Ames Area Metropolitan Planning Organization 2050 Metropolitan Transportation Plan

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1 INTRODUCTION

INTRODUCTION

THE AMES AREA METROPOLITAN PLANNING ORGANIZATION

The Ames Area Metropolitan Planning Organization (AAMPO) was established in 2003 to lead a comprehensive, cooperative, and continuing transportation planning process for the agencies in the Ames, Iowa urbanized area. The AAMPO brings together regional stakeholders and agencies to develop long- and short-term transportation plans, identify and prioritize transportation projects and initiatives, ensure that transportation plans/projects align with regional goals and comply with federal regulations, and allocate federal transportation funds. **Figure 1** shows the AAMPO region.

The AAMPO comprises several member agencies working together to provide a performance-based, multimodal transportation planning process that is continuing, cooperative, and comprehensive. The member agencies participating in the AAMPO include:

- City of Ames
- City of Gilbert
- Story County
- Boone County
- Ames Transit Agency (CyRide)
- Iowa State University
- Iowa Department of Transportation (Iowa DOT)
- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)

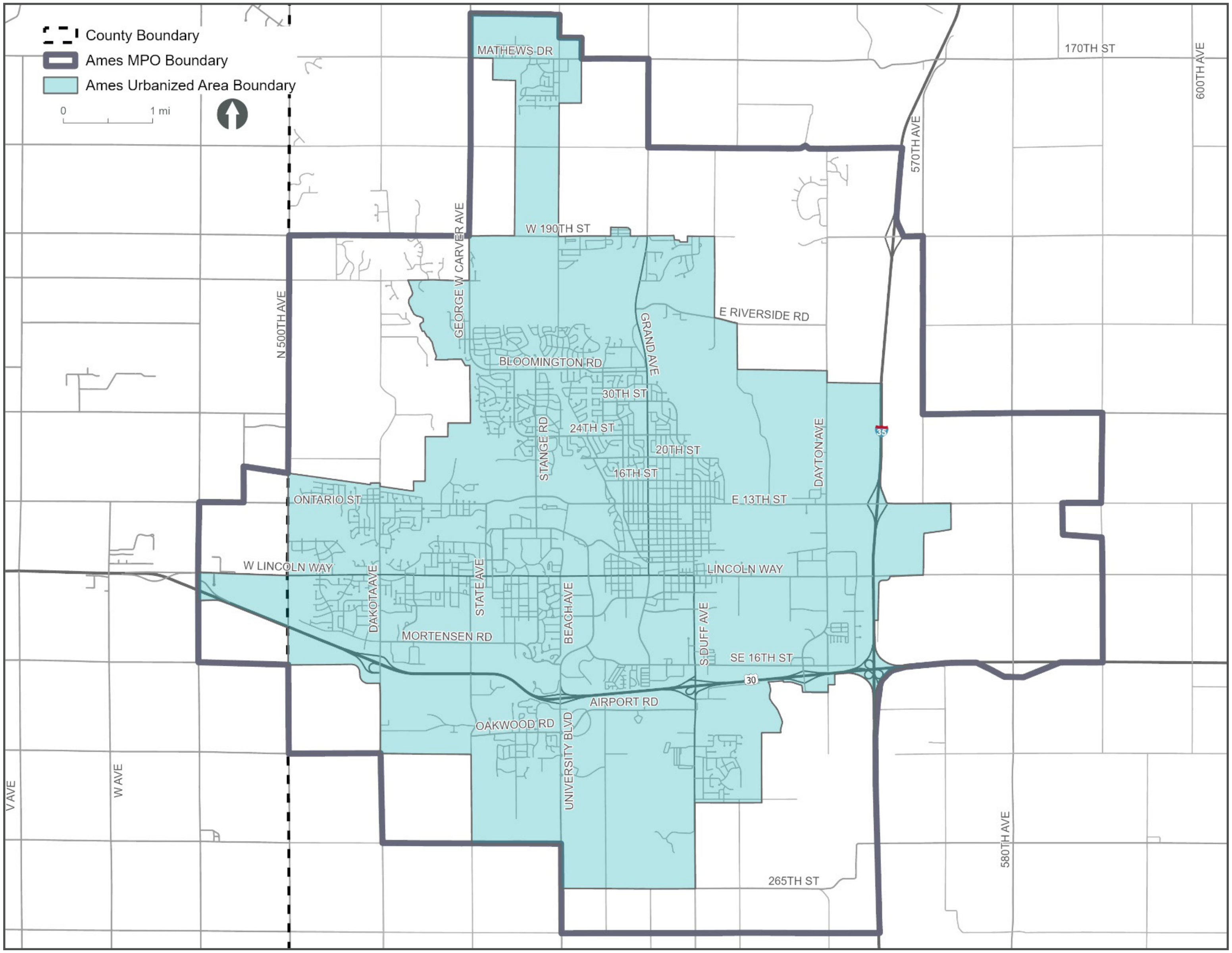
THE AAMPO'S GOVERNANCE

Two committees govern and advise the AAMPO on its transportation planning process:

- **Transportation Policy Committee (TPC):** The governing body of the AAMPO, comprised of representatives from each of the AAMPO's voting agencies: Ames, Gilbert, Story County, Boone County, and CyRide. TPC provides policy direction for long-range and near-term planning activities, selects projects for inclusion in AAMPO's annual Transportation Improvement Program (TIP), and approves the AAMPO Transportation Planning Work Program (TPWP).
- **Transportation Technical Committee (TTC):** The primary advisory committee to the TPC, comprising staff-level representatives from regional agencies and organizations for both voting and non-voting members.

One additional committee, the **Story County Transportation Collaboration**, plays a key role in the Transportation Advisory Group for the development of Passenger Transportation Plans (PTPs). The Story County Transportation Collaboration comprises representatives from organizations, health and human service agencies, and transportation providers who advise about persistent and emerging transportation needs and work to develop and strengthen partnerships to address those needs.

Figure 1: The AAMPO Region



THE METROPOLITAN TRANSPORTATION PLANNING PROCESS

Federal metropolitan transportation planning regulations contained in the Fixing America's Surface Transportation Act (FAST Act) of 2015 were carried forward with the enactment of the Bipartisan Infrastructure Law (BIL), signed into law as the Infrastructure Investment and Jobs Act (IIJA), in November 2021 as the Metropolitan Planning Program. The overarching purpose of the program is to provide a continuous, cooperative, and comprehensive framework for making transportation investment decisions in the nation's metropolitan areas.

Table 1 lists the key transportation planning documents that the AAMPO develops.

Table 1: Key Transportation Planning Documents

Document	Description
Metropolitan Transportation Plan (MTP)	Provides the guiding framework for how the metropolitan area will manage and operate its multimodal transportation system for the next 20+ years. The plan engages with residents and stakeholders and uses data to establish area goals and objectives that lay out strategies to achieve that vision. A prioritized list of fiscally constrained projects is included in the MTP.
Transportation Improvement Program	A 4-year implementation program for federally funded and regionally significant transportation projects in the Ames region; it aligns with the MTP.
Transportation Planning Work Program	Identifies work and budget to be completed by the MPO during the next 1-year period by major activity and task.
Public Participation Plan	Details how the AAMPO involves the public and stakeholders in its transportation planning efforts.
Passenger Transportation Plan	Coordinates efforts between transportation providers and human service agencies that provide transportation services for the Ames community.

THE METROPOLITAN TRANSPORTATION PLAN

The MTP is the AAMPO's overall blueprint for how the multimodal system should be operated through the year 2050. The AAMPO updates its MTP every 5 years based on stakeholder input, issues identified, and forecasted future conditions to develop a series of strategies and investments that can address issues while conforming to the region's stated vision and goals. A performance-based planning approach leveraging the AAMPO's performance targets is used to ensure progress is made toward the vision and goals.

The MTP update must include some core federal requirements:

- Updated every 5 years
- Fiscally constrained
- Plans for a horizon at least 20 years out
- Consults local agencies, Iowa DOT, FHWA, and FTA
- Is a performance-based plan promoting and supporting the region's as well as Iowa DOT's performance measures and targets

This update to the MTP, Ames Connect 2050, looks out to the year 2050 and builds off the 2045 MTP while incorporating the findings and recommendations of plans and regional studies since the 2045 MTP.

RELATED PLANNING EFFORTS

AMES PLAN 2040

Ames Plan 2040 is a comprehensive plan that guides growth and change for the City's planning area through the year 2020 and beyond. The plan was adopted in 2021 and amended in 2023 and addresses the vision for Ames related to land use and growth, mobility, community character, environment, parks and recreation, and neighborhoods, housing, and subareas. It covers the majority of the AAMPO study area.

WALK BIKE ROLL AMES

Walk Bike Roll Ames is an active transportation plan that builds on the community's existing path, sidewalk, and bikeway assets and offers recommendations to improve conditions for people walking, biking, and rolling.

STORY COUNTY TRAILS PLAN

This plan was completed in 2024 for the Story County Conservation Board and identifies actionable steps to implement new trail connections in Story County, including the AAMPO area.

IOWA IN MOTION 2050

The state's long-range transportation plan looks out to 2050 and provides the long-range vision, policies, and decision-making framework that will guide investments in Iowa's transportation system over the coming years. The plan covers all modes of transportation in the state, for both people and goods.

IOWA STATE FREIGHT PLAN

The Iowa State Freight Plan was completed in 2022 and weaves together Iowa DOT's freight planning activities to help achieve the goal of optimal freight transportation in the state. Additionally, the plan guides Iowa DOT's investment decisions to maintain and improve the freight transportation system.

CONNECT 2050 GOALS AND OBJECTIVES

The goals and objectives of the Connect 2050 plan provide a foundation for shaping the region's transportation future. Goals represent broad, long-term outcomes the plan seeks to achieve, while objectives define specific, measurable steps that support each goal. Together, they offer a clear strategic direction to guide project prioritization, investment decisions, and policy development over the next 20 years. These goals and objectives were thoughtfully developed based on public feedback gathered during the first round of community engagement, as well as the Federal Planning Factors that ensure consistency with national transportation priorities.

FORWARD 2045 GOALS AND FEDERAL METROPOLITAN PLANNING FACTORS

As part of the federal transportation planning process, Metropolitan Planning Organizations (MPOs) and state DOTs are required to consider a set of Federal Planning Factors, as outlined in federal code 23 CFR 450.306 and listed below. The ten factors ensure that transportation plans and programs address key national priorities such as safety, economic vitality, environmental sustainability, and system efficiency. They serve as a framework to guide comprehensive, performance-based planning that aligns local and regional goals with federal transportation policy.

