

FFY 2025-2028

READING AREA TRANSPORTATION STUDY

**ENVIRONMENTAL
JUSTICE
SUMMARY**

DRAFT

**READING AREA
TRANSPORTATION STUDY
C/O BERKS COUNTY PLANNING COMMISSION**

**633 COURT STREET, 14TH FL
READING, PA 19601
Phone: (610) 478-6300
Fax: (610) 478-6316**

Email: planning@berkspa.gov

Web Site: <https://www.berkspa.gov/departments/planning-commission/>

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Table of Contents

SECTION 1 – ENVIRONMENTAL JUSTICE

Background	1
PennDOT Environmental Justice Guidance	1
Public Participation	2
Definitions	2

SECTION 2 – DEMOGRAPHICS

Berks County Demographics	4
Table 1 – County Population between 2000 and 2021	4
Demographic Methodology	5
Table 2 – Definition of Minority Population Intervals	6
Table 3 – Minority Population Intervals.....	6
Table 4 – Definition of Low-Income Population Intervals	7
Table 5 – Low-Income Population Intervals.....	7

SECTION 3 – DEMOGRAPHIC ANALYSIS OF THE FFY 2025-2028 TIP

Table 6 – Berks County Population by Race and Percentage Low-Income	8
Figure 1 – Poverty Rate Among Racial/Ethnic Groups in Reading MPO, 2021	9
Table 7 – Other Potentially Disadvantaged Populations	9
Map 01 – Berks County Minority Populations by Block Group	10
Map 02 - Berks County Concentrations of Minority Population by Block Group	11
Map 03 – Berks County Low-Income Population by Block Group	12
Map 04 – Berks County Concentrations of Low-Income Population by Block Group	13

SECTION 4 – CRASH AND INJURY ANALYSIS OF THE FFY 2025-2028 TIP

Table 8 – Number and Percentage of Total Reportable Crashes, Crash Fatalities & Crash Suspected Serious Injuries by Minority Population Interval, Berks County, PA (2017-2021)	14
Table 9 – Number and Percentage of Total Reportable Crashes, Crash Fatalities & Crash Suspected Serious Injuries by Low-Income Population Interval, Berks County, PA (2017-2021)	15
Table 10 - Number and Percentage of People Using Nonmotorized Modes Involved in Crashes, Suspected Serious Injuries & Fatalities by Minority Population Interval, Berks County, PA (2017-2021)	16
Table 11 - Number and Percentage of People Using Nonmotorized Modes Involved in Crashes, Suspected Serious Injuries & Fatalities by Low-Income Population Interval, Berks County, PA (2017-2021) ...	16
Table 12 – Number and Percentage of Horse and Buggy Crashes by Minority Population Interval, Berks County, PA (2017-2021)	17
Table 13 – Number and Percentage of Horse and Buggy Crashes by Low-Income Population Interval, Berks County, PA (2017-2021)	17
Table 14 – Number and Percentage of People on Bicycles Involved in Crashes, Suspected Serious Injuries & Fatalities by Minority Population Interval, Berks County, PA (2017-2021)	18
Table 15 – Number and Percentage of People on Bicycles Involved in Crashes, Suspected Serious Injuries & Fatalities by Low-Income Population Interval, Berks County, PA (2017-2021)	18
Table 16 – Number and Percentage of Pedestrians Involved in Crashes, Suspected Serious Injuries & Fatalities by Minority Population Interval, Berks County, PA (2017-2021).....	19
Table 17 – Number and Percentage of Pedestrians Involved in Crashes, Suspected Serious Injuries & Fatalities by Low-Income Population Interval, Berks County, PA (2017-2021)	19
Map 05 – Berks County Concentrations of Minority Population by Block Group and Crashes	21
Map 06 – Berks County Concentrations of Low-Income Population by Block Group and Crashes	22

SECTION 5 – BRIDGE AND PAVEMENT CONDITIONS ANALYSIS OF THE FFY 2025-2028 TIP

Figure 2 – Inspected Bridge Components23

Table 18 – Number and Percentage of Bridges and Bridge Conditions by Minority Population Interval, Berks County, PA (2017-2021)24

Table 19 – Number and Percentage of Bridges and Bridge Conditions by Low-Income Population Interval, Berks County, PA (2017-2021)24

Table 20 – Number and Percentage of Bridge Deck Area (sq ft) and Bridge Deck Area Conditions by Minority Population Interval, Berks County, PA (2017-2021)25

Table 21 – Number and Percentage of Bridge Deck Area (sq ft) and Bridge Deck Area Conditions by Low-Income Population Interval, Berks County, PA (2017-2021)25

Map 07 – Berks County Concentrations of Minority Population by Block Group and Bridges26

Map 08 – Berks County Concentrations of Low-Income Population by Block Group and Bridges27

Table 22 – Federal Aid System in Berks County 202128

Table 23 – IRI Categories28

Table 24 – Number and Percentage of Federal Aid Segment Mile IRI by Minority Population Interval, Berks County, PA (2017-2021)29

Table 25 – Number and Percentage of Federal Aid Segment Mile IRI by Low-Income Population Interval, Berks County, PA (2017-2021)30

Table 26 – Number and Percentage of Federal Aid Segment Mile OPI by Minority Population Interval, Berks County, PA (2017-2021)31

Table 27 – Number and Percentage of Federal Aid Segment Mile OPI by Low-Income Population Interval, Berks County, PA (2017-2021)32

Map 09 – Berks County Concentrations of Minority Population by Block Group and Federal Aid Road Segments33

Map 10 – Berks County Concentrations of Low-Income Population by Block Group and Federal Aid Road Segments34

SECTION 6 – TRANSIT AND ENVIRONMENTAL JUSTICE

Map 11 – Minority Concentrations with BARTA Bus Routes.....36

Map 12 – Low-Income Concentrations with BARTA Bus Routes37

Map 13 – Berks County Block Group Low Wage Jobs to Low Wage Workers Ratios39

Map 14 – Low Wage Jobs to Low Wage Workers Ratios with BARTA Bus Routes40

SECTION 7 – TYPES OF PROJECTS AND DISTRIBUTION OF THE FFY 2025-2028 TIP

Table 28 – FFY 2025-2028 TIP Total Cost, Percent of Total Cost, and Total Per Capita Cost by Project Mode41

SECTION 8 – BENEFITS AND BURDENS ANALYSIS OF THE FFY 2025-2028 TIP

Map 15 – Minority Concentrations with TIP and LRTP Projects.....43

Map 16 – Low-Income Concentrations with TIP and LRTP Projects.....44

APPENDIX

FFY 2025-2028 TIP Statewide Environmental Justice Analysis Methodology45

EXECUTIVE SUMMARY

The preparation of an Environmental Justice Summary is required by Executive Order 12898 of 1994 and is based on Title VI of the Civil Rights Act of 1964. It requires recipients of federal aid to certify and ensure nondiscrimination in the use of those funds.

The basic principles addressed are:

- Avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority and low-income populations
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process, and
- Prevent the denial of, reduction of, or significant delay in the receipt of benefits by minority and low-income populations.

The **FFY 2025 Environmental Justice Summary** identifies concentrations of minority and low-income populations throughout Berks County. It then identifies locations of Bicycle Crashes Involving a Motor Vehicle, Pedestrian Crashes, Total Reportable Crashes, Persons Involved in Reportable Crashes, Crash Suspected Serious Injuries and Crash Fatalities, Bridge and Federal Aid Segment Mile Conditions, Transit Service, and Types of Projects and Distribution included in the FFY 2025-2028 Transportation Improvement Program and evaluates those criteria against locations of minority and low-income populations.

The report found no disproportionately high or adverse effects but did recommend careful consideration of these issues in future Transportation Improvement Program updates.

SECTION 1 - ENVIRONMENTAL JUSTICE

Background

Environmental justice addresses fairness of federal actions in regard to disadvantaged persons, particularly low-income and racial minority populations. Environmental justice became an active part of federally funded planning activities with Executive Order 12898, issued in 1994, that required federal agencies to examine the potential for their programs, policies and activities to have negative impacts on minority and low-income populations. The Environmental Justice executive order is based on Title VI of the Civil Rights Act of 1964, which requires recipients of federal aid to certify and ensure nondiscrimination.

The roadway and transit projects identified and programmed in the proposed Reading Area Transportation Study FFY 2025-2028 Transportation Improvement Program (TIP) and FFY 2023-2045 Long Range Transportation Plan must address the principles of Executive Order 12898 relating to Environmental Justice. Specifically, the plan must identify and address disproportionately high and adverse human health or environmental effects of its programs and policies on minority and low-income populations. Basic principles addressed by the Environmental Justice analysis include:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

In response to the USDOT order and the FHWA guidelines, the Pennsylvania Department of Transportation (PennDOT) developed Every Voice Counts in 2004, updated in 2012, to guide PennDOT and the local transportation planning agencies in Pennsylvania to address EJ issues. This guidance is found at: <https://www.penndot.pa.gov/ProjectAndPrograms/Planning/Pages/Environmental-Justice-Plan.aspx>.

PennDOT Environmental Justice Guidance

In general, this means that for any program or activity for which any federal funds will be used, the agency receiving the federal funds:

- Must make a meaningful effort to involve low income and minority populations in the processes established to make the decision about the use of the federal funds; and
- Must evaluate the nature, extent, and incidence of probable favorable and adverse human health or environmental impacts of the program or activity upon minority or low-income populations.

The Reading Area Transportation Study (RATS) is the regional transportation planning organization for the Reading, Pennsylvania metropolitan area. The Reading MPO is co-terminus with the political boundary of Berks County. RATS prepares this Environmental Justice report to respond to the federal and state requirements and facilitate the fair transportation planning process in Berks County. This document supersedes the 2022 EJ document.

RATS will assess the impacts of the transportation planning process, the Long Range Transportation Plan (LRTP) and the Transportation Improvement Program (TIP) on selected populations, identify their transportation needs, and explore ways to satisfy these needs. Our assessment of the potential for environmental justice concerns relies on relative measures, not specific thresholds or measures. This includes our professional judgment of the disproportionate impacts and judgment of efforts made during the planning process to inform people potentially impacted.

Public Participation

RATS supports and encourages active public participation throughout the transportation planning process. RATS adopted a public participation policy in 2017 to ensure that specific opportunities exist for the public to offer input and provide feedback as active participants in the decision-making process. Public participation takes many forms, and RATS uses a wide range of methods and media to enhance the public's participation in the process.

As part of the FFY 2025-2028 TIP and FFY 2023-2045 Long Range Transportation Plan, RATS took/will take a number of steps to ensure consideration of the public's views, including using the public participation plan, developing and contacting a comprehensive listing of stakeholders, utilizing a variety of methods to involve the public, and considering public comments in developing the list of transportation projects. The overall goal of the TIP and LRTP is to develop plans and strategies that promote an efficient and effective transportation system for Berks County.

Definitions

Minority means a person who is: (1) Black (a person having origins in any of the black racial groups of Africa); (2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); (3) Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); (4) American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition); and (5) Native Hawaii or Other Pacific Islanders (a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands). Additionally, any person who responded to the US Census as being some other race or two or more races qualifies as being in the minority population.

Low-Income means a person whose household income (or if in a community or group their median household income) is at or below the Department of Health and Human Services poverty guidelines and identified as such in the U.S. Census American Community Survey, 2017-2021 5-Year Estimates.

Limited English Proficiency includes people ages 5 and older who do not speak English as their primary language and who have reported to the Census Bureau an ability to read, write, speak, or understand English less than very well.

Persons with a Disability includes people with mobility limitation, self-care limitation, or people with both limitations. Those limitations can include a long-lasting physical, mental or emotional condition, and can make it difficult for a person to do activities such as walking, climbing stairs, dressing, bathing, learning or remembering. Limitations can also impede a person from being able to go outside the home alone or to work at a job or business.

Female Head of Household with Child includes households with a female maintaining the household with no husband of the householder present and with own children of the householder under 18 years.

Elderly population includes persons age 65 and older.

Carless Households includes households that possess no cars, vans, and pickup or panel trucks of one-ton capacity or less that are kept and available for use.

Poverty includes any individual with an income less than \$36 per day or a family of four with income less than \$72 per day. This is calculated from the poverty threshold as set by the U.S. Census Bureau.

Census Block Groups are statistical geographic subdivisions of a census tract and are the smallest geographic areas for which the Census Bureau provides sample data, primarily from the ACS 5-year period estimates.

American Community Survey (ACS) is an ongoing demographics survey program conducted by the U.S. Census Bureau that provides information on a yearly basis about the nation and its people which aids in determining how federal and state funds are distributed each year.

SECTION 2 - DEMOGRAPHICS

Berks County Demographics

Berks County is an urban county of the third class, comprised of one city of the third class, 27 boroughs, and 44 townships. It is located in southeastern Pennsylvania, surrounded by six other counties: Schuylkill County to the north, Lebanon County to the west, Lehigh and Montgomery Counties to the east and Chester and Lancaster Counties to the south. Reading, a city of the third class, serves as the county seat. The County's geographic location and transportation network promote accessibility and mobility for people and freight to several surrounding larger metropolitan areas including Allentown (39 miles), Philadelphia (56 miles), Baltimore (97 miles), and New York City (125 miles).

As of 2021, Berks County is home to 426,967 residents. In comparison to the six neighboring counties, it ranks fourth in overall population. From 2000-2010, population increased 10.2 percent, exceeding both the state and national figures, and placing 5th highest amongst the other counties. Population growth slowed substantially from 2010-2021, slightly above the state, but below national figures for the period. The county ranked sixth out of the seven adjacent counties for percentage of population growth from 2010-2021.

Table 1

County Population Between 2000 and 2021					
County	2000	2010	2021 Est.	% Change 2000-2010	%Change 2010-2021
Berks	373,638	411,850	426,967	10.2%	3.7%
Chester	433,501	499,797	531,704	15.3%	6.4%
Lancaster	470,658	520,156	550,480	10.5%	5.8%
Lebanon	120,327	133,688	142,486	11.1%	6.6%
Lehigh	312,090	350,106	372,492	12.2%	6.4%
Montgomery	750,097	801,052	850,890	6.8%	6.2%
Schuylkill	150,336	148,228	143,308	-1.4%	-3.3%
Pennsylvania	12,281,054	12,702,379	12,970,650	3.4%	2.1%
United States	281,421,906	308,745,538	331,893,745	9.7%	7.5%

Source: U.S. Census, Census 2000, and Annual Estimates of the Resident Population 2010, 2017-2021: ACS 5-Year Estimates

Demographic Methodology

For this document the FFY 2025-2028 Transportation Improvement Program Statewide Environmental Justice Analysis Methodology was used. A full copy of this document can be found as an Appendix to this document. This statewide methodology was created as a way to keep all 67 Pennsylvania Counties using a uniform scale across all counties in the state. It also provides a uniform, easily communicated and understood way of classifying the relative concentrations of low-income and minority populations across the state of Pennsylvania. In the past, minority and low-income population percentages were based on natural breaks of the percentages of those populations present within block groups for each county. This led to conducting 67 separate analyses when looking at this data on a statewide level or multiple different analyses for multicounty planning partners and across PennDOT Districts.

The current methodology classifies census block groups into intervals based on the ratio of census block group minority population or low-income population percentages to county overall minority or low-income percentages. For example, a ratio of 1 indicates the census block group has the same minority or low-income percentage as the county percentage. A noted side effect of this approach is that it resulted in some counties not having all intervals. Through use of the United States Census Bureau American Community Survey 2017-2021 5-Year Estimates the county averages for minority and low-income populations were calculated. The Berks County overall minority population percentage was determined to be **30.31%** and the overall low-income population percentage was determined to be **11.46%**. All intervals are present within Berks County except for Minority Interval 5. The Minority Interval 5 for Berks County would account for census block groups with a minority population percentage greater than **121.24%**.

Tables 2 and 4 show the definitions of the minority and low-income population concentration intervals that are used throughout this plan. The specific Berks County equivalents for these intervals can also be found on these tables.

Table 2

Definition of Minority Population Intervals		
Minority Population Intervals	Berks County Equivalent	Ratio of Minority Population Percentage in Census Block Group to County Minority Population Percentage
1	<= 15.155%	Census Block Minority Population Percentage / County Minority Population Percentage <= 0.5 (Census block group minority population percentage less than or equal to half of countywide minority population percentage)
2	> 15.155% and <= 30.31%	Census Block Minority Population Percentage / County Minority Population Percentage > 0.5 and <= 1 (Census block group minority population percentage greater than half and less than or equal to the countywide minority population percentage)
3	> 30.31% and <= 60.62%	Census Block Minority Population Percentage / County Minority Population Percentage > 1 and <= 2 (Census block group minority population percentage greater than the countywide minority population percentage and less than or equal to twice the countywide minority population percentage)
4	> 60.62% and <= 121.24%	Census Block Minority Population Percentage / County Minority Population Percentage > 2 and <= 4 (Census block group minority population percentage greater than twice and less than or equal to four times the countywide minority population percentage)
5	> 121.24% (Not applicable)	Census Block Minority Population Percentage / County Minority Population Percentage > 4 (Census block group minority population percentage greater than four times the countywide minority population percentage)

Tables 3 shows the Berks County populations and minority populations within each Minority Population Interval. The percent minority within each Minority Population Interval is also shown.

Table 3

Minority Population Intervals	1	2	3	4
Total Interval Population	192,936	82,589	68,230	83,212
Minority Population	12,929	17,975	29,496	69,025
Percent Minority	6.70%	21.76%	43.23%	82.95%

Table 4

Definition of Low-Income Population Intervals		
Low-Income Population Intervals	Berks County Equivalent	Ratio of Low-Income Population Percentage in Census Block Group to County Low-Income Population Percentage
1	<= 5.73%	Census Block Low-Income Population Percentage / County Low-Income Population Percentage <= 0.5 (Census block group low-income population percentage less than or equal to half of countywide low-income population percentage)
2	> 5.73% and <= 11.46%	Census Block Low-Income Population Percentage / County Low-Income Population Percentage > 0.5 and <= 1 (Census block group low-income population percentage greater than half and less than or equal to the countywide low-income population percentage)
3	> 11.46% and <= 22.92%	Census Block Low-Income Population Percentage / County Low-Income Population Percentage > 1 and <= 2 (Census block group low-income population percentage greater than the countywide low-income population percentage and less than or equal to twice the countywide low-income population percentage)
4	> 22.92% and <= 45.84%	Census Block Low-Income Population Percentage / County Low-Income Population Percentage > 2 and <= 4 (Census block group low-income population percentage greater than twice and less than or equal to four times the countywide low-income population percentage)
5	> 45.84%	Census Block Low-Income Population Percentage / County Low-Income Population Percentage > 4 (Census block group low-income population percentage greater than four times the countywide low-income population percentage)

Tables 5 shows the Berks County populations and low-income populations within each Low-Income Population Interval. The percent low-income within each Low-Income Population Interval is also shown.

Table 5

Low-Income Population Intervals	1	2	3	4	5
Total Interval Population	194,238	88,199	68,501	58,024	18,005
Minority Population	5,720	6,916	10,882	17,824	7,605
Percent Minority	2.94%	7.84%	15.89%	30.72%	42.24%

**SECTION 3 –
DEMOGRAPHIC ANALYSIS OF THE FFY 2025-2028 TIP**

RATS has identified the following groups to be included in this analysis. The United States Census Bureau American Community Survey 2017-2021 5-Year Estimates provides the data supporting the analysis. The method for this analysis identifies census block groups where minority and low-income populations are above the Berks County average.

Table 6 shows the Population by race and the amount of each population that is Low-Income for Berks County. While the White, Non-Hispanic population makes up nearly three quarters of the population, the Hispanic population makes up more than 20% of Berks County population, with the next highest minority being Black or African American, Non-Hispanic at 4%.

While the Native Hawaiian population has the highest poverty percentage, they also however have the lowest total population. On the opposite side of the spectrum, the White population has the highest population, but the lowest poverty percentage, 9.1%, the lowest among the races, and lower than the county low-income population percentage of 11.46%. In contrast, all minority populations are higher than the county low-income population percentage, and all minorities as a whole have a low-income population percentage of 40.42%.

