



January 28, 2022 Karst Report Prepared by: Peter Putzier, LPG

Reviewed and approved 4.8.2022 Sandra Bowman

Des. No.: 1900296

Contract No.: R-42199

Note: This project has been moved to Contract No. R-41469.

**Prepared for: INDOT** 



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# Karst Report SR 58 Slide Correction Project Lawrence County, Indiana Des. No. 1900296

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# Karst Report SR 58 Slide Correction Project Lawrence County, Indiana Des. No. 1900296

## **Date of Karst Investigation**

September 30, 2021

#### Location

The SR 58 Small Structure Replacement Project is in Lawrence County, Indiana (Attachment A1).

- Pleasant Run and Shawswick Township, Lawrence County, Indiana
- Section 34 Township 6 North, Range 1 East; Section 3 Township 5 North, Range 1 East
- Bartlettsville 1:24,000 United States Geological Survey (USGS) Quadrangle
- Latitude: 38. 9037037° N; Longitude: -86. 3983216° W

## **Project Description**

The project is located 3.56 miles west of SR 446 and approximately 2.5 miles southwest of Heltonville, Indiana along SR 58. The project, which encompasses approximately 5.13 acres, will repair a road slide occurring on the westbound lane of SR 58. Slide locations are generally occuringwhere UNT 2 to Leatherwood Creek meanders close to SR 58. The SR 58 Slide Correction project will consist of reconstructing the existing six-foot aggregate roadway shoulders and lining the UNT 2 to Leatherwood Creek with riprap to prevent future scour. Pavement will be patched where erosion has caused edge-of-asphalt pavement failure and a mill and overlay of the roadway is anticipated. The Karst Investigation Area limits were defined as approximately 2,050 feet in length along SR 58 and a width of approximately 150 feet on either side of the SR 58 centerline.

# **Karst Survey and Literature Review**

The SR 58 small structure replacement project is within the "Indiana Karst Region" defined in the *Protection of Karst Features during Project Development and Construction* document dated July 15, 2021 (Attachment A2).

A Red Flag Investigation was completed for the project and Geographic Information System (GIS) data shows no sinkholes, caves, springs, or sinking streams within the karst investigation area or project area. The closest mapped sinkhole area is approximately 0.33 mile to the southeast of the project area. The closest karst spring is mapped 0.75 mile to the southeast of the project area. Cave entrance density tiles are located 0.56 mile to the south and 0.64 mile to the west of the project area. The nearest mapped cave is located 0.75 mile southwest of the project area at an elevation of 710 ft amsl and is associated with the mapped spring. Based on an IDNR database, the nearest hibernacula for Indiana bat is approximately 8 miles to the southwest and the nearest cave obligate invertebrates are located approximately 7 miles to the west.

The project area is on the eastern edge of the Mitchel Plateau as it transitions into the Norman Uplands.



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The Mitchell Plateau is a Limestone plateau characterized by sinkholes, sinking streams, and subterranean karst drainage. The Norman Uplands is a region of hilly upland topography underlain by siltstones, shales and relatively erosion resistant sandstones. Moving east out of the Mitchell Plateau towards the Normand Uplands, valleys erode through thinning Sanders Group limestone of the Mitchel Plateau and into the underlying Borden siltstone and shale of the Norman Uplands. The project area is in a valley that has Borden Group Siltstone mapped in the northwest and Sanders Group Limestone mapped in the southeast (Attachment A6).

A literature search for the project area was conducted by a Lochmueller Group licensed geologist with karst terrain experience. Mapping from the Indiana Geological Survey and Indiana Cave Survey determined there are no known caves in the project area. GIS data for caves, sinkholes, and springs were examined for the project area. The LiDAR Hillshade Map shows that the two nearest groupings of sinkholes are located 0.75 mile to the southeast and 1.3 mile to the northwest (Attachment A8). The Indiana GIS bedrock topography indicates sandstones and siltstones of Borden Group, and limestones of the Sanders Group both of Mississippian Age are in the project area. A karst investigation by a professional geologist was recommended because the project is within the Indiana Karst Region (Attachment A2) and within 0.5 mile of RFI mapped karst features (Attachment A3).