1. Support the economic vitality of the metropolitan area
2. Increase the safety of the transportation system for motorized and non-motorized users
3. Increase the security of the transportation system for motorized and non-motorized users
4. Increase the accessibility and mobility of people and freight
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns
6. Enhance the integration and connectivity of the transportation system across modes, for people and freight
7. Promote efficient system management and operation
8. Emphasize the preservation of the existing transportation system
9. Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation
10. Enhance travel and tourism

Aligning the Connect 2050 goals and objectives with the Federal Planning Factors ensures that regional transportation strategies support national priorities. This alignment not only strengthens the plan's consistency with federal requirements, but also enhances its eligibility for funding, promotes comprehensive planning, and ensures that local investments contribute to broader outcomes such as safety, sustainability, and economic vitality. The Connect 2050 Goals and Objectives are as follows:

Accessibility & Connectivity	• Improve walk, bike, and transit connections • Promote land-use policies that support multimodal connectivity • Design streets to accommodate all users, including pedestrians, cyclists, transit users, and motorists	• Incorporate accessible design standards to serve individuals with disabilities or mobility challenges • Incorporate bicycle, pedestrian, and transit-friendly infrastructure in new developments
Safety	• Reduce fatal and serious injury crashes • Reduce the number of crashes involving vulnerable road users • Implement a safe system approach to design, operate, and incident management	• Work towards eliminating all traffic fatalities and serious injuries on streets • Focus safety investments on the High Priority Network
Sustainability	• Promote low-carbon transportation options • Reduce transportation impacts to natural resources • Reduce the number of single-occupant vehicle trips	• Build transportation infrastructure to be more resilient to natural and manmade events • Promote financially sustainable transportation system investments
Efficiency & Reliability	• Maintain acceptable travel reliability on Interstate and principal arterial roadways • Maintain the current high level of transit services • Prioritize freight corridors to minimize delays in goods movement	• Increase the regional share of trips made by walking, biking, and transit • Identify technology solutions to enhance system operation
Placemaking/ Quality of Life	• Design transportation projects that preserve and complement the unique identity of neighborhoods • Provide transportation strategies and infrastructure that support current adopted plans	• Develop infrastructure that supports affordable housing • Increase the percentage of population and employment within close proximity to transit and/or walking and biking system

Table 59 in the **Federal Compliance** chapter illustrates the alignment of the Connect 2050 plan goals and objectives to the federal planning factors.

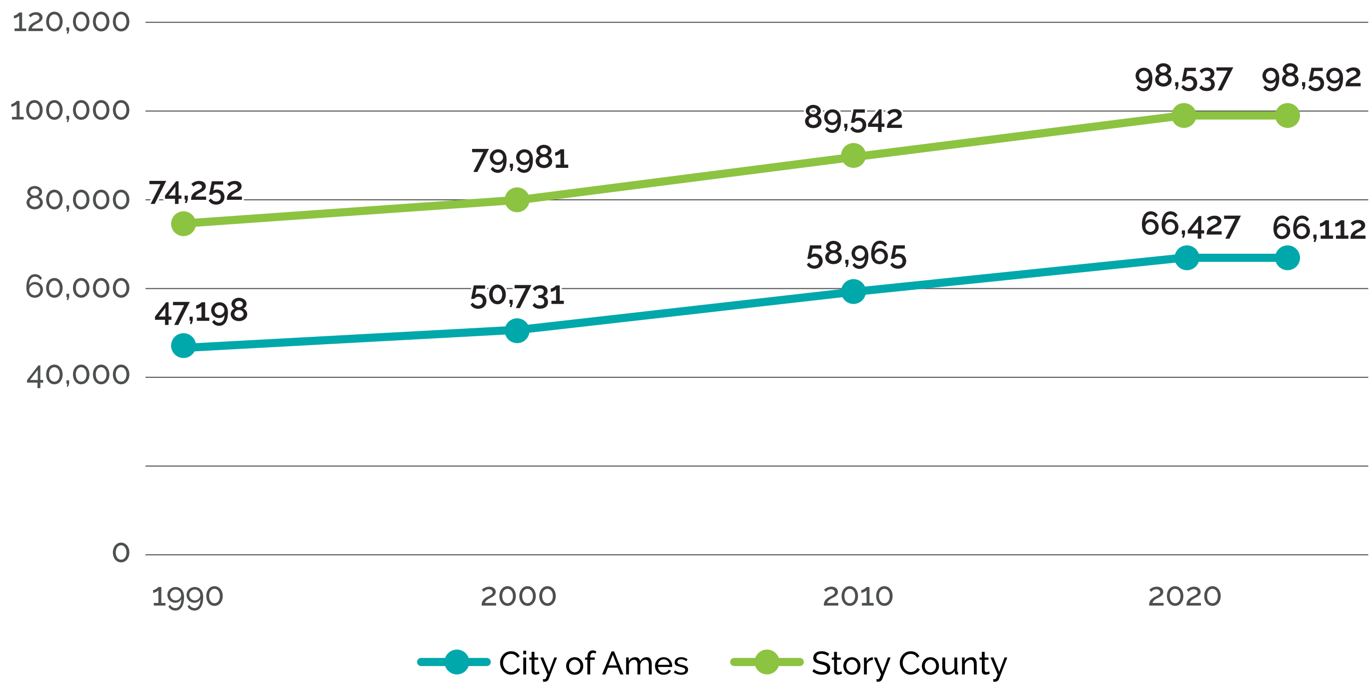
CHAPTER 2 REGIONAL PROFILE

Understanding trends related to the demographics of the AAMPO region can highlight key socioeconomic conditions influencing multimodal travel today and help estimate how transportation could be used in the future. The following section will highlight the historical population and employment trends in the AAMPO and the current demographic makeup of the region.

HISTORIC POPULATION & EMPLOYMENT GROWTH TRENDS

Population in both Ames and Story County saw a significant increase between 1990 and 2023. Ames grew from roughly 47,000 in 1990 to more than 66,000 residents in 2023. During the same period, Story County grew by about 24,000 people, as shown in **Figure 2**.

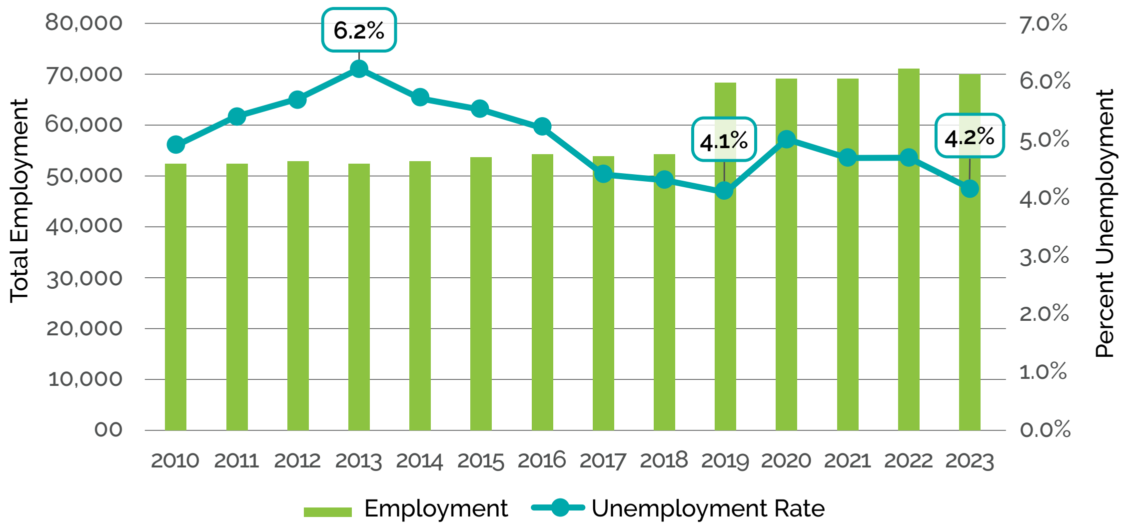
Figure 2: Historical Population Growth, Ames and Story County, 1990–2023



Source: U.S. Census Bureau, American Community Survey (ACS)

Employment in the Ames metropolitan statistical area maintained a steady level between 2010 and 2018 before increasing significantly during 2019 and maintaining a higher employment level through 2023. Meanwhile, the unemployment rate peaked at 6.2% in 2013 and fell to 4.2% by 2023, as shown in **Figure 3**.

Figure 3: Employment and Unemployment Rates, Ames Metropolitan Statistical Area, 2010–2023

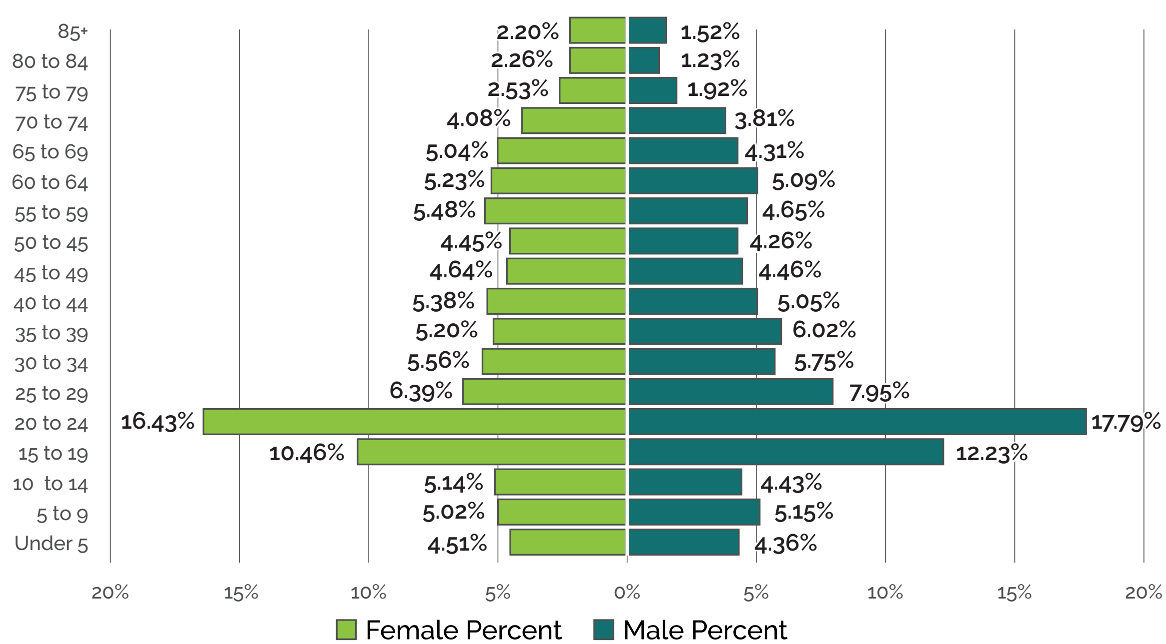


Source: ACS 2010–2023 5-Year Estimates

CURRENT DEMOGRAPHICS

The current estimated population of the Ames urbanized area is 66,112, a significant increase from 57,343 residents in 2010. **Figure 4** shows the distribution of population in Ames by gender and age. The largest age cohort in Ames is 20 to 24, most likely attributable to the large student population at Iowa State University; 2024 enrollment figures provided by Iowa State University indicate a total enrollment of 30,432 students. The next largest age cohort includes residents between the ages of 15 and 19.