Table 6

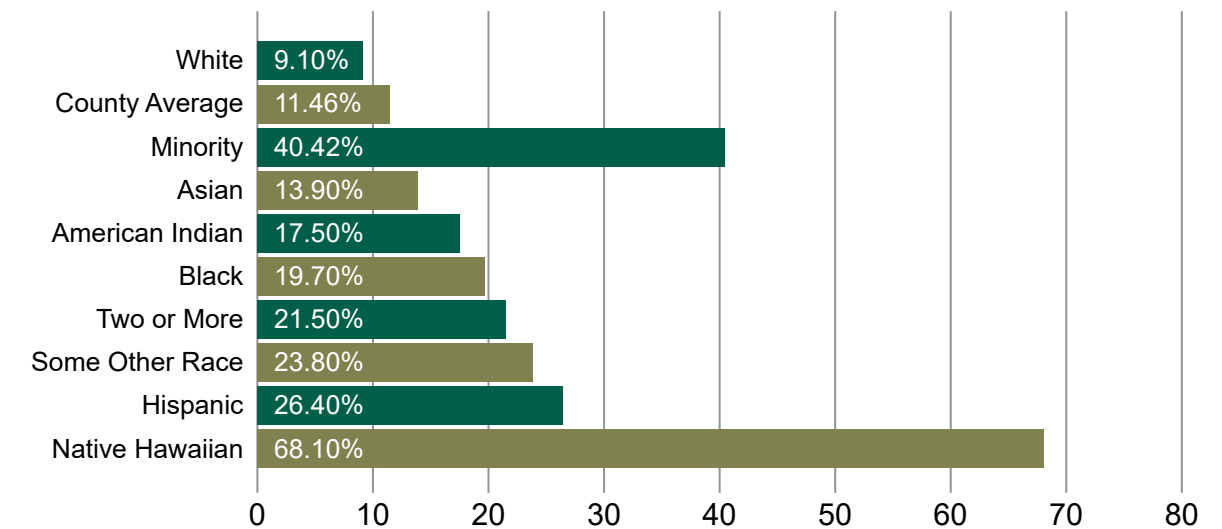
Demographic Indicator	Berks County, Pennsylvania		
	County Population	County Percentage	% Low-Income
Total	426,967	100%	11.46%
White, Non-Hispanic	297,542	70%	9.1%
Minority	129,425	30.31%	40.42%
Black or African American, Non-Hispanic	17,352	4%	19.7%
American Indian and Alaska Native, Non-Hispanic	230	0%	17.5%
Asian alone, Non-Hispanic	5,713	1%	13.9%
Native Hawaiian and Other Pacific Islander, Non-Hispanic	57	0%	68.1%
Some other race, Non-Hispanic	1,253	0%	23.8%
Two or more races, Non-Hispanic	8,271	2%	21.5%
Hispanic	96,549	23%	26.4%
Low-Income Population	48,947	11.46%	100%

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles Tables: B03002 & S1701

Figure 1 displays the poverty rate among the racial/ethnic groups throughout the Reading MPO area.

Figure 1

Poverty Rate Among Racial/Ethnic Groups in Reading MPO, 2021



Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles Tables: B03002 & S1701

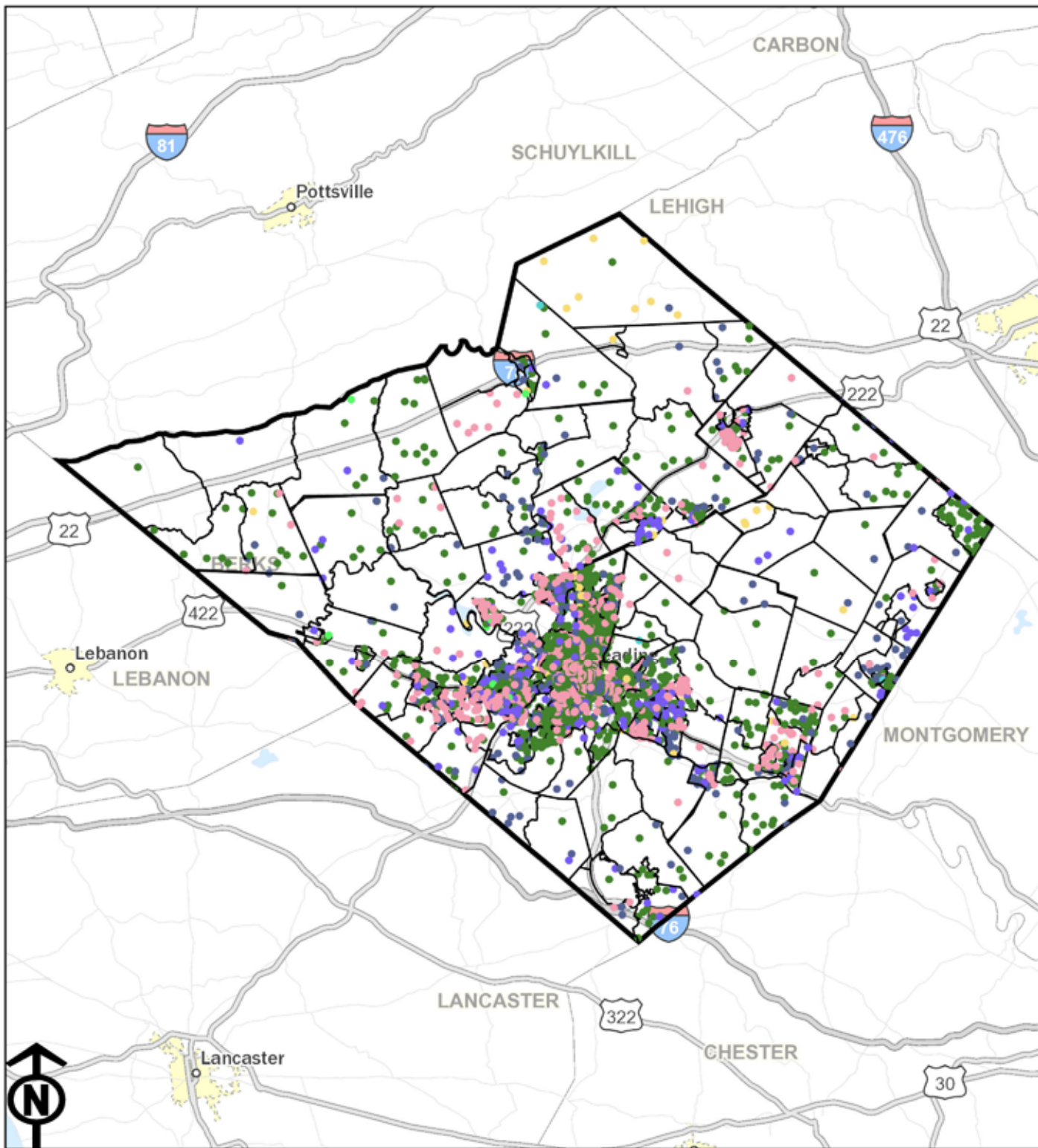
Table 7 identifies Other Potentially Disadvantaged Populations by number and percentage. These numbers show that of the Other Potentially Disadvantaged Populations, Elderly and Persons with a Disability are the highest in this category making up 17.1% and 14.0% respectively. Inclusion of these populations is imperative to determine the broader transportation and social needs of disadvantaged populations and ideas of transportation equity.

Table 7

Demographic Indicator	Berks County, Pennsylvania	
	County Population	Projected County Percentage
Other Potentially Disadvantaged Populations		
Limited English Proficiency (LEP)	30,812	7.2%
Persons with a Disability	59,758	14.0%
Elderly (65 years or older)	73,073	17.1%
Housing Units with No Vehicle *Out of 160,500 Households	13,845	8.6%
Low Income Households *Out of 160,500 Households	17,665	11.0%
Housing Units with No Computer *Out of 160,500 Households	15,566	9.7%
Housing Units with No Broadband Subscription *Out of 160,500 Households	23,908	14.9%

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles Tables: B17017, DP02, DP04, & DP05

The location of Minority and Low-Income Populations within Berks County and their concentrations by block group, which correspond to the Minority and Low-Income Intervals used throughout this document can be found on **Maps 01, 02, 03, and 04** on the following pages.



Berks County Minority Populations by Block Group - Map 01

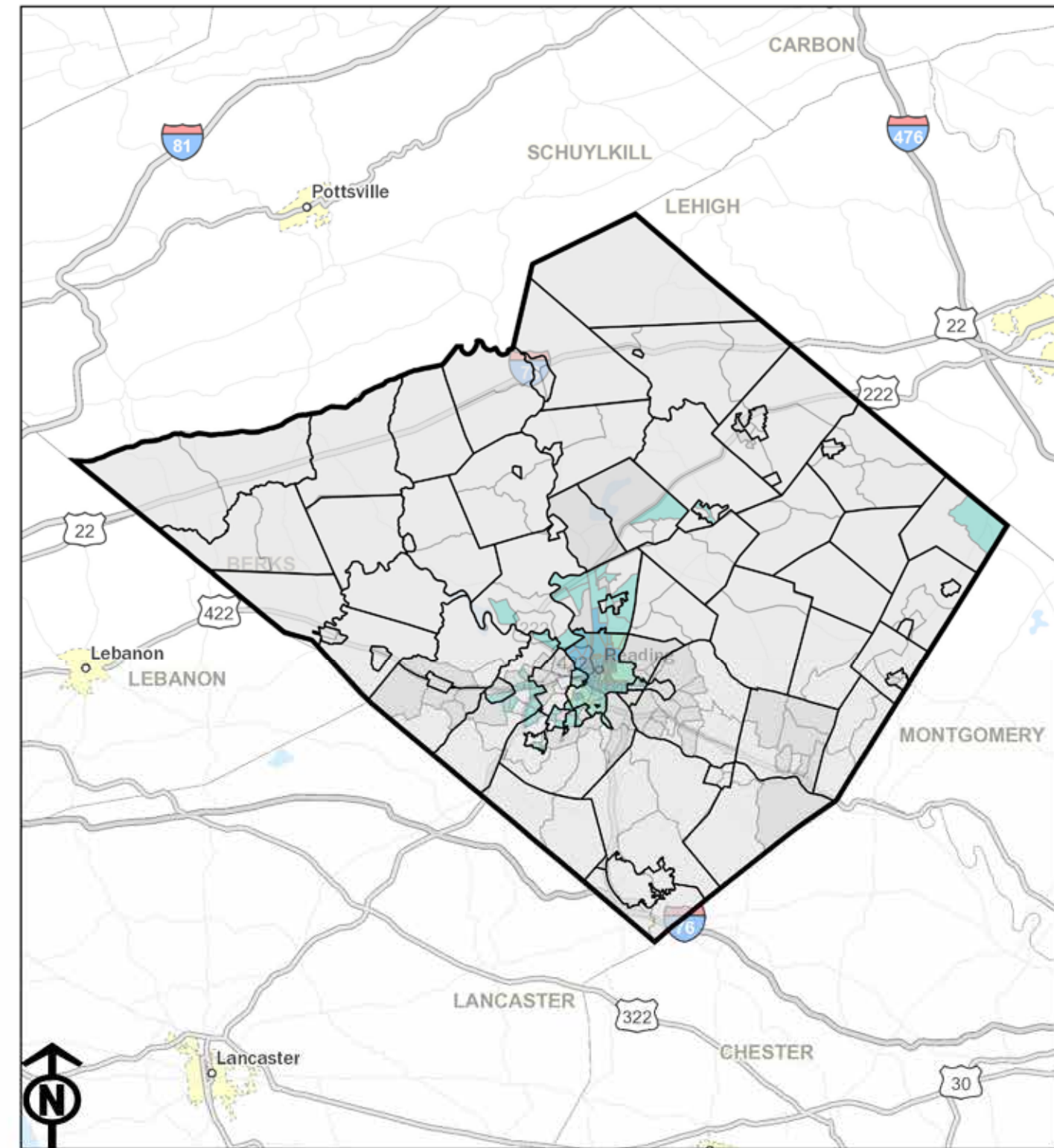
Statistics:
 County Total Population: 426,967
 County Minority Population: 129,425
 County Overall Minority Population Percentage: 30.3%

- Legend**
- Pennsylvania Counties
 - Pennsylvania Municipalities
 - Pennsylvania Census Block Groups, 2021**
 - 1 Dot = 20 People
 - Black or African-American, Not Hispanic or Latino
 - American Indian or Alaskan Native, Not Hispanic or Latino
 - Asian, Not Hispanic or Latino
 - Native Hawaiian or Pacific Islander, Not Hispanic or Latino
 - Other Race, Not Hispanic or Latino
 - Two or more Races, Not Hispanic or Latino
 - Hispanic or Latino



0 5 10 20 Miles

Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates
 Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.



Berks County Concentrations of Minority Population by Block Group - Map 02

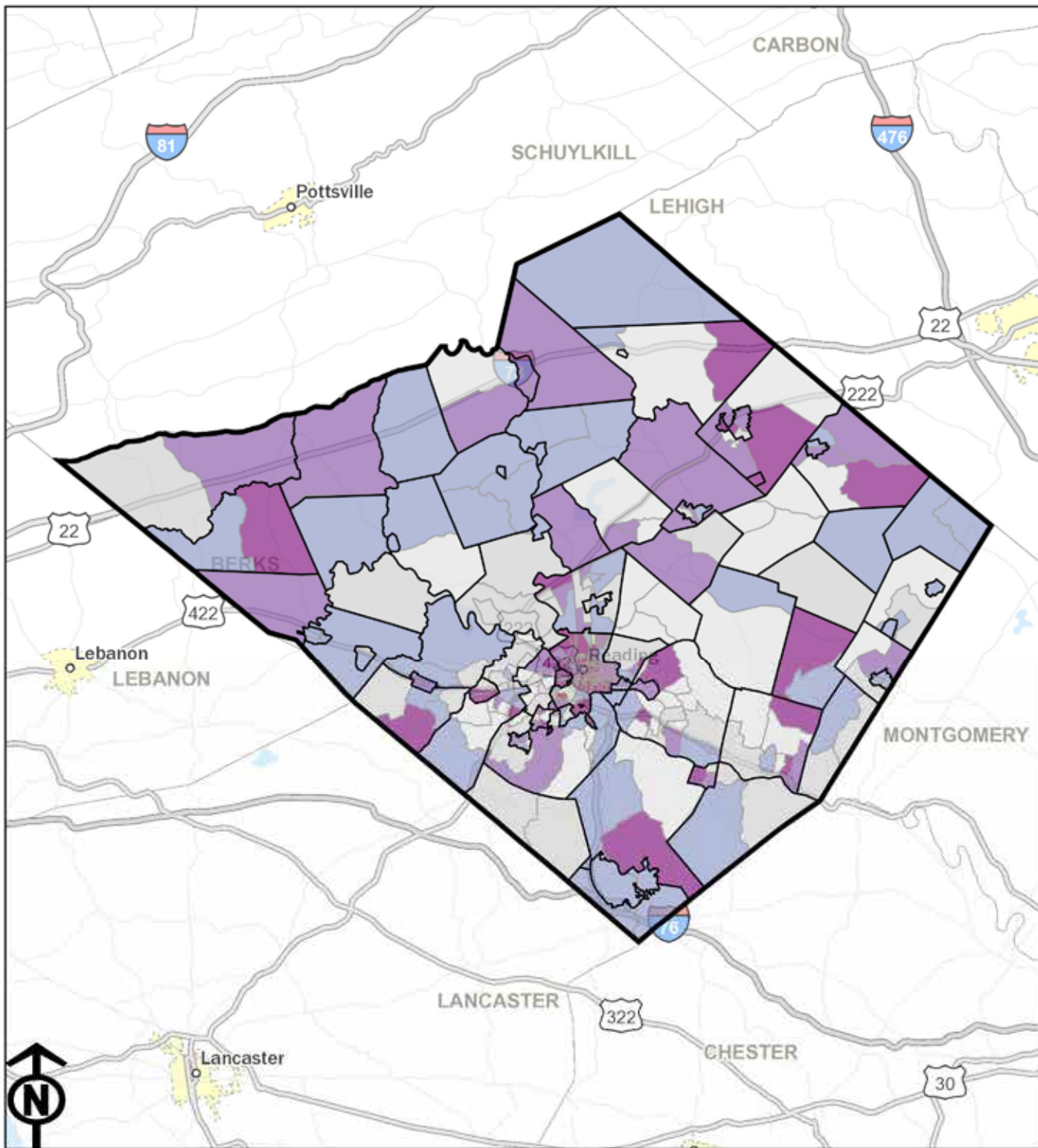
Statistics:
 County Total Population: 426,967
 County Minority Population: 129,425
 County Overall Minority Population Percentage: 30.3%

- Legend**
- Pennsylvania Counties
 - Pennsylvania Municipalities
 - Pennsylvania Census Block Groups, 2021**
 - County Minority Population Interval for Block Group**
 - Less than or equal to half the County Minority Population Percentage
 - Greater than half and less than or equal to the County Minority Population Percentage
 - Greater than the County Minority Population Percentage and less than or equal to twice the County Minority Population Percentage
 - Greater than twice and less than or equal to four times the County Minority Population Percentage



0 5 10 20 Miles

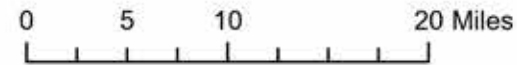
Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates
 Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.



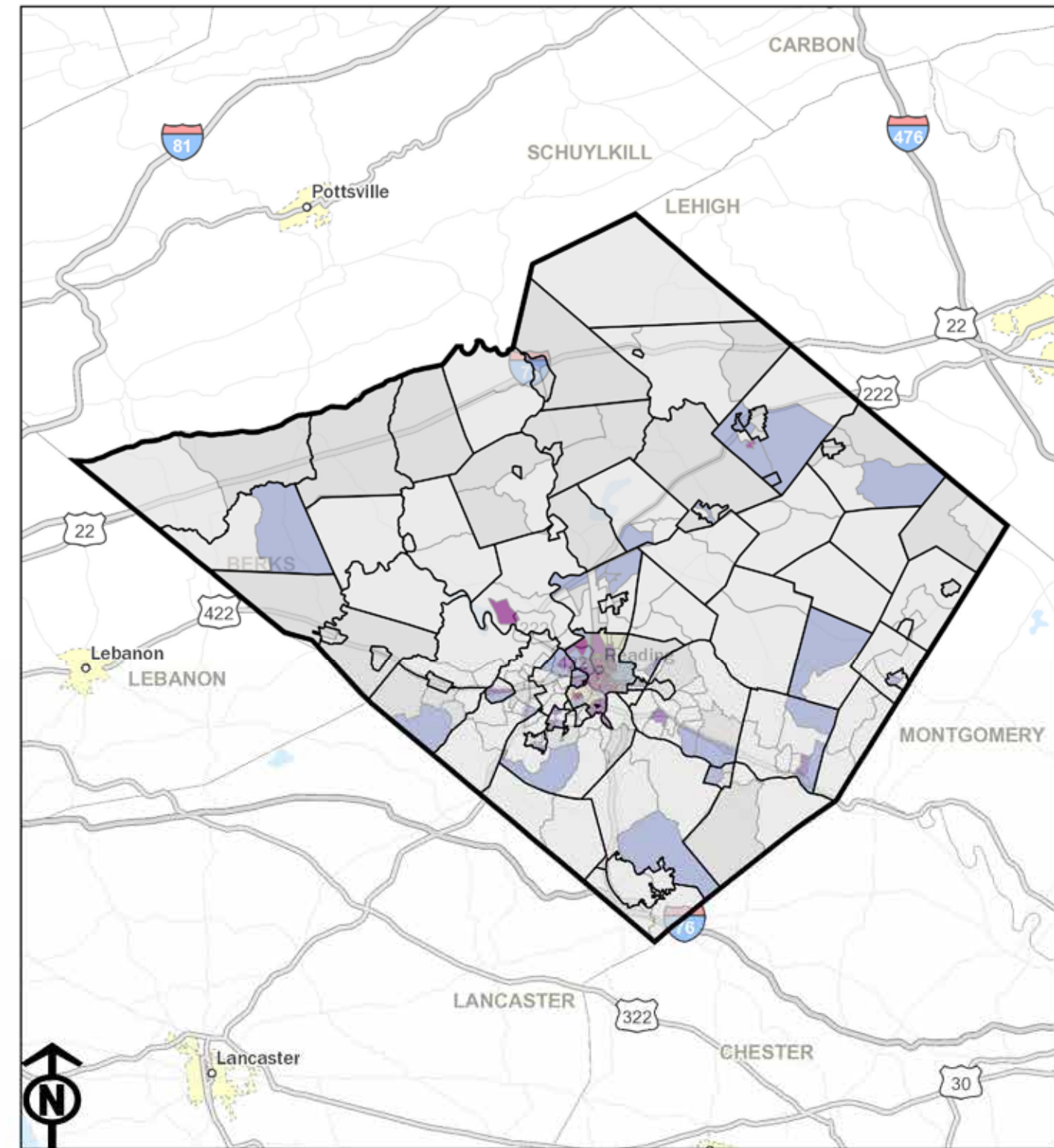
Berks County Low Income Population Count by Block Group - Map 03

Statistics:
 County Total Population: 426,967
 County Low Income Population: 48,947
 County Overall Low Income Population Percentage: 11.5%

- Legend**
- Pennsylvania Counties
 - Pennsylvania Municipalities
 - Pennsylvania Census Block Groups, 2021**
 - Low Income Population**
 - 0 - 27
 - 28 - 67
 - 68 - 122
 - 123 - 230
 - 231 - 2380



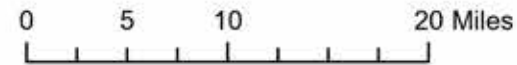
Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates
 Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.



Berks County Concentrations of Low Income Population by Block Group - Map 04

Statistics:
 County Total Population: 426,967
 County Low Income Population: 48,947
 County Overall Low Income Population Percentage: 11.5%

- Legend**
- Pennsylvania Counties
 - Pennsylvania Municipalities
 - Pennsylvania Census Block Groups, 2021**
 - Ratio of Low Income Block Group Percentage to County Low Income Percentage**
 - Less than or equal to half the County Low Income Population Percentage
 - Greater than half and less than or equal to the County Low Income Population Percentage
 - Greater than the County Low Income Population Percentage and less than or equal to twice the County Low Income Population Percentage
 - Greater than twice and less than or equal to four times the County Low Income Population Percentage
 - Greater than four times the County Low Income Population Percentage



Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates
 Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.

SECTION 4 – CRASH AND INJURY ANALYSIS OF THE FFY 2025-2028 TIP

The relationship of reportable crashes to minority and low-income population concentrations will be explored within this section.

