4. Current and Future Needs Assessment

An inventory of the existing transportation system offers a snapshot of how transportation supports Lincoln and Lancaster County today. Current conditions of the multimodal transportation system and the future conditions presented are based on the anticipated growth in the Lincoln Metropolitan Planning Area shown on **Figure 4.1**. An assessment of the current and future roadway, bicycle, pedestrian, transit, freight, and rail systems is summarized.

Land Use and Demographics

Land use and demographics are key components to understanding the transportation system, identifying travel patterns, and anticipating where new or improved facilities may be needed. Housing and employment are the two land use categories used in forecasting travel demand. Demographic information (age, income, ability, etc.) helps to understand and address the transportation needs of different cohorts in the region.

Household and Employment Growth

The number of people living and working in the region affects the transportation needs, and where people choose to live and work greatly influences the demand for transportation infrastructure and services. Understanding the region's existing and future housing and employment trends can help to inform and guide transportation investment decisions. Today's decisions must consider the changing population and align with their future transportation needs.

The US Census estimates a 2019 population of 289,102 in Lincoln and 319,090 in Lancaster County, both representing an 11.5 percent increase over the 2010 populations. The 2019 base year travel demand model for Lincoln includes 122,634 households. According to PlanForward land use forecasts, the number of local households is expected to increase approximately 52,060 over the next 30 years (almost 42.5 percent). **Figure 4.2** shows the distribution of household growth within the model area ("Cordon Area") by transportation analysis zone (TAZ). Darker colors represent higher levels of household growth; most high-growth areas are on the periphery of the future service limit, with infill development growth targeted within a portion of Lincoln.

The Lincoln MPO 2050 LRTP was completed during the COVID-19 pandemic. This Chapter presents pre-COVID data that do not reflect changes that occurred to travel demand and patterns experienced during the pandemic. Travel behaviors have been significantly changed during the pandemic, and the long-term impact is uncertain at this time.

Average density of new dwelling units, combined with increased focus on infill development strategies, will influence the amount of land required to accommodate the additional residences and transportation infrastructure needed to support the growth. Infill development opportunities can introduce several benefits for a resilient and sustainable community. Infill enables the use of existing infrastructure to a larger extent while maintenance costs remain consistent. Edge growth requires new infrastructure and adds maintenance costs. Balanced in the preferred growth scenario, these tradeoffs reflect that escalating costs to build and maintain new edge growth infrastructure at historic rates are less sustainable for the community.

A TAZ is an area used with planning modes. Area sizes vary but commonly include approximately 3,000 people based on census block information with important socio-economic data such as automobiles per household, household income, and employment which helps understand anticipated trips.

Figure 4.1 Lincoln Metropolitan Planning Areas

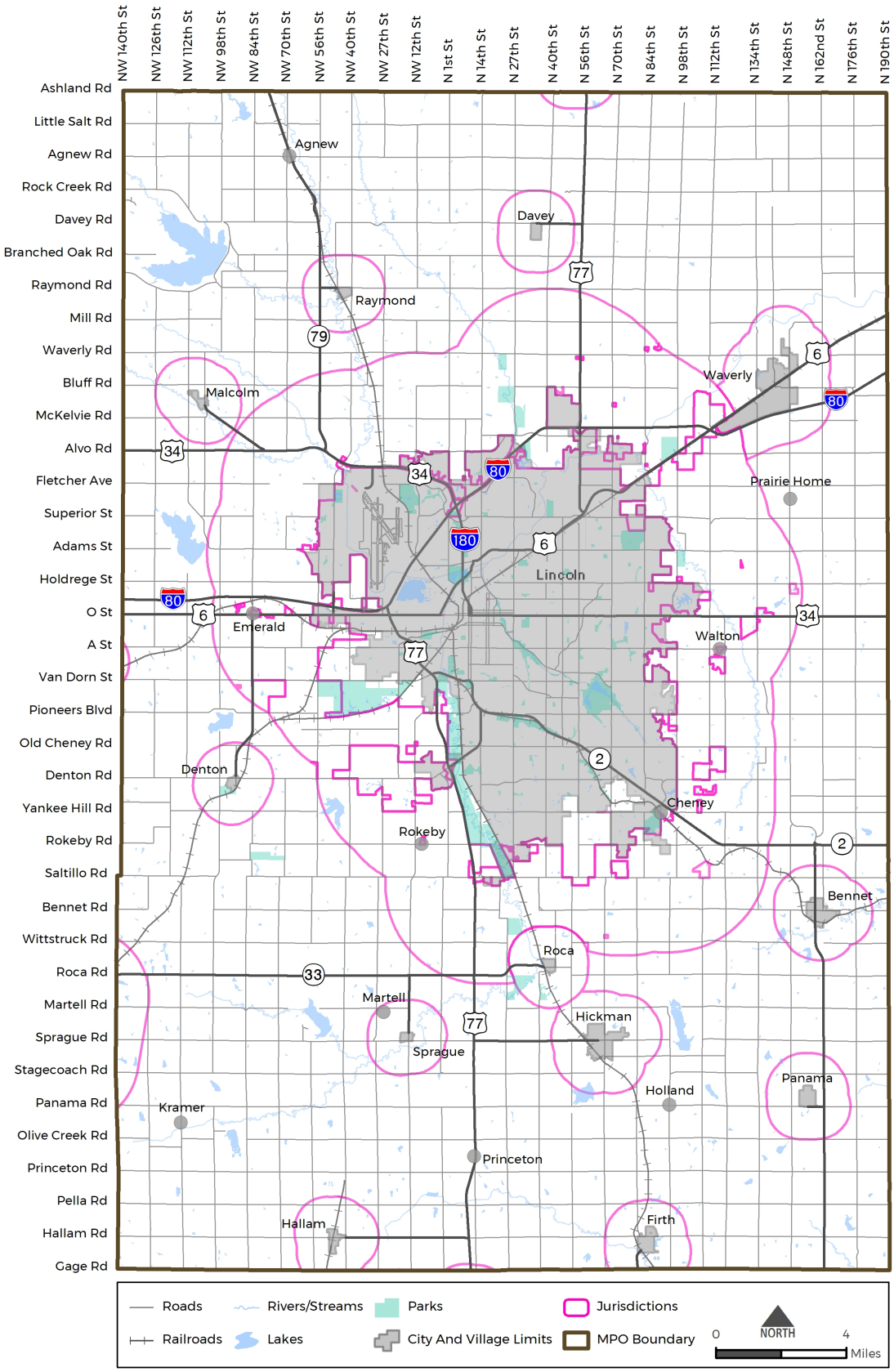
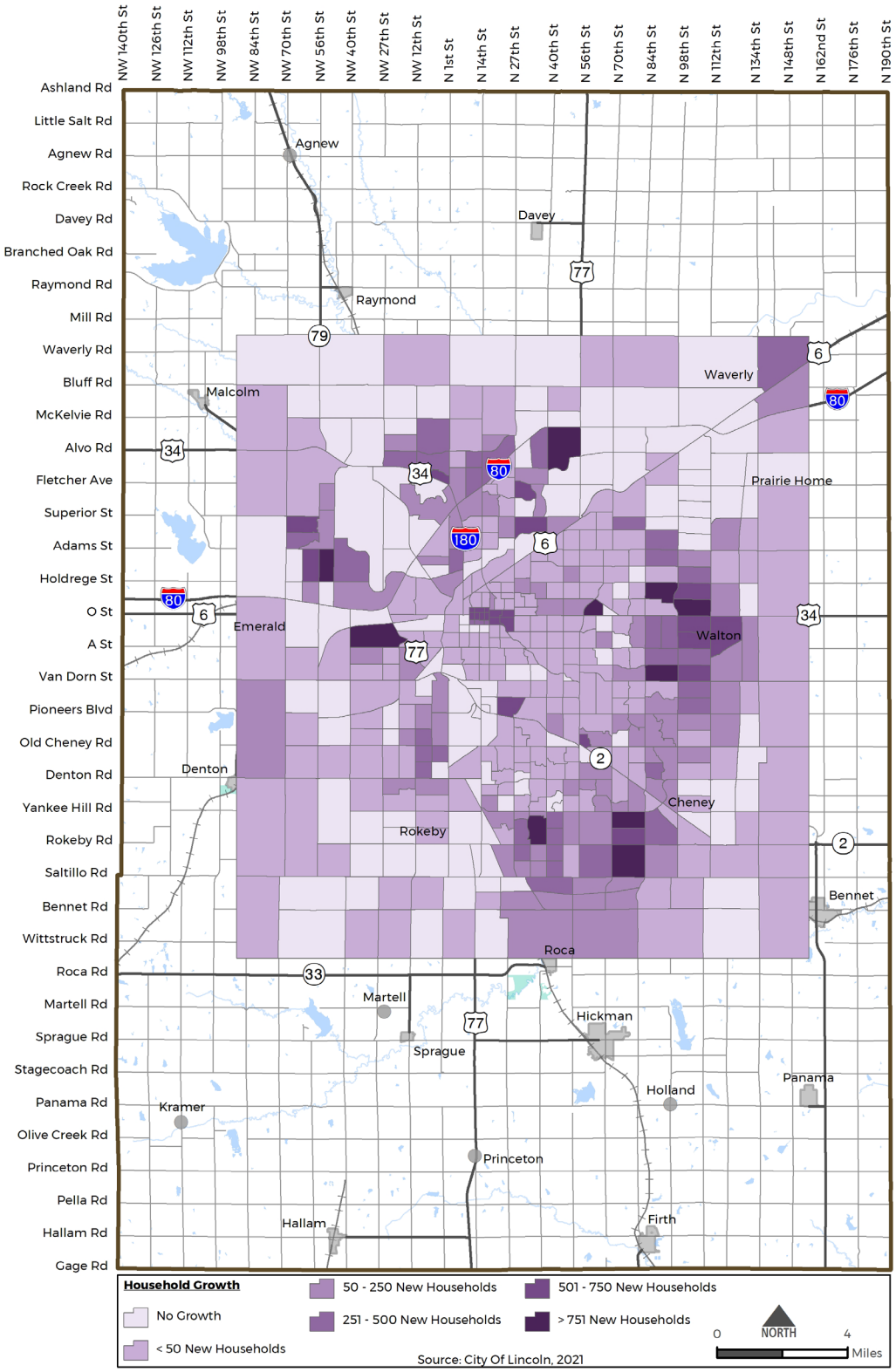


Figure 4.2 Household Growth



Increased emphasis on infill development also supports urban densities, reduced overall vehicle miles, and increased use of bicycling, walking, and transit. Higher density edge growth reduces burdens on emergency services while placing more housing close to jobs and services. The combination of infill and greater edge density also protects the rural character and agricultural economy of Lancaster County.

Similarly, **Figure 4.3** and **Figure 4.4** depict the commercial and industrial employment growth, respectively, by TAZ. Commercial employment is expected to increase by approximately 43 percent, and Industrial employment is expected to increase by approximately 37 percent.

Table 4.1 shows the 2019 base year, 2035, and 2050 household and employment forecasts within the model area. **Appendix C** documents the detailed land use forecasts by TAZ.

Consideration of overburdened and underserved communities is a core component of the development of the LRTP. The LRTP includes consideration for federally protected community members (**Chapter 7**), including people with low incomes and minority populations. Ultimately the goal of the Lincoln MPO is to provide transportation and mobility benefits to all community members, especially the underserved and overburdened communities; therefore, the LRTP goes beyond the minimum environmental justice (EJ) requirements to identify and address disparities in the transportation system.

Table 4.1 Household and Employment Growth[1]

	2019	2035	2050	16-Year Growth (2019–2035)	31-Year Growth (2019–2050)
Households	122,634	149,850	174,694	27,216	52,060
Commercial Space (KSF)	61,683	74,458	86,058	12,775	24,375
Industrial Space (Acres)	3,347	3,970	4,586	623	1,239

[1] PlanForward recommended growth scenario applied to traffic model for 2050 LRTP.

Figure 4.3 Commercial Growth

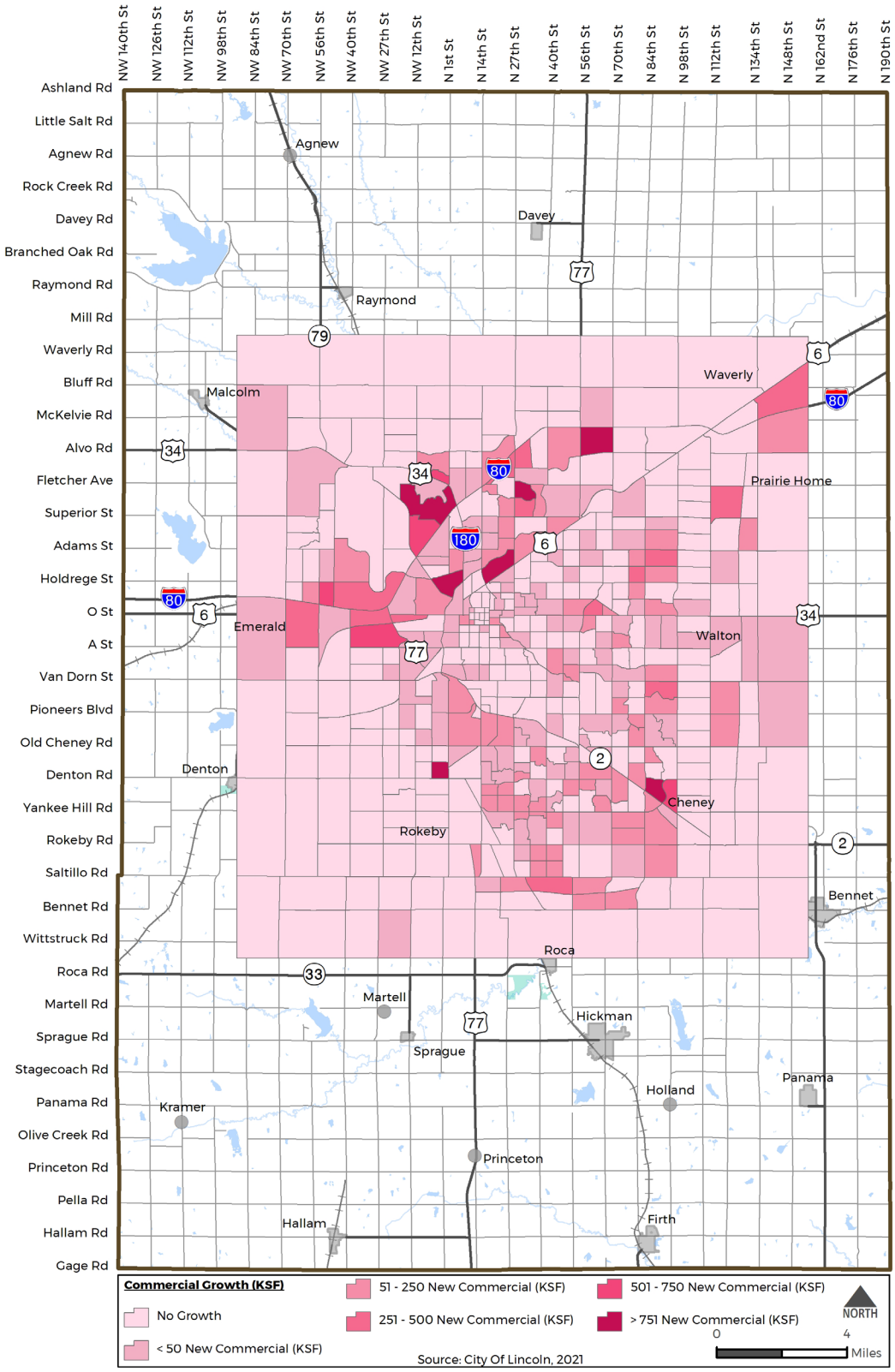
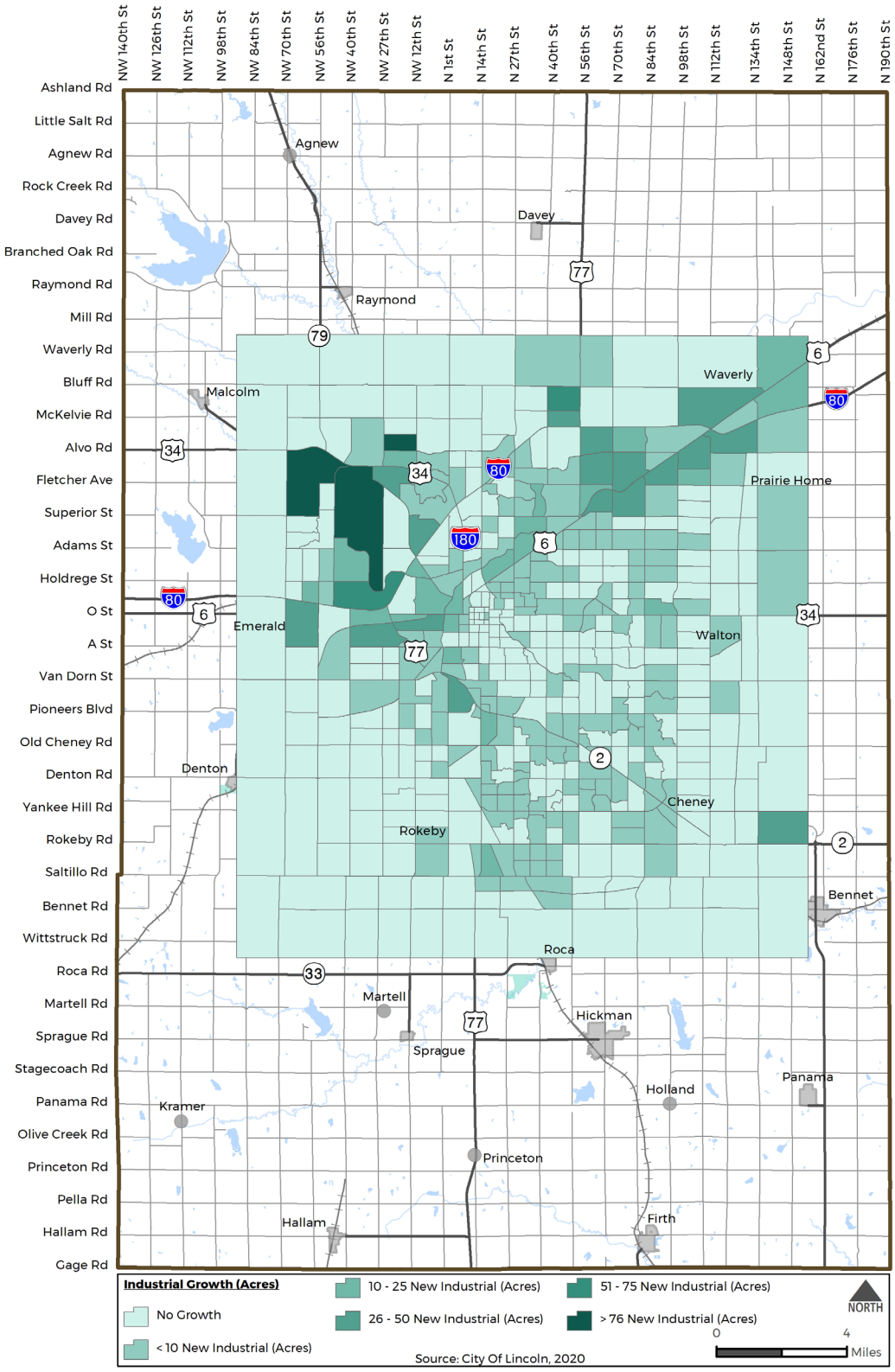


Figure 4.4 Industrial Growth



Socioeconomic Equity

Transportation planning decisions have the potential to address equity within a community and provide benefits to those with the greatest needs. Lincoln and Lancaster County have diverse population bases that reflect different socioeconomic backgrounds. To better understand the current socioeconomic attributes and needs of those who live in Lincoln and Lancaster County, data from the U.S. Census American Community Survey (ACS) were compiled (**Table 4.2**) including older adults, people with disabilities, people with limited English proficiency, BIPOC communities, people with low-income[2], single parent households, and people without access to a vehicle. Thoughtful consideration of these communities in the transportation planning process benefits the underserved and overburdened communities that experience higher than average unmet transportation needs.

To visually display the locations where underserved and overburdened communities live, a Transportation Equity Index map (**Figure 4.5**) was created. The Equity Index map combines all of the socioeconomic factors identified in **Table 4.2** to create a composite snapshot that highlights areas with the highest aggregate of historically underserved and overburdened communities. Areas with the highest numbers of these criteria present (darkest purple) require special consideration during the planning process. Transportation projects proposed in these areas must be implemented in a manner that avoids creating new or further inequities in the transportation network that may harm or burden these community members.

The term BIPOC is used to acknowledge that not all people of color face equal levels of injustice and that Black and Indigenous people are severely impacted by systemic racial injustice. Making transportation decisions to direct infrastructure investments that expand opportunities for BIPOC mobility in combination with PlanForward policies can help address this challenge.

[2] FHWA Order 6640.23A defines low-income as a person whose median household income is at or below Department of Health and Human Services (DHHS) poverty guidelines. Census data is used for transportation planning and quantifying the socioeconomic equity criteria quartiles as described in **Appendix H**.

Table 4.2 Socioeconomic Indicators

Equity Indicator	County-wide	See
Older adults	13.0%	**Figure 4.6**
People with disabilities	9.5%	**Figure 4.7**
People with limited English proficiency	4.4%	**Figure 4.8**
Single parent households	13.7%	**Figure 4.9**
People with low-income	5.0%	**Figure 4.10**
BIPOC communities	22.0%	**Figure 4.11**
People without access to a vehicle	5.7%	**Figure 4.17**