Figure 4: Population Pyramid, Ames Metro Area



Ames continues to grow into a more diverse population. In 2010, 89.2% of the Ames metro area was white, which dropped to 85.3% in 2023. As shown in **Table 2**, the second largest minority population in Ames is Asian at 9.4%, followed by Hispanic/Latino at 4.8%. **Table 3** shows the number of residents with limited English proficiency by languages spoken at home.

Table 2: Population by Race/Ethnicity, Ames Urbanized Area

Race/Ethnicity	People	Percentage
White	52,251	79.0
Black or African American	2,473	3.7
Asian	6,224	9.4
Hispanic or Latino	3,165	4.8
American Indian or Alaska Native	386	0.6
Native Hawaiian or Pacific Islander	91	0.1
Other	1,188	1.8

Source: ACS 2019–2023 5-Year Estimates

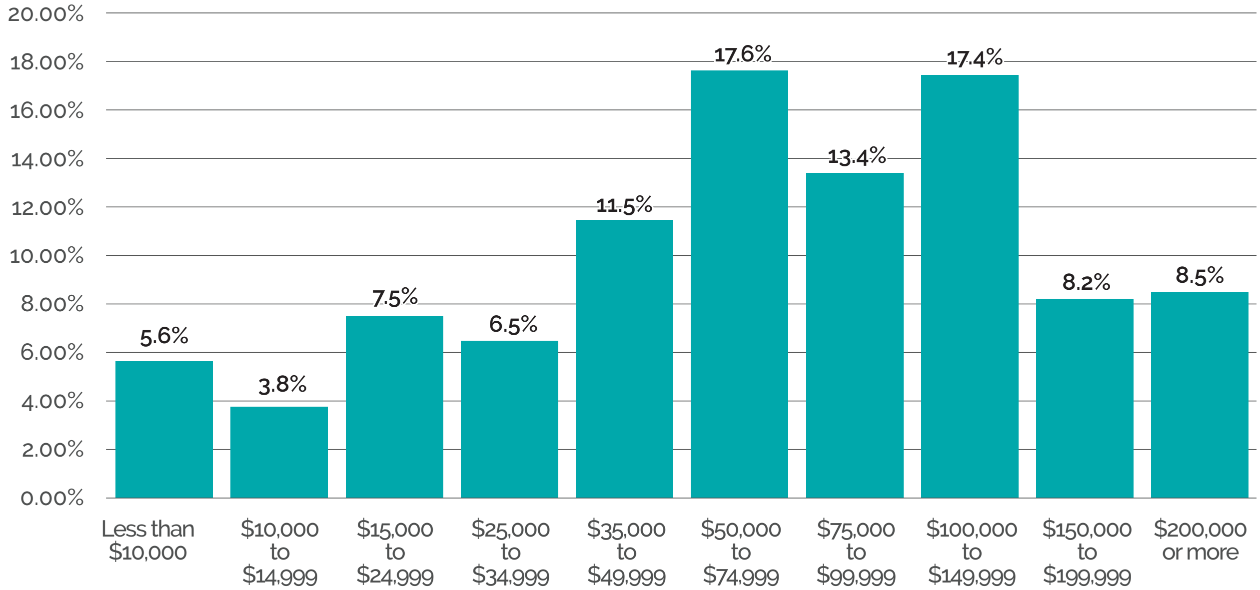
Table 3: Residents with Limited English Proficiency, Ames Urbanized Area

Language Spoken	People	Percentage
Spanish	1,112	1.7
Other Indo-European languages	2,681	4.2
Asian and Pacific Island languages	4,008	6.3
Other languages	799	1.3

Source: ACS 2019–2023 5-Year Estimates

Median household income for residents of the Ames metro area in 2023 dollars was $71,090, and median family income was $110,143. **Figure 5** shows the proportion of Ames households by 2023 household income. The percentage of the population living below the poverty level by age cohort is shown in **Table 4**. The age cohort 18 to 24, which is considered the typical age for a college student, makes up the largest percentage of population living below the poverty level, most likely due to the large number of full-time students attending Iowa State University.

Figure 5: Household Income of Residents, Ames Metropolitan Statistical Area, 2023



Source: ACS 2019–2023 5-Year Estimates

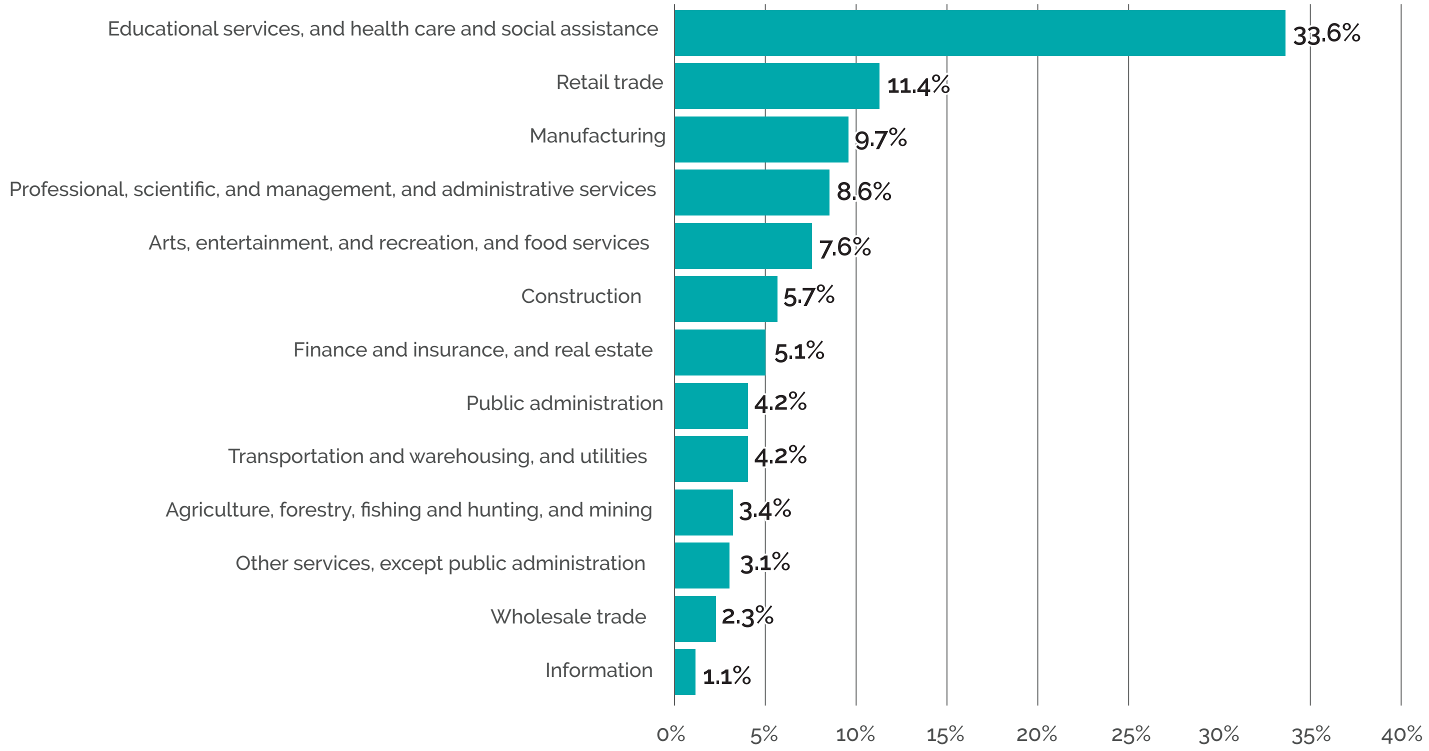
Table 4: Percent of Population Living Below the Poverty Level

Age Cohort	Population for whom Poverty Status Is Determined	Percentage Below Poverty Level
Under 18	1,729	9.7
18 to 24	10,629	59.7
25 to 34	2,011	11.3
35 to 64	2,504	14.1
65 years and over	930	5.2

Source: ACS 2019–2023 5-Year Estimates

Grouping the Ames population by occupation can help determine where most residents are traveling to and from in relation to their place of employment. In 2023, 33.6% of Ames residents were employed in the educational services, health, and social assistance job sector. The second highest sector of employment was retail trade, at 11.4%. The smallest share of employment was information, at 1.1%. **Figure 6** provides an overview of employment by industry in the Ames metro area.

Figure 6: Occupation by Industry, Ames Metro Area



Source: ACS 2019–2023 5-Year Estimates

Of workers ages 16 years or older, 72.9% commuted to work alone via private vehicle. However, 4.9% of Ames residents did walk to work versus 2.4% across the nation. Similarly, 3.2% of Ames residents used public transportation to travel to work, which is slightly less than the 3.5% public transit commute seen nationwide. **Table 5** summarizes the means of transportation to work for both Ames metro area residents and national averages.

Table 5: Commute Modes, Ames Metro Area Residents and United States

Means to Work	Ames Metro Area	United States
Drove alone	72.9%	70.2%
Carpool	7.0%	8.5%
Public transportation (excluding taxi)	3.2%	3.5%
Walk	4.9%	2.4%
Bike	0.9%	0.4%
Taxi, motorcycle, or other means	0.5%	1.5%
Work from home	10.5%	13.5%

Source: ACS 2019–2023 5-Year Estimates

For roughly 45% of the Ames metro area, it takes between 0 and 14 minutes to commute to work, while 63% of Ames residents have a commute that takes less than 20 minutes. **Table 6** shows the commute time split for Ames commuters.