Table 8 and Table 9 display the number and percentage of Total Reportable Crashes, Persons Involved in Reportable Crashes, Crash Suspected Serious Injuries, and Crash Fatalities in Berks County from 2017-2021. Within the Minority populations block group intervals, the majority of total reportable crashes (66.2%), persons involved in reportable crashes (64.1%), crash suspected serious injury (71.1%), and crashes resulting in fatality (76.6%) occurred in block groups less than or equal to the County average of Minority Population (30.31%). Similarly, the majority of total reportable crashes (64.3%), persons involved in reportable crashes (63.0%), crash suspected serious injury (68.1%), and crashes resulting in fatality (80.2%) occurred in Low-Income block groups less than or equal to County average of Low-Income Population (11.46%). This information shows that there is not a disproportionate amount of injury and fatal crashes occurring in block groups with a higher population of minority and low-income populations. This could be attributed to the lower speed limits found where these populations are concentrated, as the City of Reading has speed limits posted below 35MPH on a majority of its roads. Lower speed limits, like those posted on the roads in the City of Reading, lessen the force of impact, which in turn lessens the chance of a crash being fatal or causing serious injury. Across the state of Pennsylvania fatality rates are twice the amount on rural roads as compared to urban roads.

Table 8

Number and Percentage of Total Reportable Crashes, Persons Involved in Reportable Crashes, Crash Fatalities & Crash Suspected Serious Injuries by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
# of Total Reportable Crashes	13,102 (46.7%)	5,455 (19.5%)	4,793 (17.1%)	4,677 (16.7%)	28,027 (100%)
# of Persons Involved in Reportable Crashes	27,752 (43.9%)	12,792 (20.2%)	11,651 (18.4%)	11,071 (17.5%)	63,266 (100%)
# of Crash Suspected Serious Injuries	597 (54.6%)	180 (16.5%)	148 (13.5%)	168 (15.4%)	1,093 (100%)
# of Crash Fatalities	153 (62.7%)	34 (13.9%)	35 (14.3%)	22 (9.0%)	244 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 9

Number and Percentage of Total Reportable Crashes, Persons Involved in Reportable Crashes, Crash Suspected Serious Injuries & Crash Fatalities by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
# of Total Reportable Crashes	12,822 (42.5%)	6,591 (21.8%)	5,487 (18.2%)	3,943 (13.1%)	1,354 (4.5%)	30,197 (100%)
# of Persons Involved in Reportable Crashes	28,182 (41.5%)	14,632 (21.5%)	12,698 (18.7%)	9,076 (13.4%)	3,361 (5.0%)	67,949 (100%)
# of Crash Suspected Serious Injuries	530 (47.0%)	238 (21.1%)	182 (16.1%)	126 (11.2%)	52 (4.6%)	1,128 (100%)
# of Crash Fatalities	126 (47.2%)	88 (33.0%)	24 (9.0%)	22 (8.2%)	7 (2.6%)	267 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Nonmotorized transportation primarily consists of biking, walking, and horse-drawn vehicles but may also include other non-powered transportation devices. Many non-motorized travelers face challenges and safety concerns when utilizing the same roadway as motorized travelers, making the nonmotorized users especially vulnerable when a crash occurs. Recognizing and addressing nonmotorized challenges and safety is an important step in improving safety for all road users. The following tables in this section will look at the number of crashes, how many suspected serious injuries, and how many fatalities occurred for people using various nonmotorized modes of transportation.

Table 10 displays the number and percentage of crashes, suspected serious injuries, and fatalities associated with all modes of nonmotorized transportation. The number of nonmotorized crashes and related suspected serious injuries tend to occur more in areas that have higher minority and low-income concentrations. However, nonmotorized fatalities occur more often in areas where minority and low-income concentrations are low. Within Berks County, more nonmotorized users of the transportation system tend to live in urbanized areas and boroughs, consistent with the location of higher minority and low-income concentration. This indicates a higher proportion of nonmotorized crashes are occurring in areas that utilize nonmotorized transportation more than interval areas with lesser concentrations of Minority or Low-Income populations. However, there are also fewer fatalities in these areas that utilize more nonmotorized transportation. The risk of fatality to these vulnerable road users is closely tied to speed limits. The average chance of an adult pedestrian being seriously injured or killed when hit by a vehicle traveling 30MPH or less is only 10%. As the vehicle speed increases over 30MPH, the risk of serious injury and fatality increases sharply and significantly to the vulnerable road user. The speed limits in block groups with higher minority and low-income populations are generally posted at 35MPH or less.

Table 10

Number and Percentage of People Using Nonmotorized Modes Involved in Crashes, Suspected Serious Injuries & Fatalities by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
# of People Using Nonmotorized Modes Involved in Crashes	246 (21.8%)	123 (10.9%)	272 (24.1%)	488 (43.2%)	1,129 (100%)
# of People Using Nonmotorized Modes Involved in Crashes, Suspected Serious Injuries	36 (29.5%)	19 (15.6%)	24 (19.7%)	43 (35.2%)	122 (100%)
# of People Using Nonmotorized Modes Involved in Crashes, Fatalities	8 (26.7%)	9 (30.0%)	6 (20.0%)	7 (23.3%)	30 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 11

Number and Percentage of People Using Nonmotorized Modes Involved in Crashes, Suspected Serious Injuries & Fatalities by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
# of People Using Nonmotorized Modes Involved in Crashes	253 (18.8%)	212 (15.8%)	305 (22.7%)	390 (29.0%)	185 (13.8%)	1,345 (100%)
# of People Using Nonmotorized Modes Involved in Crashes, Suspected Serious Injuries	32 (24.4%)	22 (16.8%)	33 (25.2%)	28 (21.4%)	16 (12.2%)	131 (100%)
# of People Using Nonmotorized Modes Involved in Crashes, Fatalities	13 (35.1%)	12 (32.4%)	4 (10.8%)	5 (13.5%)	3 (12.3%)	37 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Nonmotorized transportation includes horse-drawn vehicles among other non-powered transportation devices. **Tables 12 and 13** show Horse and Buggy Crashes that occurred in Berks County from 2017-2021. There was only 1 horse and buggy crash between 2017 and 2021. This crash occurred within a census block group that is below the average minority concentration and equal to or below the average low-income concentration for Berks County.

Table 12

Number and Percentage of Horse and Buggy Crashes by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
# of Horse and Buggy Crashes	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 13

Number and Percentage of Horse and Buggy Crashes by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
# of Horse and Buggy Crashes	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 14 and Table 15 display the Number and Percentage of People on Bicycles Involved in Crashes, Suspected Serious Injuries, and Fatalities in Berks County from 2017-2021. The percentage for bicycle related crashes and bicycle related suspected serious injuries are nearly equal amongst all Minority and Low-Income Population Intervals. The percentage for bicycle related fatalities is much higher amongst intervals with a lower concentration of Minority and Low-Income populations. Similar to the discussion involving all nonmotorized users, the risk of fatality to bicyclists is closely tied to speed limits. This may contribute to a lesser number of fatalities in these block groups, despite a similar number of bicycle-related crashes and suspected serious injuries.

Table 14

Number and Percentage of People on Bicycles Involved in Crashes, Suspected Serious Injuries & Fatalities by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
# of People on Bicycles Involved in Crashes	55 (39.6%)	16 (11.5%)	31 (22.3%)	37 (26.6%)	139 (100%)
# of People on Bicycles Involved in Crashes, Suspected Serious Injuries	2 (22.2%)	2 (22.2%)	3 (33.3%)	2 (22.2%)	9 (100%)
# of People on Bicycles Involved in Crashes, Fatalities	4 (66.7%)	1 (16.7%)	0 (0.0%)	1 (16.7%)	6 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 15

Number and Percentage of People on Bicycles Involved in Crashes, Suspected Serious Injuries & Fatalities by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
# of People on Bicycles Involved in Crashes	42 (26.3%)	33 (20.6%)	35 (21.9%)	37 (23.1%)	13 (8.1%)	160 (100%)
# of People on Bicycles Involved in Crashes, Suspected Serious Injuries	4 (40.0%)	2 (20.0%)	3 (30.0%)	1 (10.0%)	0 (0.0%)	10 (100%)
# of People on Bicycles Involved in Crashes, Fatalities	3 (37.5%)	2 (25.0%)	0 (0.0%)	2 (25.0%)	1 (12.5%)	8 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 16 and Table 17 display the Number and Percentage of Pedestrians Involved in Crashes, Suspected Serious Injuries, and Fatalities in Berks County from 2017-2021. The locations of pedestrian crashes are primarily concentrated in areas with sidewalks such as the urbanized areas and boroughs within Berks County. These are also the areas that have higher minority and low-income populations.

Although there are more crashes involving pedestrians in areas with a higher concentration of minority and low-income populations than the county average, there are fewer pedestrian fatalities in these areas. As mentioned in the analysis of **Table 12 and Table 13**, this could be attributed to the lower speeds found in these areas significantly decreasing the risk of fatality.

Table 16

Number and Percentage of Pedestrians Involved in Crashes, Suspected Serious Injuries & Fatalities by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
# of Pedestrians Involved in Crashes	128 (15.6%)	86 (10.5%)	208 (25.4%)	396 (48.4%)	818 (100%)
# of Pedestrians Involved in Crashes, Suspected Serious Injuries	32 (29.4%)	16 (14.7%)	21 (19.3%)	40 (36.7%)	109 (100%)
# of Pedestrians Involved in Crashes, Fatalities	5 (20.0%)	8 (32.0%)	6 (24.0%)	6 (24.0%)	25 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 17

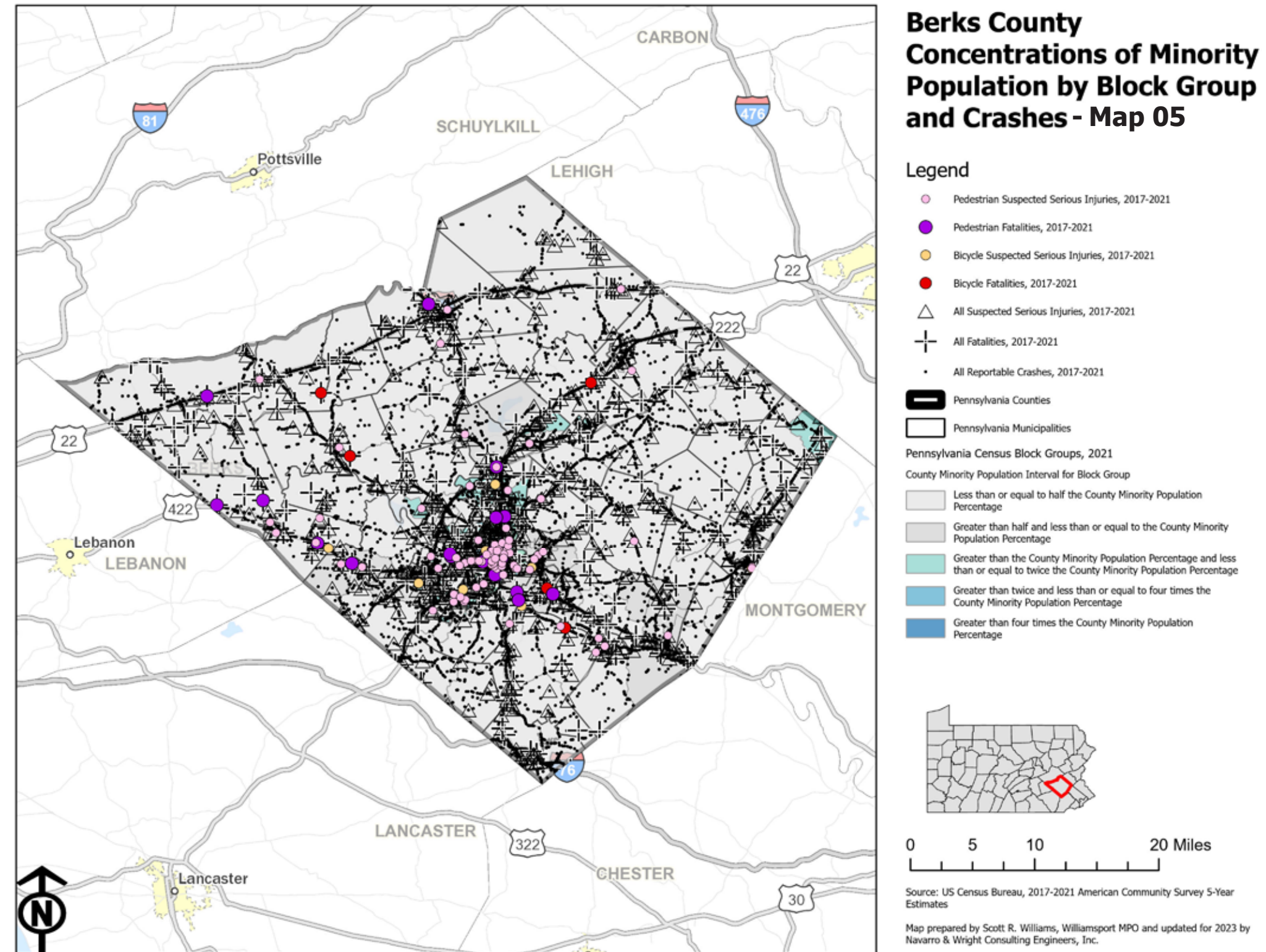
Number and Percentage of Pedestrians Involved in Crashes, Suspected Serious Injuries & Fatalities by Low-Income Population Interval, Berks County, PA (2017-2021)

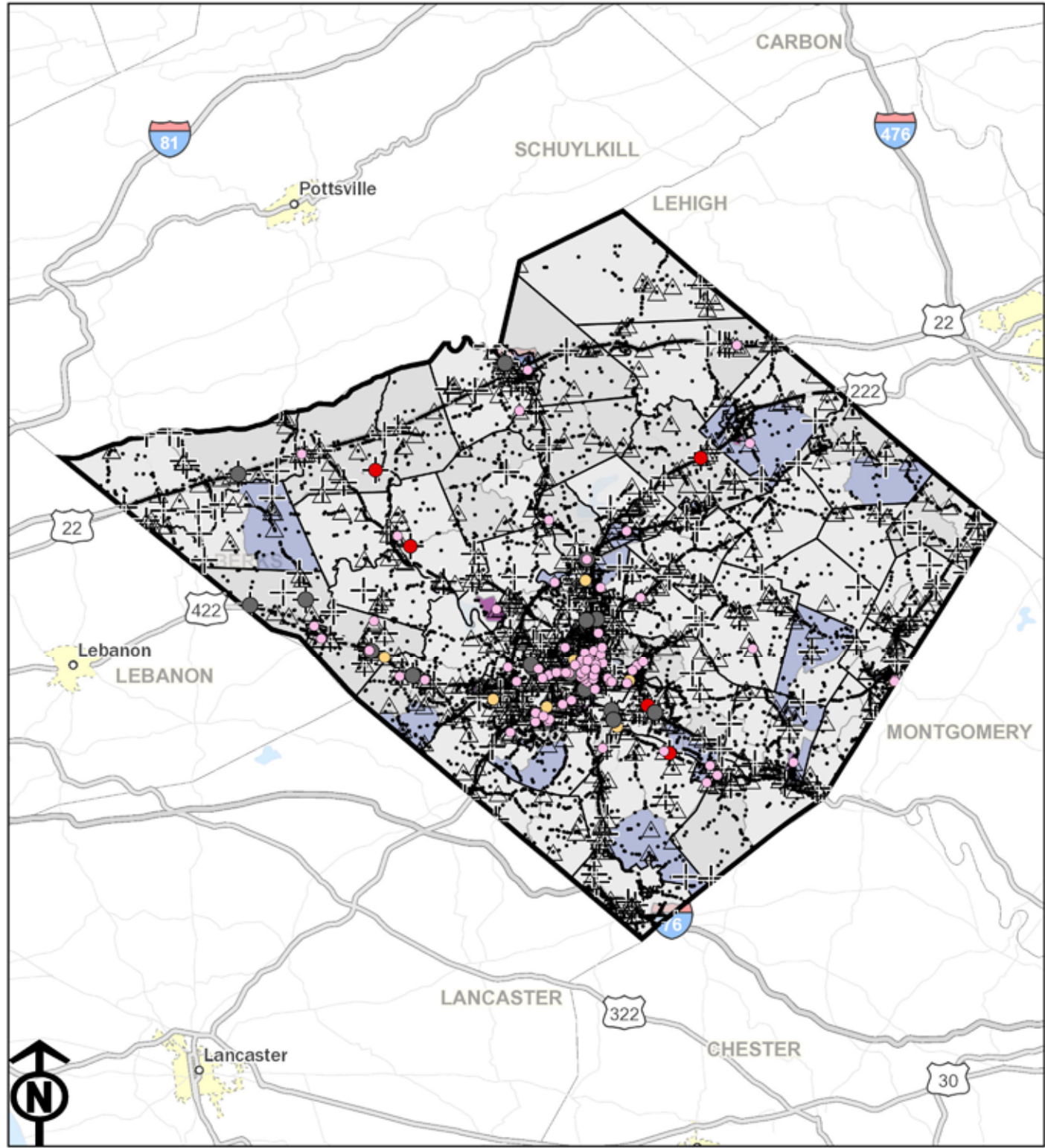
Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
# of People on Bicycles Involved in Crashes	154 (15.5%)	122 (12.3%)	240 (24.2%)	315 (31.8%)	161 (16.2%)	992 (100%)
# of People on Bicycles Involved in Crashes, Suspected Serious Injuries	28 (23.9%)	17 (14.5%)	30 (25.6%)	26 (22.2%)	16 (13.7%)	117 (100%)
# of People on Bicycles Involved in Crashes, Fatalities	10 (33.3%)	11 (36.7%)	4 (13.3%)	3 (10.0%)	2 (6.7%)	30 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Within the FFY 2025-2028 TIP, there are a few locations where bicycle and pedestrian safety improvements are taken into consideration within higher concentrated areas of Low-Income and Minority populations such as the realignment of intersections in Sinking Spring Borough (PennDOT Project Id: 87688) and corridor improvements in the City of Reading (PennDOT Project Id: 102161) as well as in the design and ultimate construction of the US 422 West Shore Bypass Reconstruction project (PennDOT Project Id: 114439). Additionally, each highway and bridge project is reviewed for bicycle and pedestrian use and improvements, which are included in those projects as appropriate. Throughout the development of the FFY 2025-2028 TIP and future TIPs, emphasis will be made to reduce the amount of non-motorized crashes, suspected serious injuries, and fatalities through identifying areas where non-motorized safety improvements can be made in areas of higher concentrations of Low-Income and Minority populations. The Reading MPO/Berks County Planning Commission have multiple resources to assist in making these determinations, such as the Berks County Bicycle and Pedestrian Plan which was updated and adopted over the Summer of 2020. Another valuable resource in determining where these safety improvements should be made is the Reading Area Transportation Study (RATS) Annual Safety Report, which is updated on a yearly basis.

Maps 05 and 06 show the locations of Reportable Crashes from 2017-2021 in Berks County amongst concentrations of Minority and Low-Income Populations.





Berks County Concentrations of Low Income Population and Crashes - Map 06

Legend

- Pedestrian Suspected Serious Injuries, 2017-2021
- Pedestrian Fatalities, 2017-2021
- Bicycle Suspected Serious Injuries, 2017-2021
- Bicycle Fatalities, 2017-2021
- △ All Suspected Serious Injuries, 2017-2021
- + All Fatalities, 2017-2021
- All Reportable Crashes, 2017-2021
- Pennsylvania Counties
- Pennsylvania Municipalities

Pennsylvania Census Block Groups, 2021
 Ratio of Low Income Block Group Percentage to County Low Income Percentage

- Less than or equal to half the County Low Income Population Percentage
- Greater than half and less than or equal to the County Low Income Population Percentage
- Greater than the County Low Income Population Percentage and less than or equal to twice the County Low Income Population Percentage
- Greater than twice and less than or equal to four times the County Low Income Population Percentage
- Greater than four times the County Low Income Population Percentage

0 5 10 20 Miles

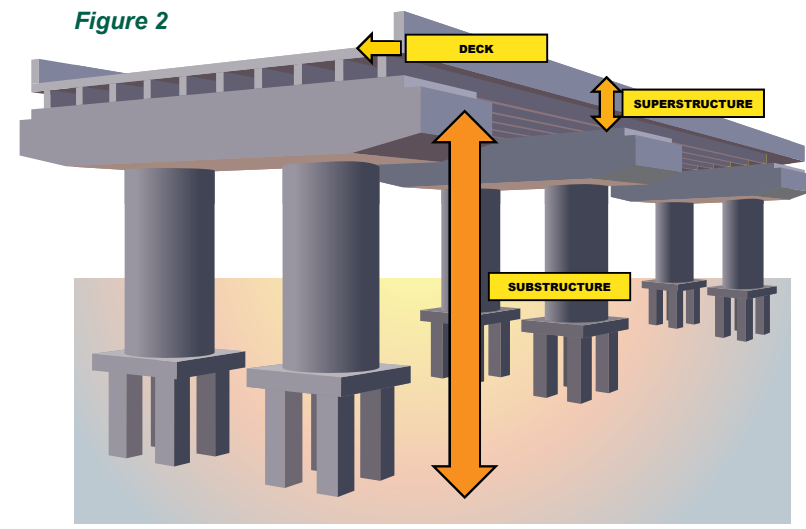
Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates
 Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.

SECTION 5 - BRIDGE AND PAVEMENT ANALYSIS OF THE FFY 2025-2028 TIP

The Schuylkill River, two lakes and countless streams provide ample recreational and commercial activities but create a transportation challenge to safely and efficiently move people and freight over them in Berks County. In 2021, there are 875 bridges in Berks County, with the majority owned by PennDOT. These bridges are those that require inspections – state bridges longer than 8 feet and local bridges longer than 20 feet. The charts below show more bridges than identified within Berks County due to the buffer used around each census block.