### Soils

The Soil Survey Geographic (SSURGO) database for Lawrence County includes the following mapped soil series within the SR 58 karst investigation area (Attachment A7). The soils, deposited on top of the Borden siltstone and shale, vary in thickness within the valley of Leatherwood Creek but are generally 5 to 10 feet thick and include the types listed below.

- Brownstown-Gilwood silt loam (BvoG), 25 to 75 percent slopes, complex, nonhydric.
- **Beanblossom silt loam (BcrAW)**, 1 to 3 percent slopes, occasionally flooded, very brief duration, predominantly nonhydric.
- Caneyville silt loam (CbpD2), 12 to 20 percent slopes, eroded, nonhydric.
- Hoosierville silt loam (HnoA), 0 to 1 percent slopes, hydric.
- Crider silt loam (CspC2), 6 to 12 percent slopes, eroded, nonhydric.

## **Field Reconnaissance**

An onsite karst inspection was completed on September 30, 2021 by a Lochmueller Group licensed professional geologist. The weather was warm, clear, humid and took place after several days of dry weather. The focus of the field inspection was to identify karst features potentially impacted by the project and characterize the karst drainage related to the project. Surface drainage in the project area trends northwest towards UNT 1 to Leatherwood Creek. The field review found one spring, karst feature KR1, within the karst investigation area (Attachment A10). The spring is located 50 ft south of the southeast end of the survey area and emerges near the contact between the Sanders Group limestone and the underlying Borden Group siltstone. The spring (KR1) indicates that karst drainage pathways are present in the uplands surrounding the project area. Although the generalized bedrock mapping layer depicts the transition between the Borden Group and Sanders Group roughly in the middle of the project area, field investigation identified the transition between siltstone and limestone occurring at



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roughly 690 ft amsl. This indicates that Borden Siltstone underlies the entire project area while the surrounding valley tops are composed of Lower Sanders Group Limestone and red clay soil remnants of eroded bedrock. The limestone on the adjacent valley crests is generally thin (roughly 10–30 ft) and contains some karst drainage conduits in highly eroded portions of the Mitchell Plateau. This limestone once had a more developed karst subterranean drainage to springs in the region, but many of the karst features have been filled with clay residuum, covered by glacial loess deposits, and no longer have perennial drainage. However, karst drainage systems are still active as demonstrated by the small spring within the karst investigation area.

No other karst features or soil piping were identified in the karst investigation area. Borden Siltstone, which does not typically form karst features or drainage, underlies the project area. Karst system limestone lies above the siltstone. Photo locations are shown in Attachment A10. The photographs include water features, culverts, and bedrock exposures (Attachment A11).

## **Proposed Activities and Direct Impacts**

There are no expected direct impacts to karst features related to the proposed construction activities. There are no known cave or spring entrances in the project area that may be utilized by troglobitic species.