Source: American Community Survey, 2018

Figure 4.5 Equity Index

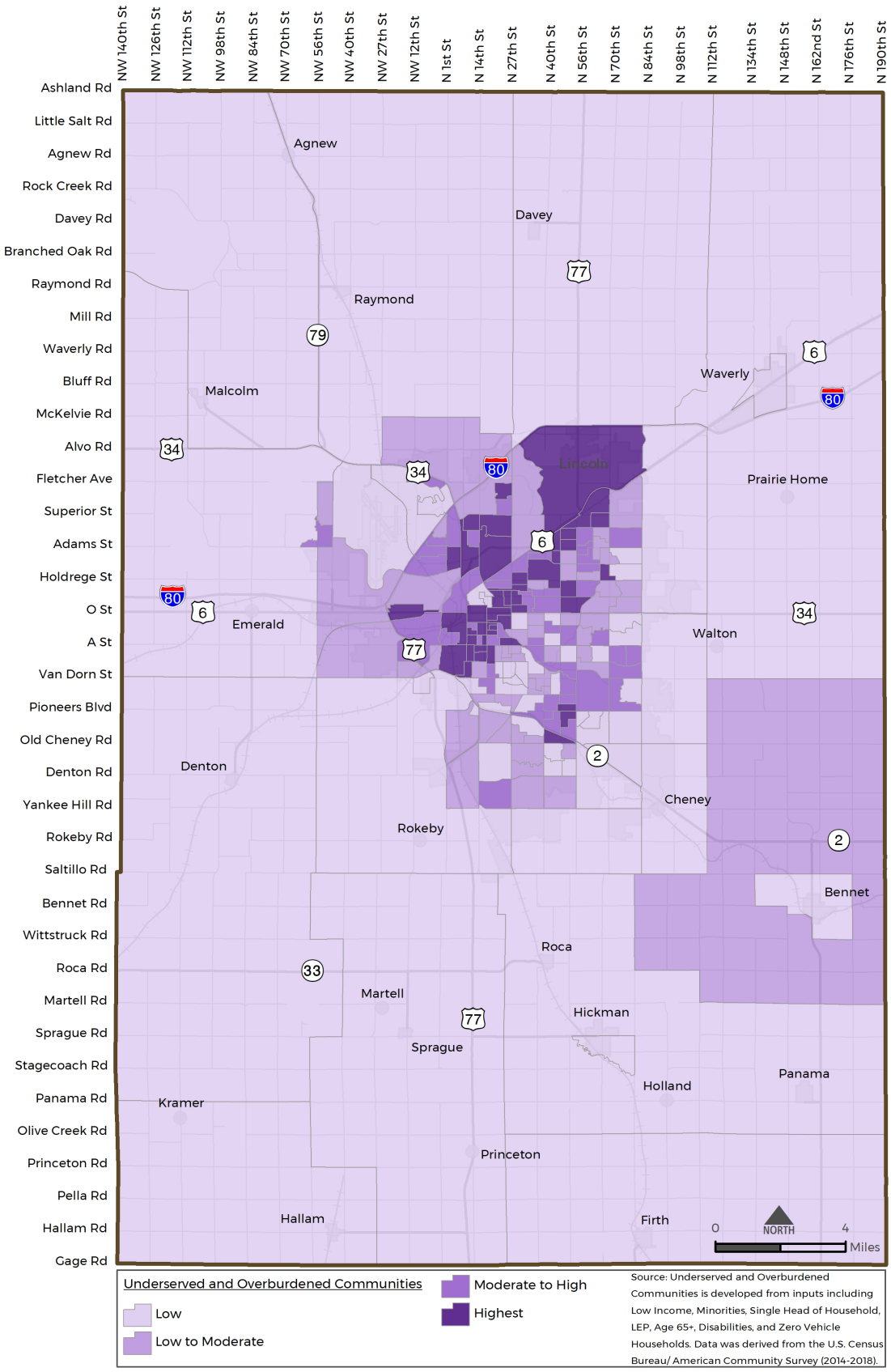


Figure 4.6 Older Adults

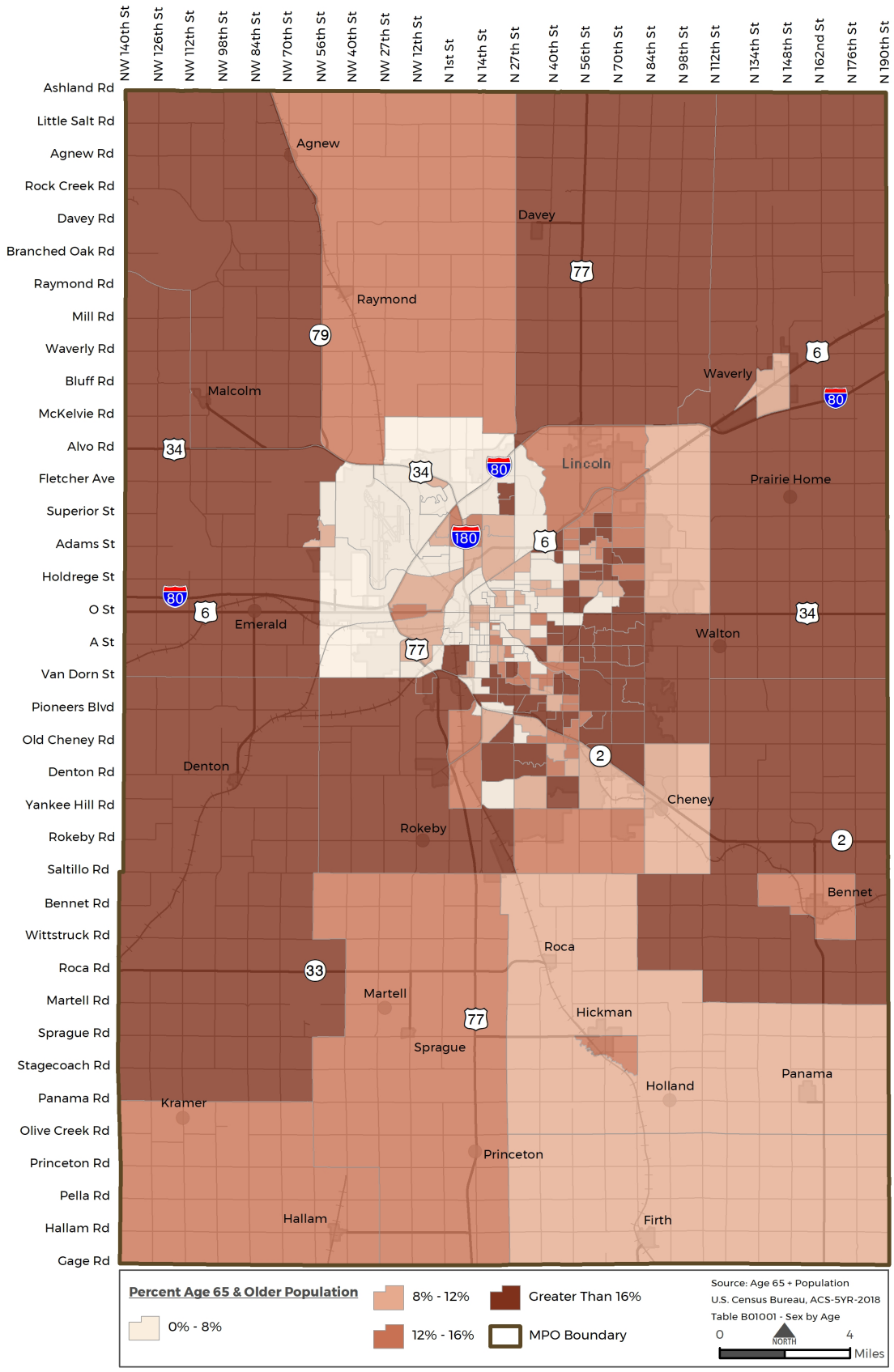


Figure 4.7 People with Disabilities

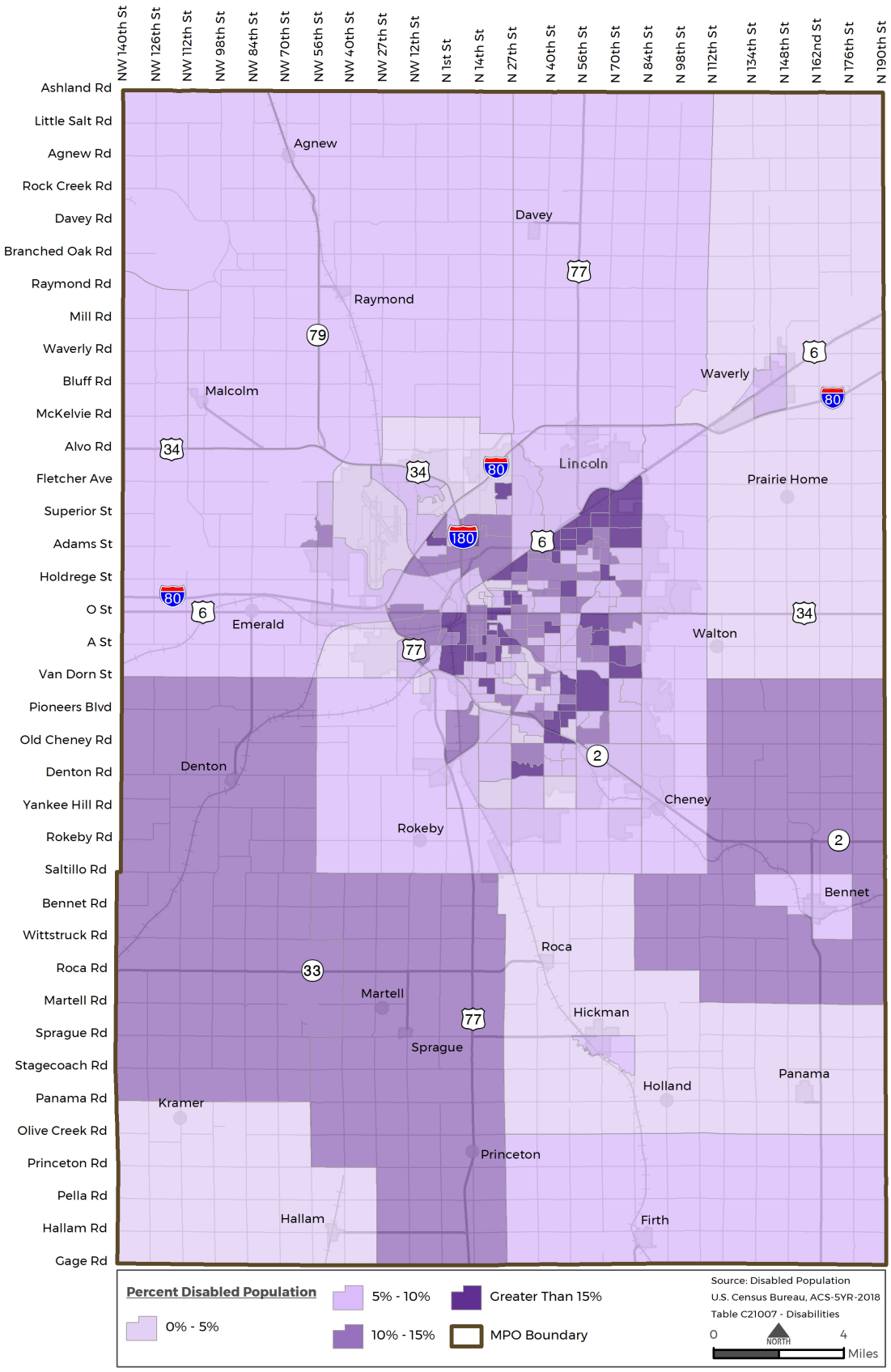


Figure 4.8 People with Limited English Proficiency

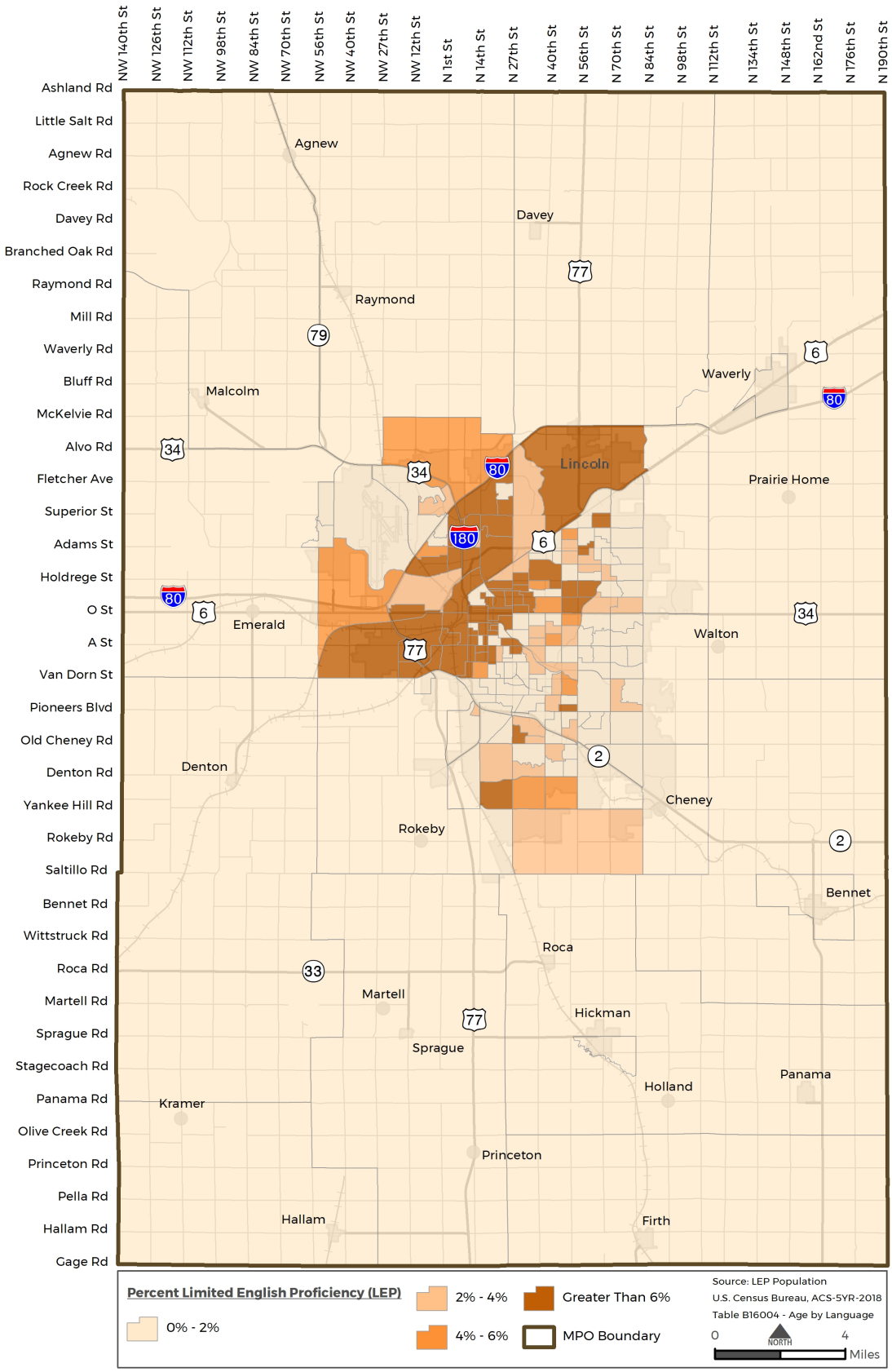


Figure 4.9 Single Parent Households

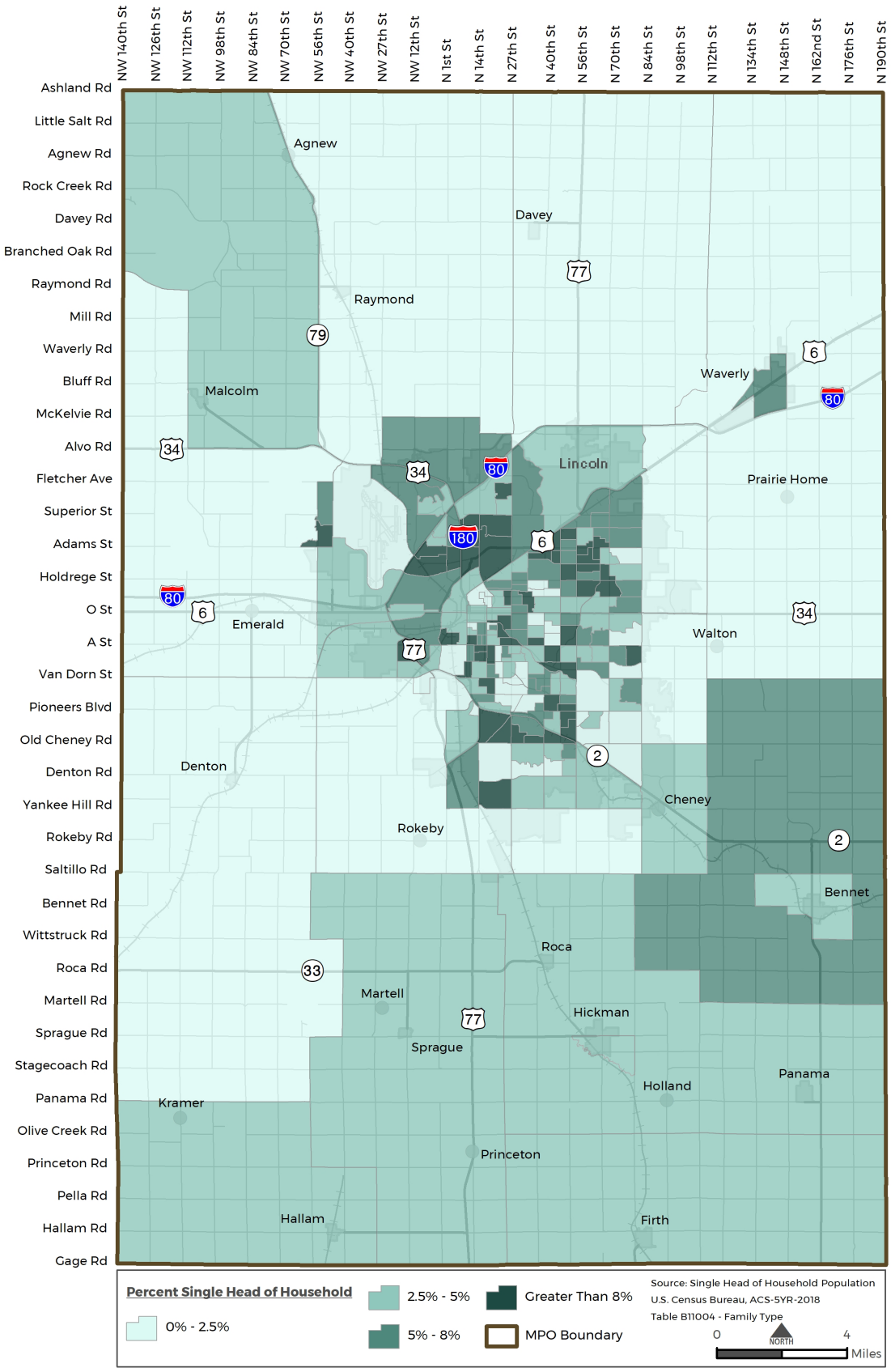


Figure 4.10 People with Low Income

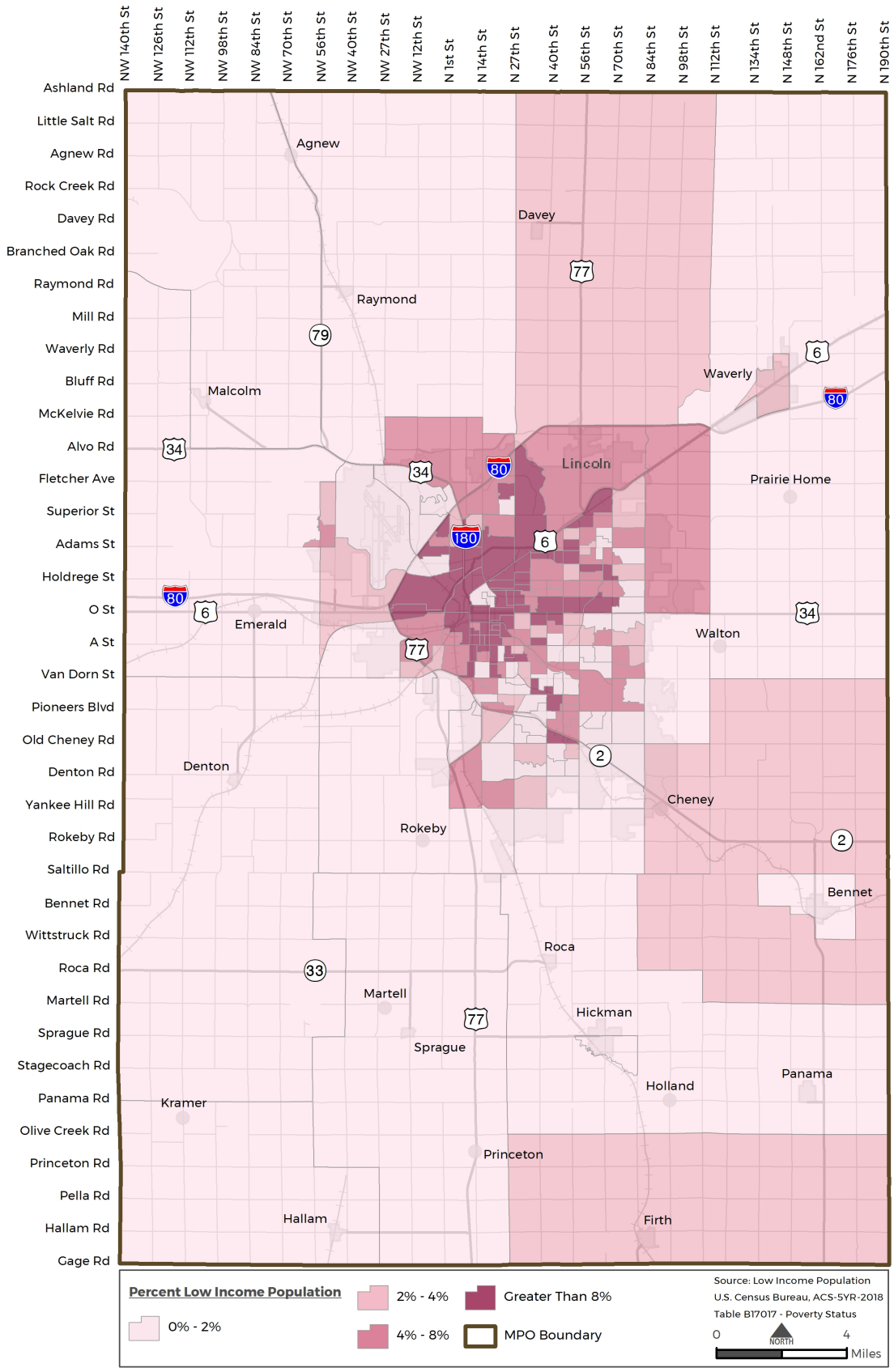
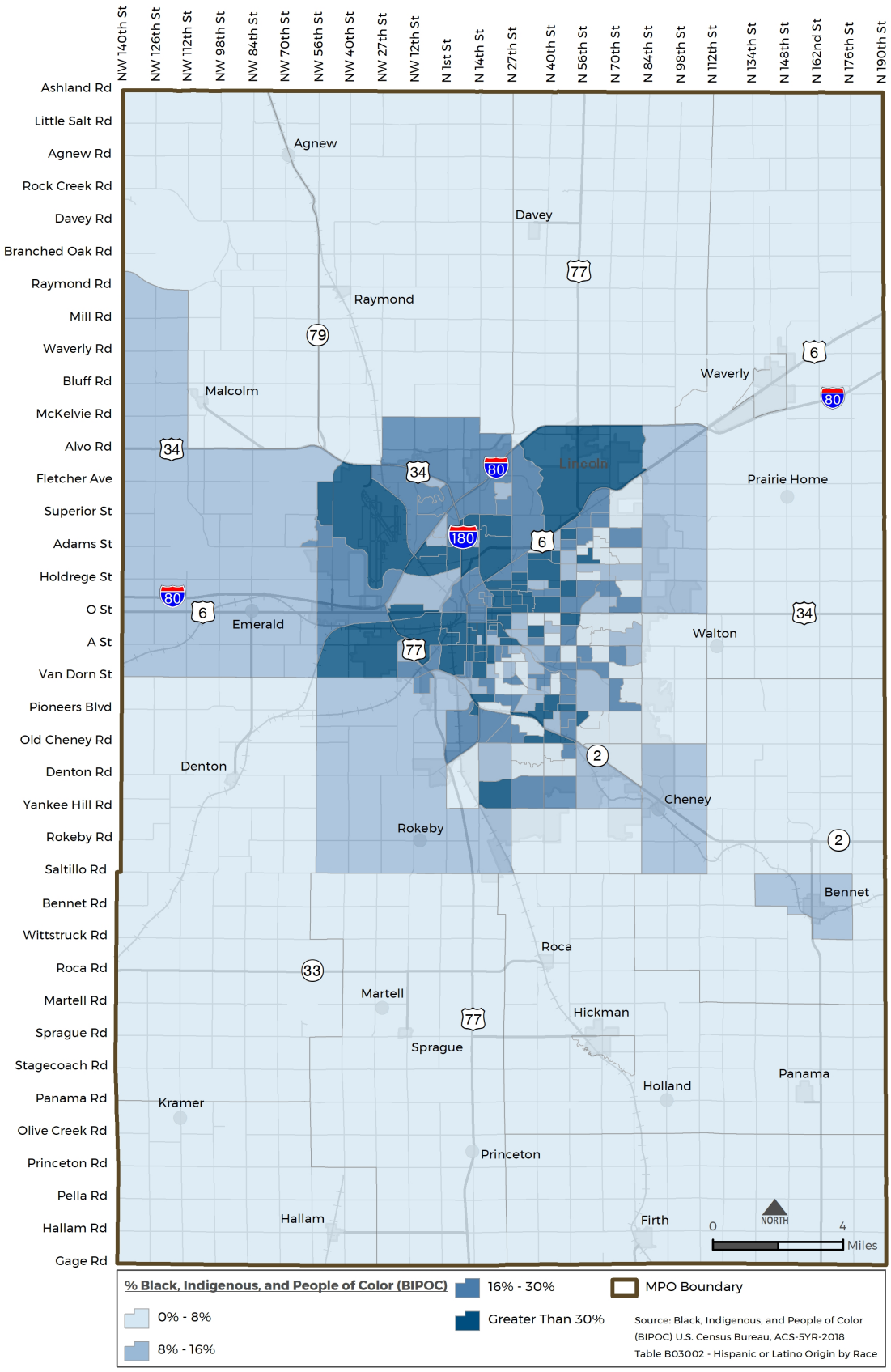


Figure 4.11 BIPOC Communities



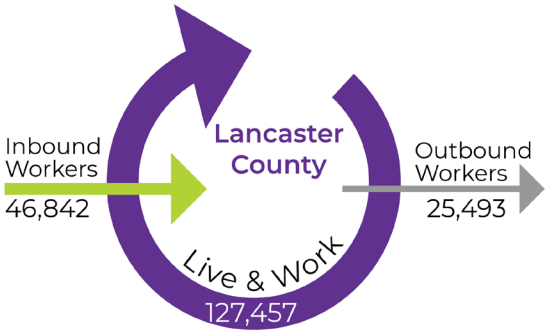
Travel Patterns and Trends

The following section provides an overview of transportation and commuting patterns in Lincoln and Lancaster County.

Commuting Patterns

Each day, almost 47,000 people travel to work in Lancaster County from outside the county, while approximately 25,500 County residents travel to work elsewhere (as shown on **Figure 4.12**). Roughly 127,500 residents both live and work within Lancaster County. That is, there is a net inflow of more than 20,000 workers into the County. Around 83.3 percent of employed Lincoln and Lancaster County residents commute to work within the County, a number that is mostly unchanged from 2010.

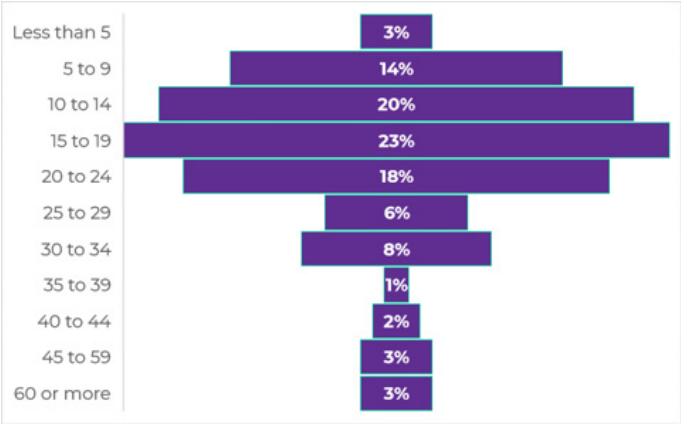
Figure 4.12 Workflows



Source: US Census Longitudinal Employer-Household Dynamics (LEHD) Employment for Lancaster County, 2017

The average travel time to work for Lincoln residents is 18.7 minutes (19.1 minutes for all of Lancaster County). Residents' commute time is almost 8 minutes less than the average for all US residents. When compared to local travel times in 2010, commuters spent slightly more than a minute longer getting to work in 2018. Between 2018 and 2020, the Green Light Lincoln initiative upgraded traffic signal equipment and timing at more than 400 intersections, which has reduced the total number of vehicle stops and delay associated with commuting. The values in **Figure 4.13** reflect a five-year average between 2014 and 2018 and indicate approximately three out of four Lancaster County residents arrived at their place of work in less than 25 minutes. Four out of five residents arrived to work within a 35-minute commute. The remaining residents traveled longer than 35 minutes to work, with only 3 percent of trips taking more than an hour.