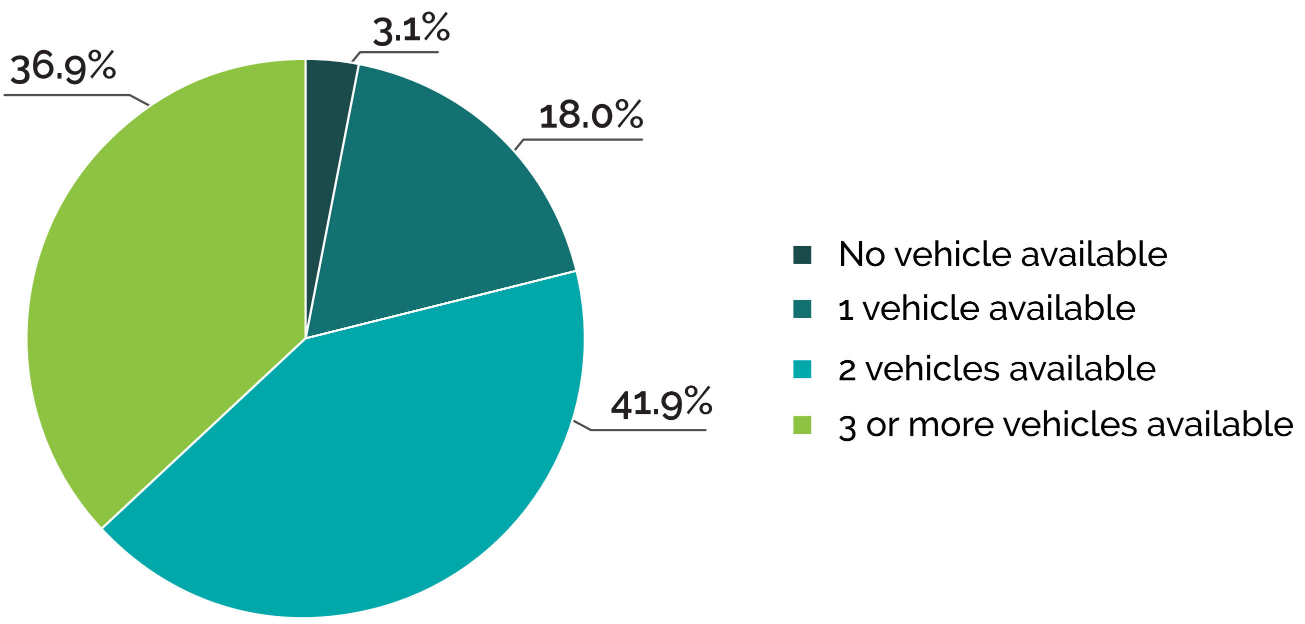
Table 6: Travel Time to Work, Ames Metro Area Residents

Travel to Work	Ames Metro Area
Less than 10 minutes	24.8%
10 to 14 minutes	20.7%
15 to 19 minutes	17.3%
20 to 24 minutes	10.9%
25 to 29 minutes	5.3%
30 to 34 minutes	7.6%
35 to 44 minutes	5.5%
45 to 59 minutes	5.0%
60 or more minutes	2.9%

Source: ACS 2019–2023 5-Year Estimates

Figure 7 shows the number of vehicles available to households. Approximately 79% of households have access to 2 or more vehicles, while roughly 3% of households do not have a vehicle available.

Figure 7: Household Car Ownership, Ames Metro Area



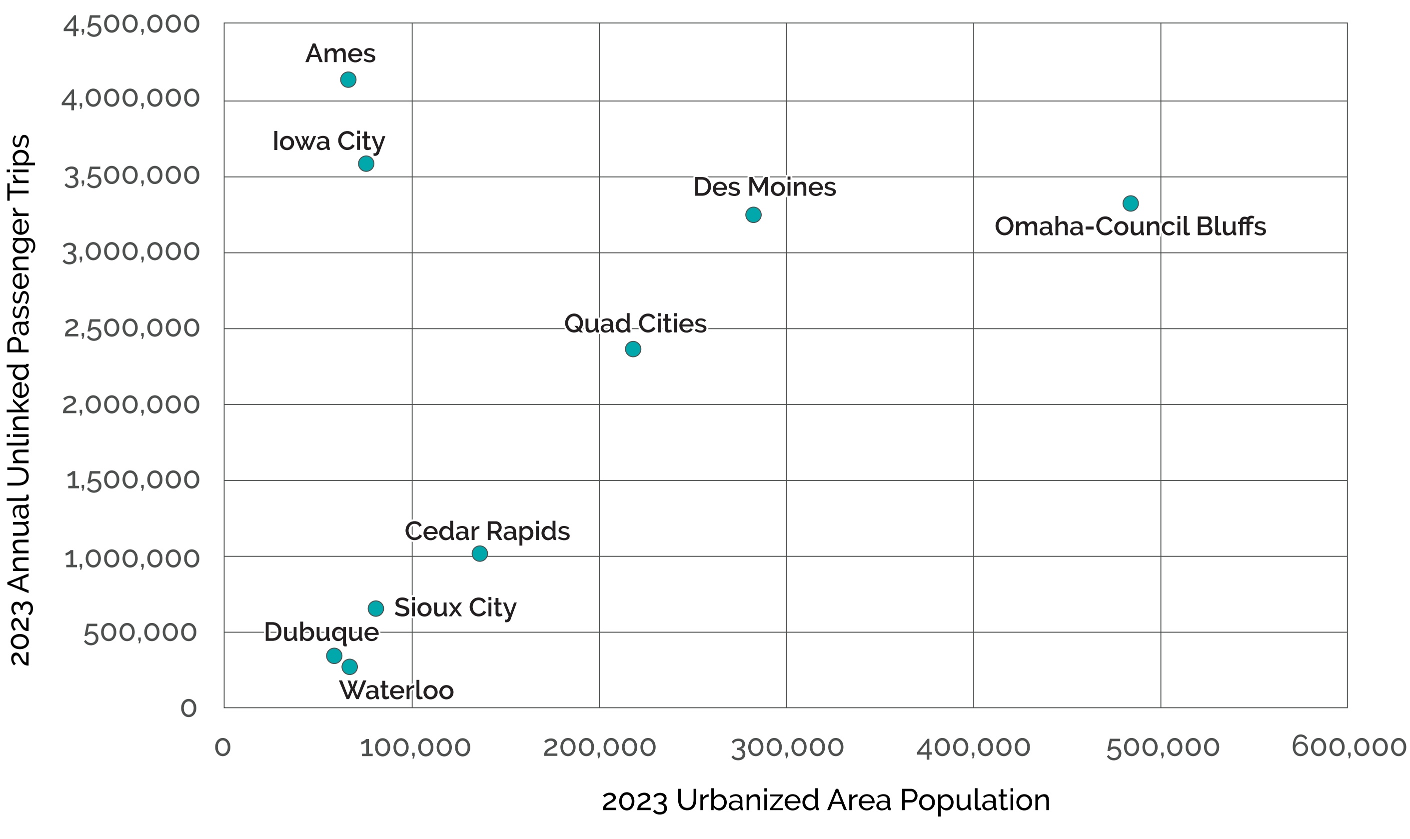
Source: ACS 2019–2023 5-Year Estimates

Understanding the socioeconomic conditions of the AAMPO region can help determine future transportation needs and demands. For residents who may be economically disadvantaged, having access to transportation that does not require a personal vehicle is important. Additionally, given the large presence of university students, options such as transit, walking, and biking are in more demand due to limited car ownership and parking options.

Ames enjoys a high level of transit service due to the demand for public transit by residents affiliated with Iowa State University. The public transit provider, CyRide, estimates that approximately 94% of public transit ridership is university-student related. Refer to the Existing System Performance chapter for further discussion about Ames' transit services.

To add more insight into the transit usage in the AAMPO region, annual passenger trips in other metropolitan areas in Iowa and peer cities were compared to the CyRide system in Ames. As shown in **Figure 8**, the annual unlinked passenger trips in Ames were the highest among all other metropolitan areas in Iowa during 2023. The transit provider that came closest was Iowa City, which is also home to a large student population who rely on fixed route transit.

Figure 8: 2023 Annual Unlinked Passenger Trips for Public Transit Providers in Iowa



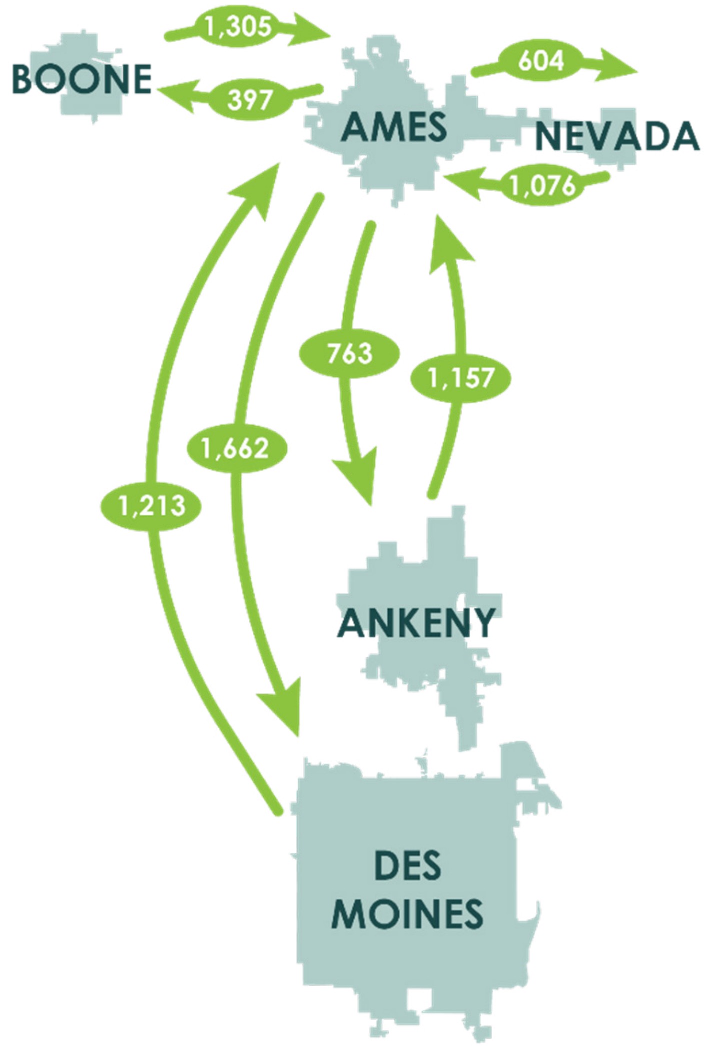
Source: National Transit Database

INTERCITY COMMUTE PATTERNS

Intercity commute patterns were collected from the U.S. Census Bureau's Longitudinal Household-Employer Dynamics (LEHD) Program, which compiles data about employers and employees to provide insight into local economies. LEHD data for 2022 was reviewed for Ames, Boone, Ankeny, Nevada, and Des Moines to identify intercity commuting patterns among the primary metropolitan areas along Interstate 35 (I-35) and U.S. Highway 30 (U.S. 30). As shown in **Figure 9**, the LEHD data shows that the largest share of commuting trips is between Boone to Ames and Ames to Des Moines. The city with the largest inflow and outflow overall with Ames is Des Moines, likely due to a larger number of employment opportunities and larger population. There is significant commuting pattern between Ames and Ankeny as well, with 1,157 Ankeny residents traveling to Ames for work and 763 Ames residents working in Ankeny. 1,076 Nevada residents also travel to Ames for work, with 604 Ames residents working in Nevada.

An example of a travel patterns analysis based on Streetlight data for Ames is shown within **Appendix D**.