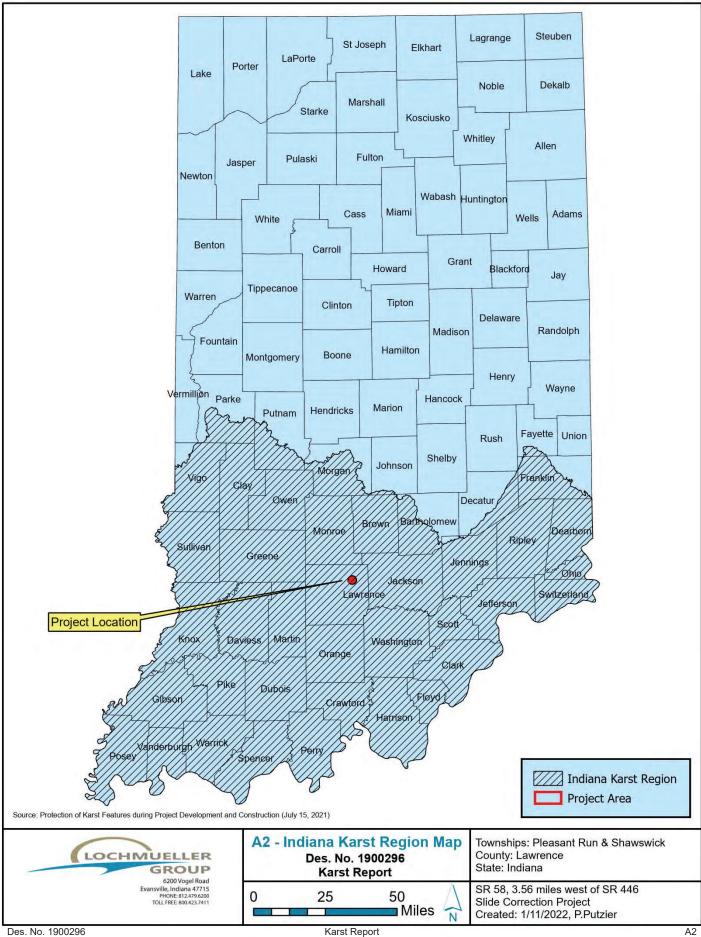
#### Recommendation

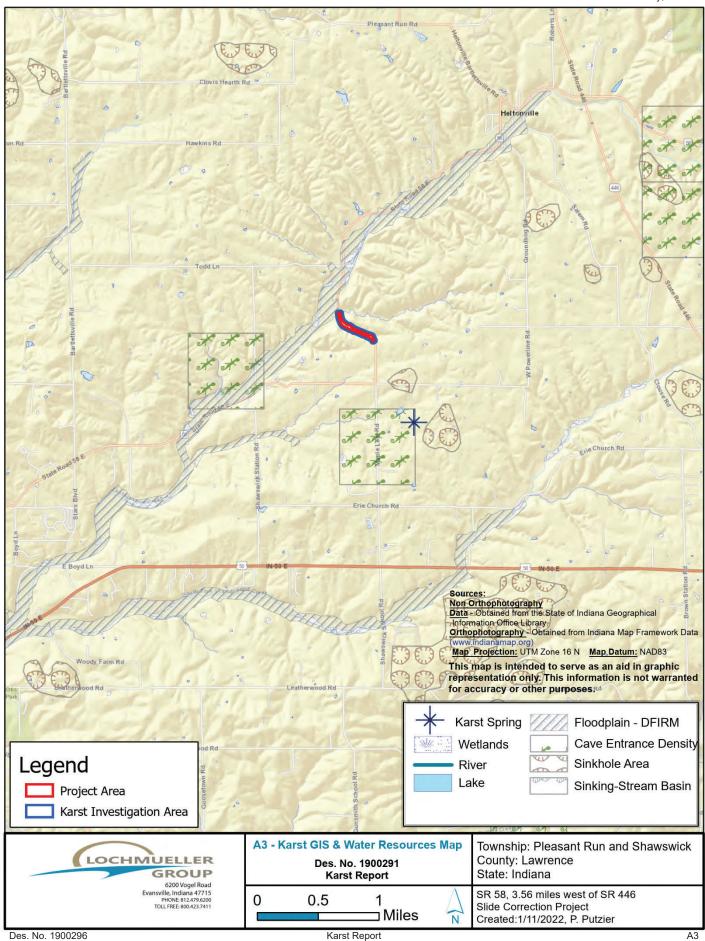
Based on the completed surface karst inspection there are no known or identifiable karst features that will be impacted. The potential for discovery of buried karst features during construction exists but is minimal. The following recommendation is proposed to address this potential. In the event that a bedrock void, karst flow path or troglobitic species is encountered during construction, a karst qualified geologist should be contacted immediately to determine if additional karst investigations and/or coordination are needed relative to the Protection of Karst Features during Project Development and Construction document (July 15, 2021).