Bridges are characterized by the condition of their major components. State-owned bridges 8 feet in length or more and local-owned bridges over 20 feet in length are inspected on a regular, rotating basis. These inspections result in condition ratings for the deck, substructure, and superstructure. If the bridge is a culvert, then the one structural piece is given a condition rating. If any one of these structural parts has a condition rating of 4 or less, that bridge is deemed Poor. Bridges and culverts with a condition rating of 5 for any of the structural parts are considered Fair. Bridges and culverts with a condition rating of 6 or higher are considered Good. Each of these components is rated based on the Federal Highway Administration's Pavement and Bridge Condition Report Performance Measures final rule, which became effective in February 2017.

A Poor designation does not imply that a bridge is unsafe. However, such bridges typically require significant maintenance and repair to remain in service and would eventually require major rehabilitation or replacement to address the underlying deficiency. Some examples of underlying deficiencies can include inadequate under-clearances, insufficient load-carrying capacity, poor alignment with the roadway, or can no longer adequately service today's traffic.



Inspected Bridge Components
 This graphic shows the locations of a bridge substructure, superstructure, and deck, which are all considered in the overall condition rating.

Tables 18 and 19 identify the number and percentage of bridges and their conditions amongst concentrations of Minority and Low-Income Populations within Berks County. To fully understand the tables below, one should view the total percent of all bridges within each interval. If an interval has 75% of all bridges, that interval should include approximately 75% of bridges of each condition. These tables display that there is not a disproportionate amount of Poor condition bridges in areas with high concentrations of Minority and Low-Income populations. Instead, generally a higher number and percentage of Poor condition bridges are found in the block groups where Minority and Low-Income populations are below the county average compared to the total number of bridges found within each interval. Throughout Berks County, bridges included in the TIP and LRTP are selected based on the recommended treatments needed at this time based on a lowest life cycle cost approach to project programming.

Table 18

Number and Percentage of Bridges and Bridge Conditions by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
# of Bridges in Good Condition	157 (75.8%)	32 (15.5%)	14 (6.8%)	4 (1.9%)	207 (100%)
# of Bridges in Fair Condition	466 (72.4%)	96 (14.9%)	63 (9.8%)	19 (3.0%)	644 (100%)
# of Bridges in Poor Condition	93 (73.2%)	24 (18.9%)	6 (4.7%)	4 (3.1%)	127 (100%)
Total Bridge Count	717 (73.2%)	152 (15.5%)	83 (8.5%)	27 (2.8%)	979 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 19

Number and Percentage of Bridges and Bridge Conditions by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
# of Bridges in Good Condition	120 (51.7%)	80 (34.5%)	29 (12.5%)	3 (1.3%)	0 (0.0%)	232 (100%)
# of Bridges in Fair Condition	392 (56.6%)	173 (25.0%)	98 (14.2%)	20 (2.9%)	9 (1.3%)	692 (100%)
# of Bridges in Poor Condition	76 (56.7%)	42 (31.3%)	10 (7.5%)	4 (3.0%)	2 (1.5%)	134 (100%)
Total Bridge Count	589 (55.6%)	295 (27.9%)	137 (12.9%)	27 (2.5%)	11 (1.0%)	1,059 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

The deck of a bridge is the top surface that carries traffic and is a major component of bridge inspection. **Tables 20 and 21** display bridge deck area by square foot and the associated conditions by concentrations of Minority and Low-Income Populations within Berks County. Similar to the results seen by analyzing the number of bridges rated by condition across Minority and Low-Income Intervals, the bridge deck condition is showing more poor bridge deck area in census block groups with less population of minorities and lower income individuals. Comparing poor bridge deck area to the total bridge deck area within each interval, the only interval with a higher percentage of poor condition bridge deck area would be Low-Income Population Interval 5, however, this is only by a slight amount.

Table 20

Number and Percentage of Bridge Deck Area (sq ft) and Bridge Deck Area Conditions by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
Deck Area in Good Condition (sf)	582,865 (74.3%)	149,237 (19.0%)	44,447 (5.7%)	8,029 (1.0%)	784,578 (100%)
Deck Area in Fair Condition (sf)	1,244,496 (44.1%)	537,622 (19.1%)	519,043 (18.4%)	520,771 (18.5%)	2,821,933 (100%)
Deck Area in Poor Condition (sf)	253,490 (51.4%)	112,286 (22.8%)	66,038 (13.4%)	61,116 (12.4%)	492,930 (100%)
Total Bridge Deck Area (sf)	2,082,830 (50.8%)	799,145 (19.5%)	629,528 (15.3%)	589,916 (14.4%)	4,101,418 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

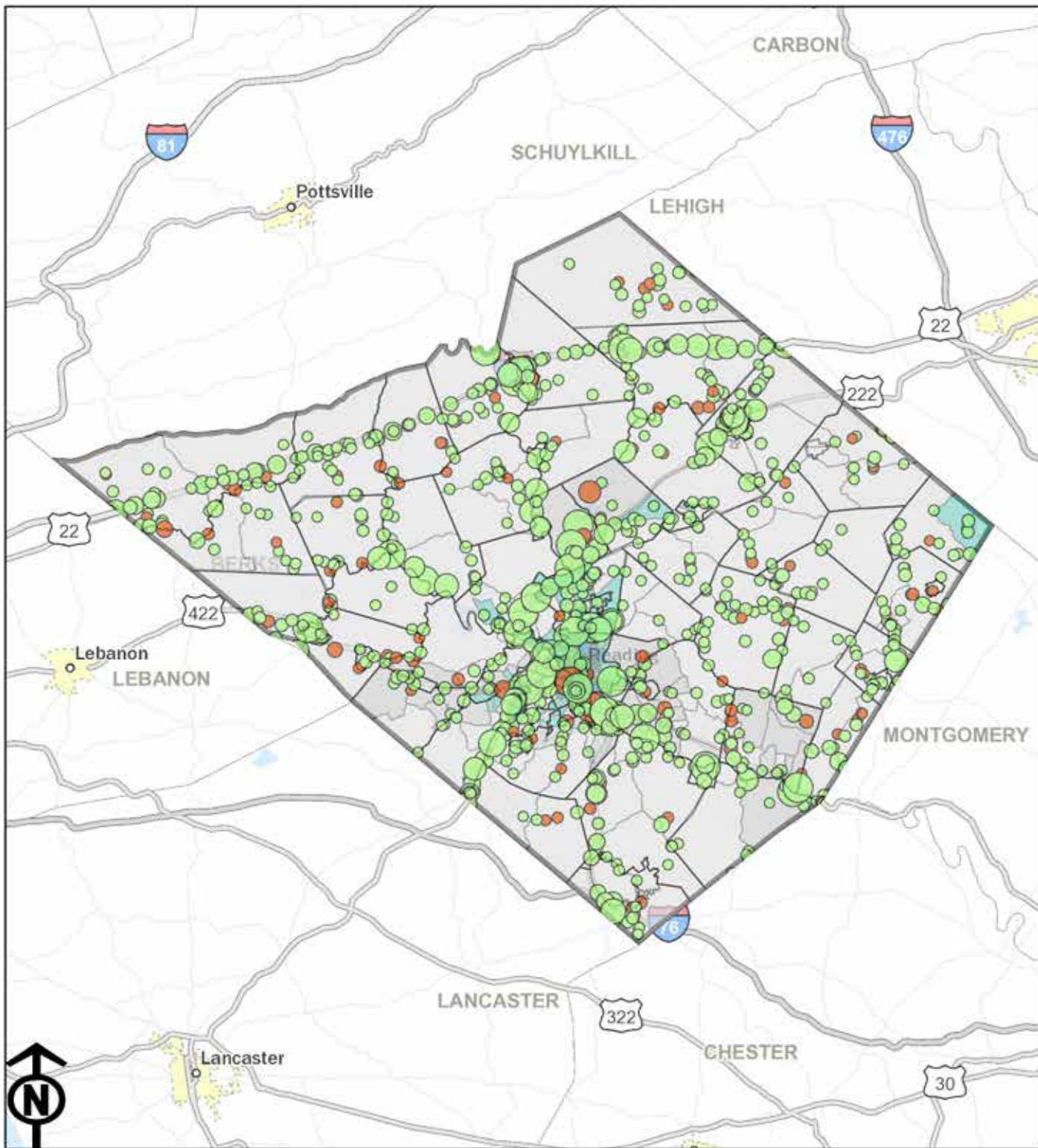
Table 21

Number and Percentage of Bridge Deck Area (sq ft) and Bridge Deck Area Conditions by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
Deck Area in Good Condition (sf)	416,589 (46.9%)	308,444 (34.8%)	155,392 (17.5%)	7,043 (0.8%)	0 (0.0%)	887,467 (100%)
Deck Area in Fair Condition (sf)	1,380,960 (44.5%)	551,564 (17.8%)	628,008 (20.2%)	199,706 (6.4%)	346,273 (11.1%)	3,106,511 (100%)
Deck Area in Poor Condition (sf)	309,745 (55.8%)	113,487 (20.5%)	64,433 (11.6%)	13,712 (2.5%)	53,456 (9.6%)	554,832 (100%)
Total Bridge Deck Area (sf)	2,109,272 (46.3%)	973,494 (21.4%)	847,833 (18.6%)	220,461 (4.8%)	399,729 (8.8%)	4,550,789 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Maps 07 and 08 display the locations of bridges and their conditions in relation to Concentrations of Minority and Low-Income Populations.



Berks County Concentrations of Minority Population by Block Group and Bridges - Map 07

Legend

- Pennsylvania Counties
- Pennsylvania Municipalities

Pennsylvania Census Block Groups, 2021

County Minority Population Interval for Block Group

- Less than or equal to half the County Minority Population Percentage
- Greater than half and less than or equal to the County Minority Population Percentage
- Greater than the County Minority Population Percentage and less than or equal to twice the County Minority Population Percentage
- Greater than twice and less than or equal to four times the County Minority Population Percentage

State and Local Bridges

Bridge Condition

- Poor Condition or Worse
- Fair Condition or Better

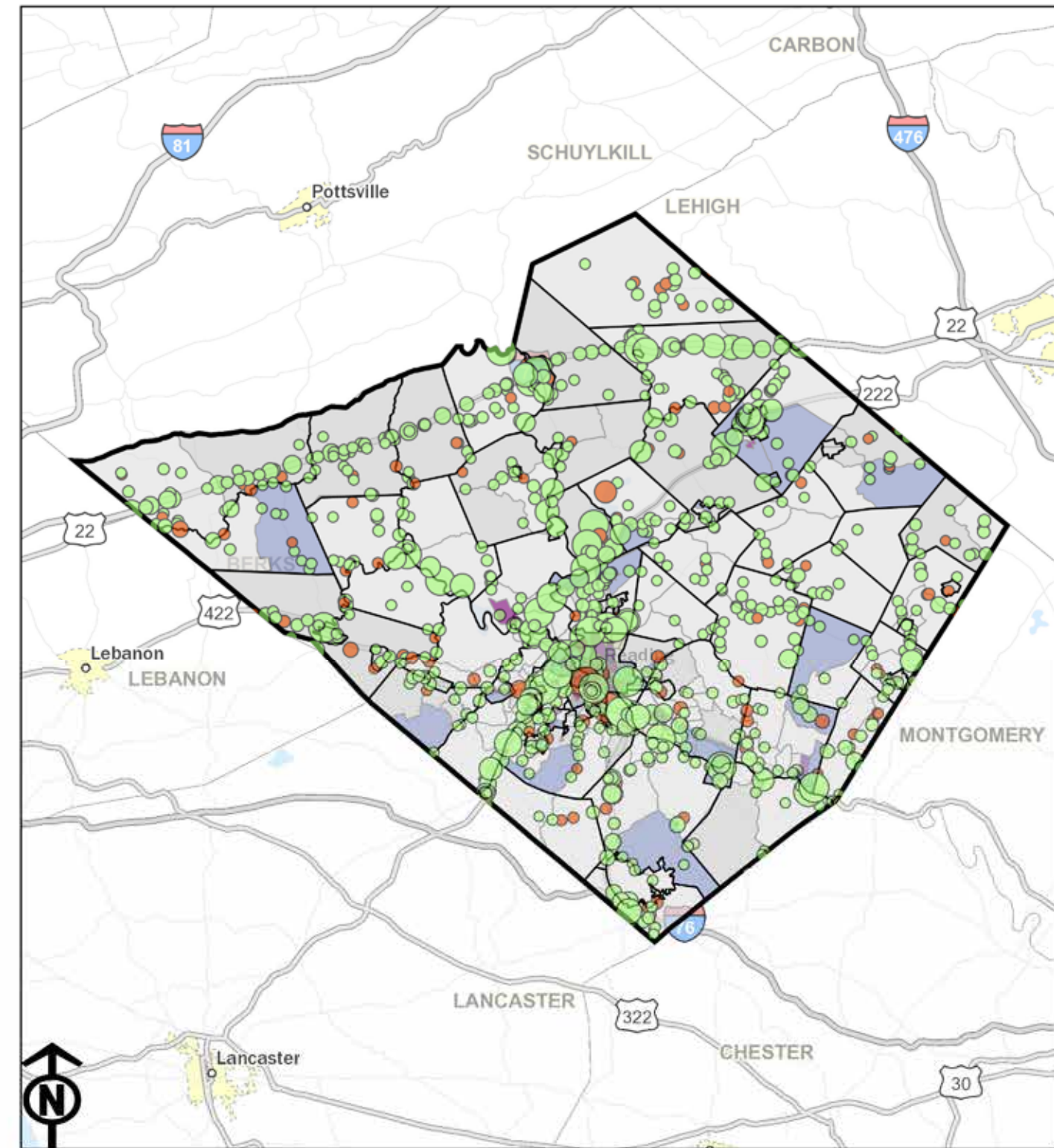
Deck Area (Square Feet)

- 0
- 5,333.33
- 10,666.7
- 16,000

0 5 10 20 Miles

Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates

Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.



Berks County Concentrations of Low Income Population and Bridges - Map 08

Legend

- Pennsylvania Counties
- Pennsylvania Municipalities

Pennsylvania Census Block Groups, 2021

Ratio of Low Income Block Group Percentage to County Low Income Percentage

- Less than or equal to half the County Low Income Population Percentage
- Greater than half and less than or equal to the County Low Income Population Percentage
- Greater than the County Low Income Population Percentage and less than or equal to twice the County Low Income Population Percentage
- Greater than twice and less than or equal to four times the County Low Income Population Percentage
- Greater than four times the County Low Income Population Percentage

State and Local Bridges

Bridge Condition

- Poor Condition or Worse
- Fair Condition or Better

Deck Area (Square Feet)

- 0
- 5,333.33
- 10,666.7
- 16,000

0 5 10 20 Miles

Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates

Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.

To fully analyze the information provided in **Tables 24 and 25**, as well as **Maps 9 and 10** on the following pages, one must understand the Federal Aid System and the usage of International Roughness Index (IRI) as a unit of measure for pavement conditions.

The Federal Aid System (with the exception of rural minor collectors and local roads) is a collection of roads in the county that are eligible for federal funds. In 2021, the federal aid system represented 734.7 linear miles, or 22.04% of all roadways in Berks County. The tables below show variations in total numbers of the Federal Aid System due to the buffer used to create Minority and Low-Income Intervals, as well as the fact that the reference table shows the total based on Linear Miles, while the data tables are showing the Federal Aid System by Segment Miles.

Table 22

Federal Aid System in Berks County 2021	
Agency	Linear Miles
Local	140.3
PennDOT	594.4
Total	734.7

The IRI is a statistic used to measure how smooth or rough a pavement surface. The IRI is separated into four categories, which are Excellent, Good, Fair, and Poor where Excellent IRI is in the best condition and Poor IRI is in the worst condition. IRI ranking categories can be seen in the table below.

Source: PennDOT, Pennsylvania Highway Statistics, 2021

Table 23

IRI Categories	Interstate	NHS Non-Interstate	Non-NHS ≥ 2,000 ADT	Non-NHS ≤ 2,000 ADT
< 70	Excellent	Excellent	Excellent	Excellent
71-75	Good	Excellent	Excellent	Excellent
76-100		Good	Good	Good
101-120	Fair	Good	Good	Good
121-150		Fair	Fair	Fair
151-170	Poor	Fair	Fair	Fair
171-195		Poor	Poor	Poor
196-220		Poor	Poor	Poor
>220		Poor	Poor	Poor

Source: PennDOT Roadway Management and Testing

The best way to analyze **Tables 24 through 27** is by comparing the percentages by interval for each condition.

Table 24 shows the distribution of Federal Aid Segment Miles and associated IRI amongst Minority Populations. A majority of Federal Aid Segment Miles are located within Minority Population Intervals 1 and 2, which have a smaller minority population than the countywide average. Due to this large number of segment miles being located within the census block group areas associated with these intervals, there is a significantly larger number of poor condition IRI Federal Aid segment miles in these intervals. However, when looking at the percentages of poor condition IRI Federal Aid segment miles to total segment miles within each interval, it can be observed that there is a disproportionate amount of poor condition federal aid segment miles in Minority Population

Intervals 3 and 4. In particular, Minority Population Interval 4, only has 19.7 Federal Aid segment miles. Nearly equal amounts are in good condition as there are poor condition at approximately 6 segment miles. To have a more equal percentage of IRI condition of Federal Aid Segment Miles within each interval, the consideration of resurfacing/repaving projects to Poor IRI Federal Aid Segment Miles should be focused in small amounts in the areas with a higher than county average of Minority Populations. Smaller projects of resurfacing/repaving could add to a more equal distribution within each of these Minority Intervals as they have less total Federal Aid Segment Miles.

Table 24

Number and Percentage of Federal Aid Segment Mile IRI by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
Excellent IRI Federal Aid Segment Miles	68.61 (78.7%)	13.21 (15.1%)	3.76 (4.3%)	1.66 (1.9%)	87.2 (100%)
Good IRI Federal Aid Segment Miles	133.47 (63.9%)	44.51 (21.3%)	24.72 (11.8%)	6.19 (3.0%)	208.9 (100%)
Fair IRI Federal Aid Segment Miles	68.90 (58.2%)	27.24 (23.0%)	16.82 (14.2%)	5.42 (4.6%)	118.4 (100%)
Poor IRI Federal Aid Segment Miles	31.30 (46.6%)	17.18 (25.6%)	12.37 (18.4%)	6.25 (9.3%)	67.1 (100%)
Other IRI Federal Aid Segment Miles	5.36 (95.7%)	0.00 (0.0%)	0.00 (0.0%)	0.20 (3.6%)	5.6 (100%)
Total Federal Aid Segment Miles	307.6 (63.1%)	102.1 (21.0%)	57.7 (11.8%)	19.7 (4.0%)	487.2 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 25 shows the distribution of Federal Aid Segment Miles and associated IRI amongst Low-Income Populations. Analyzing the poor condition Federal Aid Segment Miles by Low-Income Population Intervals, it can be seen that the largest percentage of poor condition Federal Aid Segment Miles is found in the three intervals with the least low-income population. However, Interval 1 is showing approximately 10% of this interval's total Federal Aid Segment Miles in poor condition within this interval, while Interval 5 is showing approximately 38% of this interval's total Federal Aid Segment Miles in poor condition. By focusing resurfacing/repaving projects in the area encompassed by Interval 5, smaller projects would reduce this percentage by a much greater amount than the larger projects that would take place in areas covered by Interval 1 which has a total of 258.5 Federal Aid Segment Miles compared to the 10.5 Federal Aid Segment Miles in Interval 5. This will be considered when adding repaving/resurfacing projects to the TIP.

Table 25

Number and Percentage of Federal Aid Segment Mile IRI by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
Excellent IRI Federal Aid Segment Miles	47.5 (48.6%)	37.3 (38.1%)	7.9 (8.1%)	3.4 (3.5%)	1.7 (1.7%)	97.8 (100%)
Good IRI Federal Aid Segment Miles	124.3 (54.4%)	58.9 (25.8%)	33.2 (14.5%)	9.9 (4.3%)	2.1 (0.9%)	228.5 (100%)
Fair IRI Federal Aid Segment Miles	55.5 (40.5%)	40.7 (29.7%)	27.4 (20.0%)	11.0 (8.0%)	2.5 (1.8%)	137.0 (100%)
Poor IRI Federal Aid Segment Miles	25.9 (32.8%)	19.8 (25.1%)	21.6 (27.3%)	7.6 (9.6%)	4.0 (5.1%)	79.0 (100%)
Other IRI Federal Aid Segment Miles	5.3 (91.4%)	0.1 (1.7%)	0.0 (0.0%)	0.2 (3.4%)	0.2 (3.4%)	5.8 (100%)
Total Federal Aid Segment Miles	258.5 (47.2%)	156.8 (28.6%)	90.1 (16.4%)	32.2 (5.9%)	10.5 (1.9%)	548.1 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

The Overall Pavement Index (OPI) is explored in **Tables 26 and 27** in relation to Minority and Low-Income Population Intervals. The OPI is a Pennsylvania specific pavement index that looks at pavement roughness and distress. OPI includes both IRI as well as other pavement distresses collected through the Systematic Technique to Analyze and Manage Pennsylvania Pavements (STAMPP) Program, resulting in a more comprehensive index for comparison than IRI alone. The OPI is combined with Out of Cycle (OOC) pavement data to help determine when pavement should be repaved. The OOC is based on the age and type of last pavement surface. Therefore, by combining the OPI and OOC; rider acceptance, pavement conditions, age and type of last surface are all considered to aid in making better decisions on when to repave a road.