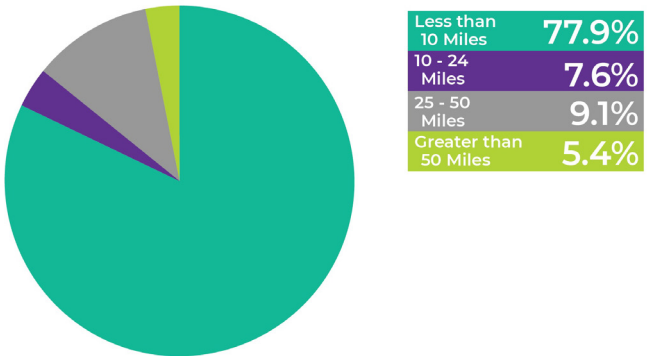
Figure 4.13 Travel Time to Work



Source: American Community Survey – 2018 5-Year Average Table B08303

Three factors strongly influence travel time to work: travel distance between home and work, travel mode used, and the level of congestion experienced during a commute trip. In 2017, approximately 77 percent of Lancaster County residents traveled to jobs located less than 10 miles from their homes. Since 2010, this proportion has increased by almost 0.7 percent, while the percentage of workers living between 10 and 24 miles from work decreased by a similar amount. Workers traveling 25 miles or more to get to work represent approximately 14.5 percent of all commuters. **Figure 4.14** shows the breakdown of Lancaster County work commute travel by miles.

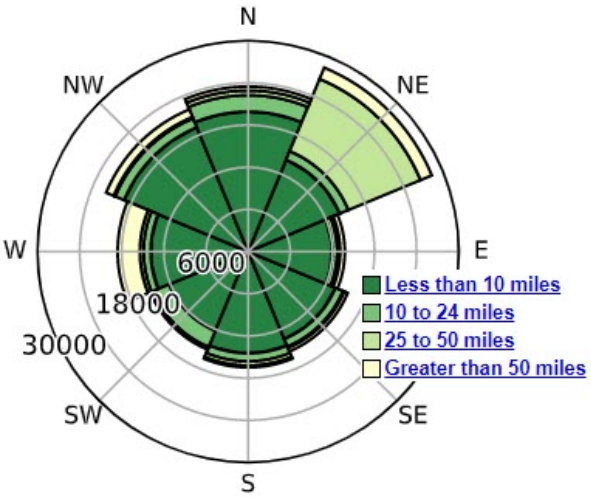
Figure 4.14 Distance from Home to Work



Source: US Census Longitudinal Employer-Household Dynamics (LEHD) Employment for Lancaster County, 2017

Most employees traveling between 25 and 50 miles are traveling in a northeastern direction, toward Omaha. The largest portion of employees traveling greater than 50 miles for work travel west toward Grand Island, Hastings, and Kearney. **Figure 4.15** shows the total distance and direction of commute travel.

Figure 4.15 Distance and Direction from Home to Work



Source: US Census Longitudinal Employer-Household Dynamics (LEHD) Employment for Lancaster County, 2017

Mode Split

The ACS asks respondents to identify their primary means of transportation to work. Driving alone, referred to as Single Occupant Vehicles (SOV), is by far the most common mode of transportation in Lancaster County. Over 90 percent of residents drive alone to work (81 percent within the City of Lincoln).

Table 4.3 displays the percentage of workers who use each mode to travel to and from work in Lincoln and Lancaster County. National values are also shown for comparison. Commuters use transit far less in Lincoln than in the rest of the nation but demonstrate higher uses of active transportation modes such as walking and bicycling.

Table 4.3 Commuter Mode Split

Commuting to Work	Lincoln	Lancaster County	National
Drove alone (SOV)	81.0%	81.3%	76.4%
Carpooled	9.1%	9.0%	9.1%
Public Transportation (excluding taxicab)	1.4%	1.3%	5.0%
Walked	3.3%	3.2%	2.7%
Bicycled	1.3%	1.2%	0.6%
Other	0.6%	0.6%	1.2%
Worked at Home	3.3%	3.6%	4.9%

Source: American Community Survey – 2018 5-Year Average Table S0801

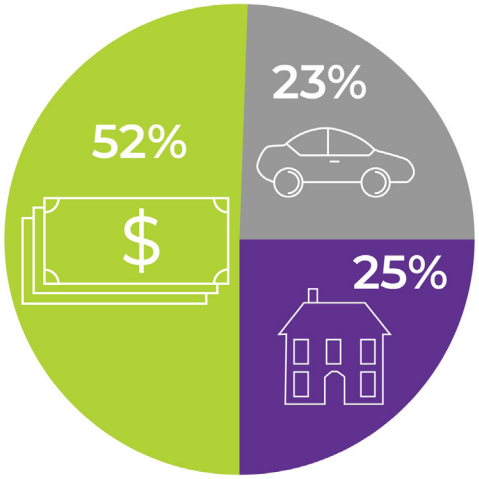
Data presented in **Table 4.3** may be broken down further by gender to identify some trends that influence mobility options. For example, in Lincoln, Census data from 2018 indicate that males are seven times more likely than females to commute to work by bicycle. Gender also plays a role in transit use as females who commute to work use transit approximately 20 percent less frequently than males—indicating that transportation mobility and access equity can be improved. Further, historical statistics for those who work from home may also face significant changes as the business disruptions caused by COVID-19 continue to play out beyond 2021. Flexible work policies and technology available to support working from home full- or part-time may have long-term impacts on communing patterns, traffic congestion, and quality of life. It is too soon to know how these fundamental changes will impact where people choose to live and how flexibility will affect their commute patterns.

Housing and Transportation Affordability

The Department of Housing and Urban Development considers housing to be affordable when consuming less than 30 percent of a household's income. The Housing and Transportation (H+T) index expands this traditional measure to include transportation costs, usually a household's second largest expense. The H+T index offers an expanded view of affordability, one that combines housing and transportation costs and sets the benchmark at no more than 45 percent of household income. By considering the combined costs of housing and transportation, the H+T index provides a more complete understanding of affordability and shows that location-efficient places can be more livable and affordable.

The average household's housing expense in Lancaster County is considered affordable, accounting for approximately 25 percent of total average income. Interestingly, transportation expenses account for approximately 23 percent of total average income, exceeding the value that could be considered affordable by 8 percent. Combined, the cost of housing and transportation in Lancaster County is 48 percent of the average household income (**Figure 4.16**), which is slightly higher than the Center for Neighborhood Technology (CNT) benchmark of 45 percent.

Figure 4.16 Housing + Transportation Index



Source: Center for Neighborhood Technology (CNT); Average housing and transportation costs as a percent of total household income for Lancaster County, based on 2018 American Community Survey 5-Year Estimates

The City of Lincoln 2020 Affordable Housing Coordinated Action Plan is an important reference for geographic context and distribution of housing costs. The proportion of owner and renter households that pay more than 30 percent of their income for housing is not equally distributed. In some block groups, up to 47 percent of homeowners and 72 percent of renters expend more than 30 percent of their household income on housing.

These cost-burdened households are increasingly dependent on transportation options other than personal vehicle ownership and on jobs accessible by transit.

Owning a personal vehicle is the single biggest transportation cost factor for households, followed by insurance and repairs. Complete neighborhoods that are compact, mixed use communities with a balance of housing, density of jobs, and stores, as well as easy access to transit, generally have lower household transportation costs. In such situations, residents may access daily needs with fewer cars and car trips, potentially reducing household transportation costs. Lower income households generally pay a larger portion of their expenditures on transportation because the cost of personal vehicle ownership and maintenance is relatively high. As household incomes grow, smaller portions are required for transportation.

The way in which many cities have grown in the last half century has impacted American households. Individuals who buy homes farther from jobs often pay more in the form of higher transportation costs. These same households are most sensitive to fuel price and maintenance costs because they drive longer distances. The community also experiences negative impacts overall. Longer travel distances and more SOVs serving outward growth mean more congestion on city streets, time spent commuting, and GHG emissions.

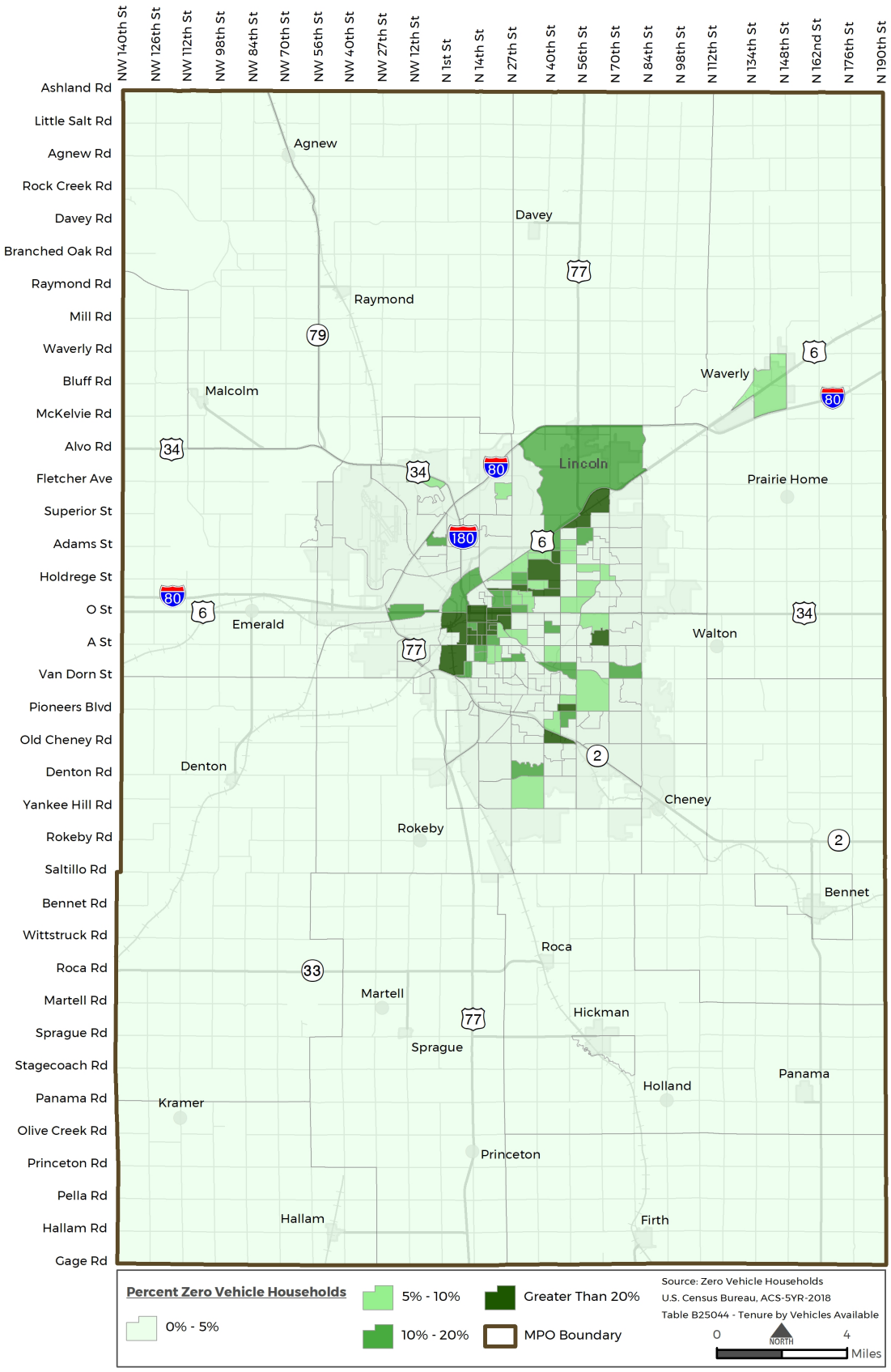
Vehicle Availability

Access to a personal vehicle provides many residents with a common mode of transportation and increases the range of access to work opportunities, commerce, health care, education, and recreation. Although the most common form of commuting in Lancaster County is by SOV, an estimated 7,033 households (5.7 percent) in 2018 had no access to a personal vehicle. This can result from being unable to drive, an inability to afford a vehicle, or a personal choice to forego vehicle ownership. In 2015, this same measure reflected 6.4 percent of the County population, demonstrating the number and proportion of individuals with access to a personal vehicle has increased in recent years. In households of two or more persons of driving age, approximately 18.5 percent of households have one vehicle or less, indicating that access to a personal vehicle may be limited within a significant number of County households.

Households without access or limited access to personal vehicles more heavily depend on reliable transit services, connected multimodal facilities, and complete streets that are safe to travel by alternative modes.

Figure 4.17 shows the geographic distribution of zero vehicle households throughout the county. There is a higher concentration of zero vehicle households (darkest green color) in the downtown area and along Highway 6 although pockets of zero-vehicle households are found throughout the MPO.

Figure 4.17 Zero Vehicle Households



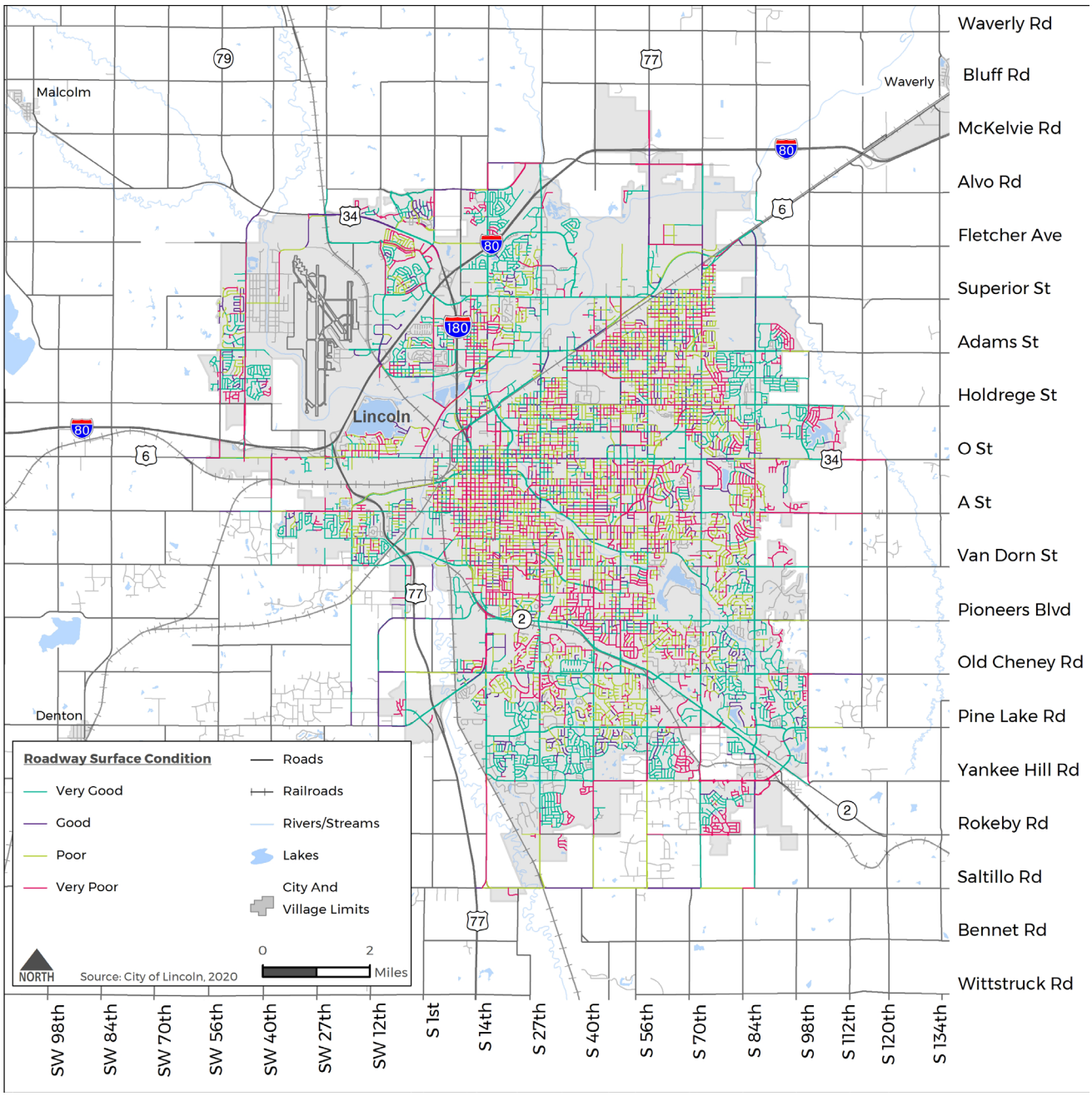
Roads and Bridges

An extensive system of streets and highways serve the Lincoln MPO today. This system ranges from roads capable of safely carrying thousands of vehicles each hour, down to local residential streets that help form the character of neighborhoods. The street system further plays a vital role in commerce by carrying products to all portions of the city and county. The rural road network also links bedroom communities while the agricultural community accesses key transportation centers, allowing their commodities to be shipped around the world.

Surface Conditions

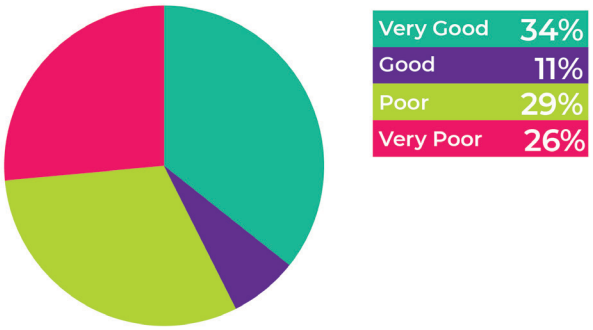
The City of Lincoln and Lancaster County are investing in streets to ensure a better tomorrow. Upkeep and maintenance of street infrastructure has become an increasingly critical need. The City of Lincoln monitors the pavement condition of the arterial street network every other year and the residential street network every fourth year. To conduct a pavement condition survey, a specially equipped van collects high-quality digital images of the pavement surface and measures the number and extent of defects. The van also records the extent of roughness and rutting along each street surface. The information is entered into a pavement management software program designed to take into account the type of paving materials. The 2020 MPO Annual Report summarized pavement surface condition assessments as recent as 2017 (**Figure 4.18**).

Figure 4.18 Roadway Surface Conditions (2017)



The City of Lincoln roadway network consists of almost 200 million square feet of paved surfaces. Effective maintenance of these roadways requires ongoing prioritization and management. Approximately 45 percent of the roadway surface areas in the city are rated as Very Good (**Figure 4.19**). The city prioritizes funding to keep these roadway surfaces in this condition for as long as possible. Approximately 55 percent of the roadway surface area has fallen into the lowest categories of Poor and Very Poor. Maintenance of these surfaces is more complex and expensive to complete. Preventing roadway surfaces from degrading to these conditions is more cost effective than repairing them.

Figure 4.19 Roadway Surface Conditions by Percent (2018)



Source: Lincoln Transportation & Utilities, 2018

Measurable improvements in the condition scores have been seen following one-time funding increases for arterials in 2012 (ARRA funding) and 2015 (Antelope Valley), as well as for residential in 2014 (increased gas tax collections) and 2019 (quarter cent sales tax). Not reflected in 2018 data illustrated by **Figure 4.19**, the City invested over $10 million in street rehabilitation in 2017–18, providing rehabilitation of 23 miles of arterial streets and 588 blocks of residential streets.

The 2017–18 residential rehabilitation (**Figure 4.20**) exceeded the total centerline miles of rehabilitation completed between 2011–16. The City's increased focus on preventative maintenance has had a positive impact on the pavement condition, though challenges remain to address the Poor and Very Poor surface maintenance needs.

According to the 2018 Lancaster County Transportation Strategy, Lancaster County crews continually work on pavement preservation countywide throughout the year. The County currently does not specify performance measures for roadway condition. Crews are on the roadways with personnel and equipment evaluating existing roads and bridges for upgraded treatments as needed. The prioritization of street resurfacing work focuses on preventative maintenance with an emphasis on more heavily traveled roads, which is a requirement for the County to be eligible to receive State funding for street resurfacing work. Therefore, a moderately weathered and cracked arterial road might receive a relatively inexpensive slurry seal treatment or thin overlay before a badly deteriorated cul-de-sac is reconstructed. The rationale is that significantly more preventative maintenance treatment, such as slurry seal, can be applied for the cost of having to totally reconstruct pavement.

The State also maintains pavement condition ratings for the National Highway System (NHS). Federal pavement condition ratings of Good, Fair, or Poor for pavement section is based on combined values for International Roughness Index, cracking, rutting, and faulting. Throughout the Lincoln Metropolitan Planning Area, as of 2019, 88 percent of the Interstate segments were rated Good, while 12 percent rated Fair. The Non-Interstate portions of the NHS were rated 34, 65, and 1 percent as Good, Fair, and Poor, respectively.

Figure 4.20 City of Lincoln Surface Maintenance Activity

Average Annual Centerline Miles
2007 - 2016 (74)

Average Annual Centerline Miles
2017 - 2018 (294)

Source: Lincoln MPO LRTP Annual Report, 2018

Bridge Conditions

The City of Lincoln, Lancaster County, and Nebraska Department of Transportation (NDOT) report bridges in Good, Fair, and Poor condition based on the National Bridge Inspection program data (**Table 4.4**). Bridges are inspected at least once every 24 months. Bridges are considered to be in Good condition if all major National Bridge Inspection components (bridge deck, bridge superstructure and bridge substructure or culvert) are in good condition or better (9, 8, 7). Bridges are considered to be in Poor condition if one or more of the major components is in Poor condition or worse (4 or less). Bridges that do not meet the criteria for Good or Poor condition are considered to be in Fair condition (5 or 6).

The previous LRTP referred to the term "Structural Deficiency," which is equivalent to "Poor" condition in the current rating method. **Figure 4.21** shows all city, county, and state bridges according to their current structural ratings. Using structural ratings complies with federal standards and enables County bridge evaluations.

Table 4.4 Bridge Conditions

Condition Rating	City (144)	County (292)	State (181)
Good	69.4%	39.4%	72.9%
Fair	27.1%	50.3%	24.9%
Poor	3.5%	10.3%	0.2%

Source: LTU, Lancaster County, NDOT, 2019-20

National Highway System

The US Department of Transportation (USDOT), in cooperation with the states, local officials, and MPOs, developed the NHS to identify the core road network considered critical to the nation's economy, defense, and mobility. The US Congress approved the NHS in 1995, with the intent that the United States would prioritize federal-aid funds appropriately to ensure that the NHS was adequately maintained. **Figure 4.22** shows the NHS routes in the Lincoln-Lancaster County region.

Figure 4.21 Bridge Ratings

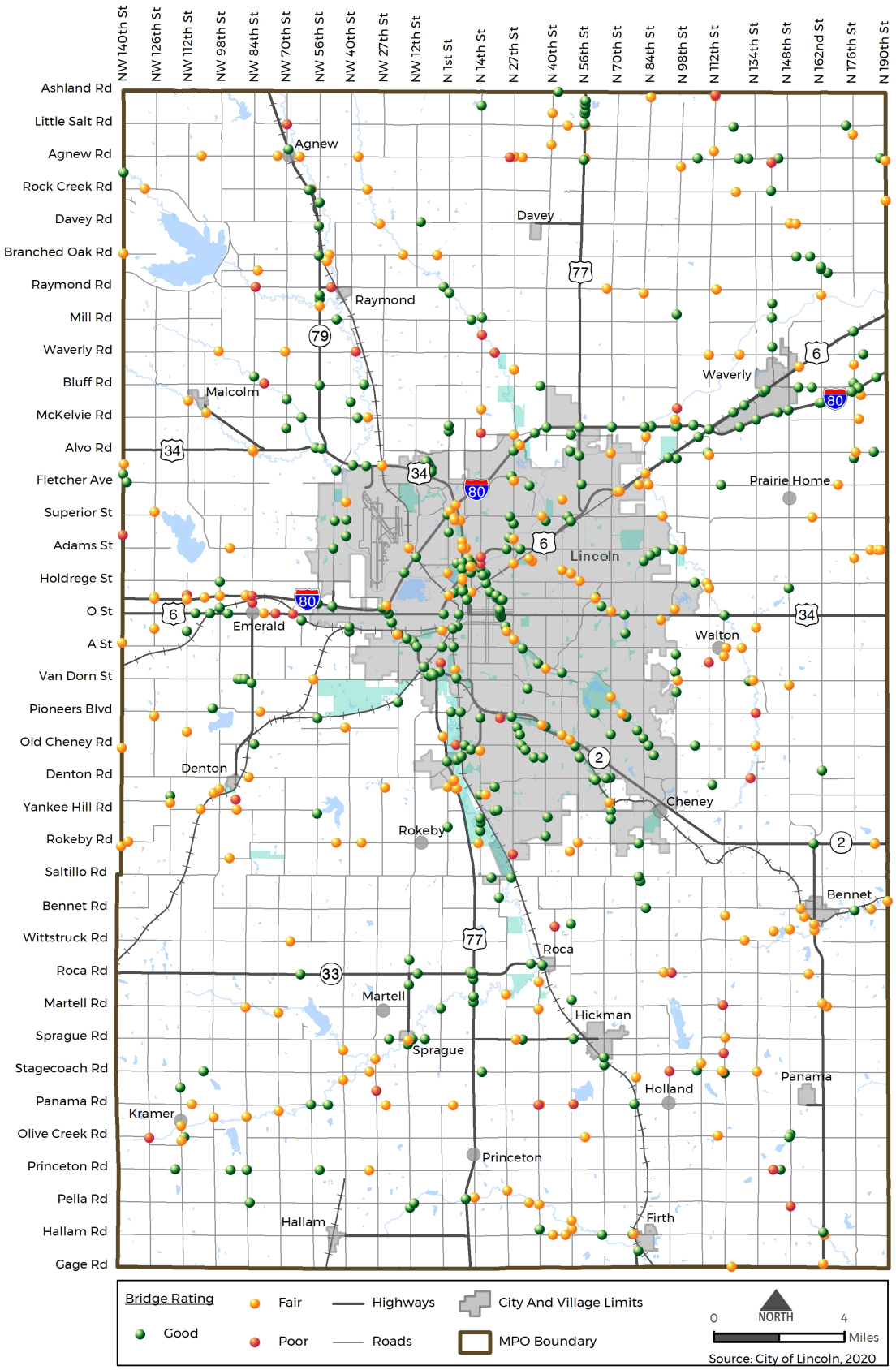
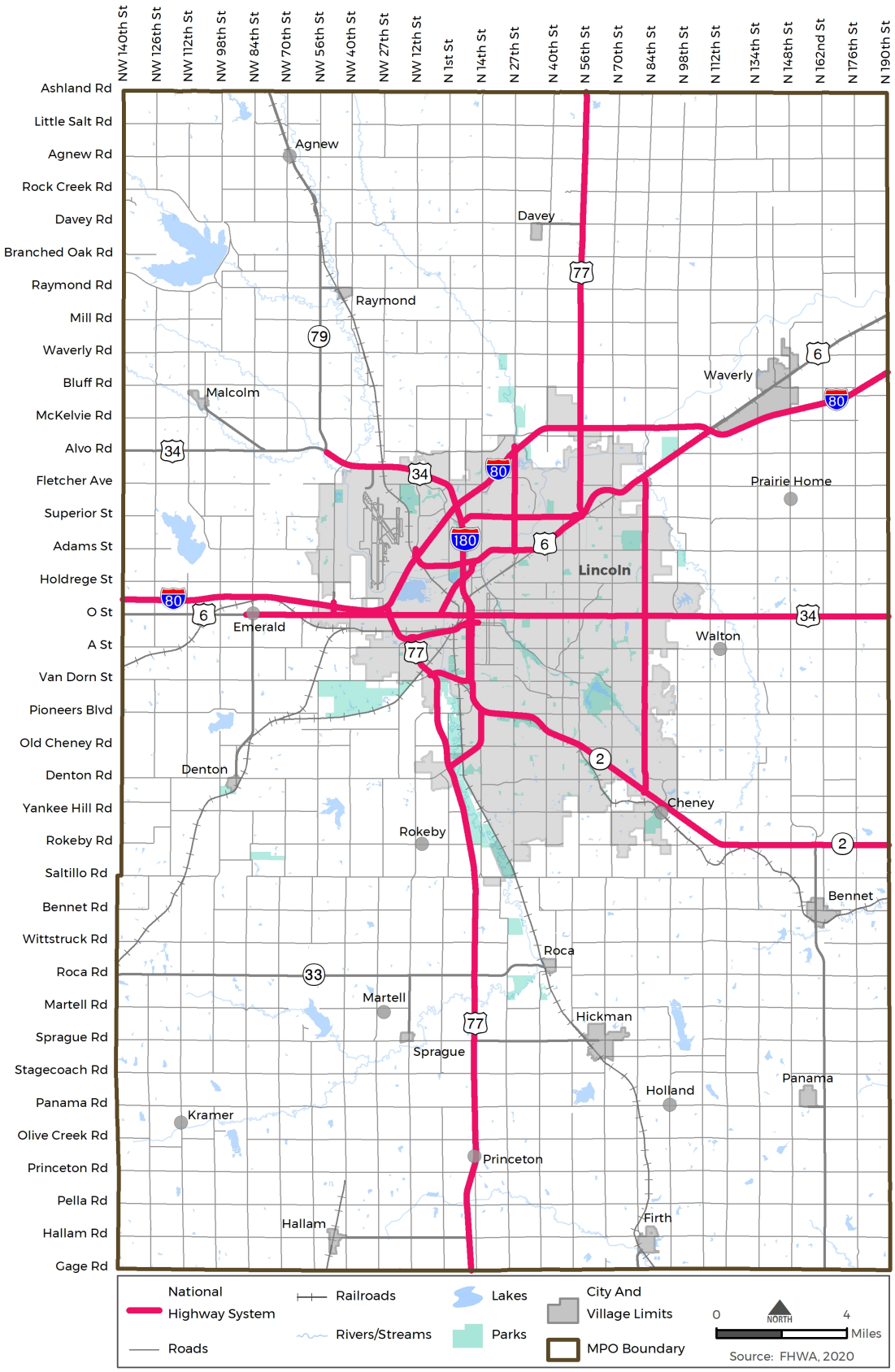