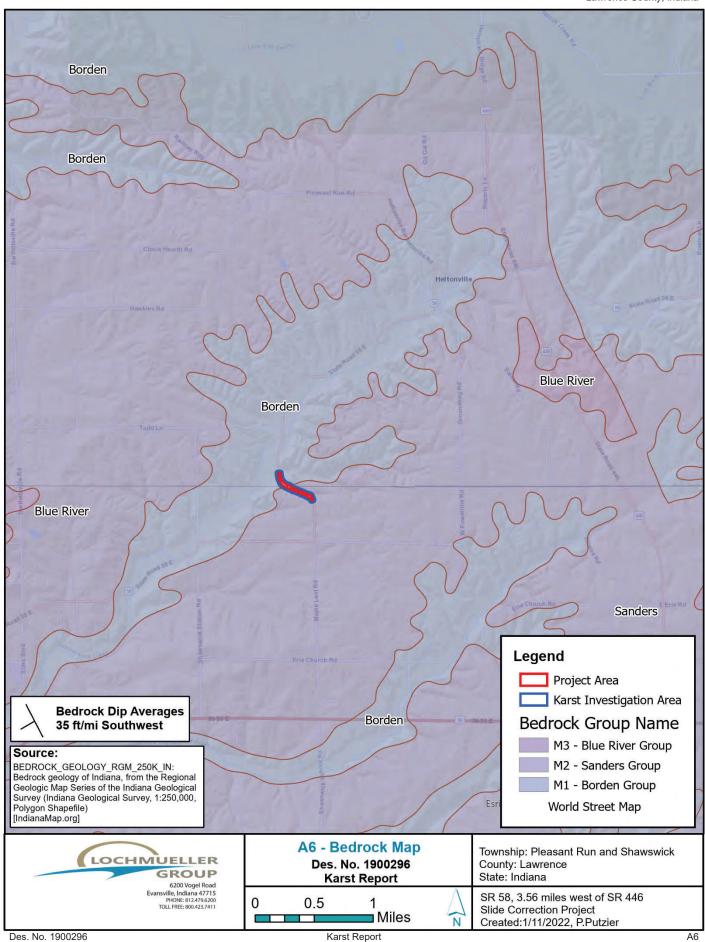
### **Preparers**

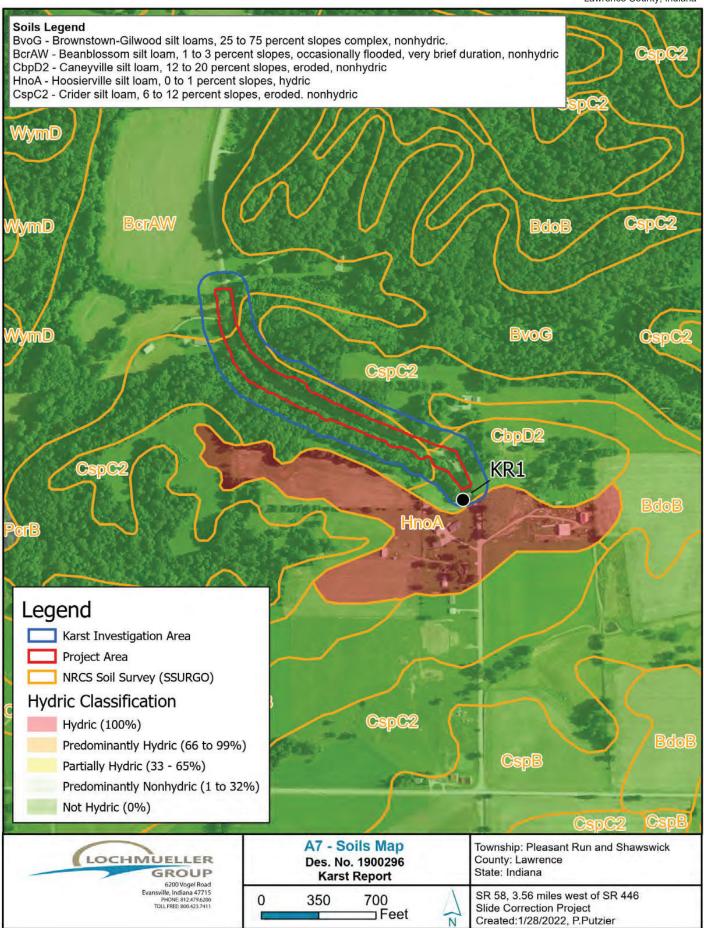
Lochmueller Group, Inc. Staff	Position	Contributing Effort
Peter Putzier, LPG	Licensed Professional Geologist	Field Data Collection
		Report Preparation
Garre Conner, LPG	Licensed Professional Geologist	Report Preparation

