 3,400 vehicles per day above what would be expected if Kansas Avenue is not constructed <p>There will be signalized intersections at both Plainview Road and Weaver Road where they cross the Kansas Avenue Extension to help provide increased capacity on the roadways.</p>
When will the project be extended to Nixa?	Schedule / Engineering	Extending Kansas Avenue to Nixa is not anticipated to occur before 2040.
I would like to see the survey or comments from area residents who support this Project.	Communication	Responses from the open house, mailed in comment cards, and other correspondence can be found in Appendix I of the EA.
Are sound walls going to be installed?	Engineering / Noise	A noise abatement analysis showed that two noise walls would likely be feasible and reasonable. These walls would be 10 to 13 feet in height. Final recommendations for number and placement of any noise walls would be made during final design. More information can be found in Section 3.6 of the EA.
Can trees remain behind homes? How can privacy be maintained?	Environmental	Existing trees will be left in place unless removal is required for construction. More information on what might be needed for construction will be determined during final design. Property owners will be able to add features to address privacy, as desired within their property boundary.

Question/Concern	Category	Answer
Will there be loss of property value?	Economic	Property values are based on a variety of factors including location, condition, accessibility, zoning restrictions, utility connectivity, etc. It would be impossible to speculate on how this project would impact the value of any particular property - either positively or negatively.
No current plan for southern outlet?	Engineering	Extending Kansas Avenue south of FR 190 is not anticipated to occur before 2040. Greene County is assessing alignment options to extend FR 190 easterly past Campbell Avenue.
The new road would dump back onto Cox. How does this fix the problem?	Engineering	Extending Kansas Avenue to Cox Road provides additional north/south travel lanes
How will caves be impacted?	Environmental	No caves or cave habitats were identified within the Study Corridor during the preliminary geologic evaluation. More information about mitigation of cave impacts can be found in Section 3.11 of the EA.
How will the water runoff be dealt with?	Engineering	Enclosed storm sewer systems will be constructed throughout the length of project and collect pavement runoff.
Why can't another road (such as FF/West Bypass) be used? Why can't an existing road be expanded?	Engineering	As part of the Ozark Transportation Organization long range plan, different options for improving north/south travel were considered, including expanding Route FF/West Bypass and improving Campbell Avenue. Other options each have their own merit, however, extending Kansas Avenue provides the best balance of cost and future connectivity needs for the region.
Can the bike path be on both sides of the road? Currently only shown on one side. Concerned about crossing such a big road to get to bike path.	Engineering	A bike path will be constructed on one side with a sidewalk constructed on the opposite side. Crossings at signalized intersections will be available at Weaver Road, Plainview Road FR 190 and FR 145.
Why is the speed limit 40 mph in a residential area?	Engineering	To set a speed limit many factors, including roadway design, access to the roadway from entrances or side roads, and driver expectancy, are considered. The 40 MPH limit provides an appropriate speed for the surrounding area, limited number of access points, and anticipated spacing of traffic signals.
Why isn't the speed limit higher? We could move commuters through the area faster if the speed limit were higher.	Engineering	To set a speed limit many factors, including roadway design, access to the roadway from entrances or side roads, and driver expectancy are considered. The 40 MPH limit provides an appropriate speed for the surrounding area, limited number of access points, and anticipated spacing of traffic signals.

Question/Concern	Category	Answer
What is the schedule for the phases of the project? (Two lanes vs four lanes?) Why do we need to wait to get a four lane?	Engineering	Funding for construction is anticipated to be available in 2018 to construct the initial two-lane portion of Kansas Avenue from Republic to Weaver Road. Construction of two lanes from Weaver Road to FR 190 is anticipated to occur between 2023 and 2030. Building the project as an initial two-lane roadway with expansion to four at some point in the future allows Greene County to spread available resources and address needs throughout the county.
Will wildlife be displaced?	Environmental	There will be a temporary displacement of bird, mammal, and other wildlife species common to the area during construction. More information about wildlife can be found in Section 3.9 of the EA.
Will there be commercial development in residential neighborhoods?	Development	Based on the City of Springfield and Greene County land use plans, it is projected that additional commercial/office development will occur along Republic Road at the north end of the corridor and near the south end of the corridor. Additional residential development and the conversion of agricultural land to residential will likely also occur in the future. More information can be found in Section 1.4 of the EA.
Safety concerns—a road would bring more people into the residential neighborhood who don't live there. How can we maintain the safety of our neighborhood?	Safety	The Project does not cross through or provide direct access to any subdivisions and will take traffic away from residential streets, particularly Cox Avenue, which was modeled to have a reduction in traffic incidents.
How will the bridge be designed? Ward Branch floods and might be considered a safety hazard.	Engineering / Safety	Hydraulic studies will be conducted as part of the bridge design for the Kansas Avenue crossing of Ward Branch. The bridge design will be compatible with MoDOT requirements for needed clearance over high water conditions.
Will trees be planted along both sides of the new road?	Engineering / Environmental	No additional tree plantings are planned. To the maximum extent possible, the existing trees will be left in place unless removal is required for construction.
Can parking and access be built around the James River at the bridge (FR 190 and Cox)?	Engineering	The Cox Road crossing of the James River lies outside the boundaries of the study and river access was not a consideration. No plans currently existing to provide a parking area with river access.
How will karst topography (including caves/sinkholes) be protected during construction?	Engineering / Environmental	Specifications addressing protection of karst topographical features have been prepared by both Greene County and MoDOT. These specifications will be included in all construction contracts.