Figure 9: 2022 Regional Commuting Patterns



Source: U.S. Census Bureau LEHD 2022

CHAPTER 3 EXISTING SYSTEM PERFORMANCE

The performance of the AAMPO's existing multimodal transportation system was evaluated to understand how the system operates today and the issues and needs facing multimodal transportation in the region. The existing system performance evaluation is based on a series of data-driven technical analyses that focus on safety, traffic operations, asset conditions, and multimodal operations. The overarching goal of the existing system performance analysis is to develop a baseline profile for the AAMPO region's multimodal transportation system that can be used to evaluate future growth scenarios.

This chapter discusses socioeconomic trends related to transportation, provides a summary of the existing system performance analyses and key findings, and concludes with an overview of the key issues facing multimodal transportation today, as shown below.

- **Traffic Safety**
- **Traffic Operations**
- **Bridge and Pavement Conditions**
- **Freight Conditions**
- **Transit Conditions**
- **Regional Connections**

ROADWAY SYSTEM CONDITIONS

ROADWAY CLASSIFICATIONS

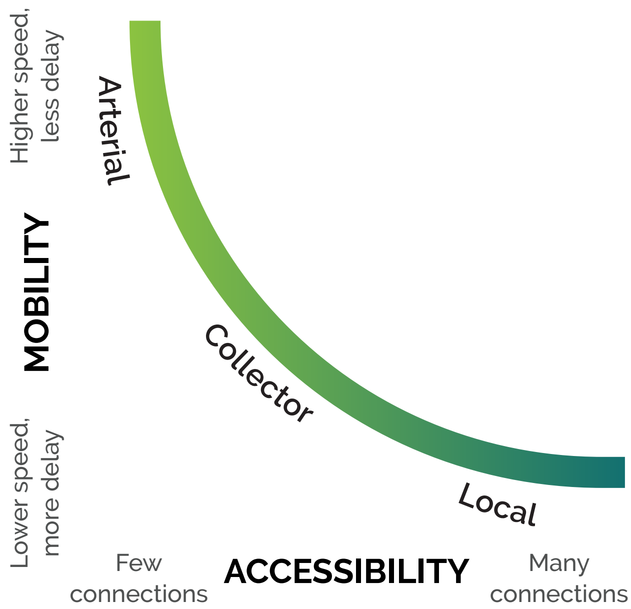
Functional Classifications

FHWA established a federal functional classification system to categorize highways, roads, and streets by their mobility and access functions. The classification guidelines determine how roads are funded, planned, and engineered. The classification also helps determine design, speed limits, accessibility, and other considerations.

Beyond planning, the classification system functions as a designation for certain federal funding programs. For example, streets and roadways designated as functionally classified routes are also considered federal aid roads eligible for federal funds for transportation-related improvements.

Functional classifications for roadways in the AAMPO area are shown in **Figure 10** and defined as follows:[1]

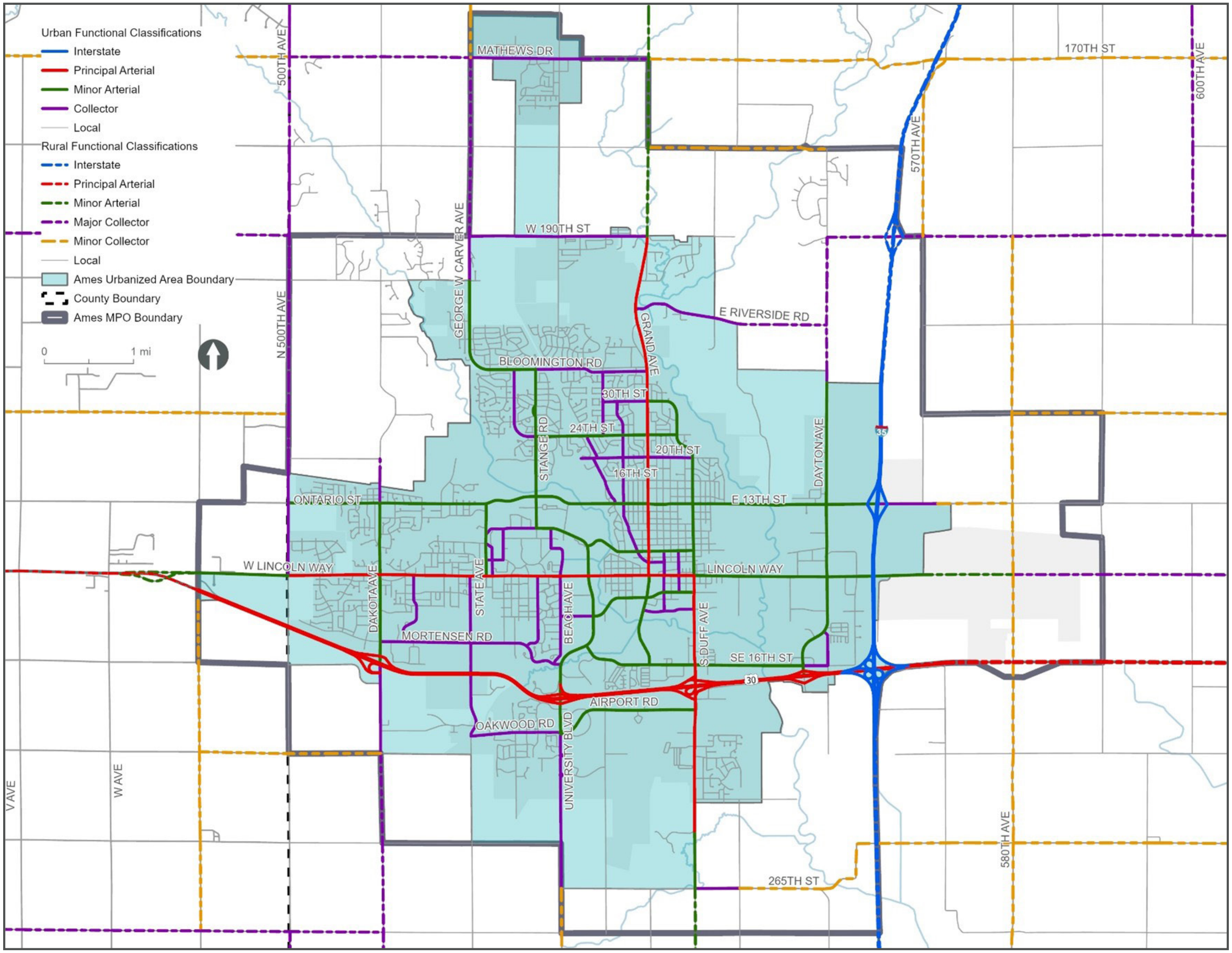
- **Interstates** are designed for higher mobility, speeds, and long-distance travel. I-35 is the sole Interstate in the AAMPO region.
- **Principal Arterials** provide high mobility to major metropolitan areas, provide intra-area travel, and allow for mobility to adjacent land uses.
- **Minor Arterials** are for moderate length trips, serve geographies smaller than principal arterials, and provide direct connections to the higher arterial system.
- **Collectors** are designed to collect traffic from local roads and deliver it to the nearest arterial. Collectors do not accommodate long-distance travel. Collector roads outside urban areas are further classified into "major collector" and "minor collector" designations.



Local streets and roads are an additional classification outside the federal functional classification system; these facilities are designed to have high accessibility and functionality for all users and modes. Local roads connect to collector and arterial roads and typically not used for through traffic or long-distance travel.

1 FHWA, ***Highway Functional Classification Concepts, Criteria and Procedures***.

Figure 10: The AAMPO's Functionally Classified Streets and Roads



AMES CONNECT2050

NATIONAL HIGHWAY SYSTEM

The National Highway System (NHS) is a federally designated system of highway routes that are critical to the nation's economy, defense, and mobility needs. Designation as an NHS route results from coordination among FHWA, state and local governments, and metropolitan planning organizations (MPO). Eligibility for certain federal funding programs is contingent on inclusion in the NHS classification of national and state highways.

The NHS comprises five subsystems:[2]

- **Interstate:** Eisenhower Interstate System of Highways
- **Other NHS Routes:** Highways in rural and urban areas that provide access between an arterial and major port, public transportation facility, or other intermodal facility
- **Strategic Highway Network:** Network of highways that are important to the United States strategic defense policy and that provide access, continuity, and emergency capabilities
- **Major Strategic Highway Network Connectors:** Highways providing access between major military installations and highways that are part of the Strategic Highway Network
- **Intermodal Connectors:** Highways that provide access between major intermodal facilities and the other four NHS subsystems

There are currently several NHS routes in the AAMPO region, as shown in **Table 7.**

Table 7: NHS Routes, AAMPO Region

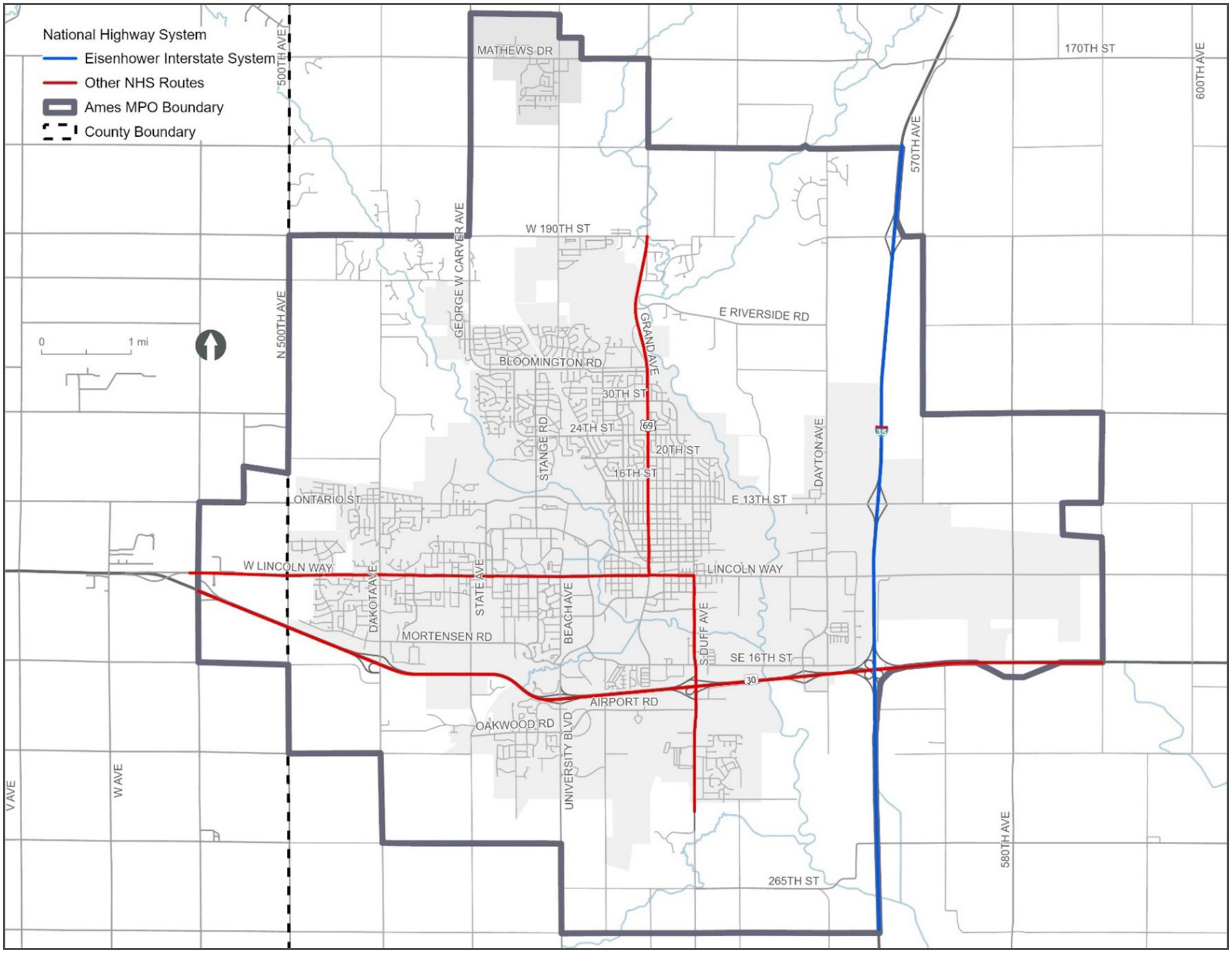
Route	NHS Subsystem
I-35	Eisenhower Interstate System
U.S. 30	Other NHS Routes
U.S. 69	Other NHS Routes
Lincoln Way	Other NHS Routes