Figure 4.22 National Highway System



System Background

Section line roads form the basic layout for the city's and county's existing street system. Spaced approximately one mile apart, these roads create the underlying grid pattern found throughout the County. The United States government established this roadway pattern nearly 155 years ago. Surveyors were sent west to the Plains states to create a patchwork of one-mile squares. These squares became the building blocks upon which the earliest European settlements and agricultural communities were formed.

The section line roads are used today as Lincoln's main system of arterial streets. In the newer areas of the city, section line roads are planned to be built with four through lanes, with turning lanes added to improve safety and operations along these corridors. However, two lanes with some turn lanes or roundabouts, where needed, are often built to carry lower levels of traffic and then expanded to four lanes when growth occurs and as traffic warrants. The grid pattern has also been accentuated in the older areas of Lincoln through the use of arterial streets at the half section (or half mile) line. This has created a more extensive street grid pattern in the older areas of the community.

To aid in moving traffic through and across the community, other routes have been layered on top of the County's underlying one-mile grid pattern. From the Federal Interstates (such as I-80 and I-180), to State highways (Highway 2, 33, 43, and 79), U.S. Highways 6, 34, and 77, and to local facilities (such as Capital Parkway, Cotner Boulevard, and Sheridan Boulevard), diagonal roads have helped expand the community's street capacity. These facilities often offer more direct movement between major centers of activity than are provided by the grid system.

Bridges and overpasses have also been added over the years to make travel safer and easier. Separating cars and trains reduces the potential for crashes and the time motorists spend waiting for passing trains. Even the spanning of the region's numerous creeks and streams with permanent structures has allowed people and vehicles to move more easily.

Existing National Functional Classification

The Lincoln and Lancaster County road network consists of specific classifications that have degrees of mobility and access among neighborhoods, commercial, retail, and industrial places. From local streets within neighborhoods and the arterial streets used to travel within the city, to highways and interstates used to travel longer distances at faster speeds, each roadway shown on **Figure 4.23** has important functions to serve. Such functions influence the ability of a driver to move between locations and the places accessible along the route. **Figure 4.24** shows the number of through lanes on the current roadway network within the model area.

For vehicle operators, streets generally provide two important functions: mobility and land access. These functions conflict with each other—the carrying capacity for vehicle traffic decreases as greater access to adjacent land uses is provided. Each roadway type is specifically designed to operate with certain characteristics based on the adjoining land uses, level of continuity, and proximity and connections to other facilities. Each street's functional classification describes these characteristics.

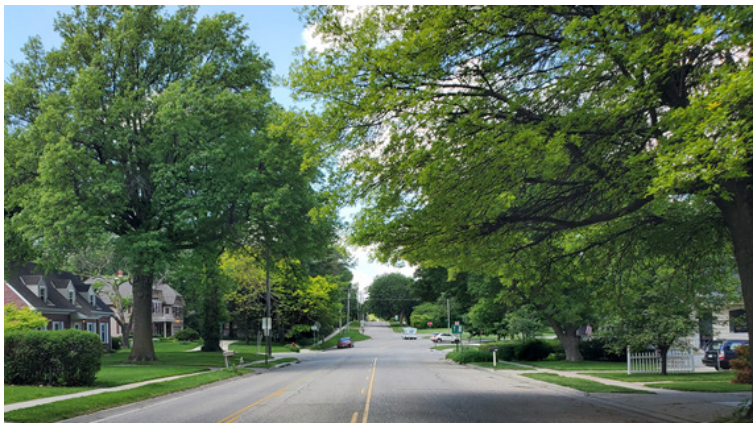
Interstate and Expressway: These are divided, limited access facilities with no direct land access. Freeways such as I-80 do not have at-grade crossings or intersections. Expressways such as Nebraska Highway 77 are similar to freeways except that they may have cross streets that intersect at-grade and access is either fully or partially controlled. Freeways and expressways provide the highest degree of mobility typically serving

higher traffic volumes and longer trip lengths.

Principal Arterials: This functional class of street serves the major portion of inter-community and intra-community traffic movement within the urban area. Principal arterials are designed to carry high traffic volumes. Facilities within this classification such as Superior Street or 84th Street can provide direct access to adjacent land, but such access is incidental to the primary functional responsibility of moving traffic within the system.

Minor Arterials: This functional class serves trips of moderate length such as Vine Street between 17th and 70th Street or Cotner Boulevard between South and 70th Streets. Minor arterials offer a lower level of mobility than principal arterials. This class interconnects with and augments principal arterials, distributes traffic to smaller areas, and provides some direct land access. Minor arterial streets are designed to carry moderate to heavy traffic volumes and provide the largest coverage of transit routes within the city.

Collector Streets: These streets serve as a link between local streets and the arterial system. Collectors such as Calvert Street between 13th and 56th Streets provide both access and traffic circulation within residential, commercial, and industrial areas. Collector streets also provide more direct routes through neighborhoods for use by pedestrians and bicyclists. In rural settings, minor collectors provide service to smaller places, link locally important traffic generators and are spaced relative to population density to serve local roads.



Local Streets: These streets serve as conduits between abutting properties and streets of higher functional classification. Local streets provide the lowest level of mobility and are generally designed to carry low levels of traffic at the lowest posted speeds.

Figure 4.23 Existing Functional Classification

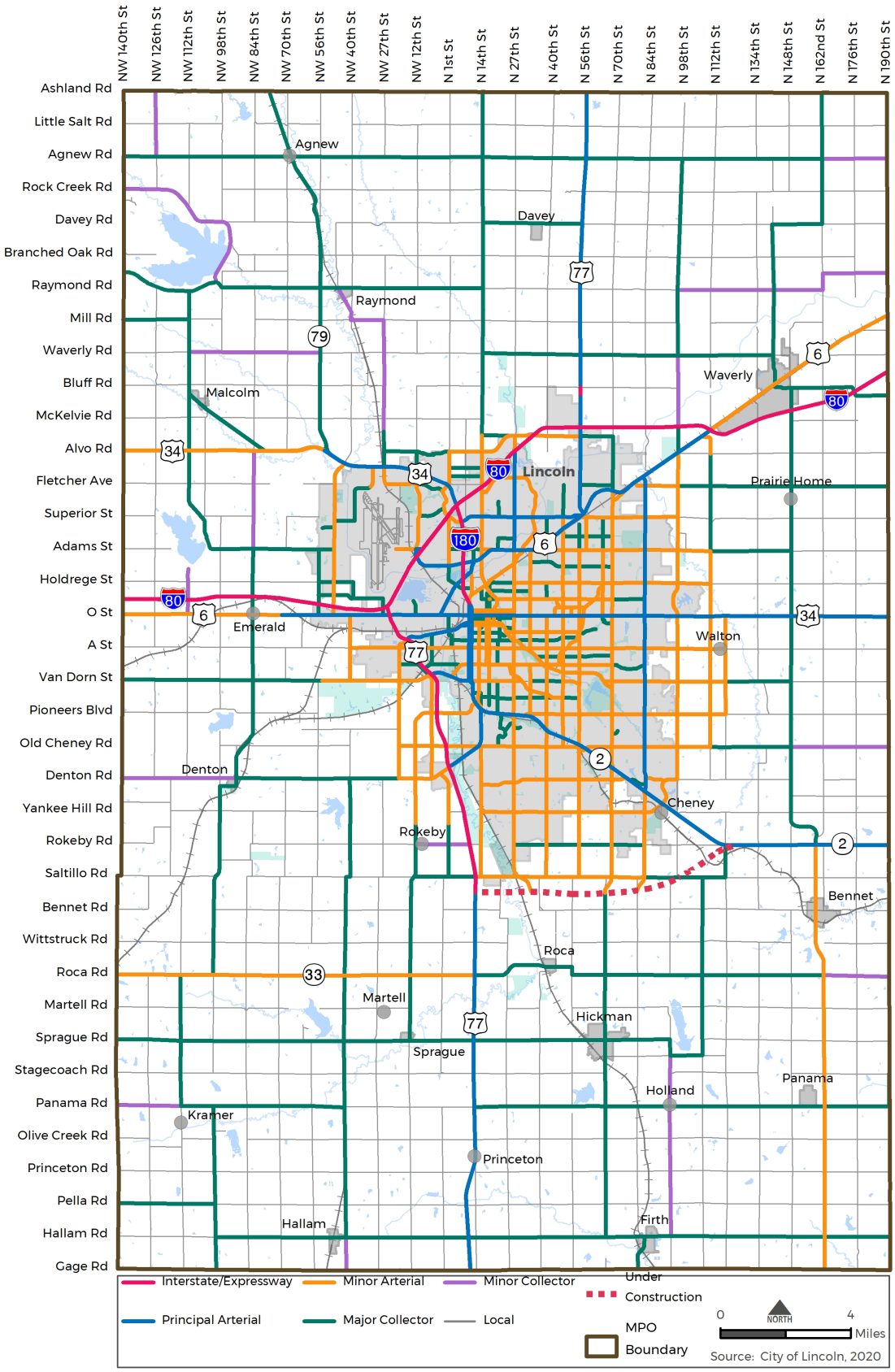
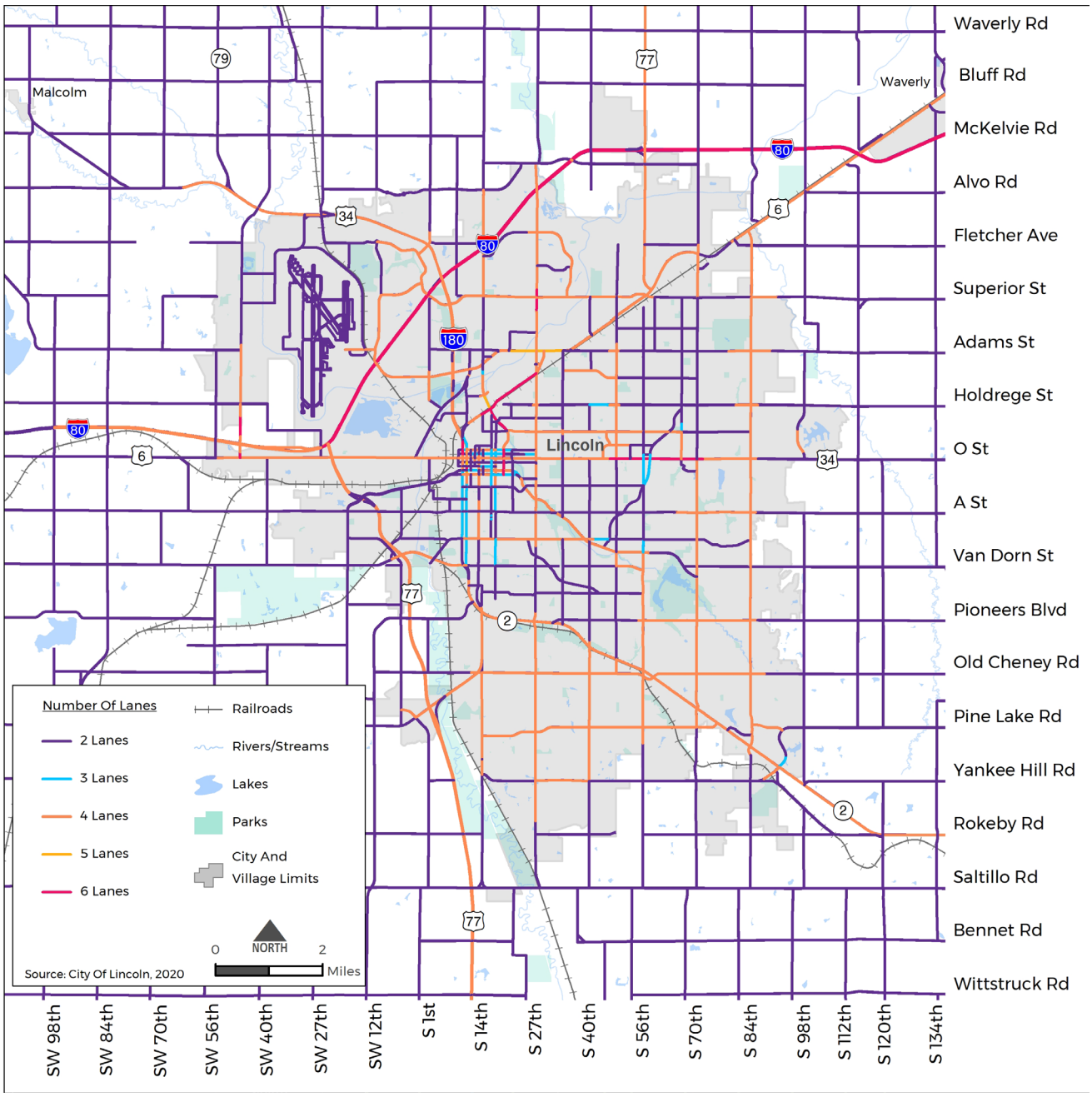


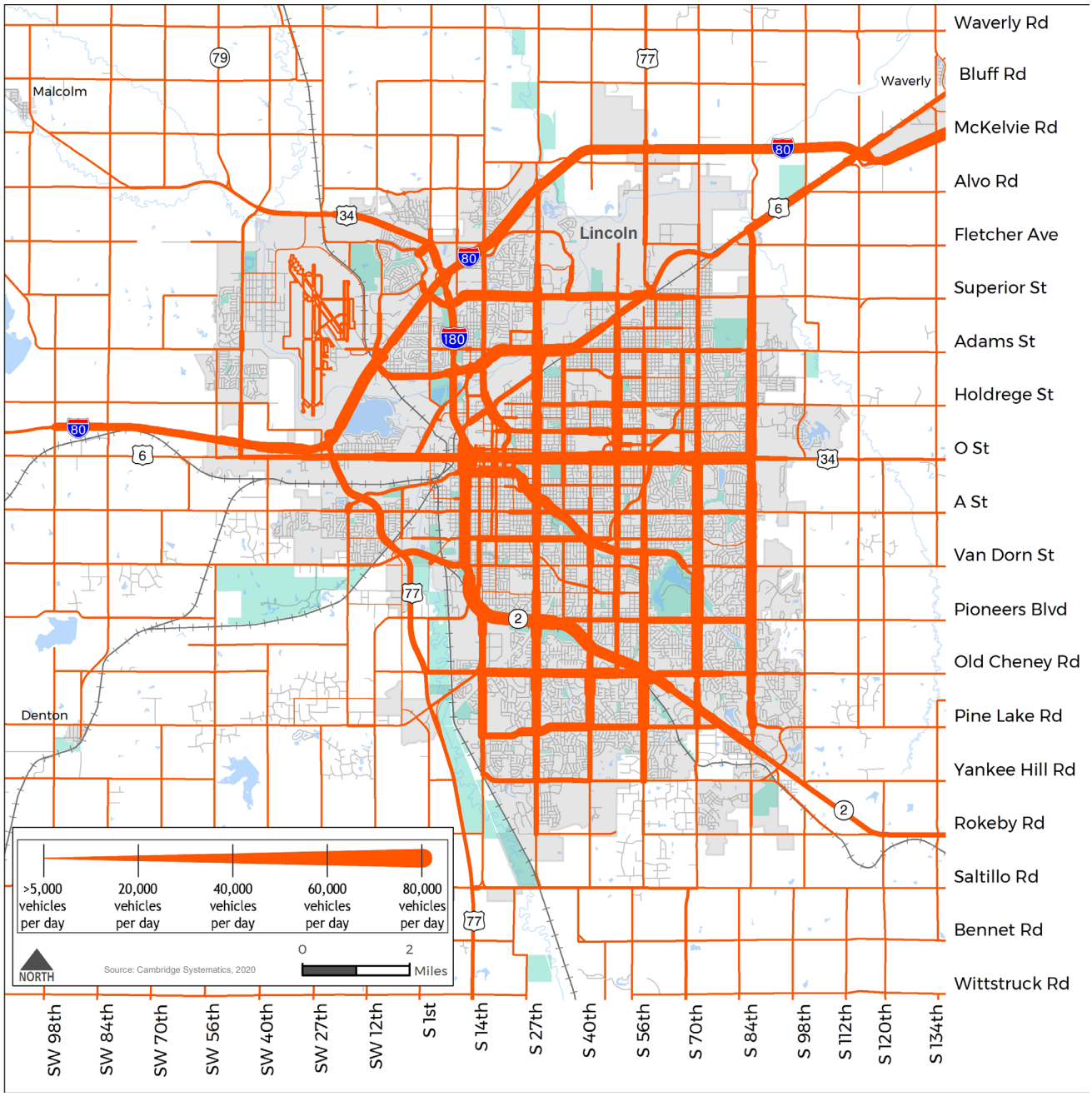
Figure 4.24 Existing Through Lanes



Current Traffic and Congestion

The City of Lincoln manages a traffic count program with volume data representing more than 1,350 locations. The city's current volume data are combined with the most current data from the County and State within the model area to assess the current conditions and as a means to calibrate the travel demand model. **Figure 4.25** depicts the current (2019) daily traffic volumes using bandwidths.

Figure 4.25 Current (2019) Daily Traffic Volumes



An important aspect of determining transportation needs is the capacity of the roadway system to meet traffic demand. Several factors influence roadway capacity, including the number of through lanes, signal timing and priority, presence of turn lanes and medians, and presence of on-street parking. The frequency of driveways and intersections can also play a role in roadway capacity by introducing friction.

The approach to capacity for long range planning purposes considers roadway facility type (e.g., principal vs. minor arterial) and area type (e.g., urban vs. suburban). A generalized level of reference for each facility type is presented in **Table 4.5**. Roadways with higher facility types are assumed to have more consistent turn lanes, less frequent driveways and intersections, and higher signal timing priority than lower facility types. Similarly, roadways in denser areas such as downtown and the surrounding urban areas are assumed to have a reduced capacity as compared to roadways in suburban and rural areas due to reduced side friction, wider lanes, and longer intersection spacing. Capacities for this plan consider hourly capacities, helping to identify facilities expected to become congested during the busiest hour of the day, typically the PM peak hour.

Comparing current daily traffic volumes with planning level capacities (volume to capacity [V/C] ratio) can help to identify levels of congestion on the roadway network. The planning level capacities used for this analysis vary depending on the street's functional classification, the area type, and the number of through lanes.

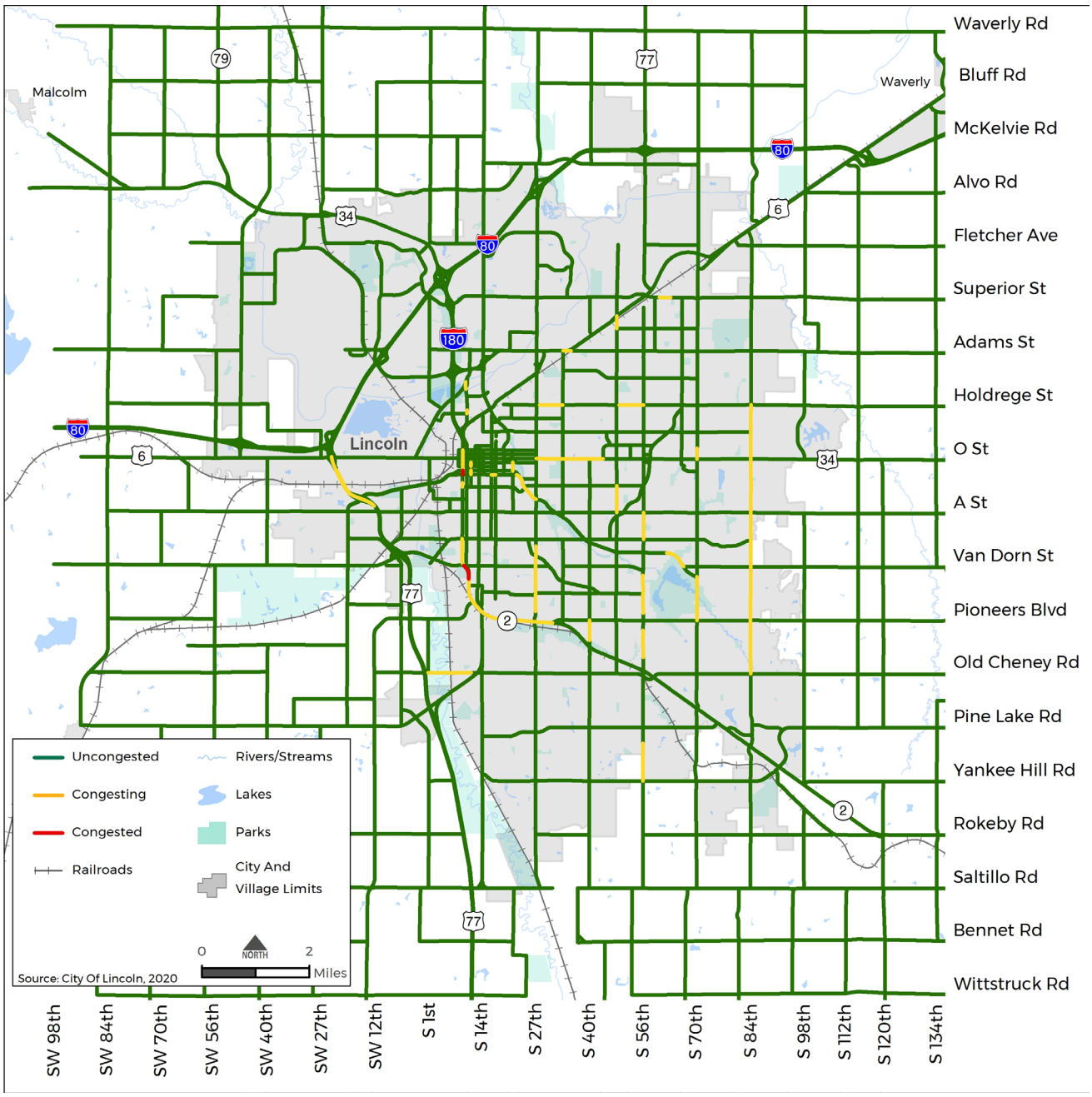
Because the V/C analysis uses planning-level capacities and daily traffic volumes, it does not explicitly account for delays or congestion that may be experienced at a particular intersection during shorter intervals of time (i.e., peak hours). The analysis provides a high-level snapshot (**Figure 4.26**) of the current congestion.