Table 26 shows the distribution of Federal Aid Segment Miles and associated OPI amongst the Minority Populations. **Table 27** shows the distribution of Federal Aid Segment Miles and associated OPI amongst the Low-Income Populations.

Table 26 shows the distribution of Federal Aid Segment Miles and associated OPI amongst Minority Populations. A majority of Federal Aid Segment Miles are located within Minority Population Intervals 1 and 2, which have a smaller minority population than the countywide average. Due to this large number of segment miles being located within the census block group areas associated with these intervals, there is a significantly larger number of poor condition IRI Federal Aid segment miles in these intervals. However, when looking at the percentages of poor condition OPI Federal Aid segment miles to total segment miles within each interval, it can be observed that

there is a disproportionate amount of poor condition federal aid segment miles in Minority Population Intervals 3 and 4. In particular, Minority Population Interval 4, only has 19.7 Federal Aid segment miles, which is 4.0% of the Berks County Federal Aid Segment Miles, however, 6.7% of Berks County Federal Aid Segment Miles that are in poor condition are found within this interval. In comparison, Minority Interval 1 contains 63.2% of the Federal Aid Segment Miles in Berks County, but only contains 44.7% of the Federal Aid Segment Miles that are in poor condition. To have a more equal percentage of OPI condition of Federal Aid Segment Miles within each interval, the consideration of resurfacing/repaving projects to Poor IRI Federal Aid Segment Miles should be focused in small amounts in the areas with a higher than county average of Minority Populations. Smaller projects of resurfacing/repaving could add to a more equal distribution within each of these Minority Intervals as they have less total Federal Aid Segment Miles.

Table 26

Number and Percentage of Federal Aid Segment Mile OPI by Minority Population Interval, Berks County, PA (2017-2021)

Minority Population Intervals	1	2	3	4	1-4 (Berks County Total)
Total Interval Population	192,936	82,589	68,230	83,212	426,967
Minority Population	12,929	17,975	29,496	69,025	129,425
Percent Minority	6.70%	21.76%	43.23%	82.95%	30.31%
Excellent OPI Federal Aid Segment Miles	21.0 (77.5%)	4.6 (17.0%)	0.5 (1.8%)	1.0 (3.7%)	27.1 (100%)
Good OPI Federal Aid Segment Miles	184.2 (59.7%)	66.0 (21.4%)	44.4 (14.4%)	14.1 (4.6%)	308.7 (100%)
Fair OPI Federal Aid Segment Miles	86.3 (71.3%)	23.2 (19.2%)	8.8 (7.3%)	2.7 (2.2%)	121.0 (100%)
Poor OPI Federal Aid Segment Miles	11.3 (44.7%)	8.3 (32.8%)	4.0 (15.8%)	1.7 (6.7%)	25.3 (100%)
Other OPI Federal Aid Segment Miles	5.0 (96.2%)	0.0 (0.0%)	0.0 (0.0%)	0.2 (3.8%)	5.2 (100%)
Total Federal Aid Segment Miles	307.8 (63.2%)	102.1 (21.0%)	57.7 (11.8%)	19.7 (4.0%)	487.3 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Table 27 shows the distribution of Federal Aid Segment Miles and associated OPI amongst Low-Income Populations. Analyzing the poor condition Federal Aid Segment Miles by Low-Income Population Intervals, it can be seen that the largest percentage of poor condition Federal Aid Segment Miles is found in the three intervals with the least low-income population. However, Interval 1 is showing approximately 4.3% of this interval's total Federal Aid Segment Miles in poor condition within this interval, while Interval 4 is showing approximately 7.2% of this interval's total Federal Aid Segment Miles in poor condition. By focusing resurfacing/repaving projects in the area encompassed by Interval 4, smaller projects would reduce this percentage by a much greater amount

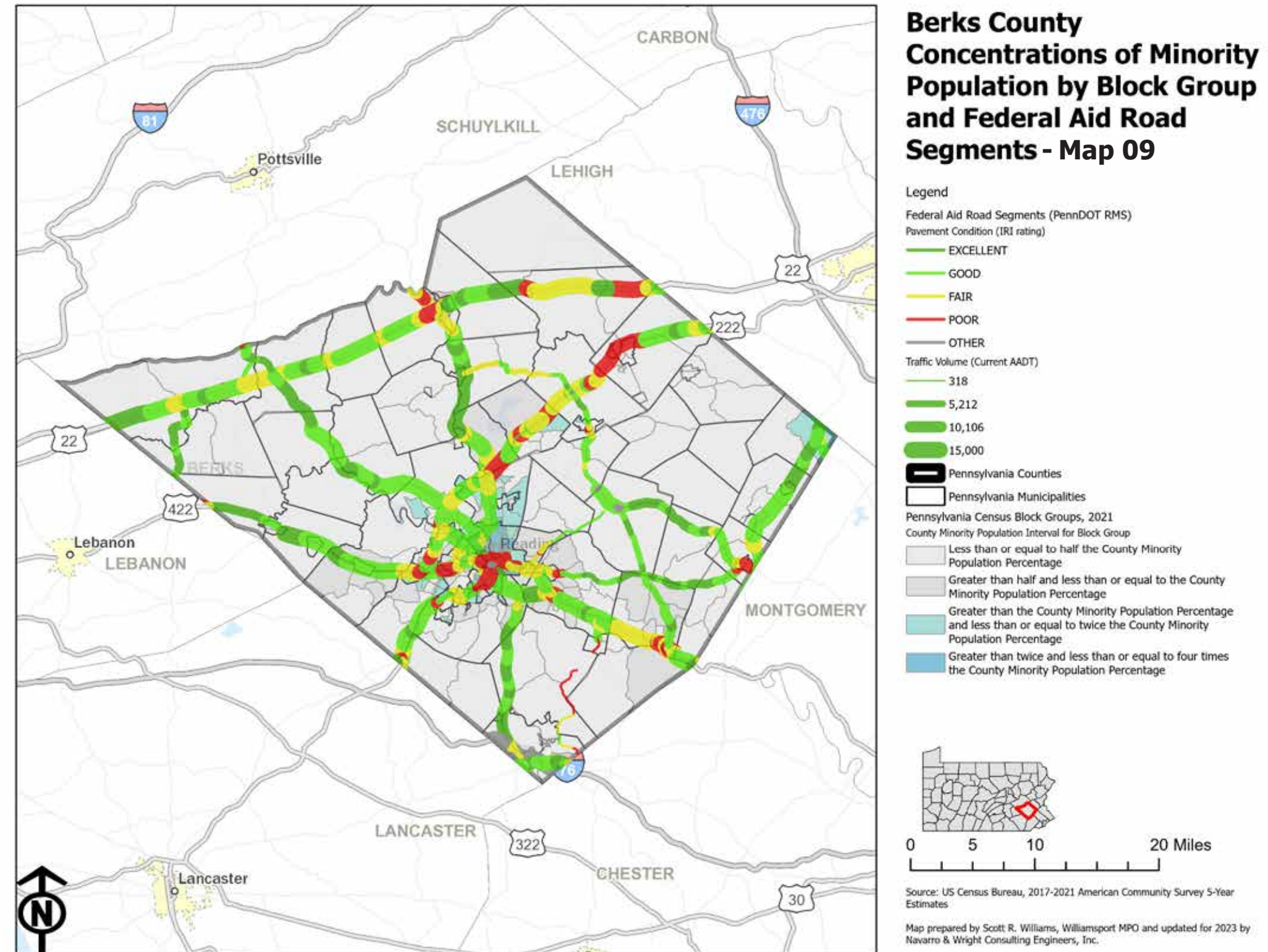
than the larger projects that would take place in areas covered by Interval 1 which has a total of 258.5 Federal Aid Segment Miles compared to the 32.1 Federal Aid Segment Miles in Interval 4. This will be considered when adding repaving/resurfacing projects to the TIP.

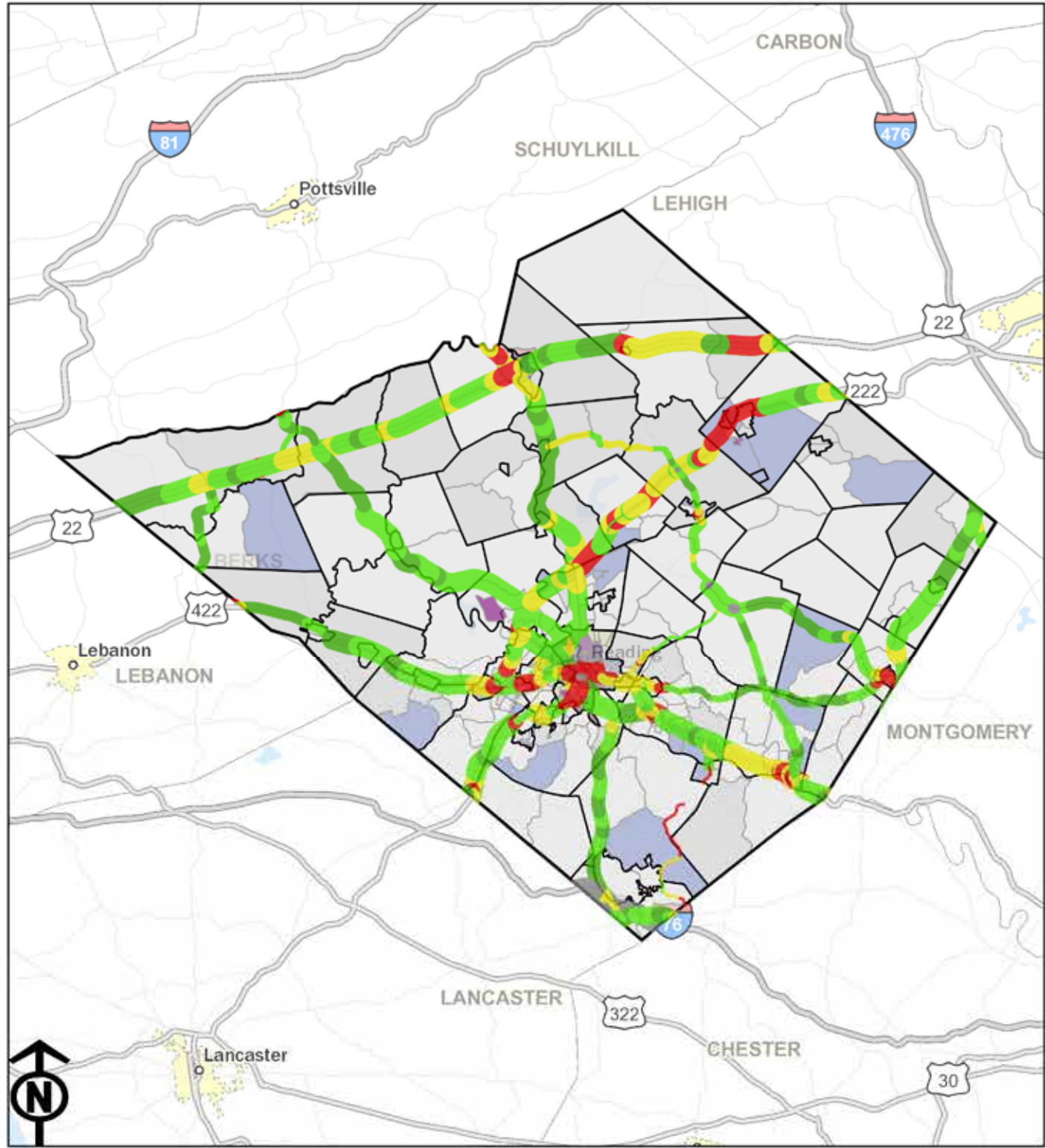
Table 27
Number and Percentage of Federal Aid Segment Mile OPI by Low-Income Population Interval, Berks County, PA (2017-2021)

Low-Income Population Intervals	1	2	3	4	5	1-5 (Berks County Total)
Total Interval Population	194,238	88,199	68,501	58,024	18,005	426,967
Low-Income Population	5,720	6,916	10,882	17,824	7,605	48,947
Percent Low-Income	2.94%	7.84%	15.89%	30.72%	42.24%	11.46%
Excellent OPI Federal Aid Segment Miles	15.6 (54.5%)	8.1 (28.3%)	2.4 (8.4%)	1.5 (5.2%)	1.0 (3.5%)	28.6 (100%)
Good OPI Federal Aid Segment Miles	169.3 (49.6%)	92.7 (27.1%)	49.3 (14.4%)	22.3 (6.5%)	7.9 (2.3%)	341.5 (100%)
Fair OPI Federal Aid Segment Miles	57.5 (39.6%)	47.0 (32.4%)	33.6 (23.2%)	5.8 (4.0%)	1.2 (0.8%)	145.1 (100%)
Poor OPI Federal Aid Segment Miles	11.1 (40.7%)	9.0 (33.0%)	4.8 (17.6%)	2.3 (8.4%)	0.1 (0.4%)	27.3 (100%)
Other OPI Federal Aid Segment Miles	5.0 (92.6%)	0.0 (0.0%)	0.0 (0.3%)	0.2 (3.7%)	0.2 (3.7%)	5.4 (100%)
Total Federal Aid Segment Miles	258.5 (47.2%)	156.8 (28.6%)	90.1 (16.4%)	32.1 (5.9%)	10.4 (1.9%)	547.9 (100%)

Source: American Community Survey 2021: ACS 5-Year Estimates Data Profiles, PennDOT PennShare 2017-2021

Maps 09 and 10 display the location of Federal Aid Road Segments and their IRI conditions in relation to Concentrations of Minority and Low-Income Populations.





Berks County Concentrations of Low Income Population and Federal Aid Road Segments - Map 10

Legend

Federal Aid Road Segments (PennDOT RMS)
Pavement Condition (IRI rating)

- EXCELLENT
- GOOD
- FAIR
- POOR
- OTHER

Traffic Volume (Current AADT)

- 318
- 5,212
- 10,106
- 15,000

Pennsylvania Counties
 Pennsylvania Municipalities

Pennsylvania Census Block Groups, 2021
Ratio of Low Income Block Group Percentage to County Low Income Percentage

- Less than or equal to half the County Low Income Population Percentage
- Greater than half and less than or equal to the County Low Income Population Percentage
- Greater than the County Low Income Population Percentage and less than or equal to twice the County Low Income Population Percentage
- Greater than twice and less than or equal to four times the County Low Income Population Percentage
- Greater than four times the County Low Income Population Percentage

Source: US Census Bureau, 2017-2021 American Community Survey 5-Year Estimates

Map prepared by Scott R. Williams, Williamsport MPO and updated for 2023 by Navarro & Wright Consulting Engineers, Inc.

SECTION 6 - TRANSIT AND ENVIRONMENTAL JUSTICE

While the FFY 2025-2028 TIP looks to equitably manage where and how funds are spent relative to the population, one factor often overlooked is the impact of the access to public transportation within a geographic area. The transit system is primarily provided by the South Central Transit Authority (SCTA), which oversees the Berks Area Regional Transportation Authority (BARTA), that serves Berks County.

Transit projects are generated by the operating agency - the South Central Transit Authority (SCTA) and include both fixed route and Special Services to provide transportation services to individuals with disabilities, older adults, and people with low-incomes. The Americans with Disabilities Act (ADA) mandates that federally funded public transportation operators must accommodate passengers who live within ¼ mile of a fixed bus route but are physically unable to access the service. To provide this accommodation, most public transportation providers use a paratransit service to provide eligible passengers service from their origin to their destination. The Special Services program is used to address that mandate.

The County has looked at potential pedestrian and potential bicyclist transportation needs in the Berks County Bicycle and Transportation Plan 2020 to grow and maintain access to BARTA's Fixed Route System. When considering potential pedestrian transportation needs to access this transit system a buffer of ½ mile is used since the average transit user travels 10 minutes or less to and from their bus stop. When considering potential bicyclist transportation needs to access this transit system the buffer is raised to 2 miles, representing the distance a beginner or average cyclist can travel in 10 minutes. Through spatial analysis of Maps 11 and 12, these buffers were taken into consideration to determine whether a block group has access to the BARTA Fixed Route System or not.

Maps 11 and 12 display the proximity of residents to the transit system, especially concerning access for Minority and Low-Income populations.

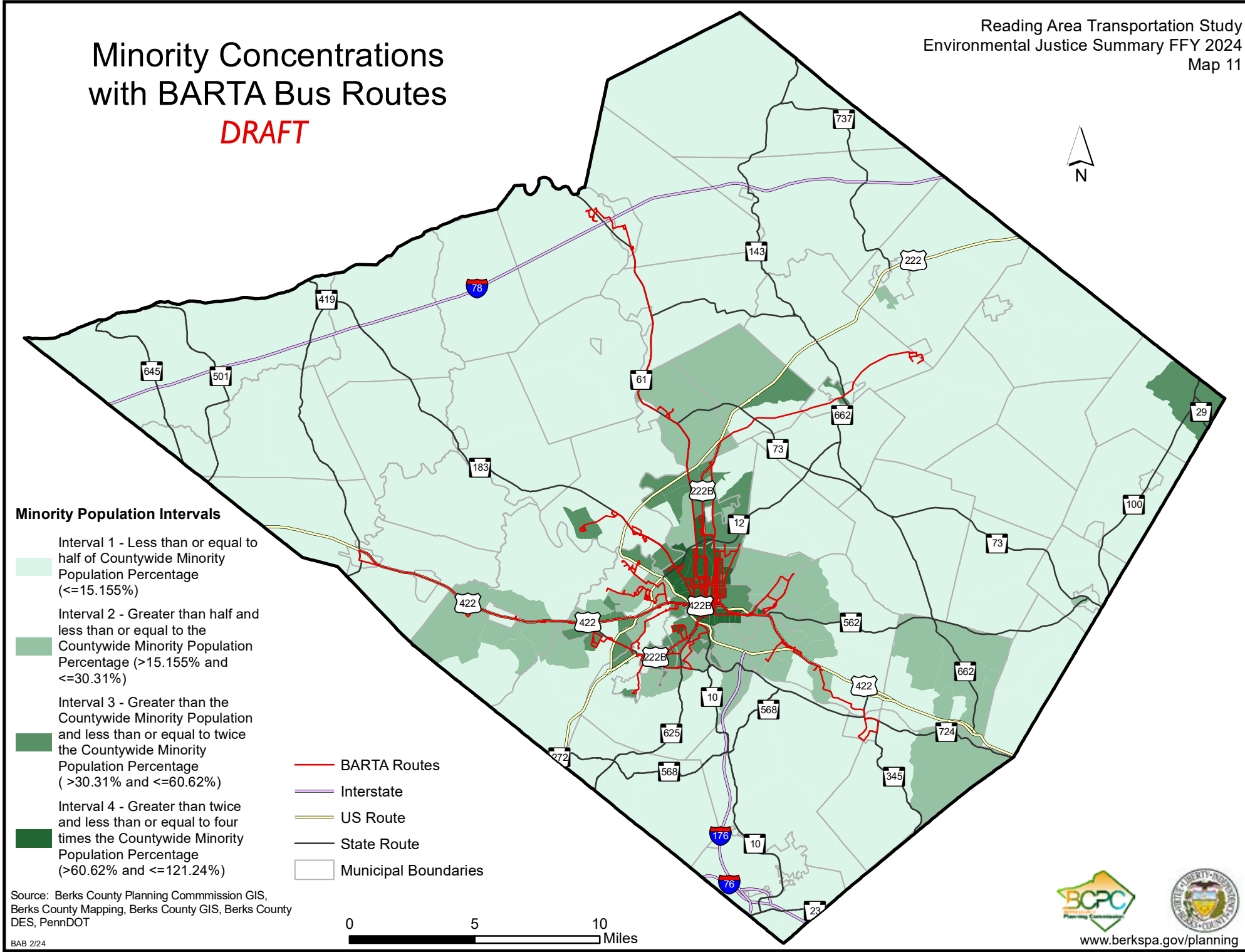
Map 11 shows that a majority of the block groups with Minority populations above the county average are along BARTA routes. Only two of these block groups do not have a BARTA route adjacent or running through their respective geographic area and are further than ½ mile from the route, which limits pedestrian access. However, one of these block groups is within 2 miles of the BARTA Fixed Route System, which would allow for bicyclist access. The other block group with a higher than average minority concentration is much further from the center of the county where a majority of the bus routes exist and is not located along major transportation corridors that would allow transit access to be more easily provided.

Map 12 shows that the Low-Income groups centrally located around the City of Reading are serviced by BARTA routes, however, twelve of the outlying block groups of with Low-Income populations above the county average are not along or within ½ mile of the BARTA Fixed Route System. Nine out of these twelve block groups are also more than 2 miles from these transit routes leaving residents without BARTA fixed route service even if accessed via bicycle.

In order to best facilitate the needs of all residents to access the public transportation system, regardless of type of bus including fixed route service, paratransit service, or express route service, coordination should continue to occur between Reading MPO and SCTA to make sure all avenues are being explored to improve accessibility.