Note: U.S. 69 = U.S. Highway 69

Figure 11 shows the AAMPO's streets and roadways included in the NHS.

2 FHWA, ***National Highway System***.

Figure 11: NHS Routes, AAMPO Region



SYSTEM SAFETY

FEDERAL SAFETY PERFORMANCE MEASURES

The AAMPO documents safety performance per federal performance management reporting requirements. The AAMPO is also responsible for setting safety performance targets; it may also opt to support safety performance targets identified by Iowa DOT. The AAMPO currently supports Iowa DOT's statewide safety targets, which are shown in **Table 8**.

Table 8: Safety Targets (Adopted September 2024)

Performance Measure	Five-Year Rolling Average	
	2019–2023 Baseline	2021–2025 Target
Number of fatalities	350.2	365.8
Fatality rate per 100 million vehicle miles traveled	1.070	1.085
Number of serious injuries	1,378.4	1,496.1
Serious injury rate per 100 million vehicle miles traveled	4.208	4.391
Non-motorized fatalities and serious injuries	142.2	148.4

Source: The AAMPO

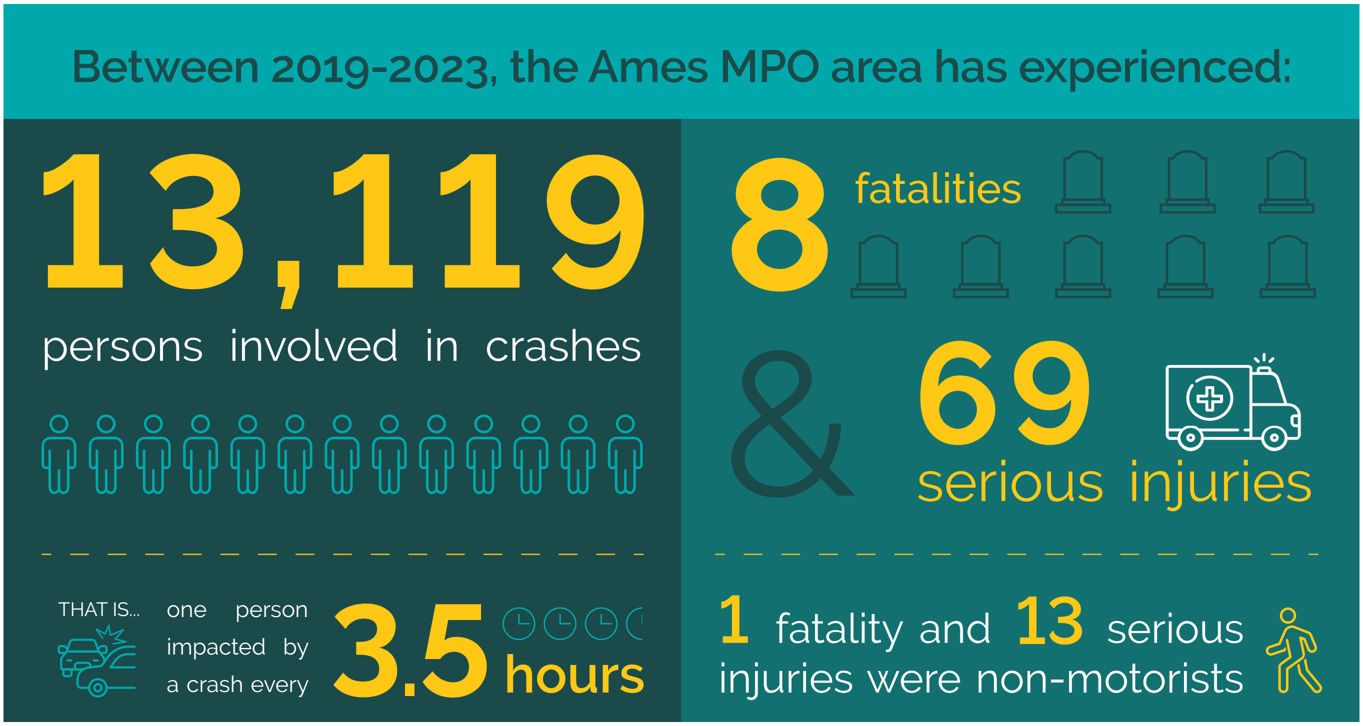
AAMPO COMPREHENSIVE SAFETY ACTION PLAN

The AAMPO is currently developing a regional Comprehensive Safety Action Plan[3] (CSAP) funded through the federal Safe Streets and Roads for All program to identify safety projects and strategies that could reduce or eliminate fatal and serious injuries and save lives through a data-driven approach.

The AAMPO has initiated the CSAP study in tandem with the 2050 MTP update to provide a synergistic process in which MTP and CSAP findings support one another. The existing safety conditions conducted as part of the CSAP effort inform the existing safety conditions for the 2050 MTP update. **Figure 12** shows key safety findings for the AAMPO region based on 2019 through 2023 crash data from Iowa DOT.

3 The AAMPO, ***Comprehensive Safety Action Plan***

Figure 12: Key Safety Findings, The AAMPO Region, 2019–2023



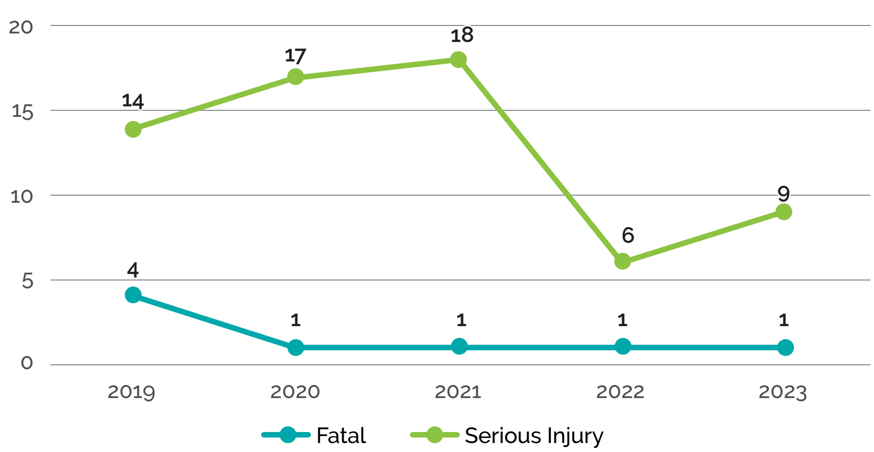
Source: Iowa DOT, Iowa Crash Analysis Tool.

FATAL AND SERIOUS INJURY CRASHES

The safety analysis conducted as part of the CSAP effort seeks to understand factors influencing fatal and serious injury crashes in the AAMPO region. As such, the summary of existing safety conditions in the following sections focuses on these crash types.

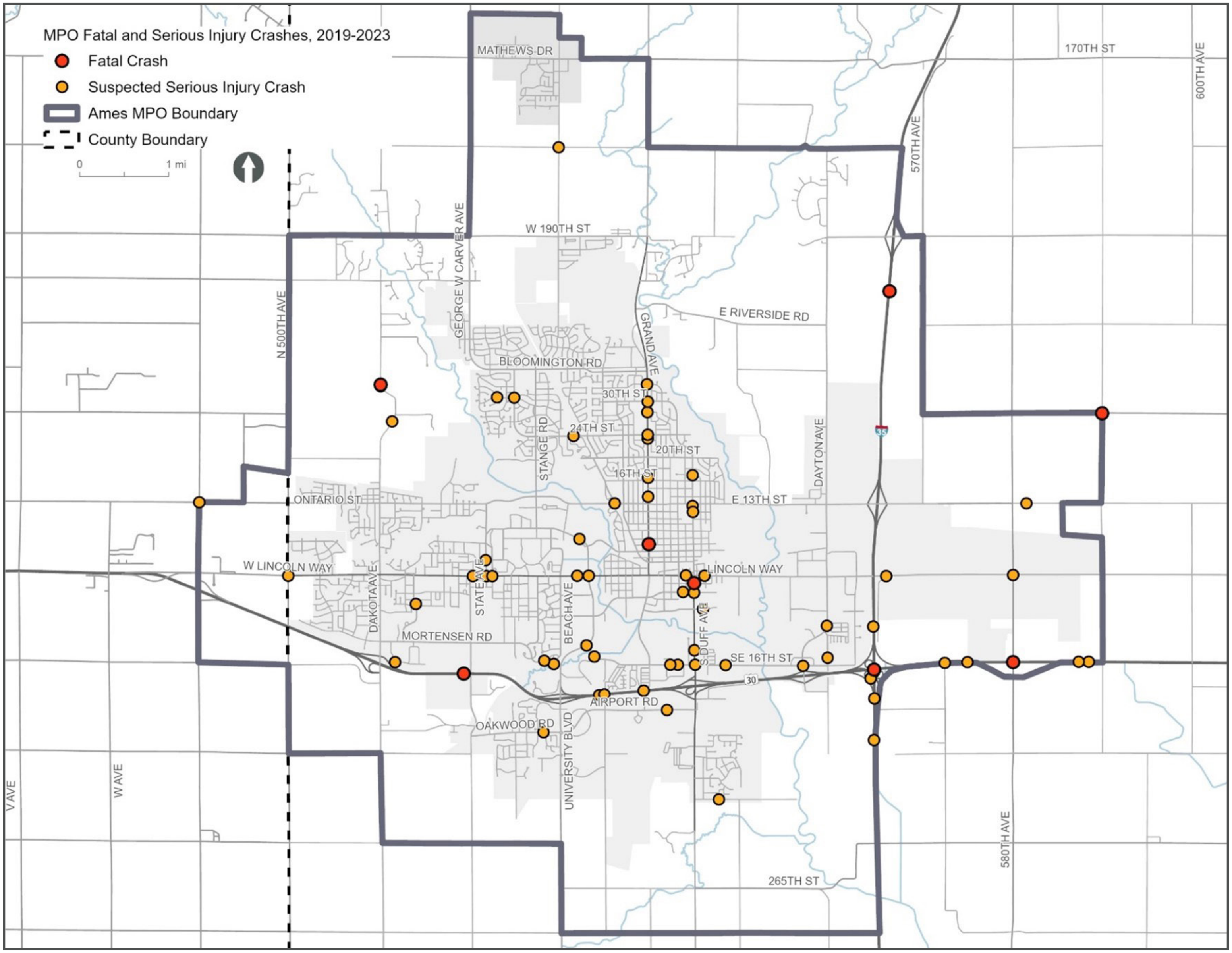
Overall, 72 crashes resulting in fatal or serious injuries occurred in the AAMPO region between 2019 and 2023. **Figure 13** shows fatal and serious injury crashes by year, while the crash locations are shown in **Figure 14**.