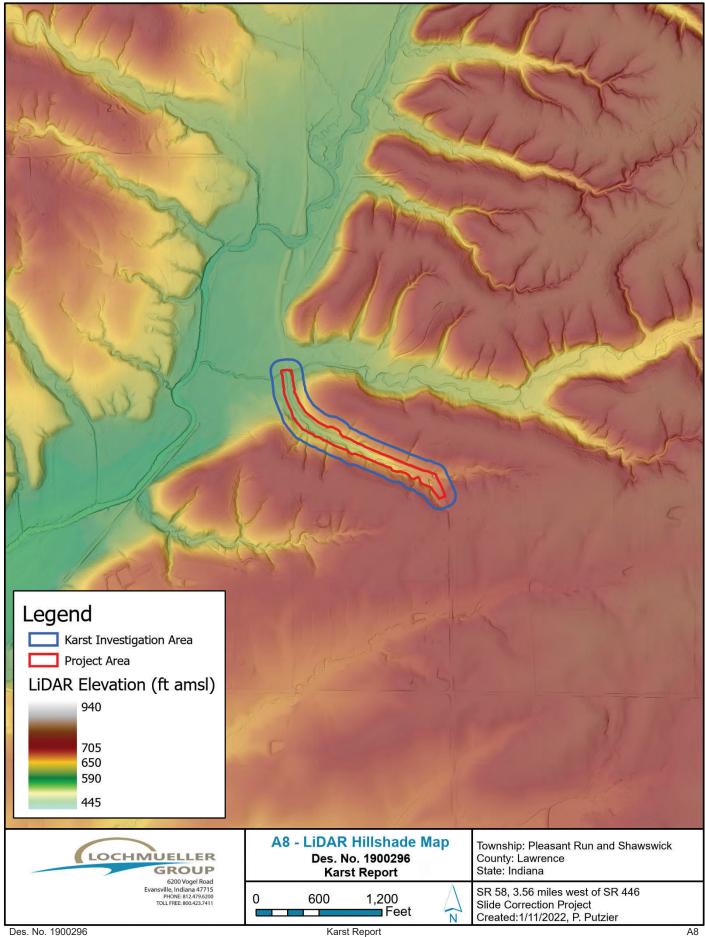


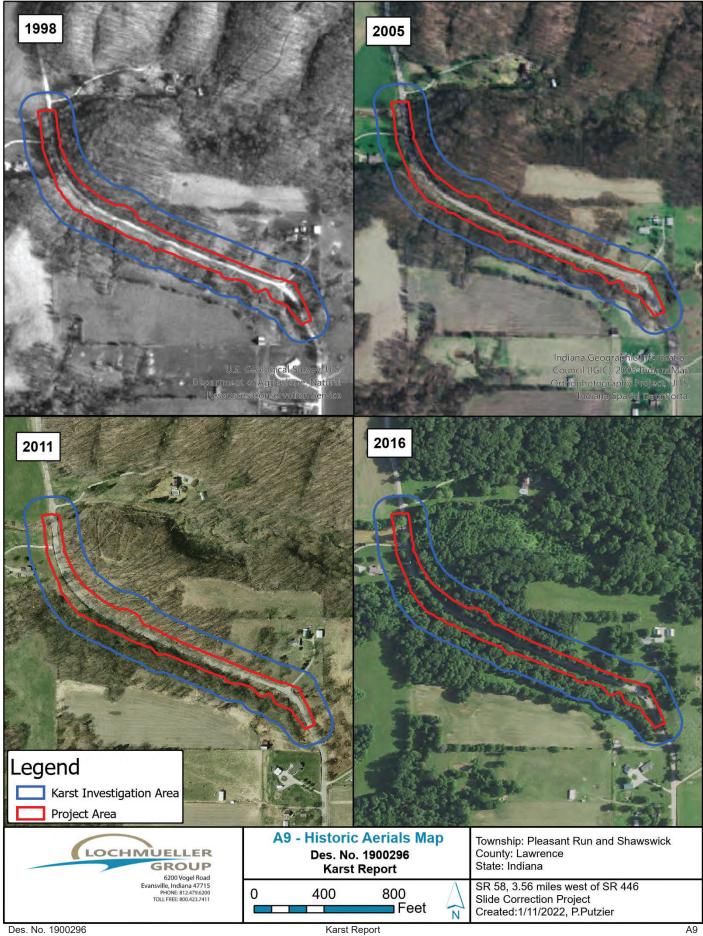












# Land and Water Conservation Fund (LWCF) County Property List for Indiana (Last Updated March 2022)

ProjectNumber SubProjectCo	ode County	Property
1800010 1800010	Lawrence	Spring Mill State Park & Donaldson's Cave Nature Preserve
1800132 1800132	Lawrence	Mitchell Park and Pool
1800161 1800161C	Lawrence	Spring Mill State Park
1800162 1800162	Lawrence	Spring Mill State Park & Donaldson's Cave Nature Preserve
1800171 1800171N	Lawrence	Spring Mill State Park
1800177 1800177C	Lawrence	Spring Mill State Park
1800180 1800180	Lawrence	Spring Mill State Park & Donaldson's Cave Nature Preserve
1800309 1800309B	Lawrence	Spring Mill State Park
1800312 1800312P	Lawrence	Spring Mill State Park