Table 4.5 Planning Level Daily Capacities (Per Through Lane)[3]

Functional Classification	Capacity
1 - Freeway	20,000
2 - Expressway	12,000
3 - Principal Arterial/Major Arterial	9,000
4 - Minor Arterial	8,000
5 - Urban Collector	6,000
6 - Major Rural Collector (State)	6,000
7 - Major Rural Collector (County)	6,000
8 - Minor Rural Collector	6,000
9 - Local/Other	6,000
10 - Ramp	9,999
11 - Freeway Ramps	9,999

[3] Lincoln MPO Travel Demand Model daily factor for calculating LOS. Methodology described in **Appendix D**.

Figure 4.26 Current Congestion Levels V/C



Future Travel Demand

The travel demand model was updated to study impacts that household and employment growth will have on congestion. The PlanForward preferred growth scenario was used to input data for each TAZ into the model. This information is used to support trip generation estimates for work, shopping and other transportation needs. The future year models (2035 and 2050) were developed using the Existing + Committed (E+C) roadway network—that is, the existing network plus those improvement projects with committed funding to begin construction over the next six years. These projects were verified in September 2020 and include roadway improvements, intersection improvements, and Priority Growth Projects. Methods and data used to complete this update including the calibration, mode choice assumptions, and validation are described in **Appendix D**.

The updated model was used to produce an estimate of total vehicle miles traveled (**Table 4.6**) for each planning year, as well as the daily traffic forecast according to 2035 (**Figure 4.28**) and 2050 (**Figure 4.29**) roadway segments. These forecasts were calibrated using existing traffic counts.

Table 4.6 Vehicle Miles Traveled

Model Scenario	Vehicle Miles Traveled
2019 (Base Year)	6.2 Million
2035 E+C	7.9 Million
2050 E+C	9.5 Million

Source: Cambridge Systematics, 2020

The 2035 (**Figure 4.31**) and 2050 (**Figure 4.32**) traffic volume forecasts have been compared with the planning-level capacities of each roadway segment to identify the future locations of congestion. The V/C ratios use the fully calibrated traffic volumes and the capacities associated with the E+C network for each future year. **Figure 4.27** provides a summary of congestion levels over time reflecting the miles of congesting and congested centerline-miles within the modeled area.

Figure 4.27 Congestion Levels Over Time

	Uncongested (v/c less than 0.8)	Congesting (v/c between 0.8 and 0.9)	Congested (v/c greater than 0.9)
2020	757 miles (98.6%)	6.1 miles (0.8%)	4.8 miles (0.6%)
2035 E+C	748 miles (95.3%)	21.1 miles (2.7%)	16.0 miles (2.0%)
2050 E+C	692 miles (87.8%)	45.0 miles (5.7%)	51.1 miles (6.5%)

Source: Lincoln MPO Travel Demand Model

Figure 4.28 2035 Daily Traffic Forecasts E+C

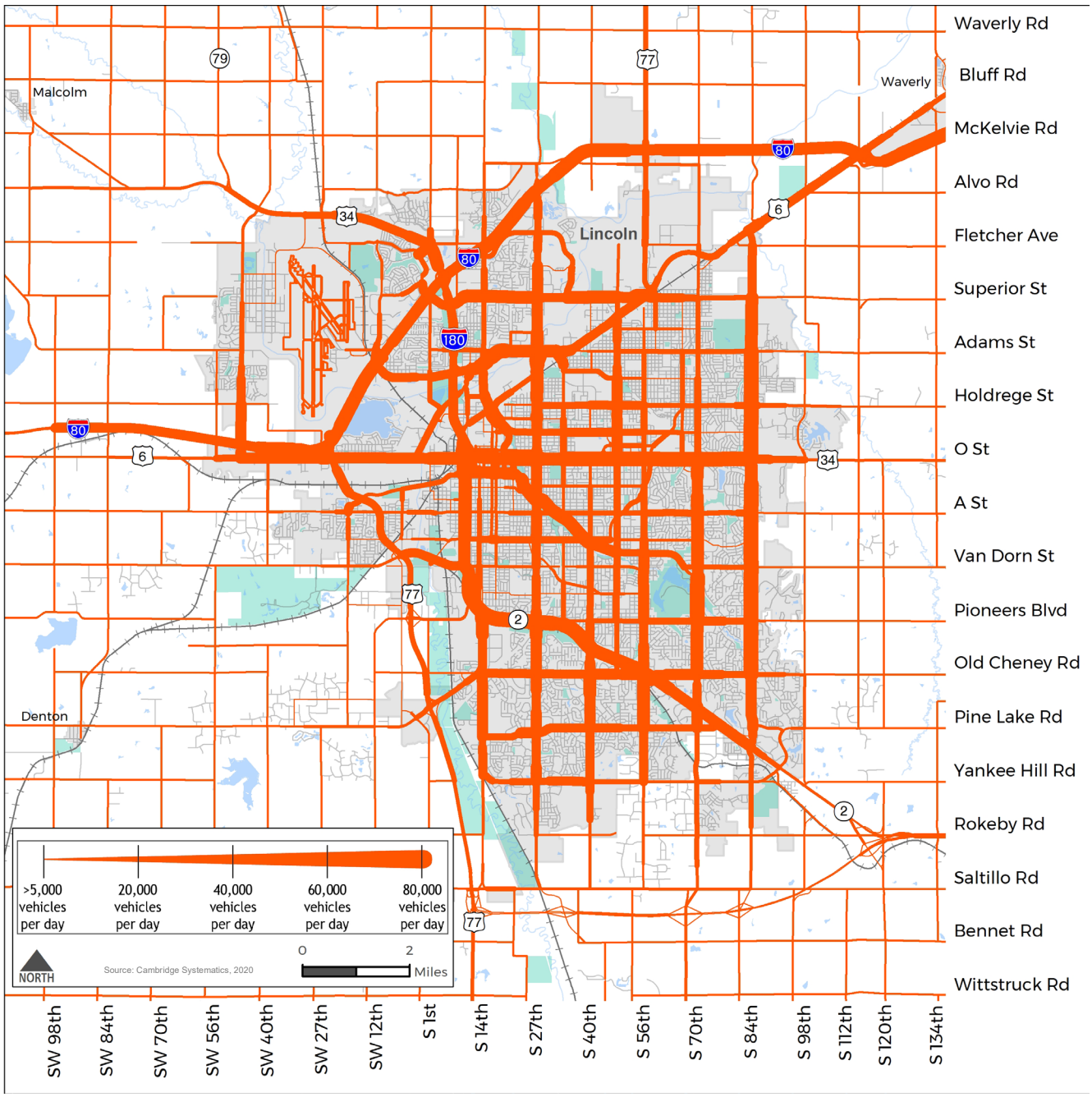


Figure 4.29 2050 Daily Traffic Forecasts E+C

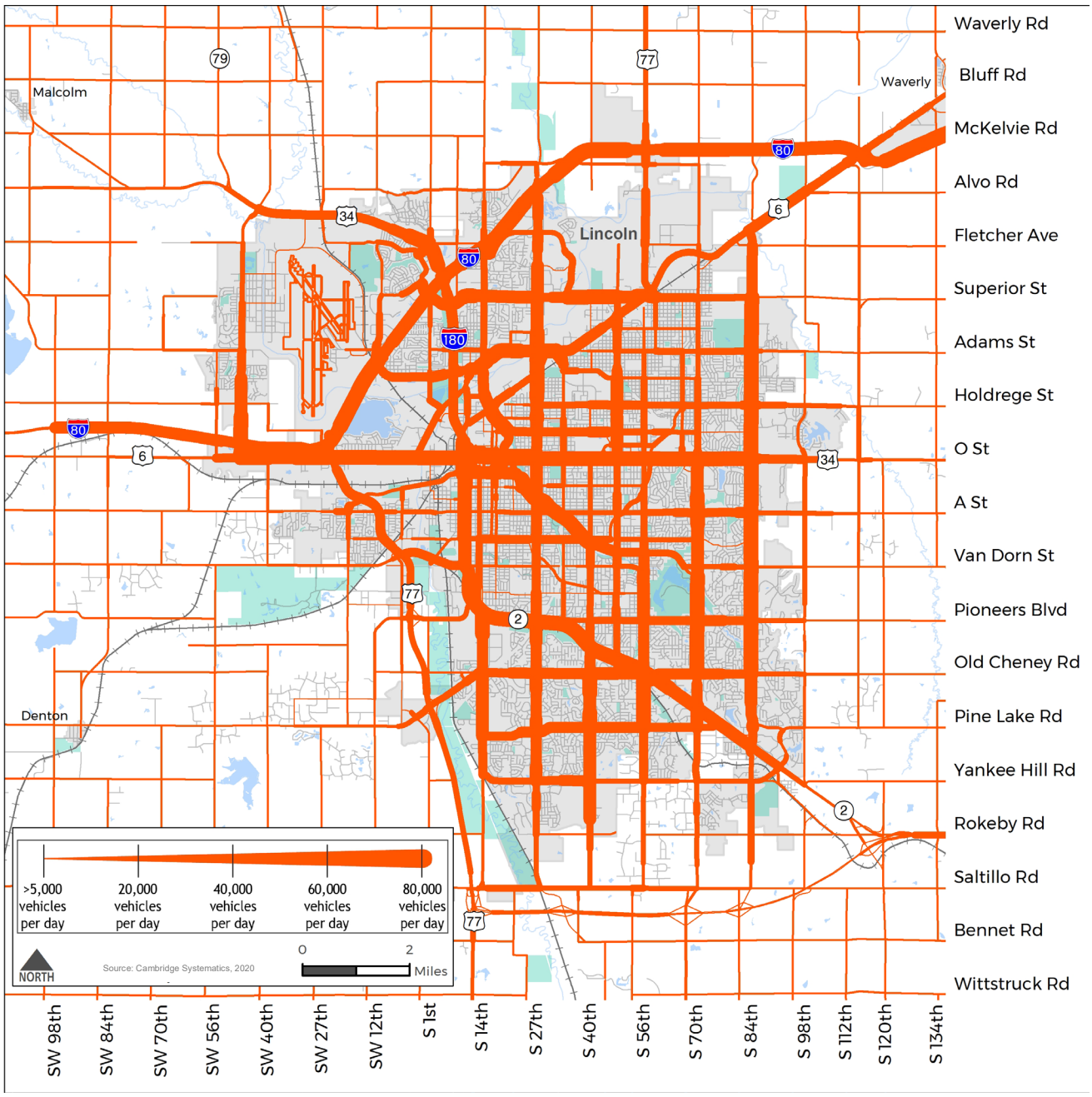


Figure 4.30 2035 Congestion Levels E+C

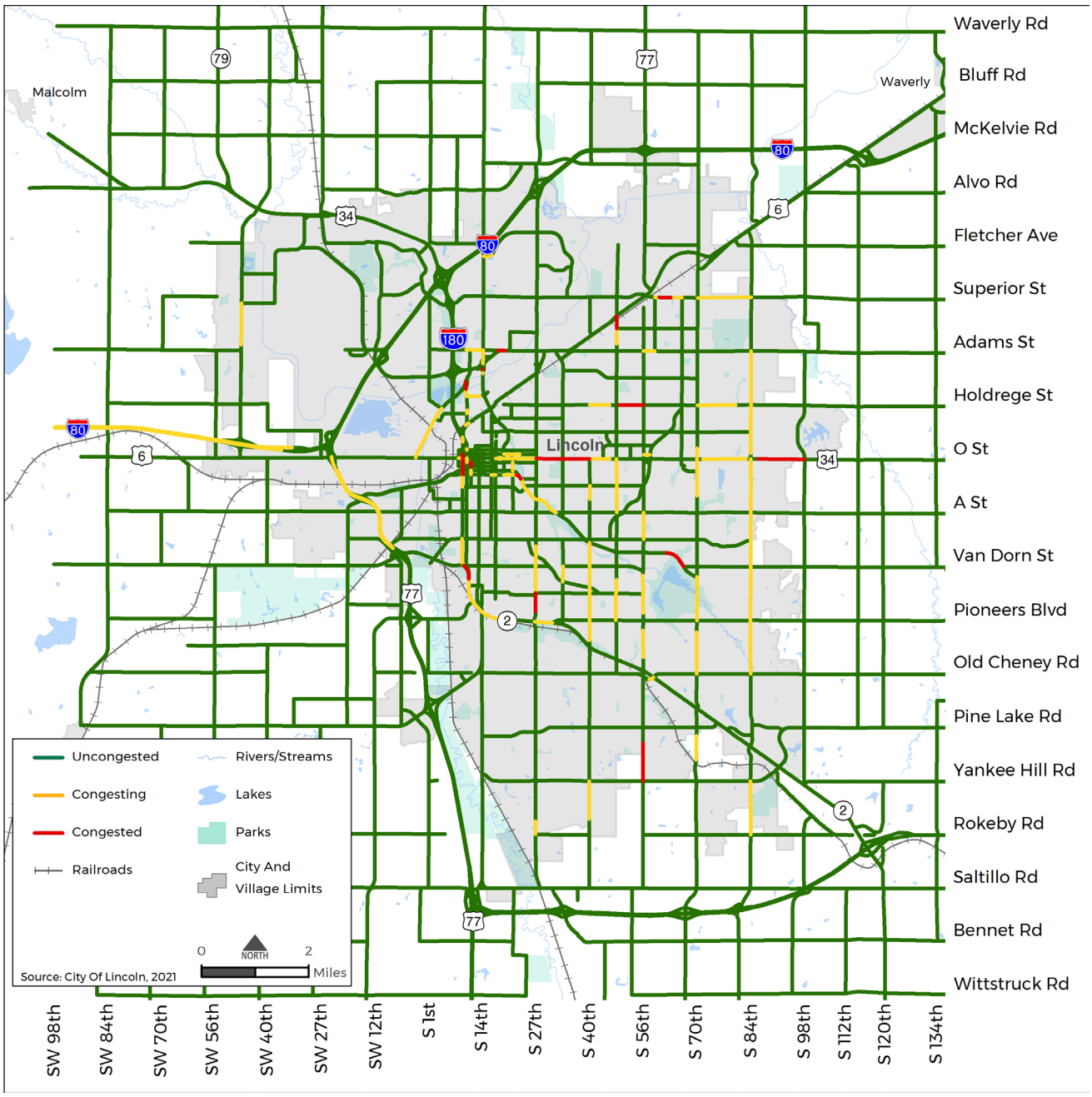
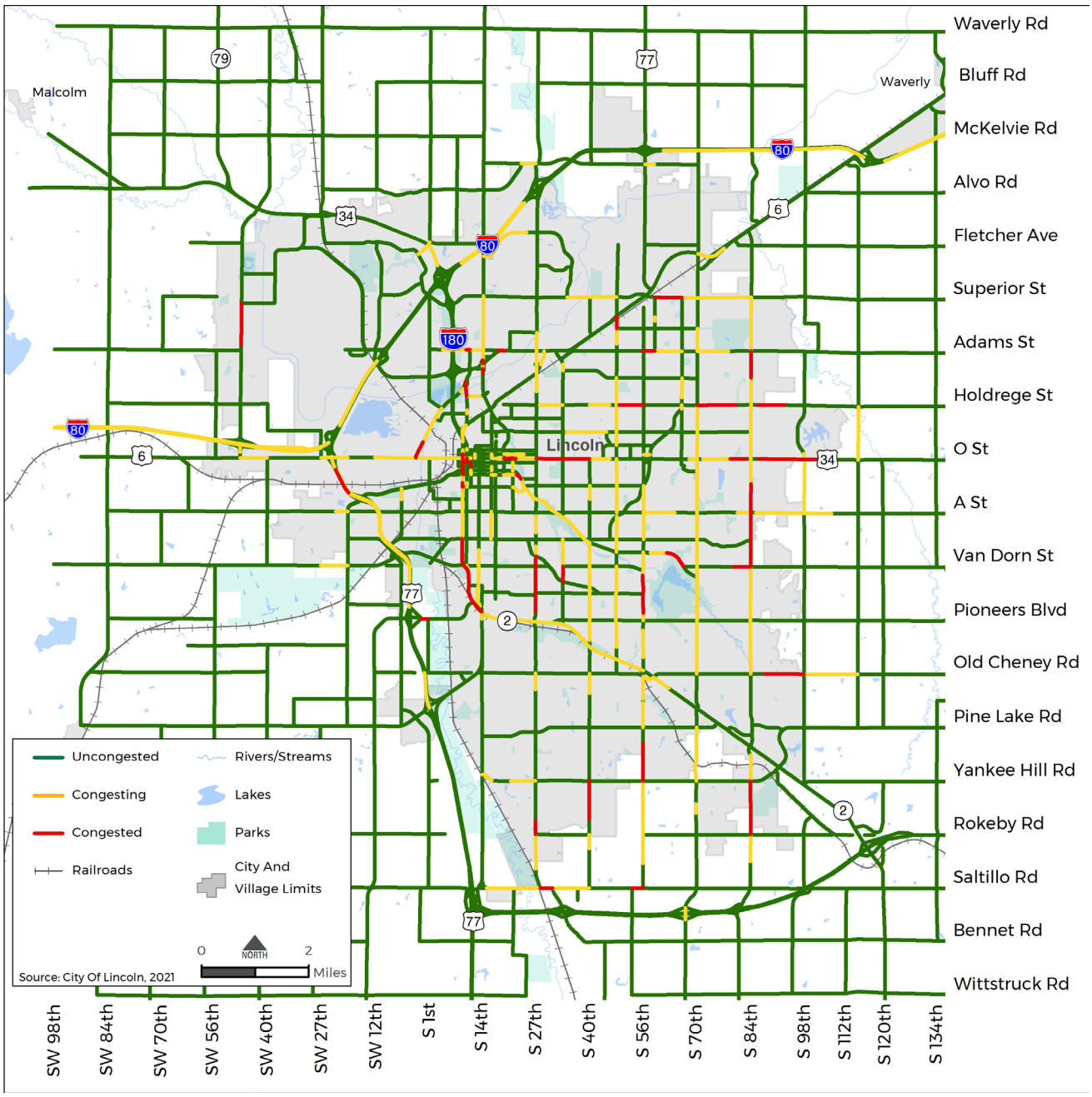


Figure 4.31 2050 Congestion Levels E+C



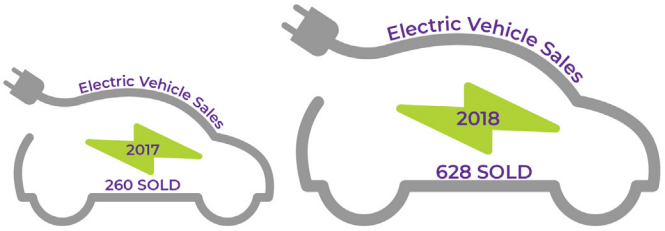
Electric Vehicles

Technological innovation in the transportation industry has been accelerating significantly in recent years. From electric and automated vehicles to "smart" infrastructure, new technologies that touch all aspects of transportation are being researched, developed, and implemented throughout the world. Vehicle technology in particular is being advanced and adopted rapidly. Understanding these innovations and their potential to benefit community and regional mobility is in the best interest of Lincoln and Lancaster County.

Adoption of personal electric vehicle technology has grown dramatically in the past decade, with fewer than 20,000 vehicle sales nationwide in 2011 increasing to over 320,000 vehicles sales in 2018. Based on research from the U.S. Department of Energy, the considerable reduction in annual emissions from an electric vehicle compared to that of a gasoline-powered vehicle is a major reason why they are becoming more popular. Nebraska ranked 37th of the 50 states in terms of total electrical vehicles sold in 2018 with 628 (**Figure 4.32**). This was a more than 140 percent increase in sales from 2017, which was the fifth largest year-to-year increase in the country. As recently as 2020, seventeen public electric charging stations were available in Lincoln according to the U.S. Department of Energy.

Compressed natural gas and electric vehicles have begun replacing older diesel engines used by the transit service fleet. StarTran electric buses increased from four to ten in 2020–21, which represents approximately 10 percent of the bus fleet. A new electric charging station was constructed in 2020 to serve the current fleet needs.

Figure 4.32 Annual Electric Vehicle Sales in Nebraska



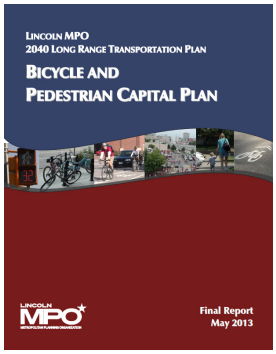
Source: Alliance of Auto Manufacturers, 2019

Advanced Vehicle Technology

Automated vehicles (AVs) are not as far along in their development and adoption as electric vehicles but offer greater possibilities and integrations for the future of transportation. Through the use of sophisticated technology, AVs can partially or entirely replace human drivers in operating and navigating a vehicle and offer substantial safety, efficiency, and mobility benefits. Most major automakers, as well as Google and Tesla, are developing and testing AV models; some that are not fully autonomous are available on the market today. A 2018 legislative bill adopted in Nebraska authorized the use of AVs for personal mobility, ride-hailing, and public transportation.

Active Transportation

Supporting active modes of transportation, such as walking and bicycling, is a crucial characteristic of a multimodal transportation system—improved public health and quality of life can be linked to communities that have enabled safe, comfortable, and convenient active transportation. The City of Lincoln and Lancaster County have taken strides in recent years to enhance the regional active transportation network with the completion of the Lincoln MPO Bicycle and Pedestrian Capital Plan (2013), followed by the Lincoln Bike Plan (2019), and ongoing implementation of project, program, and policy recommendations from each.



Complete Streets

The concept of Complete Streets—that a transportation system should be safe and convenient for all users, regardless of age, ability, or mode—has gained significant momentum in the past decade. The City of Lincoln officially established a Complete Streets policy in 2013 to formalize a more concerted effort to incorporate Complete Streets into local transportation planning, design, and construction projects. The policy's key component was the establishment of an interdepartmental Complete Streets Committee to be composed of representatives from Planning, LTU, StarTran, Urban Development, Building & Safety, Parks & Recreation, Health Department, and the Police Department to review select city projects to ensure Complete Streets objectives are accounted for.

The Complete Streets Committee prepared a Gap Analysis and Prioritization Strategy in 2015 to identify areas of the city with gaps in sidewalk, transit, trails, etc. where future Complete Streets project funding could be focused. Example projects included connecting residential streets to major trails, bike route signage, and bike racks. Although the Committee meets regularly and has authority to review projects, the program should be strengthened to benefit all transportation system users.

The Lincoln Bike Plan provided recommendations for strengthening Lincoln's Complete Street Policy, including giving it a more prominent location (now hosted on the **City's Complete Streets website**), adding additional web content, developing a Complete Streets Manual, and establishing a consistent approach to communicating elements of the Complete Streets program to the public. These improvements can help advance benefits of Complete Streets including increased mobility to work, school, and play, and wider opportunities for commercial demand of service and delivery. Complete Streets may help relieve congestion and degrading pavement conditions associated with the hundreds of thousands of visitors to Lincoln using personal vehicles on Lincoln's roadways.

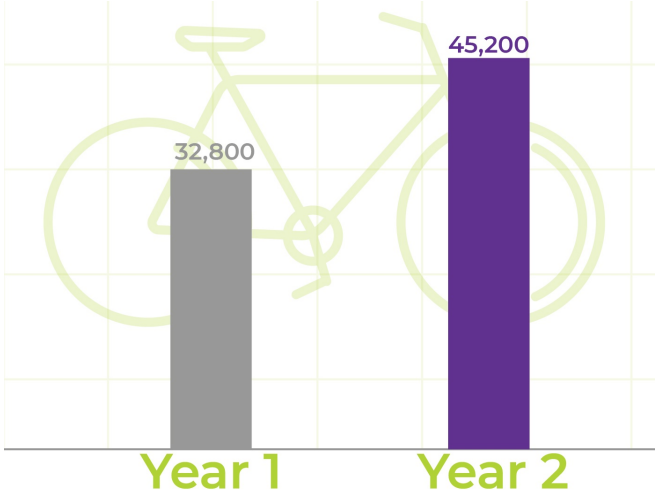
Micromobility

Micromobility services typically consist of small vehicles such as bikes, electric-bikes (e-bike), and electric scooters (e-scooters) that are deployed as a shared fleet within a distinct geographic area by an independent operator. E-scooter programs in particular have seen a rapid and significant upswing in popularity throughout the country in recent years as cities have embraced their potential to enhance mobility, create shared mobility hubs, and reduce personal motor vehicle trips.

BikeLNK is a bike sharing program launched in the City of Lincoln with 19 kiosks and 100 bikes in April 2018. The fleet has expanded to 105 bicycles and 21 docking stations located in the highest demand areas of the city (**Figure 4.34**). To provide residents and visitors an option for active commuting and recreation, BikeLNK added e-bikes as a temporary pilot to the program in 2020. During the first two years of the program's operation, nearly 80,000 trips and nearly 160,000 miles have been logged.

Ridership shown on **Figure 4.33** grew nearly 40 percent between the first and second years of operation. September was the peak month for trips in both years, and the most common time for trips is weekday afternoons and evenings.