Minority Concentrations with BARTA Bus Routes

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Minority Population Intervals

- Interval 1 - Less than or equal to half of Countywide Minority Population Percentage ($\leq 15.155\%$)
- Interval 2 - Greater than half and less than or equal to the Countywide Minority Population Percentage ($> 15.155\%$ and $\leq 30.31\%$)
- Interval 3 - Greater than the Countywide Minority Population and less than or equal to twice the Countywide Minority Population Percentage ($> 30.31\%$ and $\leq 60.62\%$)
- Interval 4 - Greater than twice and less than or equal to four times the Countywide Minority Population Percentage ($> 60.62\%$ and $\leq 121.24\%$)

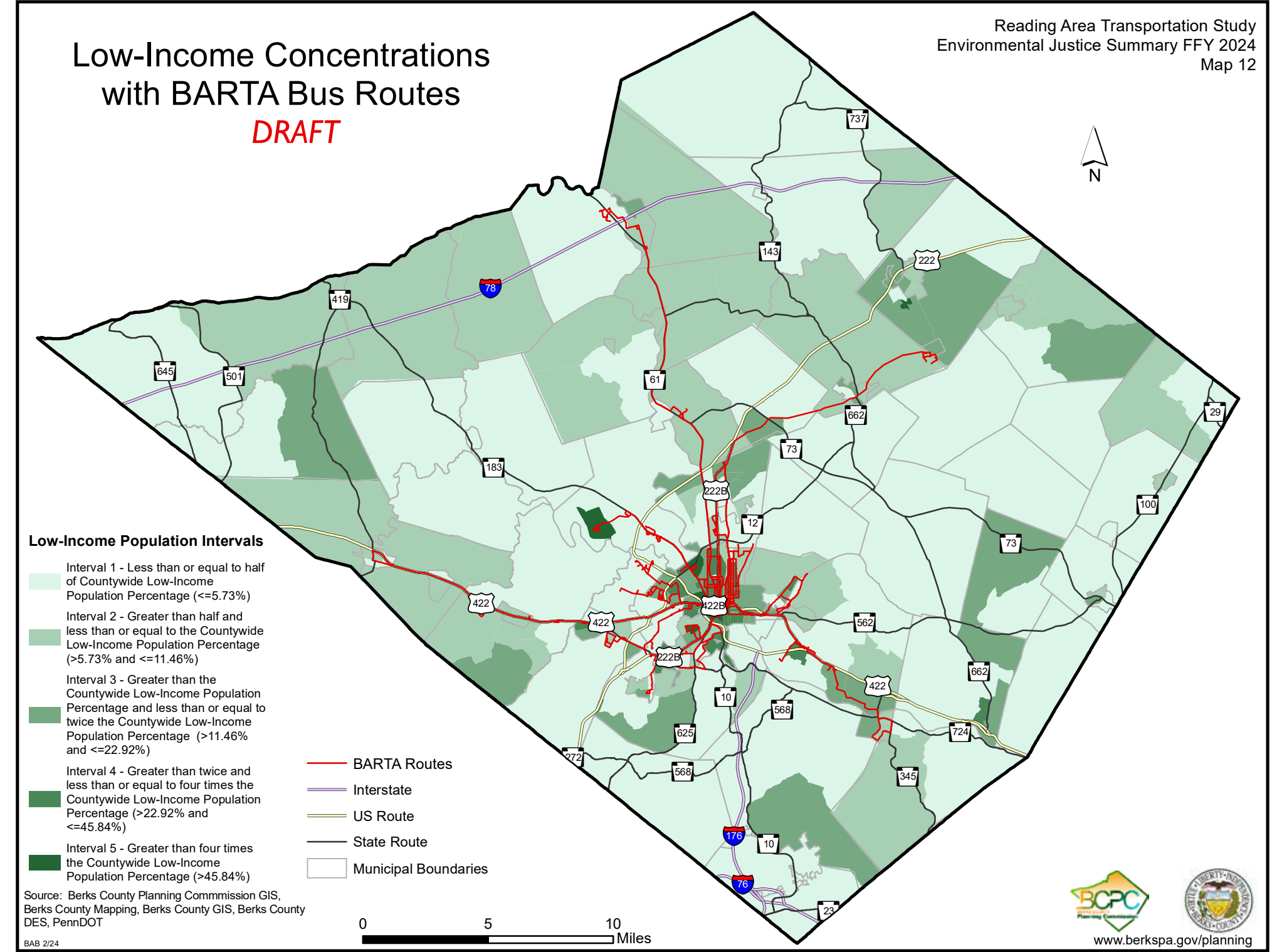
- BARTA Routes
- Interstate
- US Route
- State Route
- Municipal Boundaries

Source: Berks County Planning Commission GIS, Berks County Mapping, Berks County GIS, Berks County DES, PennDOT
BAB 2/24



Low-Income Concentrations with BARTA Bus Routes

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Low-Income Population Intervals

- Interval 1 - Less than or equal to half of Countywide Low-Income Population Percentage ($\leq 5.73\%$)
- Interval 2 - Greater than half and less than or equal to the Countywide Low-Income Population Percentage ($> 5.73\%$ and $\leq 11.46\%$)
- Interval 3 - Greater than the Countywide Low-Income Population Percentage and less than or equal to twice the Countywide Low-Income Population Percentage ($> 11.46\%$ and $\leq 22.92\%$)
- Interval 4 - Greater than twice and less than or equal to four times the Countywide Low-Income Population Percentage ($> 22.92\%$ and $\leq 45.84\%$)
- Interval 5 - Greater than four times the Countywide Low-Income Population Percentage ($> 45.84\%$)

- BARTA Routes
- Interstate
- US Route
- State Route
- Municipal Boundaries

Source: Berks County Planning Commission GIS, Berks County Mapping, Berks County GIS, Berks County DES, PennDOT
BAB 2/24



Map 13 displays the ratio of low-wage jobs to low-wage workers in Berks County with the county broken down by block group. Block groups on this map displayed in shades of pink and purple have more low-wage jobs than low-wage workers. From a planning perspective, these block groups may be places where zoning and land use policies should encourage affordable, diverse housing stock to increase the balance of low-wage workers available within a close proximity to the low-wage jobs that are offered in these areas.

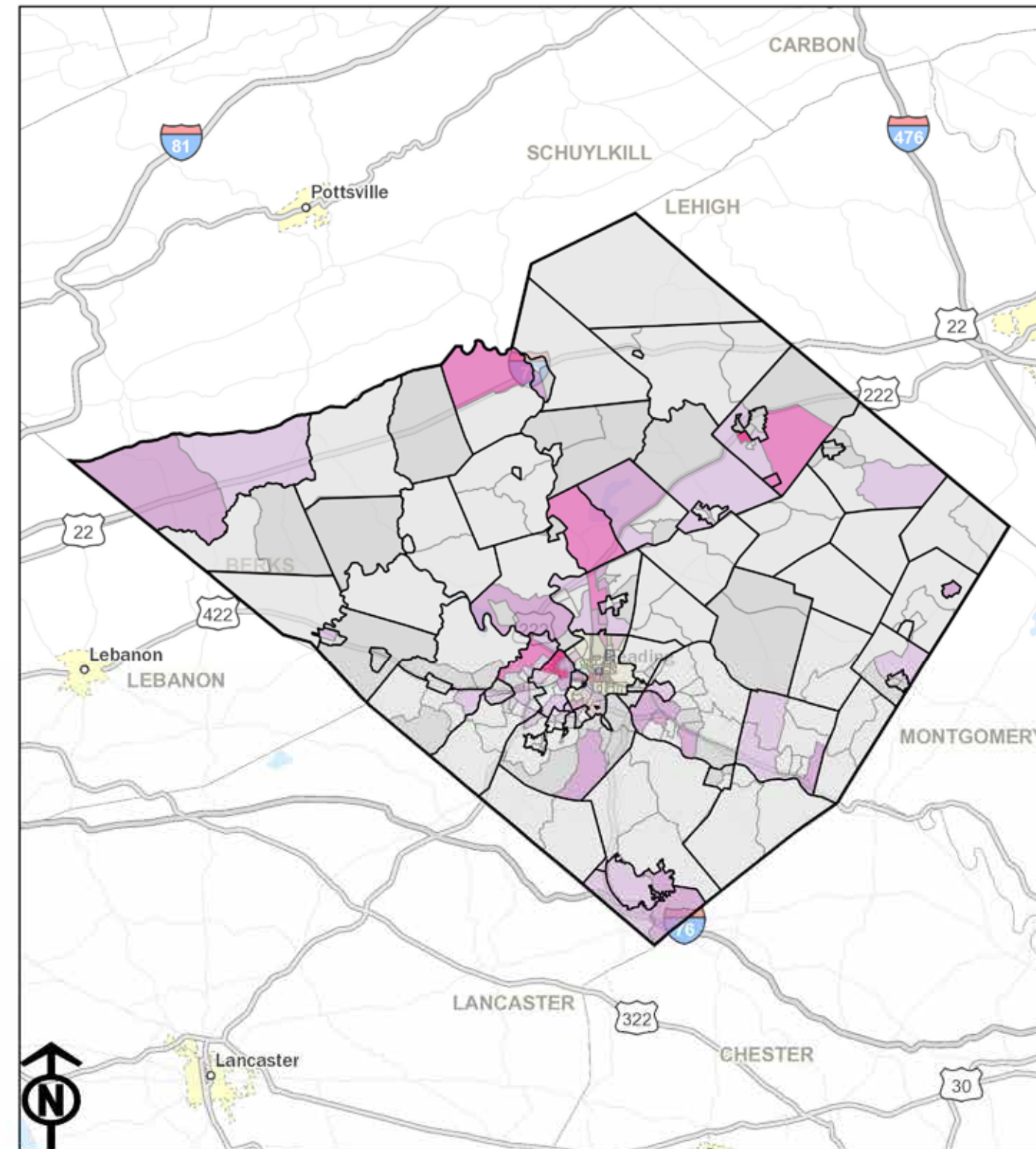
Map 14 adds BARTA bus routes overtop this geographic representation of low-wage jobs to low-wage workers. This map has been compiled to show if areas with an excess of low-wage jobs are able to be accessed using transit, as these places could be key destinations for low-wage workers for which public transportation services or other transportation policies should be considered. In order to aid in ensuring access to jobs, the Berks County Planning Commission encourages municipalities to enact policies that new development engages early with BARTA to ensure adequate access, especially when located near transit lines, and examine bus stops and sidewalk connections to bus stops to then prioritize missing connections and/or areas needing repair.

Special Services Operations are also available through BARTA such as Shared Ride, ADA, and Medical Assistance Transportation Program (MATP) programs, and are specialized, demand-responsive paratransit service and provide public transportation to persons whose disabling condition prevents the use of fixed route transit, which is the route shown on **Map 14**. Taxi service and ride sharing is another service that individuals may use when unable to take advantage of BARTA's services. As of 2023 there are eight taxicab operators active in Berks County as listed by the Public Utility Commission. Ride sharing is another popular mode of transportation when personal transportation does not exist to an individual. Berks County has been serviced by Uber since operations began in 2015, shortly followed by Lyft.

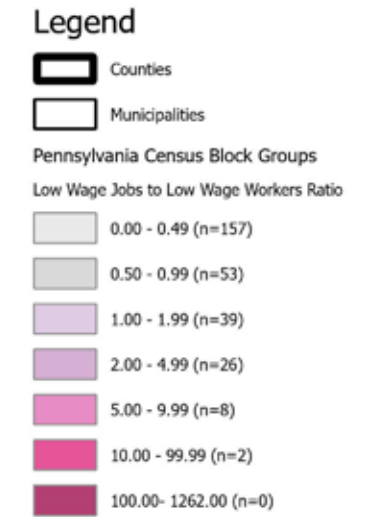
Low-wage workers without personal transportation or access to the transit system may not be able to afford a daily commute to low-wage jobs through services such as taxi or other ride sharing. To aid in providing another source of transportation to jobs, Berks County joined Commute PA (formerly Commuter Services of Pennsylvania) in 2009. This program is locally sponsored by RATS, BARTA, and the Greater Reading Chamber of Commerce and Industry. Commute PA offers free transportation demand management strategies and assistance to employers and individuals for finding options other than driving alone to work. The goal of Commute PA is to reduce the number of vehicle miles traveled and to increase the efficiency of the highway system by reducing congestion and improving air quality. Participation in the program has been successful – increasing involvement and reducing VMT since 2009. The program is funded with federal Congestion Mitigation & Air Quality (CMAQ) funds through participating MPO's.

When new businesses move into Berks County, participating with Commute PA is encouraged. Commute PA can provide free assistance in tailoring programs to meet employer's needs. Options tailored to employers can include carpooling/vanpooling, transit promotion, Emergency Ride Home program, preferential parking, active transportation options, teleworking, staggered shifts, compressed work weeks, payroll tax savings, and promotional/educational activities.

Communities can partner with Commute PA as well. Community Partners work with the Commute PA program to provide free commute option assistance to their member organizations, residents, and other interested parties within their communities.



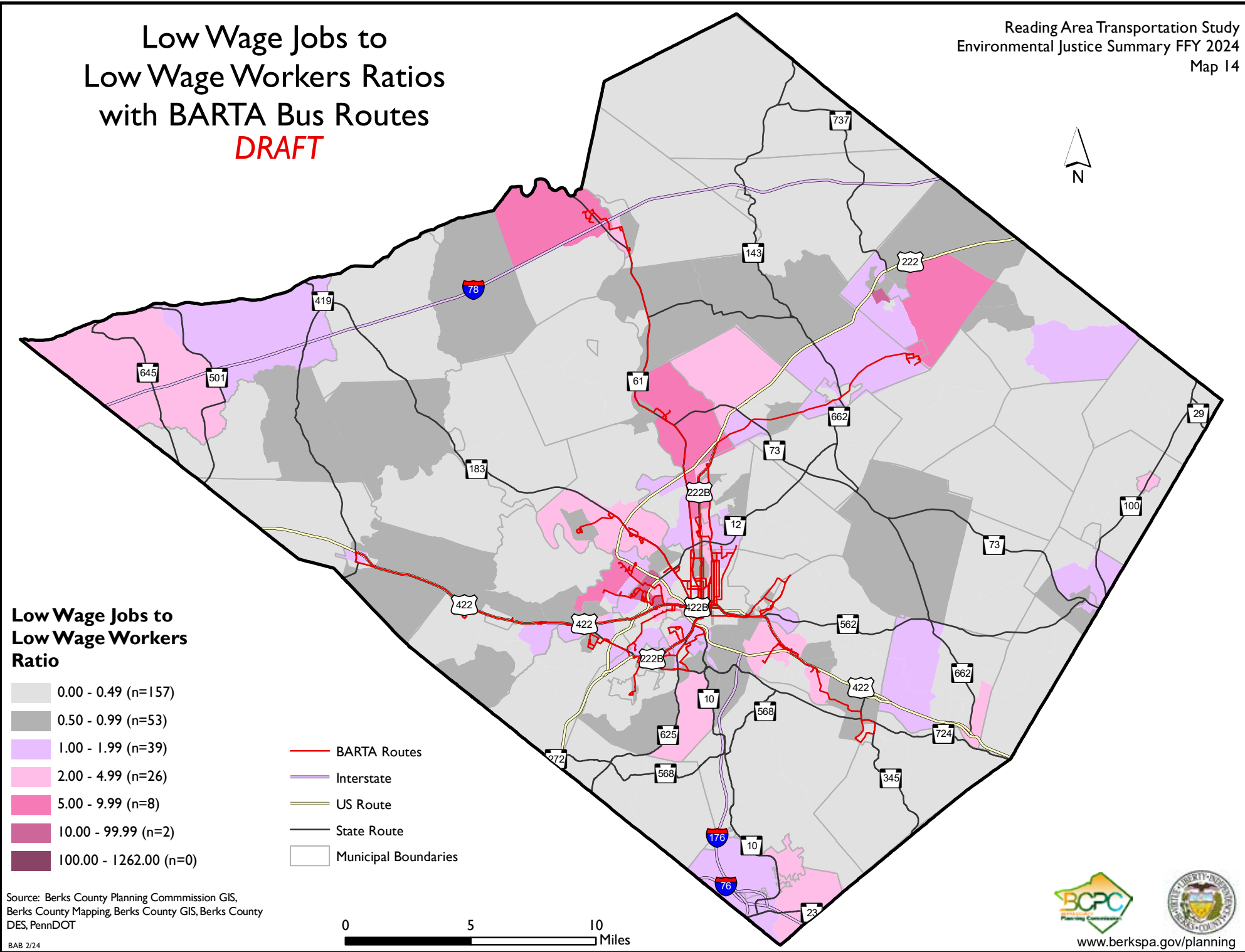
Berks County Block Group Low Wage Jobs to Low Wage Workers Ratios - Map 13



Source: United States Census Bureau, Longitudinal Employer-Household Dynamics (LEHD), LEHD Origin-Destination Employment Statistics (LODES) 8
 Map prepared for 2023 by Navarro & Wright Consulting Engineers, Inc.

Low Wage Jobs to Low Wage Workers Ratios with BARTA Bus Routes

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SECTION 7 - TYPES OF PROJECTS AND DISTRIBUTION OF THE FFY 2025-2028 TIP

The FFY 2025-2028 Highway and Bridge TIP totals \$284,194,806, while the Interstate TIP totals \$13,942,000 adding up to \$298,136,806. The projects include roadway and bridge, studies, bike and pedestrian, intermodal, as well as Interstate. Transit projects totaling \$81,608,379 are also proposed and are dedicated to maintaining the current operating system, as well as improving the local BARTA bus fleet through the SCTA Transit Asset Management Program and Capital Budget. **Table 28** gives a breakdown of the total cost of each project mode, the percent of the total cost, and the total per capita cost to occur between Reading MPO and SCTA to make sure all avenues are being explored to improve accessibility.

Table 28

Project Mode	All Projects		
	Total Cost	Percent of Total Cost	Total Per Capita Cost
Bike/Ped	\$2,411,000	0.6%	\$5.65
Bridge	\$80,692,349	21.2%	\$188.99
Intermodal/CMAQ/Transit	\$104,743,938	27.6%	\$245.32
Interstate	\$13,942,000	3.7%	\$32.65
Roadway	\$160,237,003	42.2%	\$375.29
Miscellaneous	\$17,718,895	4.7%	\$41.50
Total	\$379,745,185	100%	\$889.40

Per **Table 28**, each project, including line items, has been grouped into a project mode: Bike/Ped, Bridge, Intermodal/CMAQ/Transit, Interstate, Roadway, and Miscellaneous based on project type and source of funding. Within the Intermodal category, projects such as transit improvements and CMAQ funded items have been grouped to give us a projected total of \$104,743,938. Furthermore, the Interstate maintenance program funding totals only come from the Interstate TIP, not the Highway & Bridge TIP and involve two (2) projects associated with the I-78 corridor and I-176 corridor, which touches none of the block groups with Minority populations above the county average and none of the block groups above the county average for Low-Income populations, which can be seen in **Maps 15 and 16**. Additionally, the total cost of the Interstate maintenance program accounts for only 3.7% of the total FFY 2025-2028 TIP allocation. Roadway projects include not only restoration and reconstruction projects, but also intersection improvements, safety improvements, and shoulder upgrades. The Miscellaneous category contains \$17,718,895 in programmed funds for Delivery and Consulting and line items, but no actual projects are associated with this project mode. Line item funds that are not associated with delivery and consulting projects remain programmed on the TIP for use towards a new project or an existing project that may require additional funding due to increased costs.