Question/Concern	Category	Answer
How will Ward Branch be protected from construction impacts? How will road runoff impact the stream after construction?	Engineering / Environmental	<p>To protect water quality and reduce impacts during construction and after Project completion, construction of the roadway would be completed in conformance with Missouri State Operating Permit. MoDOT would require the contractor to implement Best Management Practices to reduce erosion and provide sediment and stormwater management during construction. A Project-specific Stormwater Pollution Prevention Plan would be prepared for the Project. The plan would include MDNR-approved components to reduce suspended solids, turbidity, and downstream sedimentation that may degrade water quality and adversely impact aquatic life.</p> <p>Stormwater runoff would increase after construction as the area of impermeable pavement would increase. Also, there would be application of compounds used to de-ice roadway surfaces in the Study Corridor once the Project is completed. Use of these chemicals takes place primarily during wet seasons when precipitation dilutes their concentration.</p>
Homeowners generally concerned about trash from commuters on the new road ending up on their property	Environmental	Homeowners may wish to consider adopting a portion of the roadway or coordinate with the City and County for other litter control measures to minimize litter accumulations, should it become a concern.
Will new development along roadway increase crime in the area?	Safety / Development	There is no direct evidence that roadway improvements lead to increased crime. Similar to other urban roadway improvement projects, this project will include on-street lighting intended to improve visibility which tends to reduce the potential for illegal activities.
Is there a way to minimize spot lights and intersections?	Engineering	Access to Kansas Avenue will be restricted and the number of intersections limited. Intersections are planned with Republic Road, FR 145, Weaver Road, Plainview Road, and FR 190.
Can subdivision own land up to new road? It's not right to sell the land behind our homes to developers.	Development	The land for the new roadway was dedicated to Greene County for use to build the new roadway. The land beyond the property dedicated for the roadway is owned by either private individuals or subdivision common property.
Can the curve near the Royal Oaks subdivision be moved farther east?	Engineering	The roadway has been laid out to best fit within the limits of the property owned by Greene County. The alignment of the new roadway may be slightly adjusted during the final design process.
Will stoplights be put at Cox & Weaver and Weaver & 170 th ? The traffic is already bad.	Engineering	Improvements along Cox and Weaver Roads are outside the boundaries of the study area. It is anticipated once Kansas Avenue is completed, traffic volumes at Cox and Weaver Road will be reduced and congestion lessened.
Will fire hydrants be placed along the new road?	Engineering	There are no plans at this time to include fire hydrants along the new road.
Will there be enough shoulder space on the road for emergency workers?	Engineering	The roadway will be constructed as an urban arterial section with curb and gutter adjacent to the travel lanes.

Question/Concern	Category	Answer
Will there be safe entrances and exits from the new road?	Engineering	Access to the new road will be restricted and the only locations to enter the roadway will be at signalized intersections, which are planned to be located at Republic Road, Farm Road 145 (existing Kansas Avenue), Weaver Road, and Plainview Road.
Why does the road follow the homes in the Lennox Place subdivision when the county owns the land adjacent to the corridor? Can this part of the road be straightened to increase distance from homes?	Engineering	The new roadway lies within the property dedicated to Greene County. The alignment of the roadway near Lennox Place may be slightly adjusted during the final design process.
Concern about car fumes in the area	Environmental	<p>The number of vehicles travelling on roads in the Study Area and surrounding communities are projected to increase over the next 25 years. This increase would contribute to congestion and to further delays along already congested Cox Road, Campbell Avenue, and at the existing intersections of Cox Road and Campbell Avenue at Plainview and Weaver Roads. Combustion of fossil fuels in vehicles creates emissions of criteria pollutants both during travel and idling. Therefore, emissions of criteria pollutants are expected to rise in the Study Area due to increased vehicle exhaust from vehicles idling and delayed by traffic congestion. Under congested traffic conditions, more vehicles spend more time in a given geographic area, contributing to increased emissions. Increasing emissions over time could affect the regions continued air quality attainment status.</p> <p>By reducing congestion on surrounding roads and shortening the distance vehicles will be travelling, cars are expected to move more quickly through the area and idle less at intersections. Therefore, the National Ambient Air Quality Standards (NAAQS) and mobile source air toxic (MSAT) emissions from the Project are expected to be the same or lower in the design year (2040) than those from the No Build Alternative in the Project area. It is important to note that there could be increases in NAAQS and MSAT emissions in a few localized areas; however, the area as whole is not expected to see a detrimental impact to the air quality between the Build and No Build Alternatives. More information can be found in Section 3.4 of the EA.</p>
When would the project connect to Campbell?	Engineering	Greene County is currently completing an analysis to extend FR 190 easterly to Campbell. No construction timeline has been set.
What is the potential for City of Springfield annexation?	Environmental / Land Use	Greene County is unaware of any plans or discussions to annex lands within the Project Corridor related to this project or any other reason.
What are the plans for the bridge over James River? Would the bridge be reinforced, expanded, straightened, etc?	Engineering	The bridge over James River is beyond the limits of the study area and not evaluated.