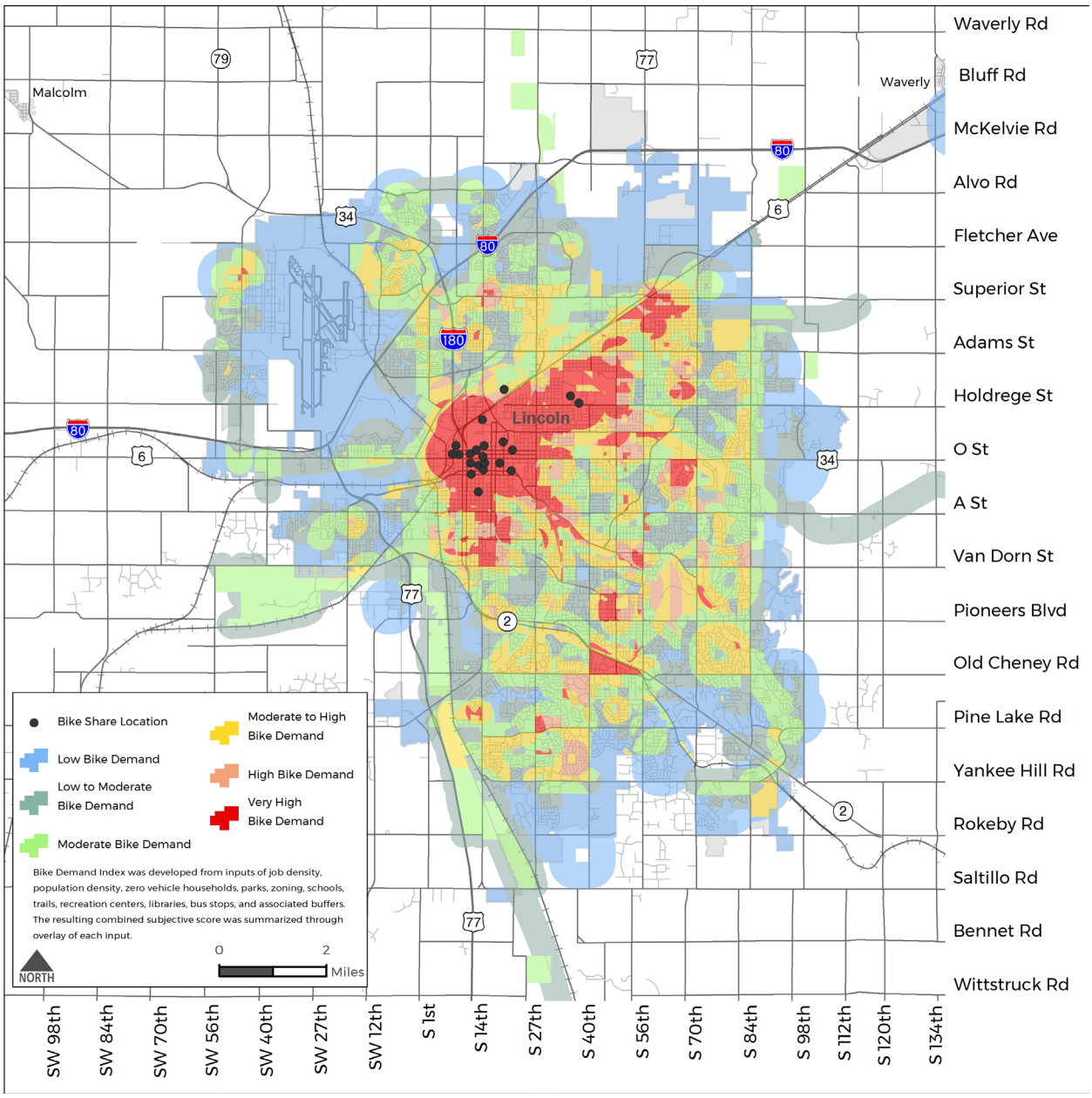
Figure 4.33 BikeLNK Ridership



Source: BCycle and City of Lincoln, 2019.

The City of Lincoln adopted an ordinance in September 2019 approving plans for a pilot program branded ScooterLNK that would allow up to three e-scooter or shared mobility providers to deploy fleets within the city for up to one year. LTU is responsible for establishing specific operating rules of the program. Launching their pilot program in September 2020, the city considered common requirements of similar programs throughout the country, such as substantial data collection and reporting requirements, access for underserved and overburdened community, and maximum fleet sizes. The maximum number of scooters allowed during the pilot program is 250 per vendor. In the first six months of operation, more than 33,000 trips were made with an average trip distance just exceeding one mile. University of Nebraska – Lincoln (UNL) currently requires bikes, scooters, and mopeds to be dismounted and walked through certain areas of campus; it is not uncommon for communities to designate areas where e-scooters may not operate.

Figure 4.34 Bike Demand and Bikeshare Locations

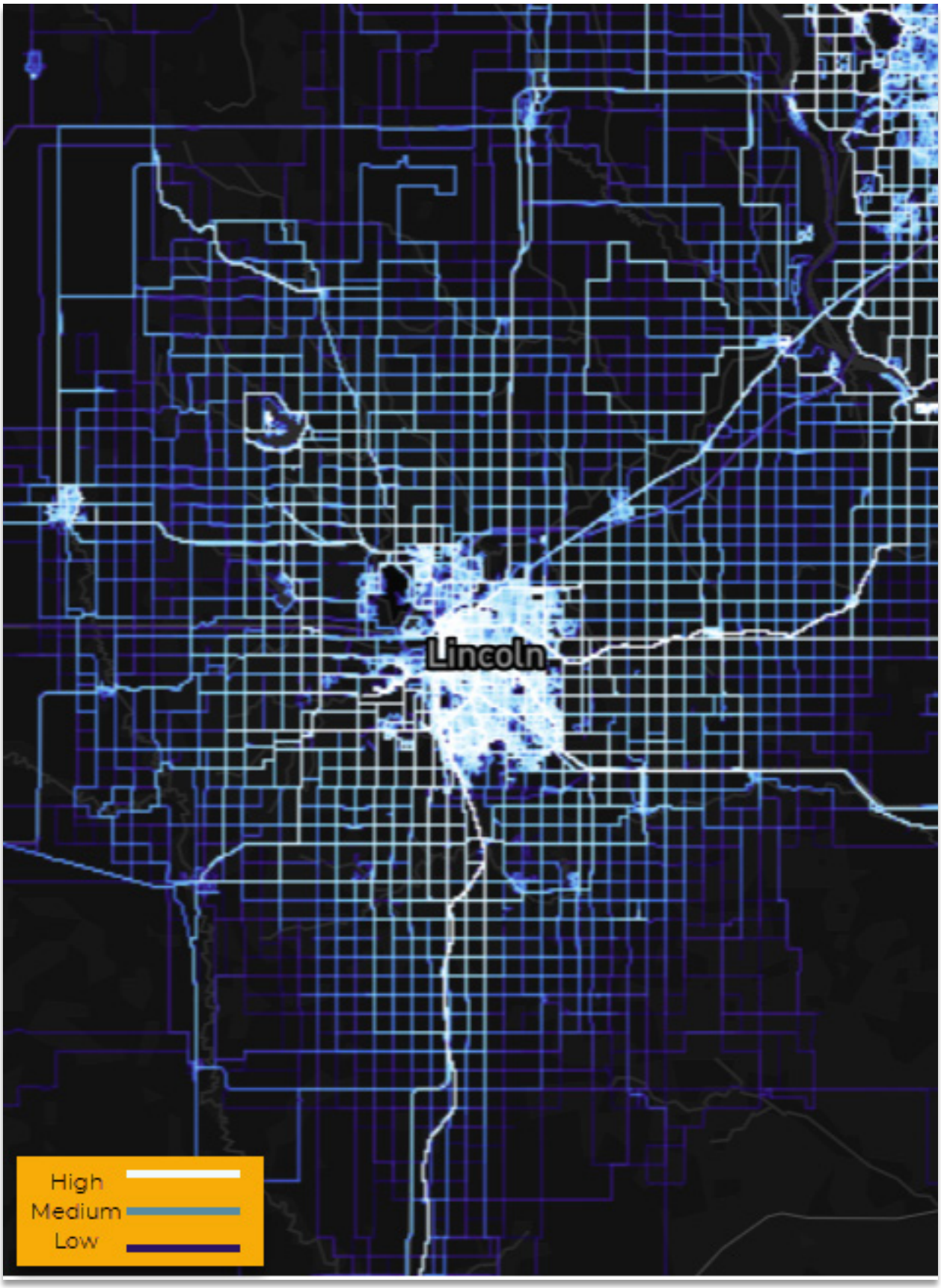


Source: Lincoln Bike Plan, 2018; BCycle and City of Lincoln, 2019

Trails and On-Street Bicycle Facilities

The backbone of the regional bicycle network is an extensive trail system, composed of both commuter trails and recreational trails, totaling 255 miles. At least 95 percent of all city households are within one mile of at least one multiuse trail. Approximately 145 additional miles of on-street bike routes and lanes provide connections within the City of Lincoln. Downtown Lincoln is also home to Nebraska's first separated bike lane, the N Street Cycle Track. A 2021 Strava heat map of bicycling activity also shows (**Figure 4.35**) most of the approximately 1,500 miles of County roads are also used by gravel bicyclists. Gravel roads are popular facilities for many riders in the County who prefer the lower traffic numbers and rolling terrain over road cycling with inconsistent shoulders and faster vehicle speeds. Gravel roads provide connectivity to all regional trails and many of the communities throughout the area.

Figure 4.35 Trail and On-Street Bicycle Activity



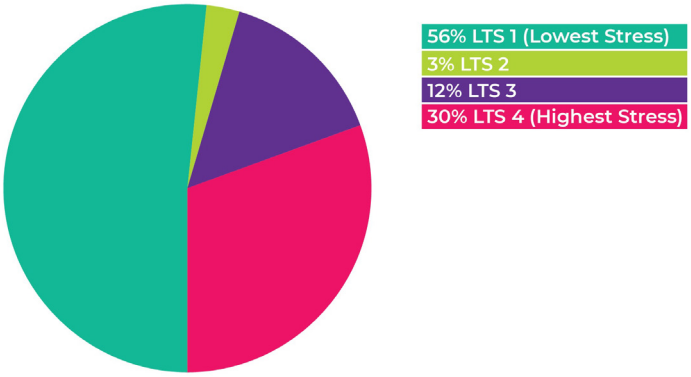
Strava relative bicycle intensity heat map (Source: Strava June 2021)

Much of the current trail system is built in the right-of-way of abandoned railroad corridors, along stream floodplains, on one side of major arterial streets, or a part of new residential development. Lincoln Parks and Recreation, LTU, and the Lower Platte South Natural Resource District are primarily responsible for the trail development in Lancaster County. Volunteer organizations also assist in maintenance and in donating significant funds for trail development.

While the existing network of bicycle routes, grade separated crossings and designed on-street facilities connect most parts of the city (**Figure 4.37**) and several of the trails extend into unincorporated Lancaster County, the system's accessibility and functionality are limited for people who are not comfortable bicycling close to motor vehicle traffic. Level of Traffic Stress (LTS) is a rating given to a road segment or crossing indicating the traffic stress it imposes on bicyclists using those facilities. A traffic stress assessment completed for the Lincoln Bike Plan found all the city's main arterials and about one-fourth of its local and collector roadways—including some designated as bike routes—to be uncomfortable for most interested bicyclists, based on their configurations, traffic volumes, and speed limits. The off-street system has a high level of comfort, but access can be challenging for people who do not live close to a trail.

High-stress streets may be suitable for some bicyclists, including those who are confident or very confident. Low-stress streets are suitable for most everyone, including children. Traffic speeds and volumes have a significant influence on the level of stress for bicyclists. **Figure 4.36** represents proportions of the transportation network in Lincoln for each level of stress. Other factors that influence bicycle stress include street width, presence of on-street parking, and number of driveway/street crossings for paths.

Figure 4.36 Citywide Network Bicycle Level of Stress



Source: Lincoln Bike Plan, 2018

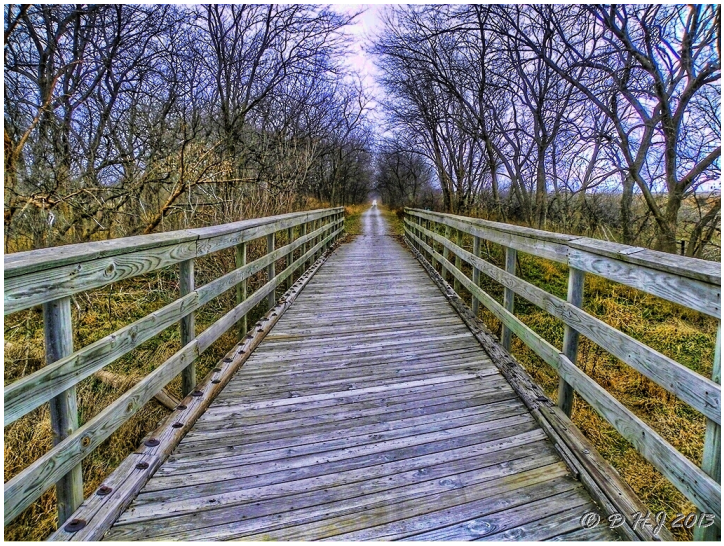
Most of the existing bike routes are low-stress facilities. However, many intersect with more stressful streets with no traffic control, making crossing difficult and potentially deterring otherwise interested bicyclists. Some have also fallen into disrepair and need maintenance (missing signage, poor pavement conditions, overhanging branches etc.), further limiting bicycle mobility.

Riding bicycles is not allowed on sidewalks in some commercial areas because of the larger number of pedestrians. These areas include Downtown, Havelock, College View, and Bethany. Because these restrictions exist, the city must provide safe on-street infrastructure for bicycle and scooter traffic to provide an

accessible and connected active transportation network.

The **Lincoln Bike Plan** provides a comprehensive set of infrastructure recommendations for enhancing the comfort and convenience of the on-street bicycle system for less-confident bicyclists, including new designated facilities, intersection improvements, and wayfinding. In total, the plan proposes approximately 140 additional miles of bicycle infrastructure[4] — approximately 30 new miles of dedicated on-street facilities (mostly concentrated around downtown and UNL), 50 more miles of bike routes, and 60 more miles of sidepaths. Gradual build-out of the plan's proposed network will greatly enhance conditions for bicycling throughout Lancaster County.

The 2040 Comprehensive Plan update also advanced and prioritized a future trails network radiating in all directions from the existing trail network toward other Lancaster County communities (**Figure 4.38**).



Waverly would be linked by a trail running along Salt Creek around the north, east and southern corporate limits at approximately 84th and Havelock Streets. The Prairie Corridor on Haines Branch will connect southwest Lincoln to Denton and regional destinations such as Conestoga Lake and Spring Creek Prairie. So also, the towns of Sprague, Hickman, and Bennet can connect to the trail network on the south just as Malcom, Raymond, and Davey on the north. By capitalizing on the rising demand for active transportation, ecotourism, and accessibility of electric pedal assistance bicycles, these trails can provide a key function and support additional mode split for transportation throughout the County.

[4] Lincoln Bike Plan Table 1 and Figure 8 documented the bicycle infrastructure projects that held the highest priority and were included in the development of the LRTP Needs Based Plan described in Chapter 5.

Figure 4.37 Existing On-street Bike Network

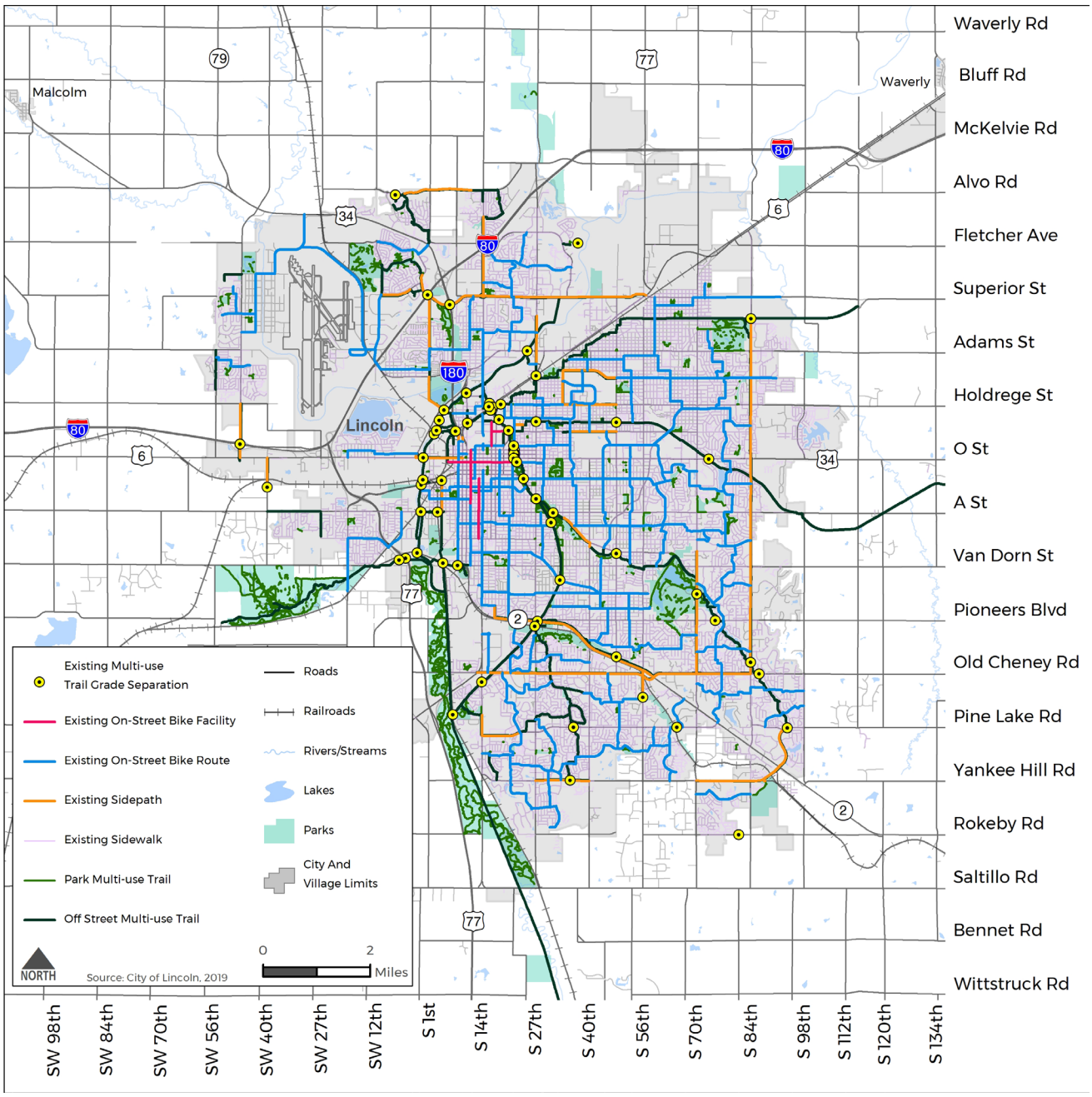
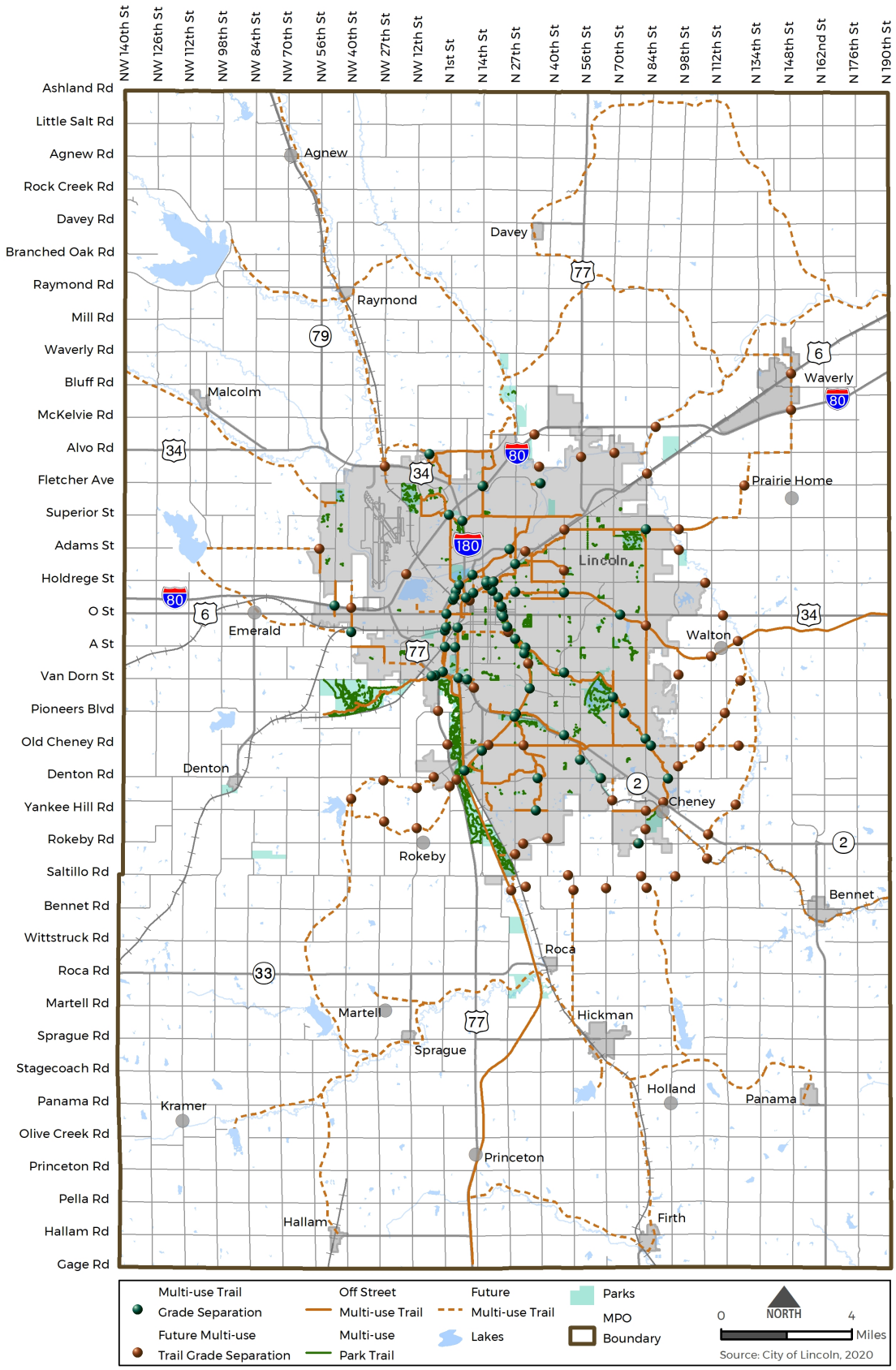


Figure 4.38 Future County Bike Trail Connections



Pedestrian Facilities

Lincoln has a comprehensive sidewalk network—approximately 1,500 miles total—that provides pedestrian access to most homes, businesses, and other destinations in the city (**Figure 4.39**). Due to a long-standing requirement that developers provide sidewalks along both sides of the streets, the vast majority of local streets, collectors, and arterials in the city have sidewalks along both sides. The trail system complements this robust network of sidewalks.

The presence of sidewalks alone is not enough to make a quality pedestrian experience. The proper and regular maintenance of sidewalks is critical. A system of sidewalks with a lot of cracks and heaving pavement limits mobility, particularly for people with disabilities, regardless of how comprehensive it is. Though most streets in Lincoln have adjacent sidewalks, maintenance issues are present; older neighborhoods in Lincoln are most prone to poor sidewalk conditions. Sidewalk widths, proximity to roadways, encroachment of tree roots, and the spacing density of curb cuts for vehicular accesses are other important determinants to the quality of the pedestrian network. Approximately $1 million is allocated annually to sidewalk repair, and many street rehabilitation projects also include sidewalk and curb ramp improvements.

As with bicycle travel, major arterials are often the most significant barriers to pedestrian travel. At intersections without traffic control, crossing safely on foot is difficult if not impossible. Several railroad crossings present safety obstacles as well. The trail network includes numerous grade-separated crossings of these barriers, but access to these trails from some areas via walking is limited.