**SECTION 8 -
BENEFITS AND BURDENS ANALYSIS OF THE FFY 2025-2028 TIP**

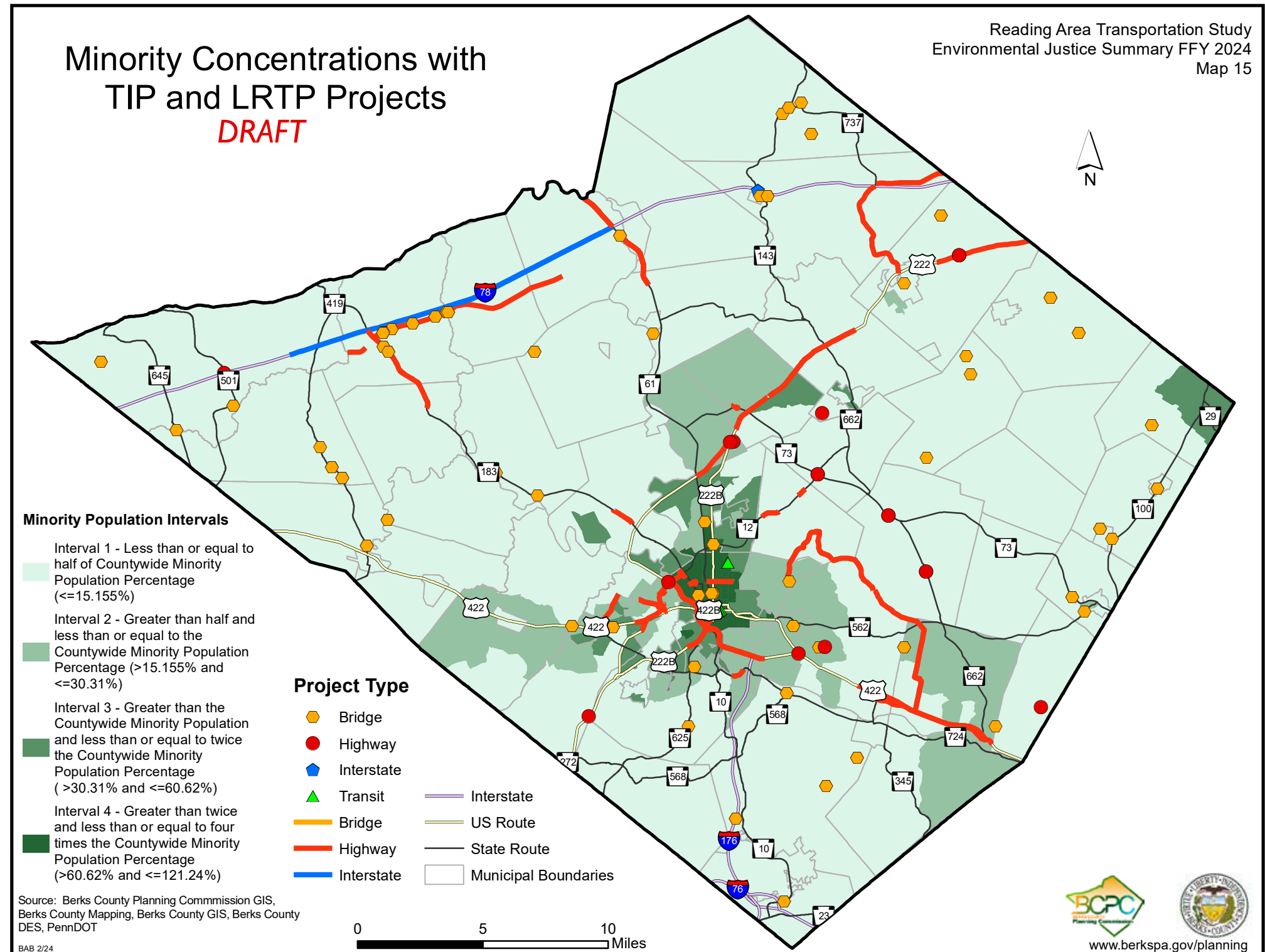
As part of the Transportation Improvement Program (TIP) adoption process, the Reading Area Transportation Study (RATS) is required to analyze the impact that TIP projects have on the surrounding environments. One aspect of this analysis is evaluating the benefits and burdens a project may have on the socio-economic population surrounding a project area. The benefits that the regional transportation program can bring are access, mobility, safety, and environmental quality. The burdens of the program can be a reduction in any of those areas to a community. Many transportation projects require a trade-off between those aspects of the transportation system and the distribution of the benefits and burdens. For example, a project that will decrease congestion in one community may result in a decrease in the environmental quality of another as additional vehicles begin utilizing the improved route. Increased safety may require a trade off in access or mobility, and increased access may bring mobility concerns. Benefits and burdens analysis in respect to environmental justice is done to ensure that the benefits of transportation investment are being shared equally and that the burdens created by new projects are not being allowed by one part of the public over another.

Projects on the FFY 2025-2028 TIP are broken down into several categories including Maintenance, Bridges, Capacity, Safety, Bicycle and Pedestrian, and Intermodal. Each type of project has a unique set of impacts and will affect individual populations differently. For example, maintenance projects tend to cause the least amount of impact on the population since they typically involve highway resurfacing or repaving work on existing roadways. Although these projects can cause delayed travel time and transit service, traffic detours, and work zone noise and debris, the projects are typically shorter in duration and result in improvements to the functionality of the roadway network by providing smoother driving surfaces and new roadway markings. While most bridge projects are identified as either a rehabilitation or replacement, both types of projects can lend itself to significant traffic detours, traffic delay, and noise. However, the benefits of these types of improvements result in safer bridge structures, improved roadway conditions, and updated signage.

Capacity projects can involve the addition of new lanes to existing roadways, new roadways to the existing network, or at times the realignment of intersections or interchanges, in an effort to provide for more traffic mobility. Special attention needs to be made when planning capacity projects, especially to low-income and minority populations. Not only can these projects result in right-of-way acquisitions to account for the additional capacity, but also construction impacts are normally more severe due to longer construction periods, travel pattern shifts, and delayed travel times among others. The consequences of the completion of capacity projects can involve the loss of property, increased traffic volumes, and decreased air quality, while other benefits can include improved transit service time, decreased travel delay, and safer roadway conditions which will result in improved quality of life for all residents and users of the roadway system.

For the RATS FFY 2025-2028 TIP, the majority of projects will not require right of way acquisition, displace residents or cause burdens on the mobility, access, or environmental health of any community, EJ Sensitive or not. This is due to the majority of candidate projects found within the RATS Highway TIP are programmed to maintain or enhance the existing transportation system.

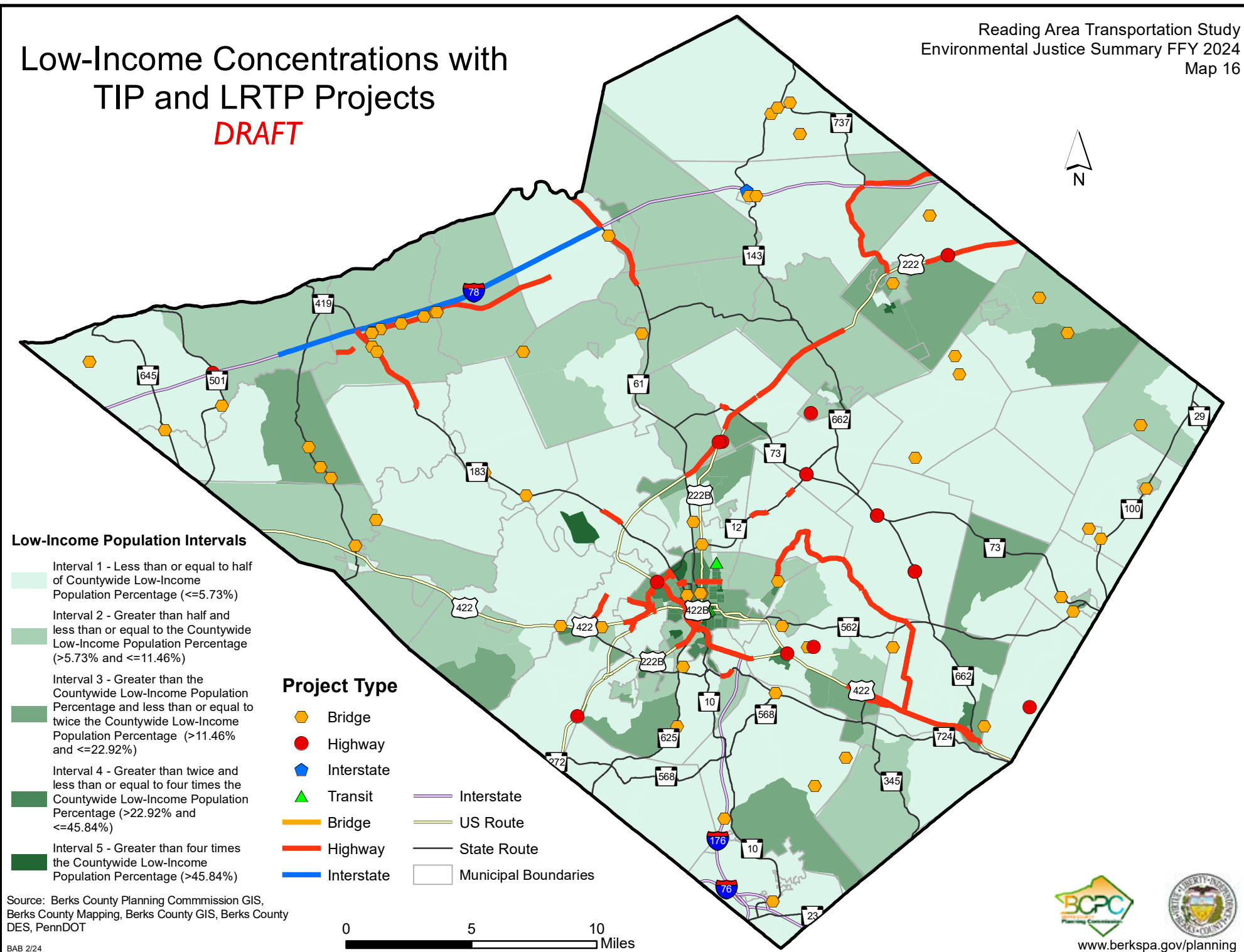
Maps 15 and 16 display the FFY 2025-2028 TIP Projects and FFY 2023-2045 Long Range Transportation Plan Candidates by concentrations of Minority and Low-Income populations. The yellow hexagons denote locations of bridge candidate projects, while the red lines and circles identify highway reconstruction or resurfacing candidate projects. Any candidate projects shown in blue address the Interstate and green triangles denote Transit.



Low-Income Concentrations with TIP and LRTP Projects

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Reading Area Transportation Study
Environmental Justice Summary FFY 2024
Map 16



FY 2025-2028 TIP Statewide Environmental Justice Analysis Methodology

Prepared For PennDOT by:
Michael Baker International, Inc.
Navarro & Wright Consulting Engineers, Inc.

Version Uploaded to SharePoint on October 27, 2023

Contents

Introduction	1
Purpose	1
Methods.....	1
Acquire Data	1
Data Sources	2
Create New Tables	3
New Excel Tables and Their Required Columns.....	3
Populate the Created Tables.....	6
Table Data Sources and Calculations	6
Add Geodatabase Feature Classes.....	12
Join Data.....	12
Run Interval Analysis Models and Export Interval Tables.....	12
Update Map Deliverables	13
Update Maps.....	13
Update Layouts	13
Export Maps.....	13
References	14
Appendix 1: Python Code for the Interval Analysis Models	15
Statewide EJ Geoprocessing Model – PennDOT Districts Additional Data Python Code	16
Statewide EJ Geoprocessing Model – Counties Additional Data Code.....	58
Statewide EJ Geoprocessing Model – PennDOT Planning Partners Additional Data Python Code.....	100

Introduction

For the FY 2025-2028 TIP Statewide Environmental Justice Analysis, the consultant team built upon the substantial work and documentation previously developed by R. Scott Williams at the Williamsburg Area Transportation Study Metropolitan Planning Organization (WATS MPO) (Williams 2023) for the FY 2023-2026 TIP analyses.

This document outlines the data and methods utilized by the consultant team to perform this update. This detailed, step-by-step process is presented in this document to allow for subsequent updates to be performed with increased ease and uniformity between study years.

Purpose

The purpose of the work performed was to provide the following deliverables:

1. Updated county profile tables detailing demographic data consistent with the previous studies.
2. Updated ArcGIS Pro project file with maps, layouts, models, and geodatabase that can serve as a template for subsequent updates.
3. Updated county, PennDOT Planning Partner, and PennDOT Engineering District low income and minority population interval tables.
4. Updated PDF maps detailing low income and minority interval conditions at the county, PennDOT Planning Partner, and PennDOT Engineering District levels.
5. A document detailing the steps taken to produce the deliverables listed above to serve as a basis for subsequent updates.

Methods

The following sections describe the steps required to update the environmental justice input datasets, perform the interval analysis, and prepare table and map deliverables. Much of the basis for the methods used were derived from the South-Central Pennsylvania Unified Environmental Justice Process and Methodology document (Alan M. Voorhees Transportation Center, 2019) with a key change developed by Williams to allow the analysis of data at a statewide scale (Williams 2023). This change involved the classification of low income and minority population percentages based on their ratio to percentages at the county, PennDOT Planning Partner, and PennDOT Engineering District as a whole. This resulted in the creation of a uniform scale to allow for comparisons of data across the state.

The methods used are broken down into the following major steps:

1. Acquire Data
2. Create New Tables
3. Populate New Tables
4. Add Geodatabase Feature Classes
5. Join Data
6. Run Interval Analysis Models and Exporting Tables
7. Update Map Deliverables

Acquire Data

To begin, assemble updated data used for the study. Twenty-one sources are required for the analysis. The required data utilized in the study includes PennDOT tables on crashes, PennDOT shapefiles for

districts and planning partners, PennDOT Shapefiles for bridges and roadways, American Community Survey 5-Year Estimate tables, US Census County and Block group shapefiles, etc.

A comprehensive list of required data and their sources is listed below. However, if a listed URL is broken, the required data can be found by using the main website’s search bar, or an internet search engine. For subsequent updates, the most current available datasets should be utilized.

Data Sources

1. US Census County Boundaries
 - a. US Census Bureau, 2021 Pennsylvania County Shapefile
2. US Census Block Group Boundaries
 - a. US Census Bureau, 2021 Pennsylvania Block Group Shapefile
3. Municipal Boundaries
 - a. <https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=41>
4. PennDOT Print Basemap
 - a. <https://gis.penndot.gov/arcgis/rest/services/basemaps/printbasemap/MapServer>
5. PennDOT Bridges
 - a. <https://data-pennshare.opendata.arcgis.com/datasets/PennShare::pennsylvania-bridges/about>
6. PennDOT RMS
 - a. <https://data-pennshare.opendata.arcgis.com/datasets/PennShare::rmsseg-state-roads/explore?location=41.034526%2C-77.667992%2C8.91>
7. Planning Partner Boundaries
 - a. <https://data-pennshare.opendata.arcgis.com/datasets/PennShare::penndot-planning-partner-boundary-1/explore?location=40.556070%2C-75.387053%2C7.44>
8. PennDOT District Boundaries
 - a. <https://data-pennshare.opendata.arcgis.com/datasets/PennShare::penndot-engineering-districts-1/explore?location=40.985868%2C-77.629000%2C8.87>
9. PennDOT Crash Data Statewide Spreadsheets (5 previous years)
 - a. <https://pennshare.maps.arcgis.com/apps/webappviewer/index.html?id=8fdbf046e36e41649bbfd9d7dd7c7e7e>
10. County Level Census Data
 - a. B03002 HISPANIC OR LATINO ORIGIN BY RACE
 - i. [https://data.census.gov/table?q=B03002:+HISPANIC+OR+LATINO+ORIGIN+BY+RACE&g=040XX00US42\\$1500000&tid=ACSDT5Y2021.B03002,%20Calculated%20values](https://data.census.gov/table?q=B03002:+HISPANIC+OR+LATINO+ORIGIN+BY+RACE&g=040XX00US42$1500000&tid=ACSDT5Y2021.B03002,%20Calculated%20values)
 - b. B17017 POVERTY STATUS IN THE PAST 12 MONTHS BY HOUSEHOLD TYPE BY AGE OF HOUSEHOLDER
 - i. <https://data.census.gov/table?q=B17017:+POVERTY+STATUS+IN+THE+PAST+12+MONTHS+BY+HOUSEHOLD+TYPE+BY+AGE+OF+HOUSEHOLDER&tid=ACSDT1Y2021.B17017>
 - c. S1701 POVERTY STATUS IN THE PAST 12 MONTHS
 - i. [https://data.census.gov/table?q=B17017:+POVERTY+STATUS+IN+THE+PAST+12+MONTHS+BY+HOUSEHOLD+TYPE+BY+AGE+OF+HOUSEHOLDER&g=040XX00US42\\$1500000&tid=ACSDT5Y2021.B17017,%20Calculated%20values](https://data.census.gov/table?q=B17017:+POVERTY+STATUS+IN+THE+PAST+12+MONTHS+BY+HOUSEHOLD+TYPE+BY+AGE+OF+HOUSEHOLDER&g=040XX00US42$1500000&tid=ACSDT5Y2021.B17017,%20Calculated%20values)
 - d. DP02 SELECTED SOCIAL CHARACTERISTICS IN THE UNITED STATES
 - i. <https://data.census.gov/table?q=DP02>
 - e. DP05 ACS DEMOGRAPHIC AND HOUSING ESTIMATES
 - i. <https://data.census.gov/table?q=DP05>
 - f. DP04 SELECTED HOUSING CHARACTERISTICS
 - i. <https://data.census.gov/table?q=DP04>
11. Block Group Level Census Data

- a. B03002 HISPANIC OR LATINO ORIGIN BY RACE
 - i. [https://data.census.gov/table?q=B03002:+HISPANIC+OR+LATINO+ORIGIN+BY+RACE&g=040XX00US42\\$1500000&tid=ACSDT5Y2021.B03002,%20Calculated%20values](https://data.census.gov/table?q=B03002:+HISPANIC+OR+LATINO+ORIGIN+BY+RACE&g=040XX00US42$1500000&tid=ACSDT5Y2021.B03002,%20Calculated%20values)
- b. C17002 RATIO OF INCOME TO POVERTY LEVEL IN THE PAST 12 MONTHS
 - i. [https://data.census.gov/table/ACSDT5Y2021.C17002?q=C17002&g=040XX00US30\\$0500000,30](https://data.census.gov/table/ACSDT5Y2021.C17002?q=C17002&g=040XX00US30$0500000,30)
- c. S1701 POVERTY STATUS IN THE PAST 12 MONTHS
 - i. [https://data.census.gov/table?q=B17017:+POVERTY+STATUS+IN+THE+PAST+12+MONTHS+BY+HOUSEHOLD+TYPE+BY+AGE+OF+HOUSEHOLDER&g=040XX00US42\\$1500000&tid=ACSDT5Y2021.B17017,%20Calculated%20values](https://data.census.gov/table?q=B17017:+POVERTY+STATUS+IN+THE+PAST+12+MONTHS+BY+HOUSEHOLD+TYPE+BY+AGE+OF+HOUSEHOLDER&g=040XX00US42$1500000&tid=ACSDT5Y2021.B17017,%20Calculated%20values)
- d. DP02 SELECTED SOCIAL CHARACTERISTICS IN THE UNITED STATES
 - i. <https://data.census.gov/table?q=DP02>
- e. DP05 ACS DEMOGRAPHIC AND HOUSING ESTIMATES
 - i. <https://data.census.gov/table?q=DP05>
- f. DP04 SELECTED HOUSING CHARACTERISTICS
 - i. <https://data.census.gov/table?q=DP04>

Maintain copies of the downloaded data in a separate folder with permissions set to “Read Only” to avoid accidental modification of the source data when working on subsequent steps.

Create New Tables

The downloaded data will be compiled into Excel tables for final presentation, and/or to facilitate the additional analysis in GIS. The first step of this process is to create the needed Excel tables for the data to be input. The five new tables created for this study are listed in the section below along with the required column names.

New Excel Tables and Their Required Columns

1. “County Membership” (used to determine which counties are associated with what planning partner or district, so block groups can be assigned to them in the “Block Group Assignments” Excel file)
 - a. County
 - b. Planning Partner
 - c. PennDOT District
2. “Block Group Associations” (to associate block groups with their county, district, and planning partners)
 - a. Block Group GEOID
 - b. County
 - c. PennDOT district
 - d. PennDOT Planning Partner
3. “Census County 5 Year Estimates”
 - a. County
 - b. Planning Partner
 - c. PennDOT District
 - d. FIPS ID
 - e. ANSI Code
 - f. County Total Population
 - g. County Minority Population
 - h. County Population, Minority Percent
 - i. County Low Income Population
 - j. County Population, Low Income Percent

- k. County Population, Speak English less than "very well."
 - l. County Population Speak English less than "very well" Percent.
 - m. Number of Census Block Groups
 - n. Average Census Block Minority Population (Percent)
 - o. Average Census Block Low Income Population (Percent)
 - p. Low Income Households
 - q. Percent Households Low Income
 - r. White Alone Total Population
 - s. White Alone Low Income Population
 - t. White Alone Low Income Population Percent
 - u. Black or African American Alone Total Population
 - v. Black or African American Alone Low Income Population
 - w. Black or African American Alone Low Income Population Percent
 - x. American Indian and Alaska Native Alone Total Population
 - y. American Indian and Alaska Native Alone Low Income Population
 - z. American Indian and Alaska Native Alone Low Income Population Percent
 - aa. Asian Alone Total Population
 - bb. Asian Alone Low Income Population
 - cc. Asian Alone Low Income Population Percent
 - dd. Native Hawaiian and Other Pacific Islander Alone Total Population
 - ee. Native Hawaiian and Other Pacific Islander Alone Low Income Population
 - ff. Native Hawaiian and Other Pacific Islander Alone Low Income Population Percent
 - gg. Some other race Alone Total Population
 - hh. Some other race Alone Low Income Population
 - ii. Some other race Alone Low Income Population Percent
 - jj. Two or More Races Total Population
 - kk. Two or More Races Low Income Population
 - ll. Two or More Races Low Income Population Percent
 - mm. Hispanic or Latino Origin (of any race) Total Population
 - nn. Hispanic or Latino Origin (of any race) Low Income Population
 - oo. Hispanic or Latino Origin (of any race) Low Income Population Percent
 - pp. White Alone, Not Hispanic or Latino Total Population
 - qq. White alone, Not Hispanic or Latino Low Income Population
 - rr. White Alone, Not Hispanic or Latino Low Income Population Percent
 - ss. Population Elderly (65 Years and Older)
 - tt. Population Elderly (65 Years and Older) Percent
 - uu. Housing Units with No Vehicle
 - vv. Housing Units with No Vehicle, Percent
 - ww. Housing Units with No Computer
 - xx. Housing Units with No Computer, Percent
 - yy. Housing Units with No Broadband Subscription
 - zz. Housing Units with No Broadband Subscription, Percent
 - aaa. Persons With a Disability
 - bbb. Persons With a Disability, Percent
4. "Block Group Data" (used to hold copied and calculated values for block groups which will be joined to the block group shapefile for analysis in GIS)
- a. GEOID
 - i. Note: GEOID for Block Group

- b. GEOID
 - i. Note: Set field as text
- c. Black or African-American, Not Hispanic or Latino
- d. American Indian or Alaskan Native, Not Hispanic or Latino
- e. Asian, Not Hispanic or Latino
- f. Native Hawaiian or Pacific Islander, Not Hispanic or Latino
- g. Other Race, Not Hispanic or Latino
- h. Two or More Races, Not Hispanic or Latino
- i. Hispanic or Latino
- j. Minority Population
 - i. Note: for the BG
- k. Low Income Population
 - i. Note: for the BG
- l. Low-Income Population Percent
 - i. Note: for the BG
- m. Minority Population Percent
 - i. Note: for the BG
- n. County
- o. County Minority Population
- p. Percent of the Total County Minority Population in this Block Group
- q. County Low Income Population
- r. Percent of the Total County Low-Income Population in this Block Group
- s. County Average Block Group Minority Population Percentage
- t. County Average Block Group Low-Income Population Percentage
- u. Ratio of Block Group Low-Income Population to County Average
- v. County Low Income Interval for Block Group
- w. County Low Income Interval ID
- x. Ratio of Block Group Minority Percent to County Minority Percent
- y. County Minority Population Interval for Block Group
- z. County Minority Interval ID
- aa. PennDOT District
- bb. PennDOT District Minority Percent
- cc. PennDOT District Low Income Percent
- dd. Ratio of Block Group Low Income Percent to PennDOT District Average
- ee. PennDOT District Low Income Interval
- ff. PennDOT District Low Income Interval ID
- gg. Ratio of Block Group Minority Percent to PennDOT District Average
- hh. PennDOT District Minority Interval
- ii. PennDOT District Minority Interval ID
- jj. PennDOT Planning Partner
- kk. Planning Partner Minority Percent
- ll. Planning Partner Low Income Percent
- mm. Ratio of Block Group Low Income Percent to Planning Partner Average
- nn. Planning Partner Low Income Interval
- oo. Planning Partner Low Income Interval ID
- pp. Ratio of Block Group Minority Percent to Planning Partner Average
- qq. Planning Partner Minority Interval
- rr. Planning Partner Minority Interval ID

5. "Crashes"

- a. No new fields, just combine the previous five years of PennDOT Crash data into a single spreadsheet.