Figure 13: Fatal and Serious Injury Crashes by Year, 2019–2023



Source: Iowa DOT, Iowa Crash Analysis Tool

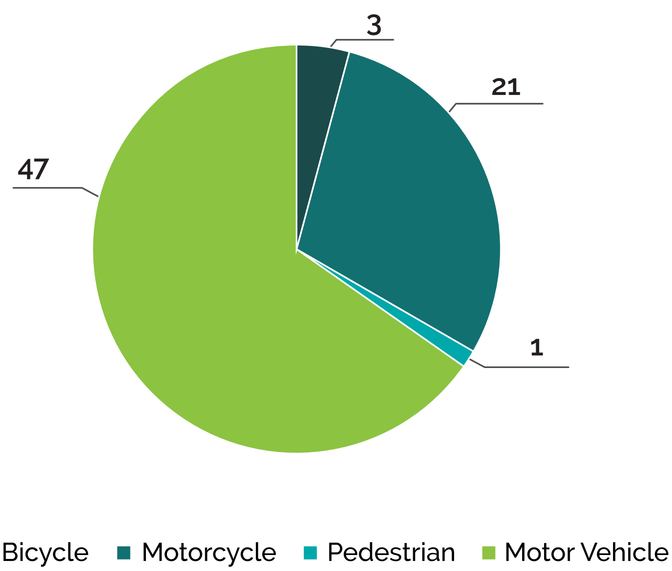
Figure 14: Fatal and Serious Injury Crashes by Location, 2019–2023



Fatal and Serious Injury Crashes by Mode

Further review of the fatal and serious injury crashes occurring between 2019 and 2023 looked at the breakdown of these crash types by mode. **Figure 15** shows the fatal and serious injury crashes involving bicyclists, motorcyclists, pedestrians, and motor vehicles. Overall, most fatal and serious injury crashes involved motor vehicles, while the second most common mode involved motorcyclists. Fatal and serious injury crashes involving pedestrians and bicyclists totaled 3 and 1, respectively. Crashes involving motorcycles, pedestrians, and bicyclists may require design mitigation for the transportation system to protect more vulnerable users with fewer layers of protection (no airbags or crumple zones like on a motor vehicle).

Figure 15: Fatal and Serious Injury Crashes by Mode, 2019–2023



Source: Iowa DOT, Iowa Crash Analysis Tool.

Fatal and Serious Injury Crashes – Emphasis Areas

Crash events, particularly fatal and severe crashes, often exhibit consistent presence of risk factors despite high levels of variation in time and space. Existing fatality and serious injury crashes were reviewed for the presence of these contributing risk factors and the highest propensity risk factors will be a focus of the future safety strategies. **Table 9** summarizes the emphasis areas pertinent to recent crash patterns in Ames.

Table 9: Safety Emphasis Areas, The AAMPO Region

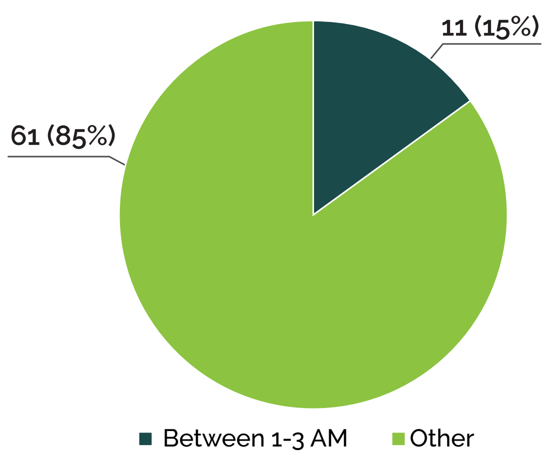
Crash Type	Percent
Intersection crashes	47% (34 of 72)
Single vehicle crashes	47% (34 of 72)
Lane departure crashes	31% (22 of 72)
Motorcycle crashes	29% (21 of 72)
Distracted driving crashes	21% (15 of 72)
Speed-related crashes	14% (10 of 72)
Impaired driving crashes	11% (8 of 72)
Crashes with occupant protection (seat belts)	22% (16 of 72)
Evening crashes (5 to 8 p.m.)	25% (18 of 72)
Late night crashes (1 to 3 a.m.)	15% (11 of 72)

Fatal and Serious Injury Crashes – Time of Day

One important factor that can influence crash events is time of day; roadway conditions during low-light hours can cause an increase in crashes compared to daylight hours. An additional factor that can influence time-of-day crash statistics is increased traffic levels during peak traffic volume periods, such as the morning and evening commute periods.

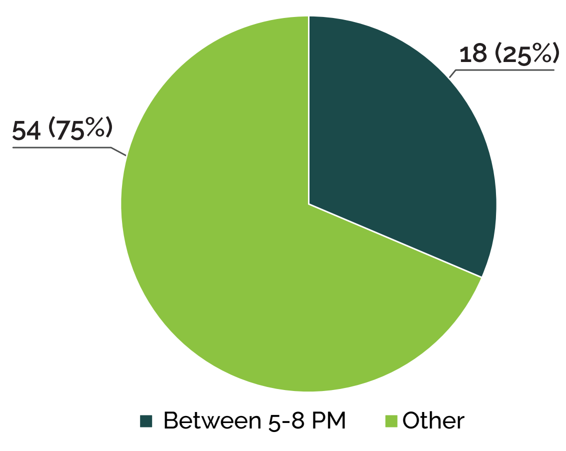
Figure 16 and **Figure 17** show the number of fatal and serious injury crashes occurring between 1 and 3 a.m. and 5 and 8 p.m., respectively. Between 2019 and 2023, 11 crashes resulting in fatal or serious injury in the AAMPO region were recorded between 1 and 3 a.m., while 18 fatal or serious injury crashes occurred between 5 and 8 p.m.

Figure 16: Fatal and Serious Injury Crashes Between 1 and 3 a.m., 2019–2023



Source: Iowa DOT, Iowa Crash Analysis Tool.

Figure 17: Fatal and Serious Injury Crashes Between 5 and 8 p.m., 2019–2023

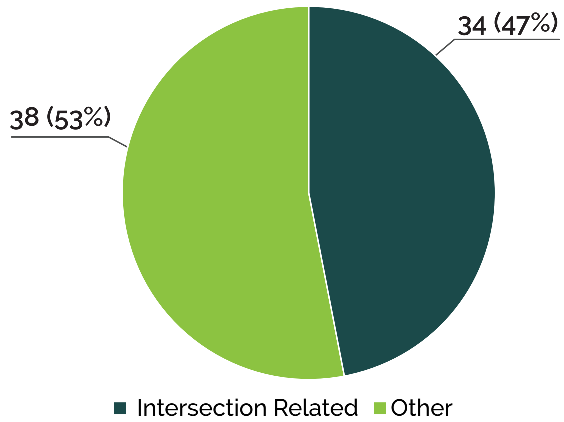


Source: Iowa DOT, Iowa Crash Analysis Tool

Fatal and Serious Injury Crashes – Intersection Related

Crashes that occur at intersections can highlight systemic and/or location-specific design factors influencing crash events. Regarding fatal and serious injury crashes that occurred in the AAMPO region, roughly 53% were not considered "intersection related" as shown in **Figure 18**.

Figure 18: Intersection-Related Fatal and Serious Injury Crashes, 2019–2023

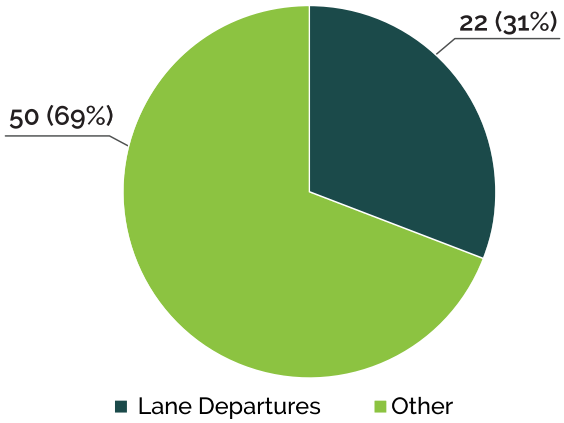


Source: Iowa DOT, Iowa Crash Analysis Tool.

Fatal and Serious Injury Crashes – Lane Departure

Lane departure refers to crashes that occur after a vehicle crosses an edge or centerline. These crash types can result in severe crashes, especially when a vehicle departs its travel lane into opposing lanes of traffic, potentially causing head-on collisions. In the AAMPO region, 22 fatal and serious injury crashes that occurred between 2019 and 2023 involved a lane departure, as shown in **Figure 19**.