Question/Concern	Category	Answer
When will construction start?	Schedule	Construction could start in 2018
Can we have plants/trees planted at the edge of our property to decrease noise and increase privacy?	Engineering / Environmental	There will no restrictions placed by Greene County on owners to plant trees at the edge of their property.
Will the road have guardrails?	Engineering	Guardrail is anticipated to be installed at the bridge crossing over Ward Branch and crossing of Workman Branch.
What is the upkeep cost for Greene County for this road?	Engineering / Funding	Routine annual maintenance activities which cover items such as roadway striping, replacement of damaged signs, mowing, snow removal and litter control are estimated to cost \$40,000 per mile.
Why couldn't Cox Road be expanded?	Engineering	The Cox Road corridor was not considered viable for expansion due to limited space to add lanes without having significant impacts to adjacent property.
This road is going to move more people to the suburbs.	Engineering / Development	The majority of the adjacent or nearby property to Kansas Avenue is already developed and limited opportunities exist for new development.
How can I find out more information about road closures during construction?	Engineering / Schedule	Traffic control plans and requirements to close roads during construction will be developed as part of the contract package.
What is the economic stimulus to the area from this road? What jobs and businesses will it bring?	Development	The purpose and need for this project is based on improved mobility and safety for both the area residents and those commuting to and from work. There might be short term economic stimulus from the construction activities related to construction materials being purchased in the area, workers being hired to build the project, and some indirect benefits as those workers purchase meals, buy gas, etc. in the area. Longer term economic benefits would be more difficult to calculate but the improved mobility resulting from the project may result in reduced transportation costs (fuel, vehicle wear, etc.) and improved quality of life associated with reduced time in traffic and shorter commutes.
Is Nicholas Road in Christian County going to be widened and/or replaced?	Engineering	The study limits for Kansas Avenue terminated at FR 190 in Greene County. Future options to improve Nicholas Road in Christian County would require a separate study.
Does the available funding cover sound walls? Where is the funding coming from?	Funding	Funding for sound walls, if determined needed and feasible, would be an eligible project cost. Funding for extending Kansas Avenue is anticipated to come from the Federal Highway Administration with local matching funds provided by Greene County.

5.4 Stakeholder Interviews

Fifteen stakeholder interviews were conducted from October 14 to 16, 2015, and on November 10, 2015. Most of the interviews were with one stakeholder at a time, but a few included multiple people. The stakeholders represented a variety of interests across the community including city officials from both Springfield and Nixa, county officials from both Greene and Christian Counties, representatives from the chamber of commerce, areas schools, residents, business leaders, and others active in the community.

The purpose of the interviews was to hear first-hand from a cross-section of community members at the outset of the environmental study to find out about their awareness of the Project and its history, to hear their reactions to the Project, and to hear about any concerns they had or what benefits they saw with the Project.

Stakeholders interviewed were aware of the Project and generally aware that discussions about the Project had been going on for many years. The majority of those interviewed were supportive of the Project, indicating they saw the need due to increased traffic and growth in the area. Those who were not supportive of the Project questioned the need for a roadway in this specific location and some had concerns about the southern connection in Christian County.

5.5 Project Email and Electronic Mailing List

As a way to provide ongoing communication, a Project email address and an electronic mailing list were developed. The email list was created to share Project updates, including information on upcoming meetings. The Project email address received over 20 inquiries, the majority requesting to be added to the email distribution list and some asking questions about the Project or providing feedback. Project-related questions and comments have also been sent directly to GCHD staff. The electronic mailing list currently has 214 email addresses.

5.6 Project Working Group

A Kansas Extension Project Working Group was created to provide community members an opportunity to dive more deeply into the details of the environmental study and design process and provide on-going feedback in a small group setting. Eighteen individuals were invited to participate in the first meeting held on March 14, 2016, at the Library Center in Springfield.

Eight people attended the group's first meeting, along with one GCHD representative and representatives from the consultant team. The agenda included a discussion of the Project background, the EA, and next steps. The group provided feedback on the overall Project, the draft Purpose and Need, and the results of the various environmental studies conducted.

The majority of the meeting participants were residents in the area and voiced concerns about the overall Project, including its necessity, the timeframe for construction, and potential impacts to safety and quality of life in the area. The group was interested in potential noise mitigation recommendations and when those would be available. An attendee shared information about a new report regarding bats in the area; that report has since been provided to the Project team. The next meeting is tentatively planned for Winter 2016 for discussions on design.

5.7 Public Review of the EA

The EA is anticipated to be available for public review in March 2017, and a public meeting and comment period will be held in conjunction with its release.

5.8 Comments on the EA

Substantive comments on the EA will be addressed following the public meeting (March 23, 2017) and closure of the public comment period anticipated to occur in April 2017.

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