Populate the Created Tables

After creating the new Excel files detailed above, the next step is to populate those tables with the previously downloaded tabular data.

To populate the data into the new tables efficiently and accurately, use of the "XLOOKUP" function in Excel is recommended whenever possible. Detailed documentation of the function is located on the following Microsoft help page: <https://support.microsoft.com/en-us/office/xlookup-function-b7fd680e-6d10-43e6-84f9-88eae8bf5929>. Use the function to search target datasets for matching GEOIDs to fill in the corresponding empty spaces of the new tables.

The list below details data sources for each of the columns in the tables. The table levels below represent the following:

- 1. Table Name
 - a. Table column name
 - i. Source of the cell data
 - 1. Explanation of any variables utilized in the cell value calculation.

Table Data Sources and Calculations

- 1. "County Membership" (used to determine which counties are associated with what planning partner or district, so block groups can be assigned to them in the "Block Group Assignments" Excel file)
 - a. County
 - b. Planning Partner
 - i. PennDOT Planning Partner Shapefile
 - c. PennDOT District
 - i. PennDOT District Shapefile
- 2. "Block Group Associations" (to associate block groups with their county, district, and planning partners)
 - a. Block Group GEOID
 - i. Copied from Census Block Group Shapefile
 - b. County
 - i. Copied from Census Block Group Shapefile
 - c. PennDOT District
 - i. Assigned based on county using XLOOKUP to "County Membership" Excel file.
 - d. PennDOT Planning Partner
 - i. Assigned based on county using XLOOKUP to "County Membership" Excel file.
- 3. "Census County 5 Year Estimates"
 - a. County
 - i. US Census Bureau, 2021 Pennsylvania County Shapefile
 - b. Planning Partner
 - i. PennDOT Planning Partner Shapefile
 - c. PennDOT District
 - i. PennDOT District Boundaries Shapefile
 - d. FIPS ID
 - i. US Census Bureau
 - e. ANSI Code

- i. US Census Bureau
- f. County Total Population
 - i. Assigned based on County using XLOOKUP from "B3002" County Data, "Total."
- g. County Minority Population
 - i. Assigned based on County using XLOOKUP from "B3002" County Data, "Total Minority."
- h. County Population, Minority Percent
 - i. $\text{County Population, Minority Percent} = \text{County Minority Population} / \text{County Total Population}$
- i. County Low Income Population
 - i. Calculated value from C17002 county table. $\text{County Low Income Population} = \text{E002E} + \text{E003E}$
- j. County Population, Low Income Percent
 - i. Calculated value. $\text{County Population, Low Income Percent} = \text{County Low Income Population} / \text{County Total Population}$
- k. County Population, Speak English less than "very well."
 - i. Assigned based on County using XLOOKUP from "DP02" County Data, "Speak English Less than Very Well."
- l. County Population Speak English less than "very well" Percent.
 - i. Assigned based on County using XLOOKUP from "DP02" County Data, "Speak English Less than Very Well" Percentage
- m. Number of Census Block Groups
 - i. US Census Bureau, 2021 Pennsylvania County Shapefile, US Census Bureau, 2021 Pennsylvania Block Group Shapefile
- n. Average Census Block Minority Population (Percent)
 - i. $\text{Average Census Block Minority Population (Percent)} = (\text{B03002_001E} - \text{B03002_003E}) / \text{B03002_001E}$, then pivot table by county name.
- o. Average Census Block Low Income Population (Percent)
 - i. Calculated Value from C17002 block group data. $\text{Income Population} / \text{Total}$. Then pivot table by county name to determine averages.
- p. Low Income Households
 - i. Assigned based on County using XLOOKUP from "B17017" County Data
- q. Percent Households Low Income
 - i. Calculated value from B17017 table data. $\text{Percent Households Low Income} = \text{Total Households Low Income} / \text{Total Households}$
- r. Total Population, White Alone
 - i. Assigned based on County using XLOOKUP from "B3002" County Data
- s. White Alone Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- t. White Alone Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- u. White Alone Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- v. Black or African American Alone Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- w. Black or African American Alone Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- x. Black or African American Alone Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data

- y. American Indian and Alaska Native Alone Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- z. American Indian and Alaska Native Alone Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- aa. American Indian and Alaska Native Alone Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- bb. Asian Alone Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- cc. Asian Alone Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- dd. Asian Alone Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- ee. Native Hawaiian and Other Pacific Islander Alone Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- ff. Native Hawaiian and Other Pacific Islander Alone Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- gg. Native Hawaiian and Other Pacific Islander Alone Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- hh. Some other race Alone Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- ii. Some other race Alone Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- jj. Some other race Alone Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- kk. Two or More Races Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- ll. Two or More Races Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- mm. Two or More Races Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- nn. Hispanic or Latino Origin (of any race) Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- oo. Hispanic or Latino Origin (of any race) Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- pp. Hispanic or Latino Origin (of any race) Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- qq. White Alone, Not Hispanic or Latino Total Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- rr. White alone, Not Hispanic or Latino Low Income Population
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- ss. White Alone, Not Hispanic or Latino Low Income Population Percent
 - i. Assigned based on County using XLOOKUP from "S1701" County Data
- tt. Population Elderly (65 Years and Older)
 - i. Assigned based on County using XLOOKUP from "DP05" County Data
- uu. Population Elderly (65 Years and Older) Percent
 - i. Assigned based on County using XLOOKUP from "DP05" County Data
- vv. Housing Units with No Vehicle
 - i. Assigned based on County using XLOOKUP from "DP04" County Data

- ww. Housing Units with No Vehicle, Percent
 - i. Assigned based on County using XLOOKUP from "DP04" County Data
- xx. Housing Units with No Computer
 - i. Assigned based on County using XLOOKUP from "DP02" County Data
- yy. Housing Units with No Computer, Percent
 - i. Assigned based on County using XLOOKUP from "DP02" County Data
- zz. Housing Units with No Broadband Subscription
 - i. Assigned based on County using XLOOKUP from "DP02" County Data
- aaa. Housing Units with No Broadband Subscription, Percent
 - i. Assigned based on County using XLOOKUP from "DP02" County Data
- bbb. Persons With a Disability
 - i. Assigned based on County using XLOOKUP from "DP02" County Data
- ccc. Persons With a Disability, Percent
 - i. Assigned based on County using XLOOKUP from "DP02" County Data
- 4. "Block Group Data" (used to hold copied and calculated values for block groups which will be joined to the block group shapefile for analysis in GIS)
 - a. GEOID (for Block Group)
 - b. GEOID (Formatted as Text)
 - c. Block Group Population
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - d. Black or African-American, Not Hispanic or Latino
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - e. American Indian or Alaskan Native, Not Hispanic or Latino
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - f. Asian, Not Hispanic or Latino
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - g. Native Hawaiian or Pacific Islander, Not Hispanic or Latino
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - h. Other Race, Not Hispanic or Latino
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - i. Two or more Races, Not Hispanic or Latino
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - j. Hispanic or Latino
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - k. Minority Population (for the BG)
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - l. Low Income Population (for the BG)
 - i. Calculated value from C17002 block group table. County Low Income Population = E002E+E003E
 - m. Low Income Population Percent (for the BG)
 - i. Calculated value from C17002 block group table. County Low Income Population = (E002E+E003E)/0001E
 - n. Minority Population Percent (for the BG)
 - i. Assigned based on GEOID using XLOOKUP from "B3002" Block Group Data
 - o. County
 - i. Assigned based on GEOID using XLOOKUP from "Block Group Associations" table.
 - p. County Minority Population
 - i. Assigned based on County using XLOOKUP from "B3002" County Data

- q. Percent of the Total County Minority Population in this Block Group
 - i. Percent of the total county minority population in this block group = $\frac{\text{Block Group Minority Population}}{\text{County Minority Population}}$
- r. County Low Income Population
 - i. Assigned using XLOOKUP based on County using the Pivot table created with the C17002 data.
- s. Percent of the Total County Low Income Population in this Block Group
 - i. Percent of the total county low-income population in this block group = $\frac{\text{Block Group Low Income Population}}{\text{Total County Low Income population}}$
- t. County Average Block Group Minority Population Percentage
 - i. Assigned based on County using XLOOKUP from "Census County % Year Estimates" table.
- u. County Average Low Income Population Percentage
 - i. Assigned based on County using XLOOKUP from C17002 block group pivot table value that was calculated as described in previous section.
- v. Ratio of Block Group Low Income Population to County Average
 - i. $\frac{\text{Low-income population percent (for the BG)}}{\text{County Low Income Population Percentage}}$
- w. County Low Income Interval for Block Group
 - i. $\text{Block Group Low Income by County Interval} = \text{IF}(x \leq 0.5, "1", (\text{IF}(x \leq 1, "2", (\text{IF}(x \leq 2, "3", (\text{IF}(x \leq 4, "4", (\text{IF}(x > 4, "5"))))))))$
 1. Where "x" (Ratio of Low Income Block Group Percentage to Low Income County Percentage) = $\frac{(\text{B17017_002E} / \text{B17017_001E})}{\text{County Population Low Income Percent}}$
- x. County Low Income Interval ID
 - i. $\text{County Low Income Interval ID} = [\text{County Name}] \& " \& [\text{County Low Income Interval}]$
- y. Ratio of Block Group Minority percent to County Minority Percent
 - i. $\frac{\text{Minority population percent (for the BG)}}{\text{County Minority Population Percentage}}$
- z. County Minority Population Interval for Block Group
 - i. $\text{Block Group Minority Population Intervals} = \text{IF}(x \leq 0.5, "1", (\text{IF}(x \leq 1, "2", (\text{IF}(x \leq 2, "3", (\text{IF}(x \leq 4, "4", (\text{IF}(x > 4, "5"))))))))$
 1. Where "x" (Ratio of Minority Block Group Percentage to Minority County Percentage) = $\frac{(\text{B03002_001E} - \text{B03002_003E})}{\text{B03002_001E}} / \text{County Minority Percentage}$
- aa. County Minority Interval ID
 - i. $\text{County Minority Interval ID} = [\text{County Name}] \& " \& [\text{County Minority Interval}]$
- bb. PennDOT District
 - i. Assigned based on GEOID using XLOOKUP from "Block Group Assignments"
- cc. PennDOT District Minority Percent
 - i. In the county level data, using a pivot table, with rows set to planning partners, sum County Low Income Population and County Total Population
 - ii. Then set the column to = Minority Population / Total Population
- dd. PennDOT District Low Income Percent
 - i. Assigned based on District using XLOOKUP from C17002 block group pivot table value summarizing statistics for districts
- ee. Ratio of Block Group Low Income Percent to PennDOT District Average
 - i. $\frac{\text{Low Income Population Percent (for the BG)}}{\text{PennDOT District average Block Group Low income population Percentage}}$

- ff. PennDOT District Low Income Interval
 - i. $\text{IF}(x \leq 0.5, "1", (\text{IF}(x \leq 1, "2", (\text{IF}(x \leq 2, "3", (\text{IF}(x \leq 4, "4", (\text{IF}(x > 4, "5"))))))))$
 1. Where "x" (Ratio of Low Income Block Group Percentage to Low Income PennDOT District Percentage) = $\frac{(\text{B17017_002E} / \text{B17017_001E})}{\text{PennDOT District Population Low Income Percent}}$
- gg. PennDOT District Low Income Interval ID
 - i. $\text{PennDOT District Low Income Interval ID} = [\text{PennDOT District}] \& " \& [\text{PennDOT District Low Income Interval}]$
- hh. Ratio of Block Group Minority Percent to PennDOT District Average
 - i. $\frac{\text{Minority population percent (for the BG)}}{\text{PennDOT District average Block Group Minority Population Percentage}}$
- ii. PennDOT District Minority Interval
 - i. $\text{PennDOT District Minority Intervals} = \text{IF}(x \leq 0.5, "1", (\text{IF}(x \leq 1, "2", (\text{IF}(x \leq 2, "3", (\text{IF}(x \leq 4, "4", (\text{IF}(x > 4, "5"))))))))$
 1. Where "x" (Ratio of Minority Block Group Percentage to Minority PennDOT District Percentage) = $\frac{(\text{B03002_001E} - \text{B03002_003E})}{\text{B03002_001E}} / \text{PennDOT District Minority Percentage}$
- jj. PennDOT District Minority Interval ID
 - i. $\text{PennDOT District Minority Interval ID} = [\text{PennDOT District}] \& " \& [\text{PennDOT District Minority Interval}]$
- kk. PennDOT Planning Partner
 - i. Assigned based on GEOID using XLOOKUP from "Block Group Assignments"
- ll. Planning Partner Minority Percent
 - i. In the county level data, using a pivot table, with rows set to planning partners, sum County Minority Population and County Total Population
 - ii. Then set the column to = Minority Population / Total Population
- mm. Planning Partner Low Income Percent
 - nn. Assigned based on District using XLOOKUP from C17002 block group pivot table value summarizing statistics for planning partners Ratio of Block Group Low Income Percent to Planning Partner Average
 - i. $\frac{\text{Block Group Low Income Percent}}{\text{Planning Partner Low Income Percent average}}$
- oo. Planning Partner Low Income Interval
 - i. $\text{IF}(x \leq 0.5, "1", (\text{IF}(x \leq 1, "2", (\text{IF}(x \leq 2, "3", (\text{IF}(x \leq 4, "4", (\text{IF}(x > 4, "5"))))))))$
 1. Where "x" (Ratio of Low Income Block Group Percentage to Low Income Planning Partner Percentage) = $\frac{(\text{B17017_002E} / \text{B17017_001E})}{\text{Planning Partner Population Low Income Percent}}$
- pp. Planning Partner Low Income Interval ID
 - i. $\text{Planning Partner Low Income Interval ID} = [\text{Planning Partner Name}] \& " \& [\text{Planning Partner Low Income Interval}]$
- qq. Ratio of Block Group Minority Percent to Planning Partner Average
 - i. $\frac{\text{Minority population percent (for the BG)}}{\text{Planning Partner average Block Group Minority population Percentage}}$
- rr. Planning Partner Minority Interval
 - i. $\text{Planning Partner Minority Intervals} = \text{IF}(x \leq 0.5, "1", (\text{IF}(x \leq 1, "2", (\text{IF}(x \leq 2, "3", (\text{IF}(x \leq 4, "4", (\text{IF}(x > 4, "5"))))))))$
 1. Where "x" (Ratio of Minority Block Group Percentage to Minority Planning Partner Percentage) = $\frac{(\text{B03002_001E} - \text{B03002_003E})}{\text{B03002_001E}} / \text{Planning Partner Minority Percentage}$

- ss. Planning Partner Minority Interval ID
 - i. Planning Partner Minority Interval ID = [Planning Partner Name]&" "&[Planning Partner Minority Interval]

Add Geodatabase Feature Classes

After the tables are populated, you will add the tables and files listed below to the ArcGIS Pro project file following the steps below.

1. Make a copy of the Last Revision's ArcGIS Pro packaged project file with an updated name.
2. Create a new File Geodatabase
3. Import the following shapefiles/feature classes and tables into the new geodatabase.
 - a. Planning Partners
 - b. PennDOT Districts
 - c. Counties
 - d. Municipalities
 - e. Block Groups
 - f. Roads
 - g. Bridges
 - h. Crash Table
 - i. Using the "XY Table To Point" (Data Management) tool, plot the Latitude and Longitude of the crashes and export to a new feature class called "Crashes."
 - i. Block Group Table

Join Data

Next, join the imported data tables to their associated feature classes to facilitate the analysis of the data and map production.

Join Block Group data table to the block group feature class using GEOID as the join field. Verify all records are matched.

Run Interval Analysis Models and Export Interval Tables

After the required data is assembled in ArcGIS Pro, the next step is to run the interval analysis models. They are the "Statewide EJ Geoprocessing Model - Counties Additional Data", "Statewide EJ Geoprocessing Model – PennDOT Districts Additional Data", and the "Statewide EJ Geoprocessing Model – PennDOT Planning Partners Additional Data" models in the default toolbox. The Python code for each model is presented in Appendix 1.

To run the models:

1. Right click on the model in the default toolbox and select "Edit."
2. In the model builder window for each of the three models, the sources of the four feature classes/layers grouped under "Data Inputs" will need to be updated to the corresponding updated feature class/layer.
 - a. To update the data source, double click on the icon, and navigate to the file added to the default geodatabase.
3. Save the updated model.
4. Select "Run" to run the model.

After the model is completed, the resulting feature class is saved to the scratch geodatabase. Copy the feature class from the scratch geodatabase to the default geodatabase.

Export the interval tables to Excel files using the "Table" to Excel" tool. Compile these separate files as sheets in a new Excel file named "Interval Tables". Format and rename columns as required for legibility.

Update Map Deliverables

Update Maps

Existing maps in the project file are then updated. Update the data sources of the layers of each map by right clicking on the layer and selecting "Properties". Under the "Source" heading, click the "Set Data Source" button, and navigate the location of the updated data, and select it. The map will be updated to reflect the new data. As maps are updated, update the year at the end of the map name to reflect the current revision year.

Update Layouts

After the maps are updated, confirm that the maps referenced in the layouts are correct and reflect the updated maps. Update the elements of the layouts as needed. For example, update previous years to current year, sources, etc.

Export Maps

After the map layouts are updated, export each layout map series as a single PDF with 300 DPI resolution.

Reading Area Transportation Study January, 2024

Coordinating Committee

PennDOT District 5-0	Mr. Chris Kufro, Acting District Executive (Chairman) Ms. Jennifer Ruth, Planning & Program Manager*
PennDOT Central Office	Mr. Mark Tobin, Division Chief, Center for Program Development and Management. Mr. James Mosca, Transportation Planning Manager*
Berks County Commissioners	Mr. Michael Rivera, Commissioner
Berks County Planning Commission	Mr. Thomas McKeon, Board Member (Vice Chairman) Mr. Alan Piper, Transportation Planner III (MPO Secretary)*
City of Reading	Ms. Donna Reed, Council Member Mr. O. Chris Miller, Council Member*
Berks County Boroughs	Mr. Brian Hoffa, Borough Council Member (Sinking Spring Borough)
Berks County 1st Class Townships	Ms. Lisha Rowe, Township Commissioner (Cumru Township)
Berks County 2nd Class Townships	Mr. Michael Kocher, Township Supervisor (Spring Township)
South Central Transit Authority / Berks Area Regional Transportation Authority	Mr. Greg Downing, Executive Director Mr. Keith Boatman, Assoc. Director of Capital Projects/Planning
Reading Regional Airport Authority	Mr. Dante Santoni, Jr., Board Member

Technical Committee

PennDOT District 5-0	Mr. Scott Vottero, District Executive for Design (Chairman) Mr. Michael Donchez, Transportation Planning Specialist*
PennDOT Central Office	Mr. David Alas, Trans. Planning Specialist Supervisor (Vice Chairman) Ms. Nyomi Evans, Transportation Planning Specialist Trainee*
Berks County Planning Commission	Mr. Alan Piper, Transportation Planner III (MPO Secretary) Ms. Amanda Timochenko, Transportation Planner II*
Berks County Planning Commission	Mr. Michael Golembiewski, Transportation Modeler Ms. Amanda Timochenko, Transportation Planner II*
City of Reading	Mr. Kyle Zeiber, Department of Public Works
City of Reading	Mr. Timothy Krall, Department of Public Works
South Central Transit Authority / Berks Area Regional Transportation Authority	Mr. Keith Boatman, Assoc. Director of Capital Projects/Planning Ms. Lauri Ahlskog, Manager of Transit Planning & Compliance*
Reading Regional Airport Authority	Mr. Zackary Tempesco, Airport Manager

* denotes alternate



READING AREA TRANSPORTATION STUDY

**ENVIRONMENTAL
JUSTICE
SUMMARY**