1800363 1800363DD	Lawrence	Spring Mill State Park
1800413 1800413T	Lawrence	Spring Mill State Park
1800433 1800433	Lawrence	Spring Mill State Park & Donaldson's Cave Nature Preserve
1800612 1800612	Lawrence	Spring Mill State Park

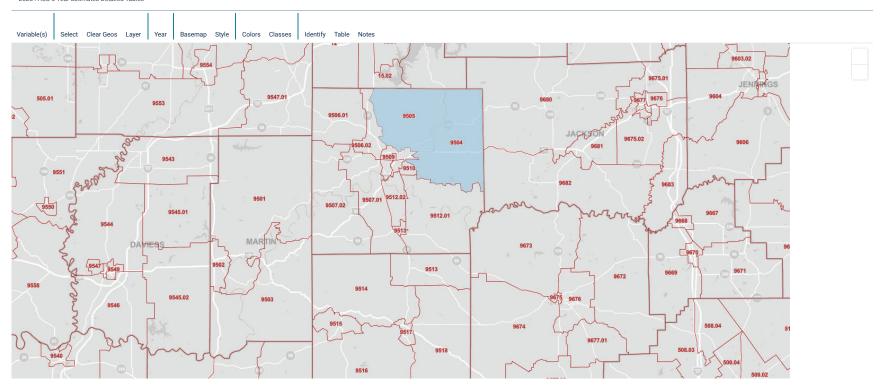
<sup>\*</sup>Park names may have changed. If acquisition of publically owned land or impacts to publically owned land is anticipated, coordination with IDNR, Division of Outdoor Recreation, should occur.

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American Community Survey

#### Total: - Estimate in 2 Geos in 2020

2020 : ACS 5-Year Estimates Detailed Tables





5 mi

https://data.census.gov/cedsci/map?text=B17001&g=0500000US18093\_1400000US18093950400,18093950500&tid=ACSDT5Y2020.B17001&cid=B17001\_001E&vintage=2020&layer=VT\_2020\_140\_... 1/1