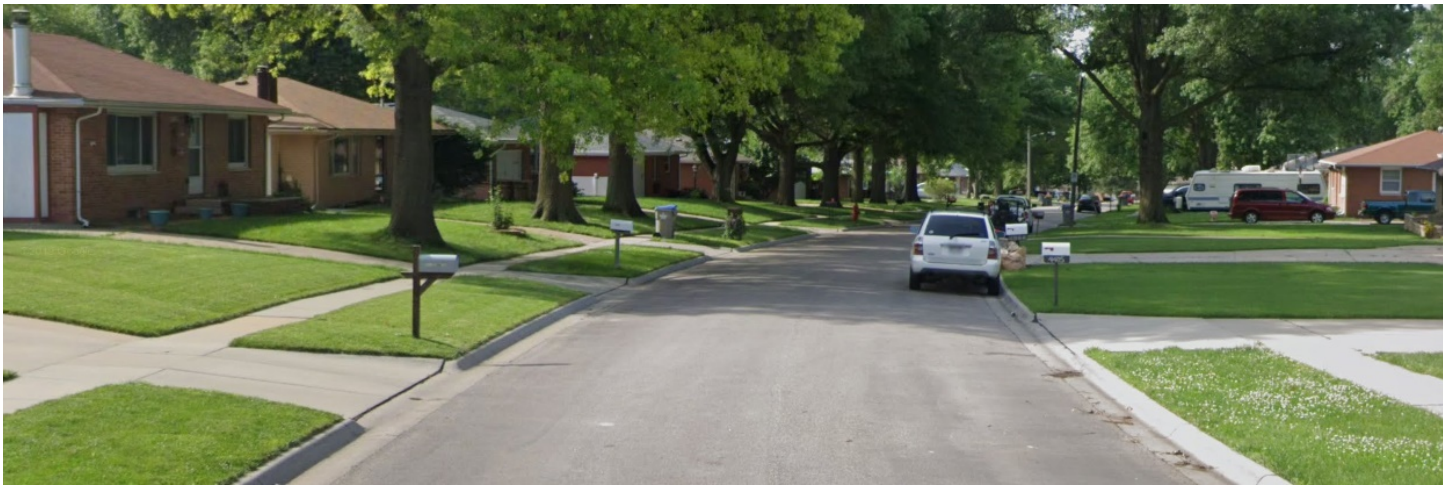
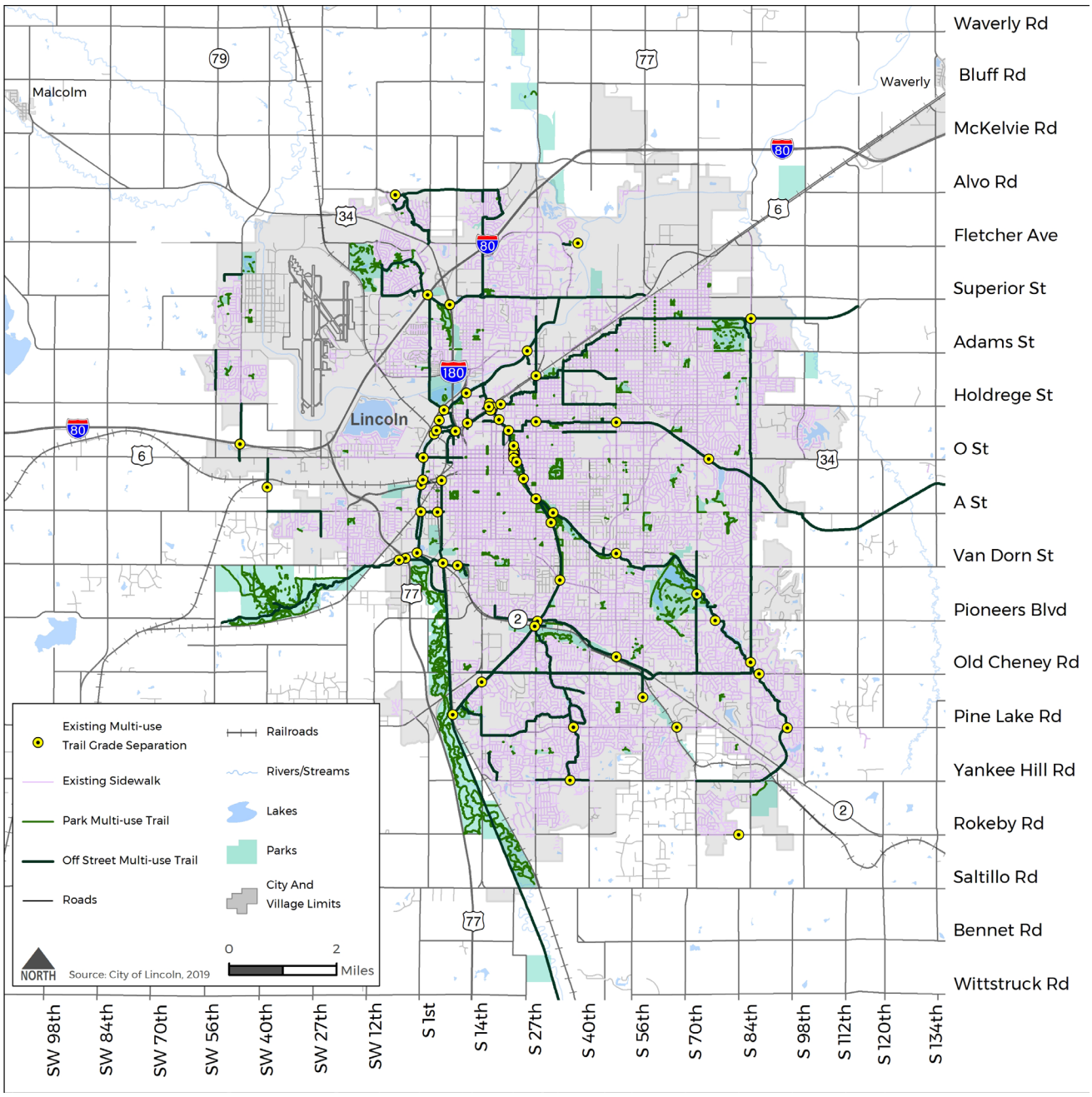


Figure 4.39 Existing Sidewalks and Trails



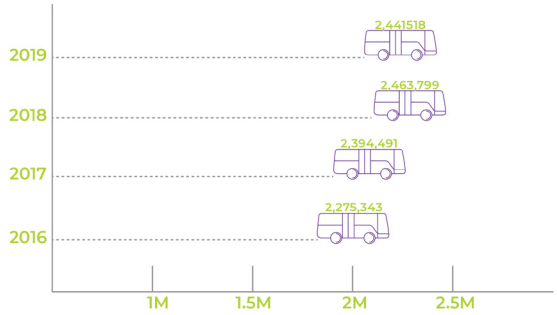
Transit

StarTran

StarTran, the division of the City of Lincoln responsible for public transit, operates 14 fixed bus routes within city limits. Service spans are generally between 5:40 AM and 9:50 PM on weekdays (though some routes operate earlier and/or later), with 30-minute frequencies typical for most of the routes on weekdays. Saturday service is also provided between 6:40 AM and 6:30 PM. In 2017 and 2018, StarTran reported providing service to 88 percent of transit supportive areas of Lincoln. In 2020, StarTran began operating VanLNK, the first city-run, on-demand transit service that allows riders to hail a van by smartphone app, designate their pickup location and destination for a $5 trip fee. Software is used to optimize the VanLNK route. The StarTran paratransit program is $3.50 per trip and limited to those with a disability that prevents the person from riding a regular city bus. Lancaster County Public Rural Transit offers a north and south route provided on alternating days of the week between Monday and Thursday.

The StarTran network (**Figure 4.41**) operates as a hub-and-spoke system, meaning all of the routes share a common origin point—an on-street transfer point along 11th Street in downtown. The Transit Development Plan is updated every five years. Many of the routes were realigned based on recommendations from the **Transit Development Plan** completed in 2016. That document also recommends increasing service spans and frequencies for key routes. Nationwide, public transit ridership has been broadly declining over the past several years but the 2.4 million trips served by StarTran in 2019 represent an increase of more than 8 percent from 2016 (**Figure 4.40**).

Figure 4.40 StarTran Ridership



Source: Lincoln MPO LRTP Performance Report, 2019

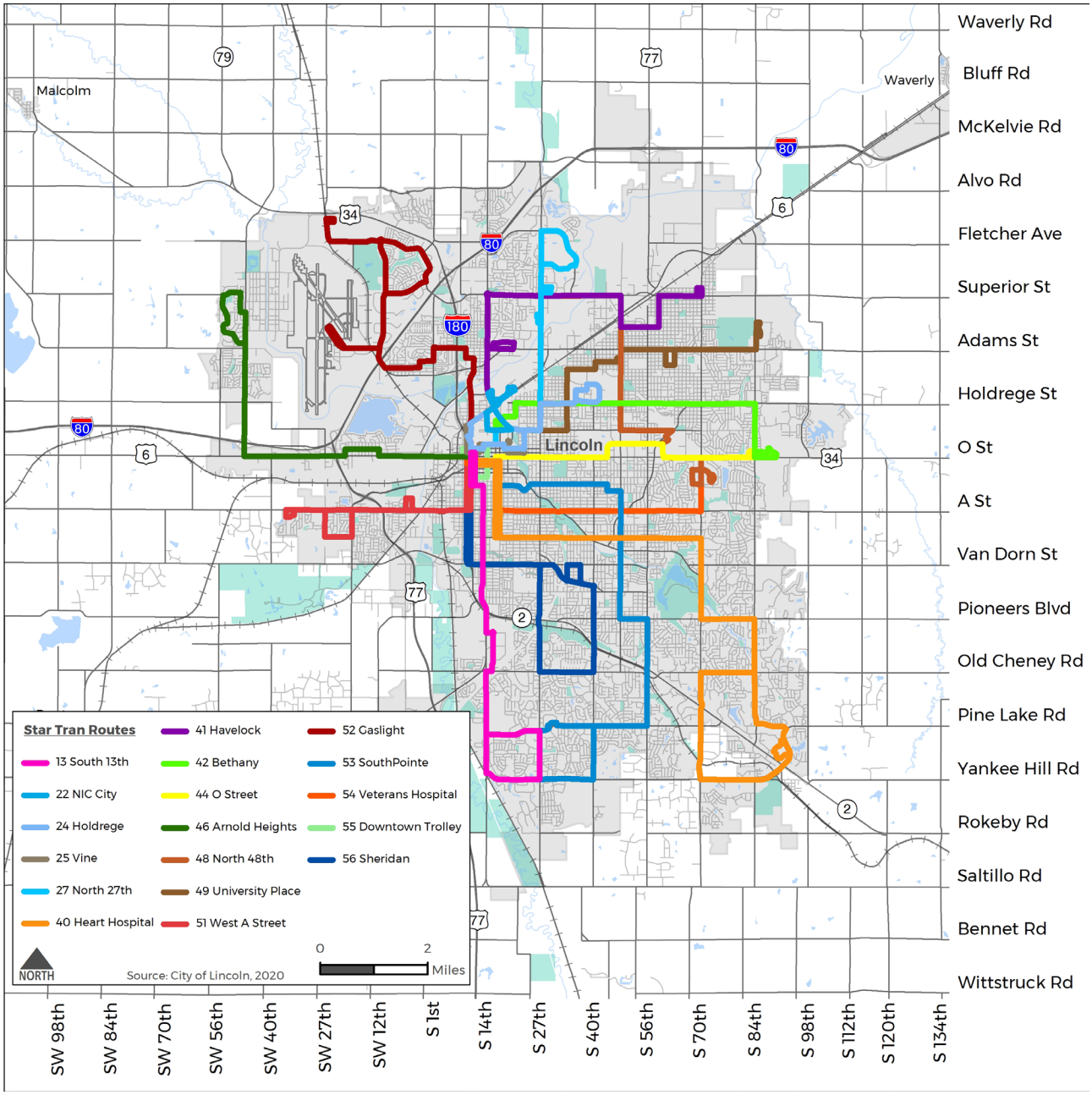
The existing downtown transfer point on 11th Street is undersized and does not have an optimal configuration for passenger transfer. StarTran initiated the **Multimodal Transit Transfer Center Feasibility and Conceptual Design Study** in 2019 to identify a location for a new central transit hub for the city that would enhance multimodal connections, provide better passenger amenities, and allow more efficient transfers. The north side of M Street between 9th Street and 10th Street has been selected as the preferred location, and a conceptual layout with designated bus bays for each of StarTran's 14 routes has been developed. The need to adjust route alignments is expected to be minimal because this facility would be located within a few blocks of the existing transfer point.

Three additional StarTran routes are primarily focused on connecting the UNL main and east campuses, as well as the Innovation Campus, and operate at 20-minute or better frequencies on school days, with reduced schedules on holidays and during vacation periods. UNL funds the operation of these routes, which are included with student fees.

They provide an important reliable service to university students and faculty.

NDOT completed the Lincoln/Omaha **Intercity Feasibility Study** in May 2020. It is aimed at identifying opportunities for future intercity bus service between Lincoln and Omaha to serve the more than 23,000 daily commute trips between them. Three route patterns have been recommended, each of which would use existing StarTran stops within the City of Lincoln. The conceptual design for the proposed downtown transit hub includes an additional bay for intercity buses.

Figure 4.41 StarTran Fixed Bus Routes

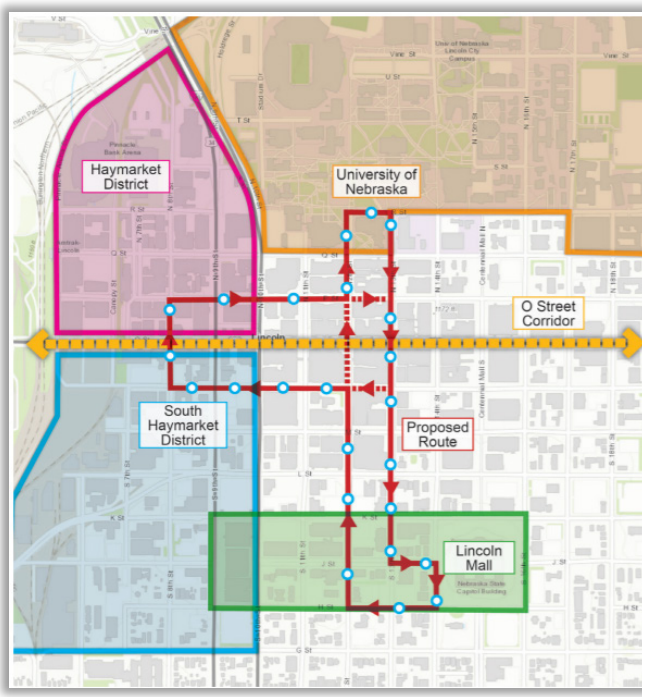


Autonomous Microtransit

Opportunities to use AVs for personal mobility, ride-hailing, and public transportation will continue to develop. Lincoln desires to be an AV flagship city offering additional mobility options for the community by leading an early expansion and adoption of a downtown transit system to facilitate the movement of people among major destinations such as the State Capital, the University of Nebraska, and the Haymarket District (**Figure 4.42**).

Recognizing that technology will be able to improve on traditional transit systems, the city is proposing to create the largest, full-service autonomous microtransit deployment in the United States. The deployment would provide on-demand service on a fixed route and may one day lessen the need for personal vehicles within downtown Lincoln.

Figure 4.42 Autonomous Microtransit: Downtown Concept

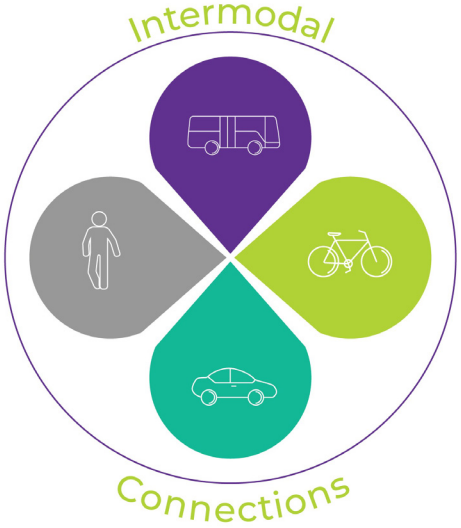


Intermodal Connections

As providing convenient transportation alternatives to driving has become a greater point of emphasis in communities throughout the country, the importance of providing a strong interface between modal networks has become apparent.

Approximately 6 percent of households in Lancaster County do not own a motor vehicle and rely on a mix of other modes to serve their transportation needs, so providing easy and reliable intermodal connections is necessary. While the proportion of zero-vehicle households has remained relatively steady in recent years, many other people who do have access a motor vehicle also choose other travel modes for some trips.

Active transportation and transit networks are often closely intertwined complements. Transit provides the means for regional mobility, while active modes are well-suited to fill the first and last miles of regional transit trips. Recent and emerging trends in transportation such as ride-hailing/ride-sharing services and autonomous vehicles can also be integrated with transit, furthering the practicality and convenience of getting around without a private motor vehicle.



As Lincoln continues to implement new transportation modes into its overall system, consideration for how best to coordinate them in a competitive (to personal vehicles) manner is crucial. A single facility where multiple transportation modes converge allowing seamless connections, a mobility hub can greatly enhance this interface. The new transit center planned for downtown Lincoln will provide the city a great opportunity for modal integration.

Rail

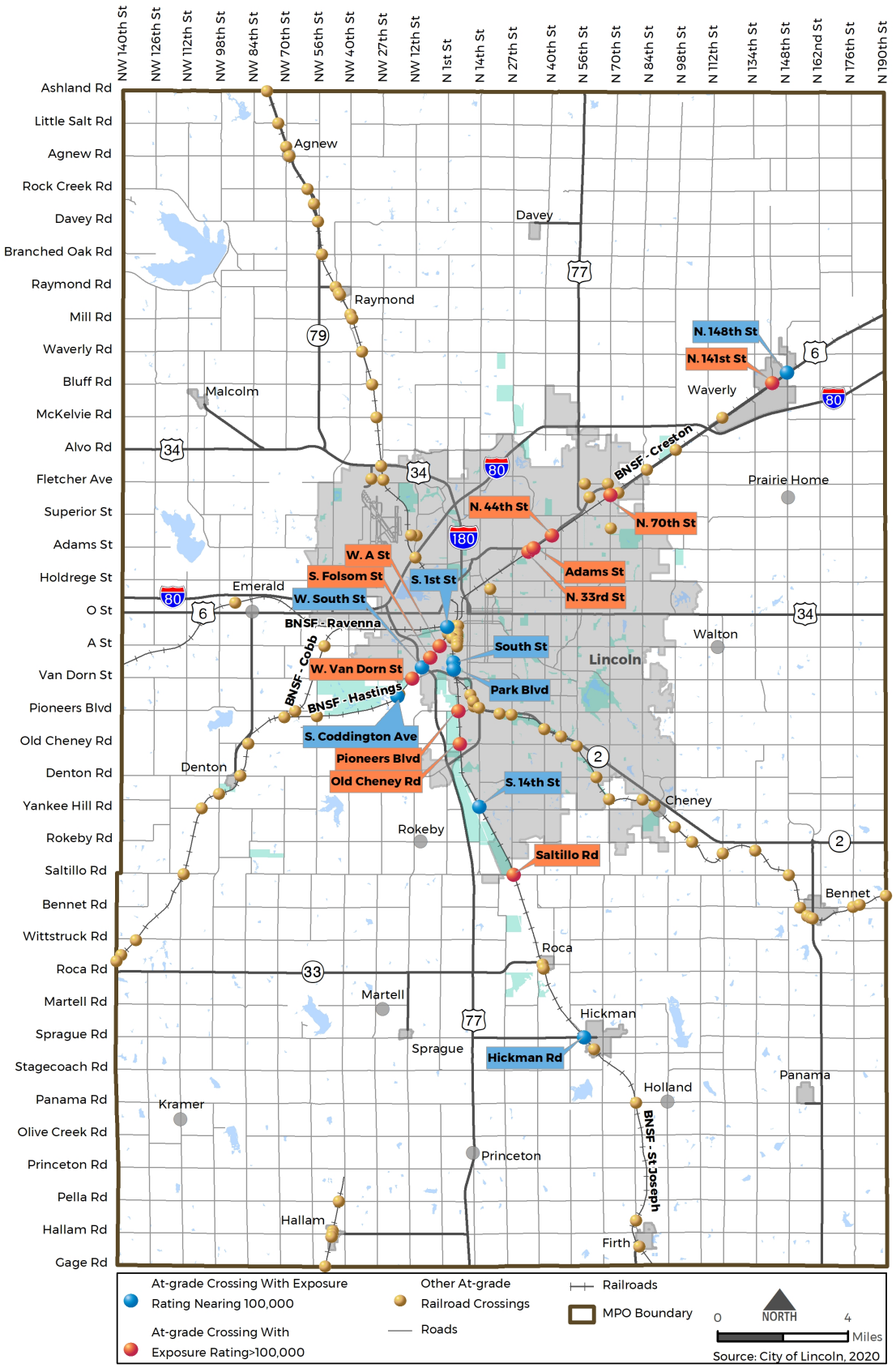
A network of tracks serving two Class I railroads and two Class III railroads extends radially from central Lincoln. Four railroad companies operate lines in Lincoln and Lancaster County: the BNSF Railway, the Union Pacific Railroad (UPRR), the OL&B Railroad, and the Omaha Public Power District (OPPD). Activity on the railroad lines ranges from 1 train per day (on the UPRR and OPPD lines) to 63 trains per day on the BNSF-Creston line. Beginning in January 2021, operation was renewed along the Highway 2 line with approximately 300 trains annually delivering freight to OPPD. Coal and agricultural products are the primary freight being moved by train through Lincoln, with some local manufacturing such as Kawasaki shipping light rail cars to the east coast.

Trains from four of BNSF's main lines (Ravenna, Cobb, St. Joseph, and Creston) cross connect through the Hobson Yard in Lincoln just west of downtown. The Hobson Yard is a vital service and support center for freight trains carrying coal and agricultural goods where inspections, maintenance, fueling, and switching all take place. The BNSF Havelock Shops in the northeast part of Lincoln are a primary freight rail car repair facility.

While the railroad lines through Lincoln and Lancaster County are critically important to the local economy, many railroad crossings with the street network are at-grade resulting in safety problems and travel delays. **Figure 4.43** shows the at-grade crossings in Lincoln and Lancaster County. Daily railroad crossing exposure rating (daily trains multiplied by the number of vehicles per day) reflects the potential for crashes between trains and motor vehicles at crossings. The BNSF rail crossing near 33rd and Highway 6 has an exposure rating of almost 491,000. The NDOT – Rail and Public Transportation Division requires a minimum exposure rating of 50,000 to qualify for possible funding for construction of a grade separation (underpass or overpass). There are 12 at-grade crossings in Lancaster County with an exposure rating above 50,000, eight of which have an exposure rating greater than 100,000.

Formed int 1971, the Lincoln/Lancaster County Railroad Transportation Safety District (RTSD) identifies railroad crossings in need of work, prioritizes projects, and conducts studies to plan future work. The RTSD's mission has been to eliminate, as much as possible, conflicts between highway traffic and railroads in Lincoln and Lancaster County. Since its inception, many projects from its early long-range plan have been completed. The number of at-grade railroad crossings of public streets in Lancaster County has been reduced from 210 in 1970 to 114 today. About half of the closed crossings were due to abandonment, while the other half were due to consolidation and grade separations.

Figure 4.43 Railroad At-grade Crossings



Existing Freight System

Lincoln and Lancaster County's economic vitality and the quality of life it offers depends on the ability of manufacturers, retailers, and distributors to efficiently transport their goods throughout the region. From package carriers to pizza deliverers, many workers in freight delivery roles rely on the transportation system to carry out their day-to-day tasks efficiently. Congestion, poor maintenance, and other street issues are particularly disruptive to their way of business. Even people without a direct connection to the freight industry benefit from it every day, further highlighting the economic necessity of smooth delivery operations. The proliferation of digital shopping and smartphone apps began well before the COVID-19 global pandemic fundamentally changed reliance on goods and services provided through online interfaces. Door-to-door pickup, as well as delivery of everything from groceries and restaurant meals to dry cleaning, is changing the freight industry considerably.

Online sales, specifically "buy online and pick up in store," have been growing at a rate of approximately 12 to 15 percent for the past five years, putting a major strain on the trucking industry and leading to heightened investment in autonomous truck research and development. The long-term impacts of modified supply chains and shipping demands caused by the COVID-19 global pandemic may provide some beneficial outcomes due to the urgent demand placed on the freight industry to respond. At the same time, anybody with a driver's license and car can now become a delivery driver for companies like DoorDash and Instacart through a simple registration process. These recent and continuing developments relating to freight delivery have implications for transportation planning and are trend worthy and notable for the MPO.

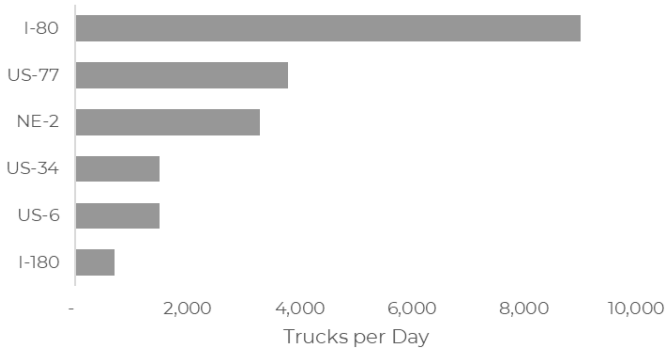
Truck Freight

Truck freight is the most visible, and most common, form of delivering goods to customers in Lincoln and Lancaster County. Activities generating high truck traffic—especially grain elevators and warehousing operations—were historically located on the periphery of the city. Many, if not most of these, have been absorbed into Lincoln as the city's corporate limits extend outward. Currently, the primary truck routes through the region include all or portions of:

- I-80
- US-6
- US-34
- US-77
- Nebraska Hwy 2
- Nebraska Hwy 79
- 14th Street/ Warlick Blvd (L55W)
- North 56th Street (L55X)
- 84th Street

Today I-80, I-180, US-34, NE-2, US-77, and US-6 all exhibit high commercial truck traffic. **Figure 4.44** shows the average trucks per day for these Major Truck Corridors, and **Figure 4.47** shows the primary and secondary truck routes, along with the major truck destinations.

Figure 4.44 Major Truck Corridors



Source: NDOT for Truck Average Daily Traffic, 2020

The Nebraska State Freight Plan designated a Critical Freight Corridor network for Nebraska. This network includes corridors on either or both the Key Freight Corridor network and Critical Urban Freight

Corridor/Critical Rural Freight Corridor (CUFC/CRFC) network. The Key Freight Corridor network includes roadways that facilitate statewide and interregional truck travel—all of Nebraska's interstate highways and specific State routes and United States Highway routes.

As part of complying with the FAST Act, every State must designate a CUFC/CRFC network as part of the National Highway Freight Network (NHFN). The purpose of the CUFC/CRFC network is to provide connectivity between important urban and rural freight generators and the NHFN. In designating this network, NDOT actively engaged MPO representatives throughout the entire process to provide their insights and to ensure that the most important routes in their respective areas were considered.

Lincoln South Beltway represents the CRFC route, while the CUFC includes portions of US-77, US-6, L55X/Old US-77, and NW 12th Street. The Key Freight Corridor routes consist of I-80, I-180, NE-2, US-6, and a portion of US-77.

Rail Freight

The majority of rail freight originating in Lancaster County is heavy, bulky agricultural product. Grain elevators and mills within Lincoln and throughout Lancaster County serve as the primary customers of railroad transportation services. The BNSF Railway serves nine grain elevators throughout Lancaster County and five in Lincoln. Much of the other freight entering or passing through the County is coal headed for power plants.

Air Freight

While the Lincoln Airport is the County's major air facility, Omaha's Eppley Airfield currently serves much of the air freight needs for Lincoln and Lancaster County. Air freight entering Lincoln Airport arrives through passenger service in small loads. United States Postal Service (USPS) mail is delivered to Lincoln through passenger service. USPS mail is not regularly shipped out of the Lincoln Airport, but rather it is trucked to Omaha's Eppley Airfield for processing. The majority of private parcel delivery service is also handled through Omaha's Eppley Airfield.