An official website of the United States government Here's how you know

# **HISPANIC OR LATINO ORIGIN BY RACE**



Note: This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

	Lawrence County, Indiana		Census Tract 9504, Lawrence Coun	ty, Indiana	Census Tract 9505, Lawrence County, Indiana		
Label	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error	
➤ Total:	45,552	****	3,953	±537	4,692	±532	
➤ Not Hispanic or Latino:	44,786	****	3,922	±542	4,532	±533	
White alone	43,292	±244	3,767	±513	4,529	±533	
Black or African American alone	197	±69	34	±45	0	±12	
American Indian and Alaska Native alone	77	±66	0	±12	3	±8	
Asian alone	242	±75	0	±12	0	±12	
Native Hawaiian and Other Pacific Islander alone	7	±11	0	±12	0	±12	
Some other race alone	203	±222	0	±12	0	±12	
➤ Two or more races:	768	±140	121	±109	0	±12	
Two races including Some other race	113	±113	52	±71	0	±12	
Two races excluding Some other race, and three or more races	655	±87	69	±77	0	±12	
➤ Hispanic or Latino:	766	****	31	±36	160	±132	
White alone	424	±210	31	±36	146	±132	
Black or African American alone	0	±26	0	±12	0	±12	
American Indian and Alaska Native alone	11	±22	0	±12	0	±12	
Asian alone	0	±26	0	±12	0	±12	
Native Hawaiian and Other Pacific Islander alone	0	±26	0	±12	0	±12	
Some other race alone	214	±171	0	±12	14	±23	
➤ Two or more races:	117	±127	0	±12	0	±12	
Two races including Some other race	117	±127	0	±12	0	±12	
Two races excluding Some other race, and three or more races	0	±26	0	±12	0	±12	

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#### **Table Notes**

### **HISPANIC OR LATINO ORIGIN BY RACE**

Survey/Program: American Community Survey Universe: Total population

Year: 2020 Estimates: 5-Year Table ID: B03002

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, for 2020, the 2020 Census provides the official counts of the population and housing units for the nation, states, counties, cities, and towns. For 2016 to 2019, the Population Estimates Program provides estimates of the population for the nation, states, counties, cities, and towns and intercensal housing unit estimates for the nation, states, and counties.

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates

The Hispanic origin and race codes were updated in 2020. For more information on the Hispanic origin and race code changes, please visit the American Community Survey Technical Documentation website.

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error and the estimate margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see ACS Technical Documentation). The effect of nonsampling error (for a discussion of nonsampling error (for a discussion of nonsampling error).

The 2016-2020 American Community Survey (ACS) data generally reflect the September 2018 Office of Management and Budget (OMB) delineations of metropolitan and micropolitan statistical areas. In certain instances, the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB delineation lists due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Explanation of Symbols:

The estimate could not be computed because there were an insufficient number of sample observations. For a ratio of medians estimate, one or both of the median estimates falls in the lowest interval or highest interval of an open-ended distribution.

N
The estimate or margin of error cannot be displayed because there were an insufficient number of sample cases in the selected geographic area.

(X)

The estimate or margin of error is not applicable or not available.

median-

The median falls in the lowest interval of an open-ended distribution (for example "2,500-")

median+

The median falls in the highest interval of an open-ended distribution (for example "250,000+").

\*\*

The margin of error could not be computed because there were an insufficient number of sample observations.

The margin of error could not be computed because the median falls in the lowest interval or highest interval of an open-ended distribution.

\*\*\*\*

A margin of error is not appropriate because the corresponding estimate is controlled to an independent population or housing estimate. Effectively, the corresponding estimate has no sampling error and the margin of error may be treated as zero.

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Technical Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