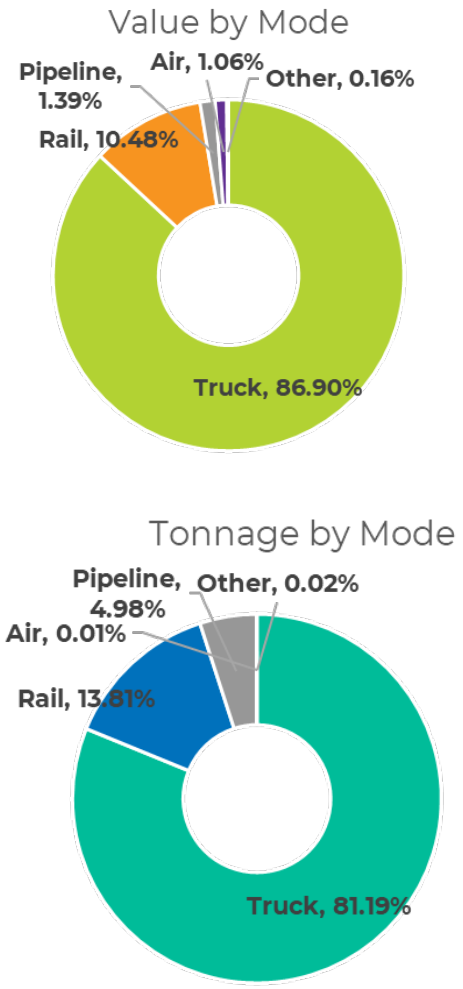
Pipeline Freight

There are approximately 165 miles of gas transmission pipelines and 145 miles of hazardous liquid pipelines in Lincoln and Lancaster County. The majority transport petroleum or natural gas products. One of the lines transports anhydrous ammonia, which is a product used in agricultural production. Eight operators are responsible for the control of the commodities through these pipelines in Lancaster County.

Freight Flows

More than 24 million tons of freight, valued at $19.9 billion, move mostly over highway and rail in the metropolitan area annually. **Figure 4.45** shows the freight flows in tonnage and value by transportation mode.

Figure 4.45 Freight Movement by Tons and Value (2015)

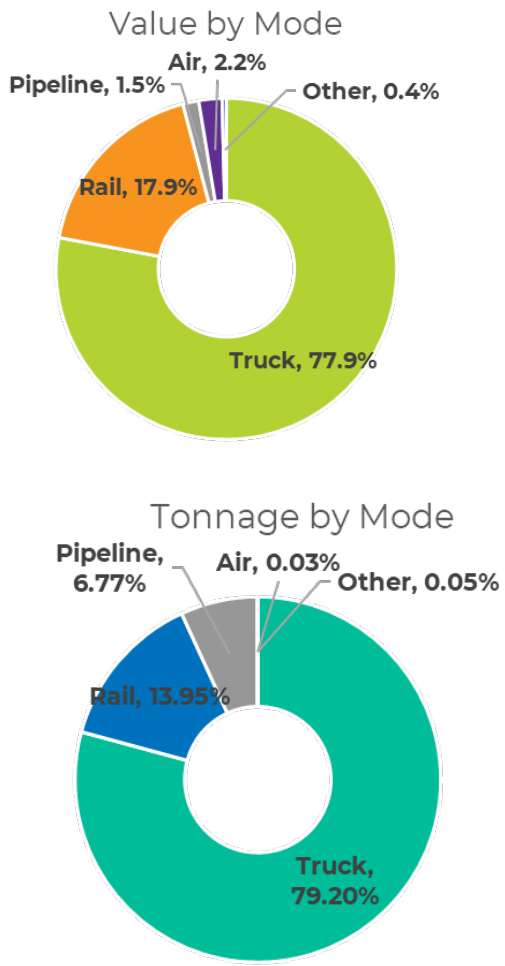


Source: FHWA Freight Analysis Framework 4.2; CS Analysis, 2017

In 2015, trucks transported the largest share of freight by weight at 81.19 percent and value at 86.90 percent. Rail accounted for the second highest modal share by weight at 13.81 percent and value at 10.48 percent. Pipeline, air, and other modes represented the remaining share by weight at 5.00 percent and value at 2.62 percent.

According to the FHWA analysis, by 2045 it is projected that the transportation system will carry more than 32.3 million tons of freight annually, valued at $33.7 billion, an increase of 34 percent by tonnage and 69 percent by value. **Figure 4.46** shows the freight flows in tonnage and value by transportation mode.

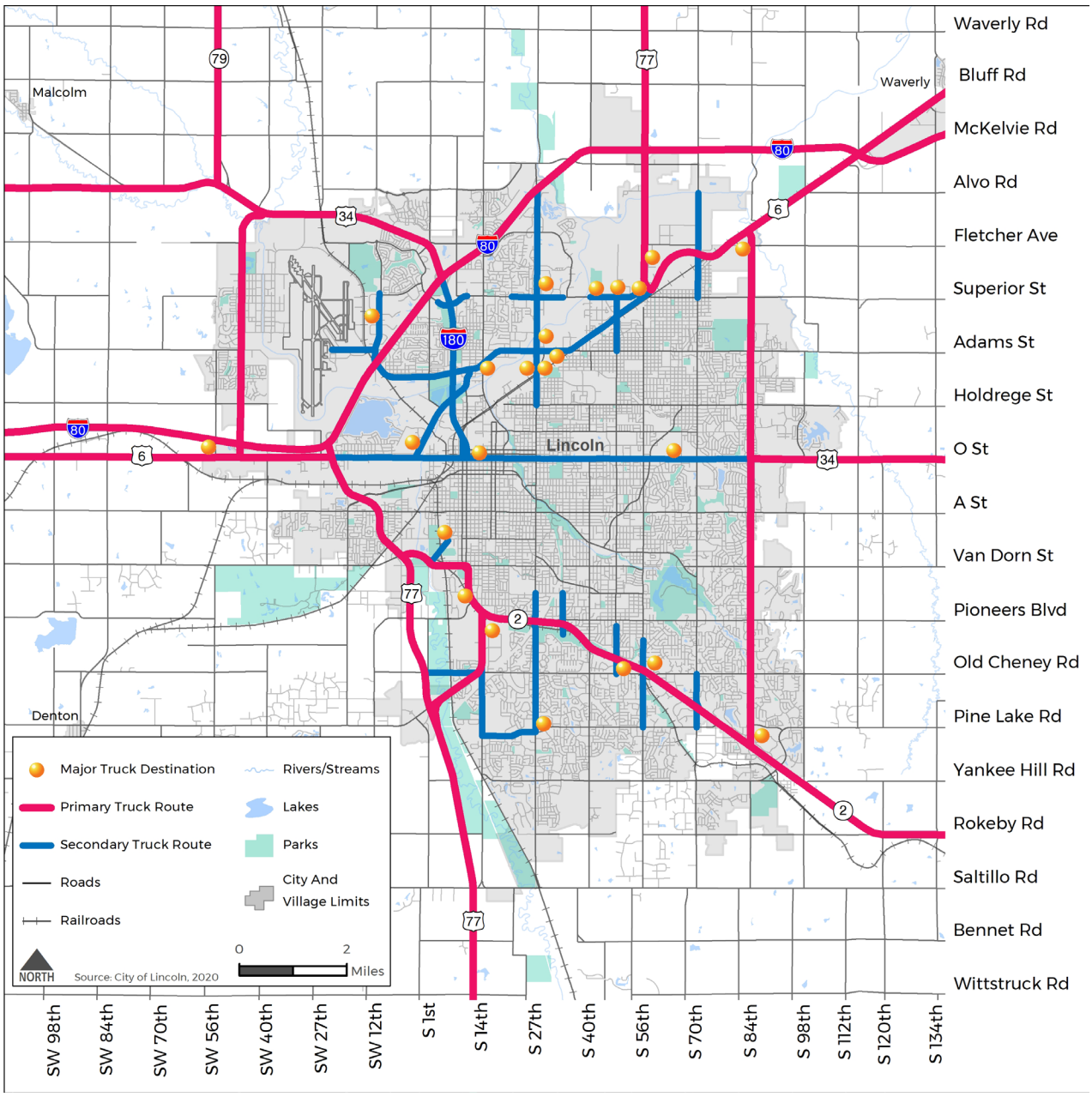
Figure 4.46 Freight Movement by Tons and Value (2045)



Source: FHWA Freight Analysis Framework 4.2; CS Analysis, 2017

Trucks are forecast to continue as the largest share of freight by weight at 79.20 percent and value at 77.94 percent. Similar to 2015, rail is projected to have the second highest modal share by weight at 13.95 percent and value at 17.94 percent, with other modes representing the remaining share by weight at 6.85 percent and value at 4.12 percent.

Figure 4.47 Truck Routes and Destinations



Existing Airports and Airfields

The Lincoln Airport is the major air facility servicing Lincoln, Lancaster County, and the region. It provides an important transportation link to national and international markets. It is located in the northwestern part of Lincoln, with access provided by Interstate and State highways.

The City of Lincoln's Airport Environs Noise District (**Figure 4.48**) and Airport Zoning Regulations have been established to ensure a balance between airport operations and the surrounding land uses. These regulations govern uses and structural characteristics compatible to the airport operations and minimize negative impacts on surrounding residents.

Smaller private airports and airfields are also located throughout the County (**Figure 4.49**). The distinction between an airport and an

airfield is generally the number of planes using the facility and who is allowed to use them. “Airfields” are limited to use by the residents of a single family home with not more than one plane. All other air facilities, including single family airfields that accommodate guest planes or house more than one plane, are termed “airports.” Within Lancaster County, airports and airfields are discouraged within close proximity to homes, schools, hospitals, or other areas potentially sensitive to noise and restricted by zoning.

Figure 4.48 Lincoln Airport Environs Noise District

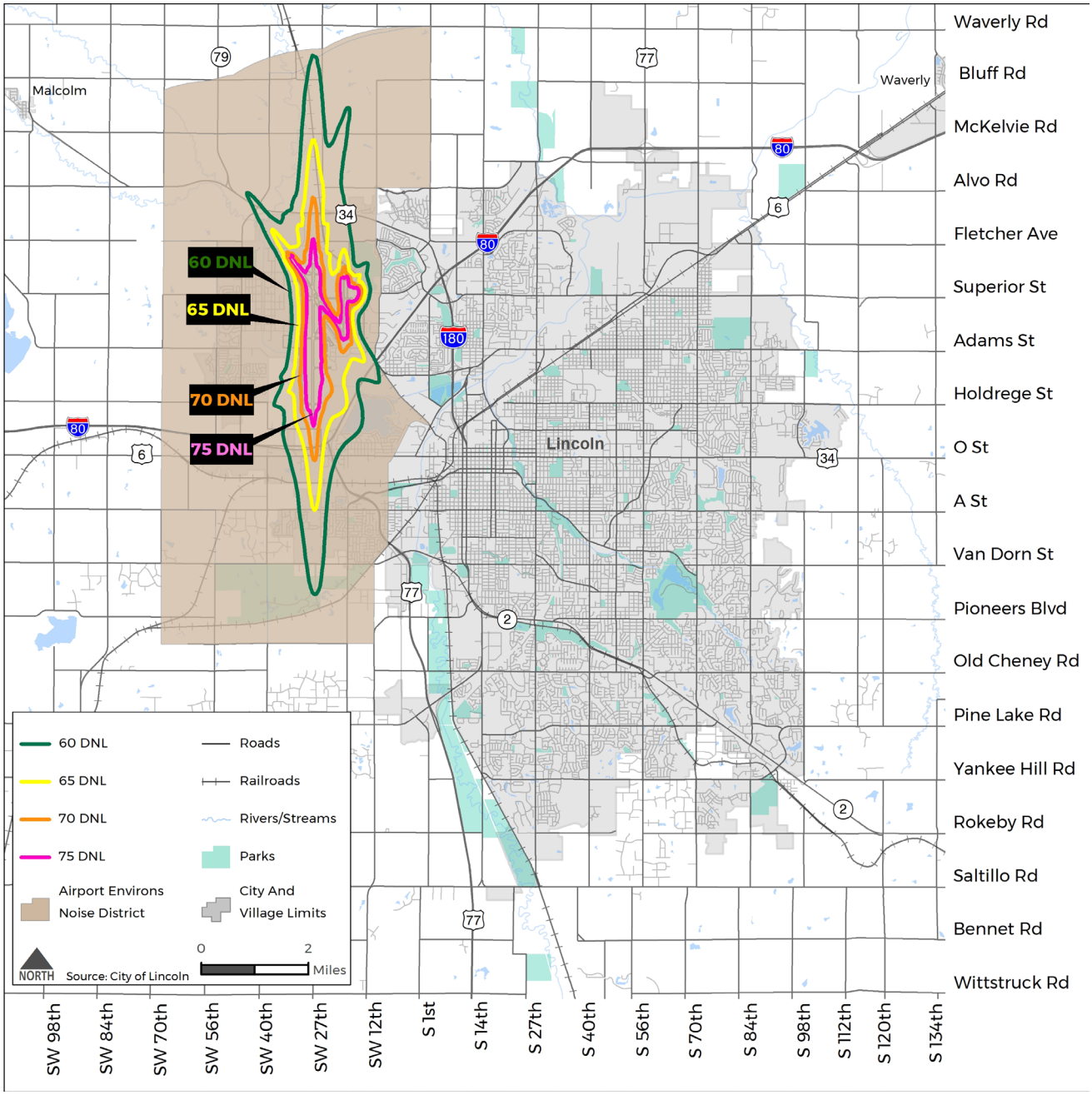
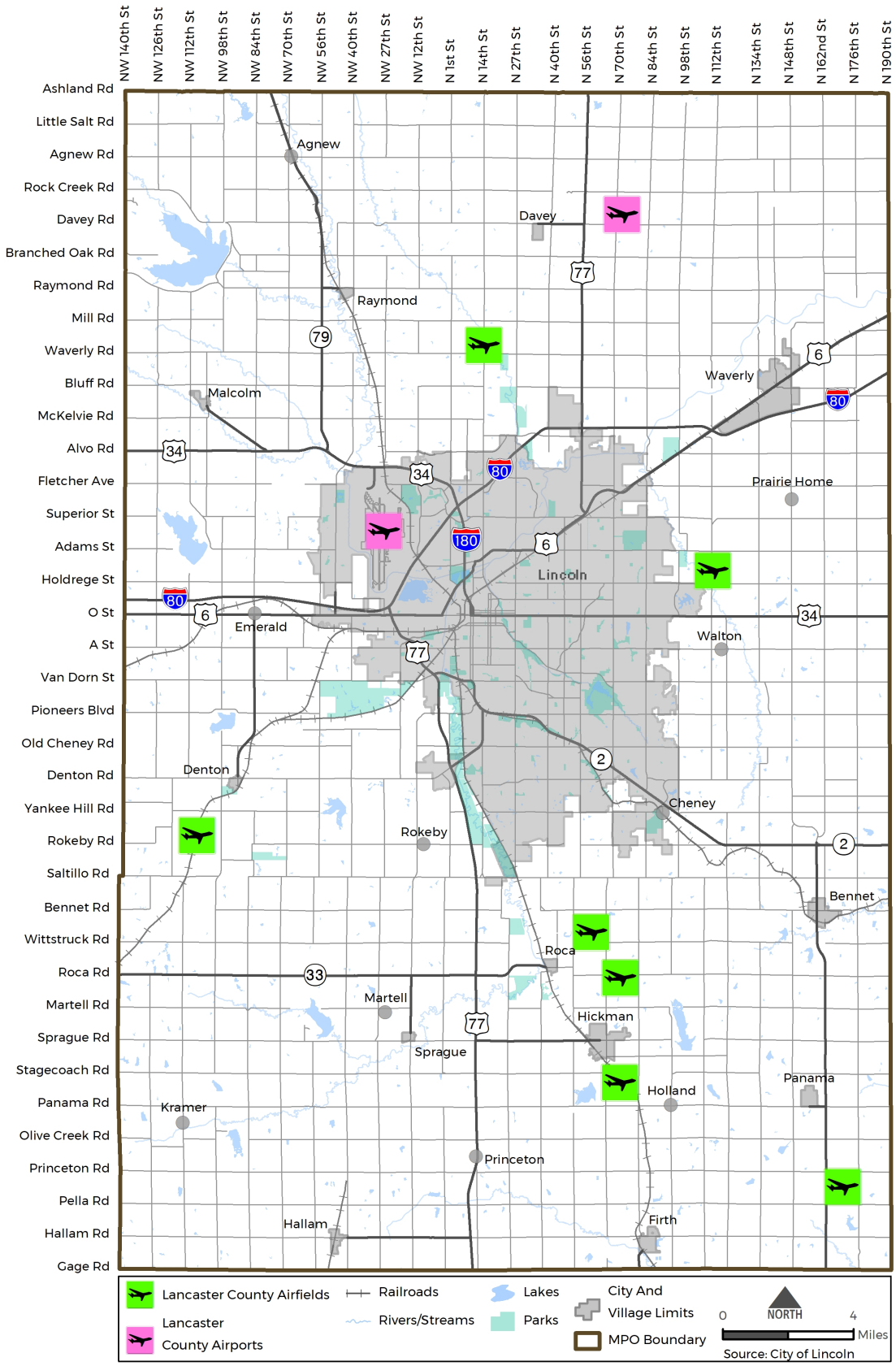


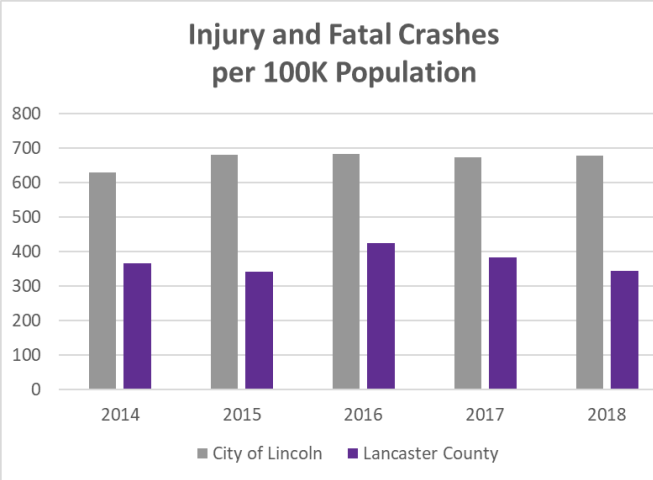
Figure 4.49 Lancaster County Airports and Airfields



Safety

Safety is a top priority not only for Lincoln and Lancaster County but also at state and federal levels. In accordance with Federal Regulations, each state is required to develop, prepare, submit and implement a comprehensive safety plan. The **Nebraska Strategic Highway Safety Plan**, developed in collaboration with public and private agencies, has identified Critical Emphasis Areas that will require the continuation of existing or implementation of new programs Understanding crash patterns that have occurred over time is important to planning safety improvements. State crash data collected over the five-year time period between 2014 and 2018 show that there were approximately 43,500 crashes in Lincoln and 1,400 in Lancaster County, an average of roughly 9,000 crashes per year. Crashes that involve injuries or fatalities are an important focus for safety study. Data represented in **Figure 4.50** indicate the average number of crashes per 100,000 population involving an injury or fatality, which was approximately 670 in Lincoln and approximately 370 in unincorporated Lancaster County per year.

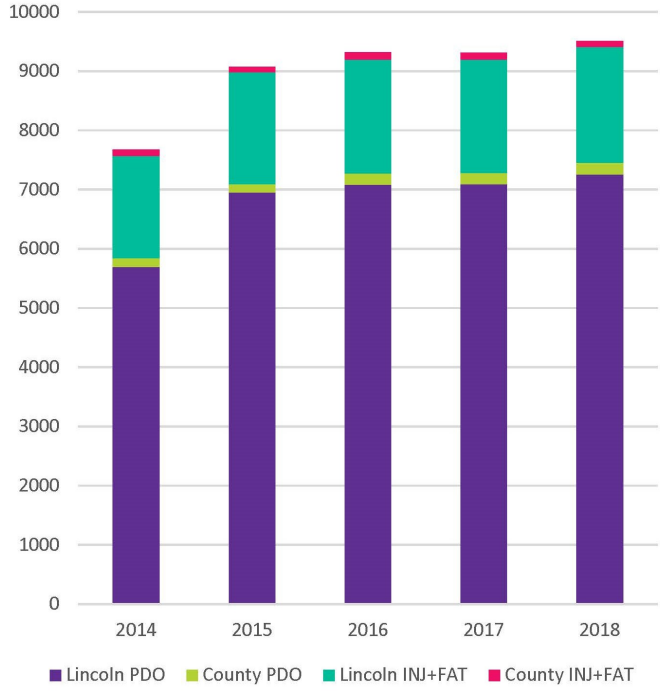
Figure 4.50 Injury and Fatality Crashes per 100K Population



Source: Lincoln MPO LRTP Performance Report, 2018

Figure 4.51 shows the severity of crashes in the region over time. Between 2014 and 2018, there were 9,947 crashes resulting in injury (INJ) or fatality (FAT) – approximately 22 percent – and the remaining crashes involved property damage only (PDO). Although crash amount increases seen in 2015 have not been reduced, the Allstate Insurance 2019 "America's Best Drivers Report" ranks Lincoln in the top 10 percent of the safest driving cities in the country.

Figure 4.51 Crash Severity



Source: Lincoln MPO LRTP Performance Report, 2018

The City of Lincoln also performed **Crash Data Analysis** to further identify patterns that could be useful for screening and planning future improvements. Crash data available for 2012 to 2016 were assessed against estimated daily traffic volumes entering each intersection to establish crash rates. The approach provided a measure for rating how well each intersection performed from a safety context with reference to other similar intersections. A critical crash rate is determined by the average crash rate for similar intersections and results in a

threshold value for comparison. This method also controls against low volume intersection bias. The analysis identified that 607 of the 6,227 intersection exceed the critical crash rate threshold. **Table 4.7** presents a summary of critical crash analysis.

Table 4.7 City Intersections Above Critical Crash Rates

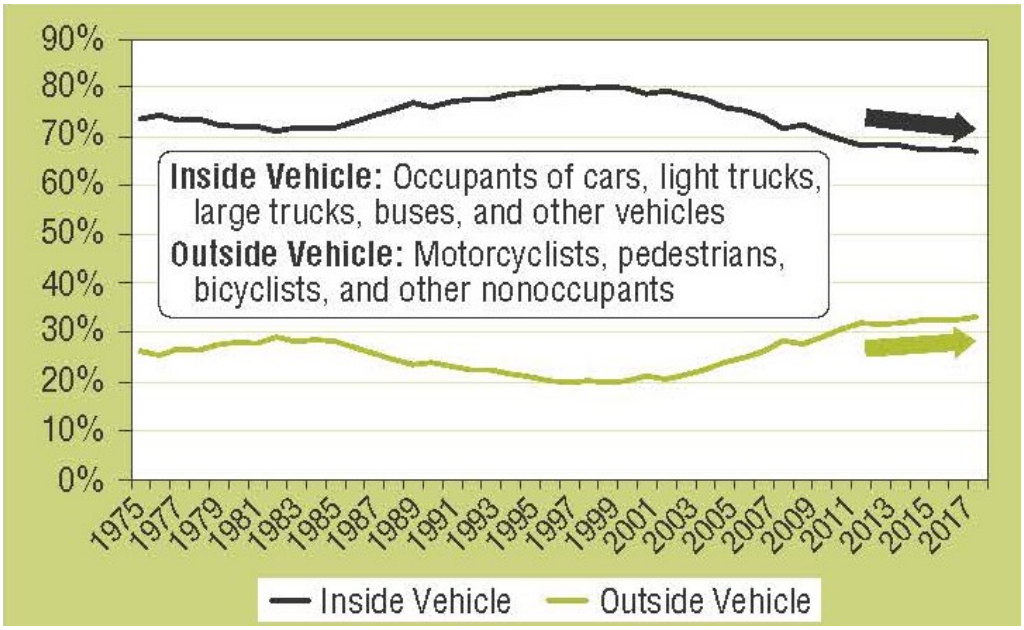
Class	Control Type	Intersections Above Critical	Percent of Intersections Above Critical
LOCAL/LOCAL	STOP SIGN	15	10%
	YIELD SIGN	8	9%
	NO CONTROLS	288	8%
	SUBTOTAL	311	8%
COLLECTOR/LOCAL	STOP SIGN	18	11%
	YIELD SIGN	2	6%
	NO CONTROLS	22	8%
	SUBTOTAL	42	9%
COLLECTOR/COLLECTOR	TRAFFIC SIGNAL	2	18%
	STOP SIGN	1	6%
	SUBTOTAL	3	5%
MAJOR/LOCAL	TRAFFIC SIGNAL	9	18%
	STOP SIGN	168	14%
	SUBTOTAL	177	14%
MAJOR/COLLECTOR	TRAFFIC SIGNAL	12	14%
	STOP SIGN	14	19%
	SUBTOTAL	26	16%
MAJOR/MAJOR	TRAFFIC SIGNAL	35	18%
	STOP SIGN	12	30%
	ROUNDABOUT	1	11%
	SUBTOTAL	48	20%
ALL INTERSECTIONS	TRAFFIC SIGNAL	58	17%
	STOP SIGN	228	13%
	YIELD SIGN	10	8%
	NO CONTROL	308	8%
	ROUNDABOUT	3	13%
	SUBTOTAL	607	10%

Vulnerable road users present additional safety considerations for the transportation network. Even though the overall crash rate by vehicle miles traveled has declined for many years, the proportion of crashes and fatalities involving pedestrians and bicyclists has steadily increased nationwide since 1996 (**Figure 4.52**). Perceived and demonstrated safety are key elements of successful bicycle and pedestrian networks. People may choose to ride or walk only if they feel safe and comfortable on the bikeway and pedestrian

networks. The National Highway Traffic Safety Administration has documented that the overall proportion of transportation fatalities associated with motorcyclists, pedestrians, bicyclists and other nonoccupants has grown nationwide by more than 10 percent since 2000 compared to travelers inside vehicles.

According to the City of Lincoln Crash Data Analysis for 2012 to 2016, crashes involving pedestrians and bicyclists accounted for 3 percent of all crashes, but 12 percent of all severe crashes, which is disproportionate for the mode choice. These vulnerable road users, similar to bicyclists, construction workers and others experience a greater risk of injury or fatality within the transportation network compared to those inside a vehicle. Pedestrian and Bike Crash frequency is one of five intersection characteristics the City of Lincoln uses to prioritize safety countermeasures.

Figure 4.52 National Proportion of Fatalities Inside/Outside Vehicle, 1997–2018



Source: National Highway Traffic Safety Administration Fatality Analysis Reporting System (FARS), 2017 Final File