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# POVERTY STATUS IN THE PAST 12 MONTHS BY SEX BY AGE



Note: This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

	Lawrence County, Indiana	ence County, Indiana Census Tract 9504, Lawrence County, Indiana Census Tract 9505, Lawrence County, Indiana				
abel	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
✓ Total:	44,758	±224	3,936	±533	4,692	±532
➤ Income in the past 12 months below poverty level:	4,950	±699	237	±148	349	±216
➤ Male:	2,067	±379	87	±74	109	±106
Under 5 years	211	±100	0	±12	0	±12
5 years	99	±75	0	±12	0	±12
6 to 11 years	218	±91	0	±12	15	±24
12 to 14 years	92	±52	0	±12	23	±37
15 years	17	±24	0	±12	0	±12
16 and 17 years	31	±31	0	±12	0	±12
18 to 24 years	157	±64	0	±12	0	±12
25 to 34 years	414	±217	0	±12	13	±22
35 to 44 years	129	±77	34	±54	0	±12
45 to 54 years	199	±113	6	±10	42	±51
55 to 64 years	232	±94	9	±18	0	±12
65 to 74 years	164	±84	29	±36	0	±12
75 years and over	104	±62	9	±18	16	±26
➤ Female:	2,883	±483	150	±106	240	±153
Under 5 years	239	±118	13	±25	35	±51
5 years	47	±55	0	±12	0	±12
6 to 11 years	304	±148	0	±12	0	±12
12 to 14 years	73	±41	17	±22	0	±12
15 years	38	±49	0	±12	0	±12
16 and 17 years	59	±43	0	±12	0	±12
18 to 24 years	283	±130	25	±38	0	±12
25 to 34 years	408	±140	26	±27	86	±93
35 to 44 years	268	±117	3	±10	0	±12
45 to 54 years	304	±136	4	±10	88	±97
55 to 64 years	356	±138	31	±30	0	±12
65 to 74 years	263	±110	27	±40	31	±49
75 years and over	241	±116	4	±8	0	±12
▼ Income in the past 12 months at or above poverty level:	39,808	±715	3,699	±511	4,343	±576
➤ Male:	19,939	±331	1,683	±287	2,321	±351
Under 5 years	1,090	±107	81	±69	141	±97
5 years	188	±82	0	±12	25	±38
6 to 11 years	1,520	±209	76	±73	190	±96
12 to 14 years	726	±208	21	±22	70	±71

https://data.census.gov/cedsci/table?text=B17001&g=0500000US18093\_1400000US18093950400,18093950500&tid=ACSDT5Y2020.B17001

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#### **Table Notes**

### POVERTY STATUS IN THE PAST 12 MONTHS BY SEX BY AGE

Survey/Program: American Community Survey Universe: Population for whom poverty status is determined Year: 2020

Estimates: 5-Year Table ID: B17001

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, for 2020, the 2020 Census provides the official counts of the population and housing units for the nation, states, counties, cities, and towns. For 2016 to 2019, the Population Estimates Program provides estimates of the population for the nation, states, counties, cities, and towns and intercensal housing unit estimates for the nation, states, and counties.

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented throughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see ACS Technical Documentation). The effect of nonsampling error (for a discussion of nonsampling error (for a discussion of nonsampling error (for a discussion of nonsampling error).

The 2016-2020 American Community Survey (ACS) data generally reflect the September 2018 Office of Management and Budget (OMB) delineations of metropolitan and micropolitan statistical areas. In certain instances, the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB delineation lists due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

#### Explanation of Symbols:

The estimate could not be computed because there were an insufficient number of sample observations. For a ratio of medians estimate, one or both of the median estimates falls in the lowest interval or highest interval of an open-ended distribution.

The estimate or margin of error cannot be displayed because there were an insufficient number of sample cases in the selected geographic area.

(X)

The estimate or margin of error is not applicable or not available.

median-

The median falls in the lowest interval of an open-ended distribution (for example "2,500-")

median+

The median falls in the highest interval of an open-ended distribution (for example "250,000+").

\_.

 $The \ margin \ of \ error \ could \ not \ be \ computed \ because \ there \ were \ an \ insufficient \ number \ of \ sample \ observations.$ 

\*\*\*

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	сос	AC 1	AC 2		
	Lawrence County,	Census Tract 9504 Lawrence County	Census Tract 9505 Lawrence County		
LOW-INCOME POPULATION					
Total Population for Whom Poverty Status is Determined	44,758	3,936	4,692		
Total Population Below Poverty Level	4,950	237	349		
Percent Low-Income	11.06%	6.02%	7.44%		
125 Percent of COC	13.82%				
AC Percent Low-Income Greater Than 125 Percent of COC?		NO	NO		
AC Percent Low-Income Greater Than 50 Percent?		NO	NO		
Population of EJ Concern?		NO	NO		
MINORITY POPULATION					
Total Population	45,552	3,953	4,692		
Minority Population	2,260	186	163		
Percent Minority	4.96%	4.71%	3.47%		
125 Percent of COC	6.20%				
AC Percent Minority Greater Than 125 Percent of COC?		NO	NO		
AC Percent Minority Greater Than 50 Percent?		NO	NO		
Population of EJ Concern?		NO	NO		