Figure 19: Lane Departure Fatal and Serious Injury Crashes, 2019–2023

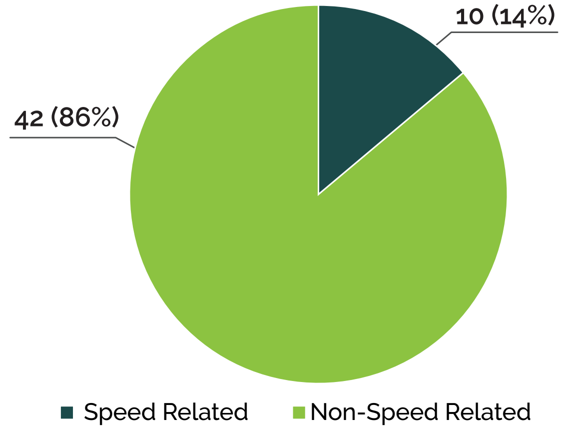


Source: Iowa DOT, Iowa Crash Analysis Tool.

Fatal and Serious Injury Crashes – Speed Related

Speeding is a major factor that influences the severity of crashes. In the AAMPO region, 10 fatal and serious injury crashes that occurred between 2019 and 2023 were speed related, as shown in **Figure 20**.

Figure 20: Speed-Related Fatal and Serious Injury Crashes, 2019–2023

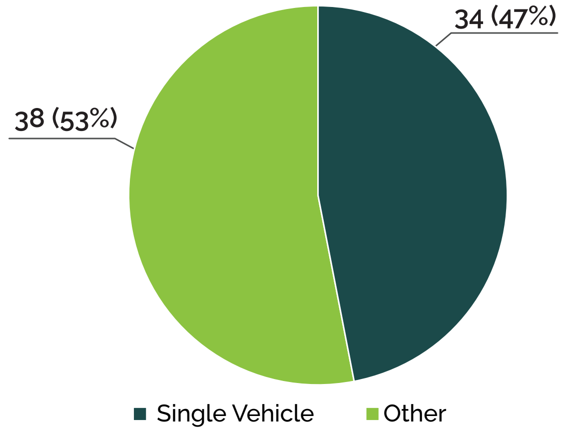


Source: Iowa DOT, Iowa Crash Analysis Tool.

Fatal and Serious Injury Crashes – Single Vehicle Crashes

Single vehicle crashes are the result of a vehicle striking an object, such as a tree or light. In the AAMPO region, 34 fatal and serious injury crashes that occurred between 2019 and 2023 were single vehicle crashes, as shown in **Figure 21**.

Figure 21: Single Vehicle Fatal and Serious Injury Crashes, 2019–2023

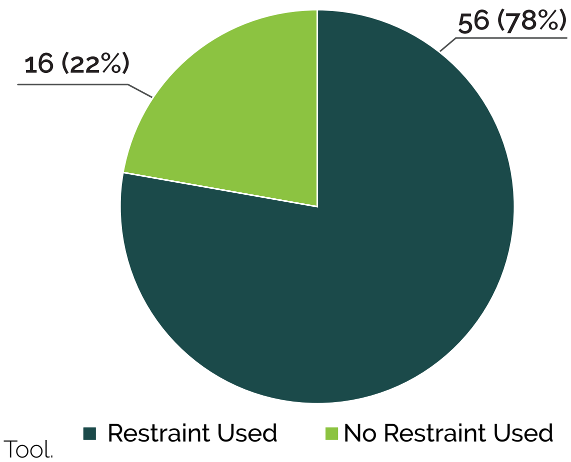


Source: Iowa DOT, Iowa Crash Analysis Tool.

Fatal and Serious Injury Crashes – Protection Worn

"Protection worn" refers to whether vehicle occupants involved in a crash used seat belts or other protective restraints. In the AAMPO region, 16 fatal and serious injury crashes that occurred between 2019 and 2023 involved occupants who did not use seat belts or other restraints, as shown in **Figure 22**.

Figure 22: Protection Worn Fatal and Serious Injury Crashes, 2019–2023

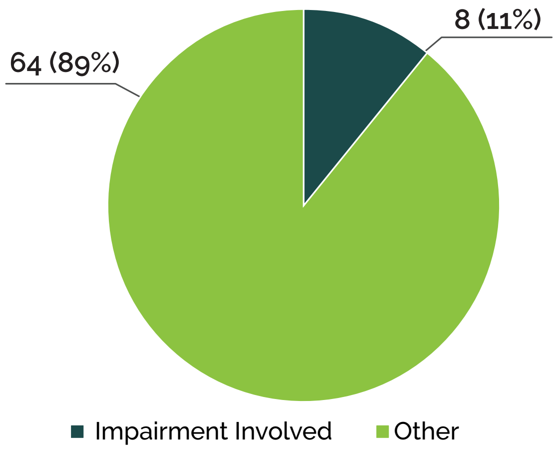


Source: Iowa DOT, Iowa Crash Analysis Tool.

Fatal and Serious Injury Crashes – Impairment Involved

Impaired driving has long been recognized as a substantial safety risk, and enforcement efforts to curb this risk have sought to reduce crashes resulting from operating under the influence of legal and illicit substances. In the AAMPO region, 8 fatal and serious injury crashes that occurred between 2019 and 2023 resulted from impaired driving, as shown in **Figure 23**.

Figure 23: Impairment-Involved Fatal and Serious Injury Crashes, 2019–2023

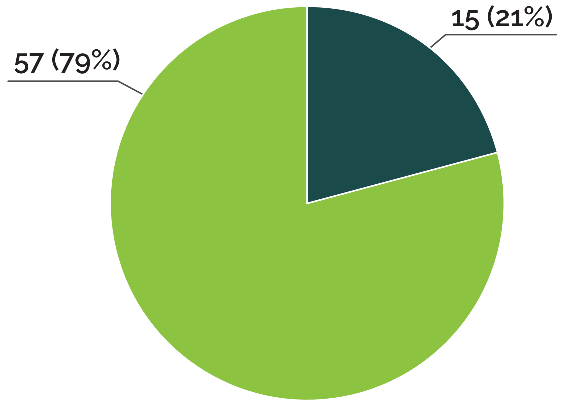


Source: Iowa DOT, Iowa Crash Analysis Tool.

Fatal and Serious Injury Crashes – Distracted Driving

Crashes resulting from distracted driving have substantially risen in frequency owing to smartphones and other devices used by vehicle operators and can pose safety risks as serious as impaired driving. In the AAMPO region, 15 fatal and serious injury crashes that occurred between 2019 and 2023 resulted from impaired driving, as shown in **Figure 24**.

Figure 24: Distracted Driving Fatal and Serious Injury Crashes, 2019–2023



Source: Iowa DOT, Iowa Crash Analysis Tool.

THE AAMPO REGION'S PERFORMANCE – SAFETY

The AAMPO's current performance toward the 2- and 4-year targets for the region's safety performance measures is summarized in **Table 10**. Note that the 2019 to 2023 baseline and 2021 to 2025 targets represent statewide performance, whereas the AAMPO's 2019 to 2023 performance is for the MPO area only.

As **Table 10** shows, the Ames area had 1.6 annual fatalities and 12.8 annual serious injuries during the five-year period. The table also shows that current baseline data for statewide fatal and serious injury crashes and crash rates are below targets for 2021-2025. During the 2019 to 2023 time period, the AAMPO region recorded a five-year average of 0.8 non-motorized fatal and serious injury crashes; again, this result reflects performance of the MPO region only whereas the 2019 to 2023 baseline and 2021 to 2025 target levels reflect non-motorized fatal and serious injury crashes for the state of Iowa.

Table 10: The AAMPO's Progress Toward the Region's Safety Performance Targets

Performance Measure	Five Year Rolling Averages		
	AAMPO's 2019–2023 Performance	2019–2023 Baseline	2021–2025 Target
Number of fatalities	1.6	350.2	365.8
Fatality rate per 100 million vehicle miles traveled	0.42	1.070	1.085
Number of serious injuries	12.8	1,378.4	1,496.1
Serious injury rate per 100 million vehicle miles traveled	3.47	4.208	4.391
Non-motorized fatalities and serious injuries	0.8	142.2	148.4

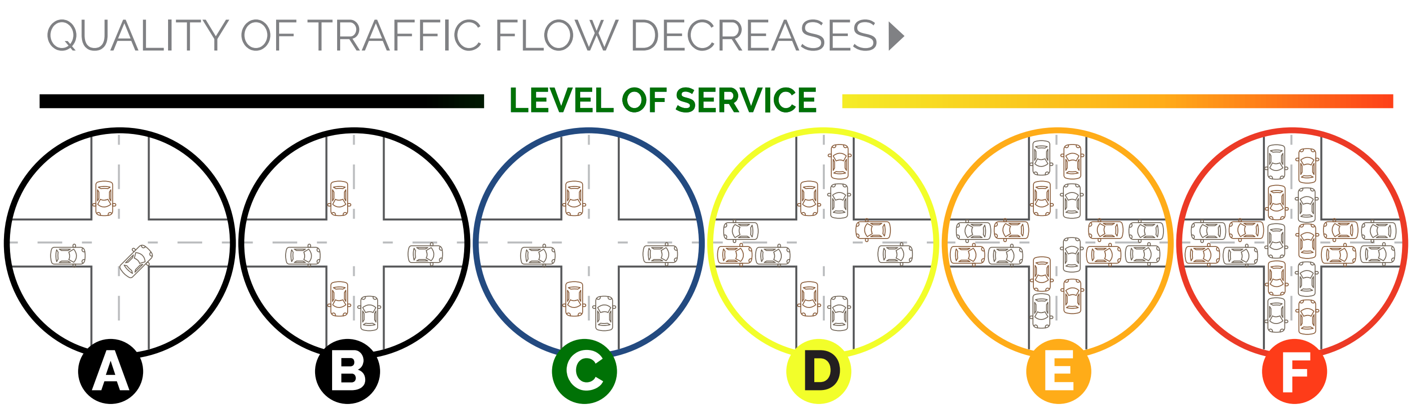
TRAFFIC OPERATIONS

Baseline traffic operations for the streets and roads network in the AAMPO region were assessed through two different approaches, peak period intersection level of service (LOS) and travel reliability, with the goal of understanding how congestion and vehicle delays are impacting the region's traffic operations. Peak period intersection LOS was obtained through analysis using Synchro 12 software, replicating the Highway Capacity Manual 7th Edition methodology for unsignalized intersections, and Synchro's methodology for control delay at signalized intersections, which incorporates gap acceptance for turning traffic queue delay from adjacent intersections.

PEAK PERIOD TRAFFIC OPERATIONS

Baseline traffic operations for the streets and roads network in the AAMPO region were analyzed using an intersection delay approach that reviewed 80 signalized intersections in the area and 19 additional unsignalized intersection locations that include all-way stop-controlled and two-way stop-controlled intersections and roundabouts. The purpose of the analysis was to estimate the seconds of delay experienced by vehicular traffic during the peak hour PM travel period; from the estimated delay, each intersection is assigned an LOS grade that ranges from "A" to "F." The thresholds for each LOS grade are shown in **Figure 25**.

Figure 25: Level of Service Thresholds for Intersections



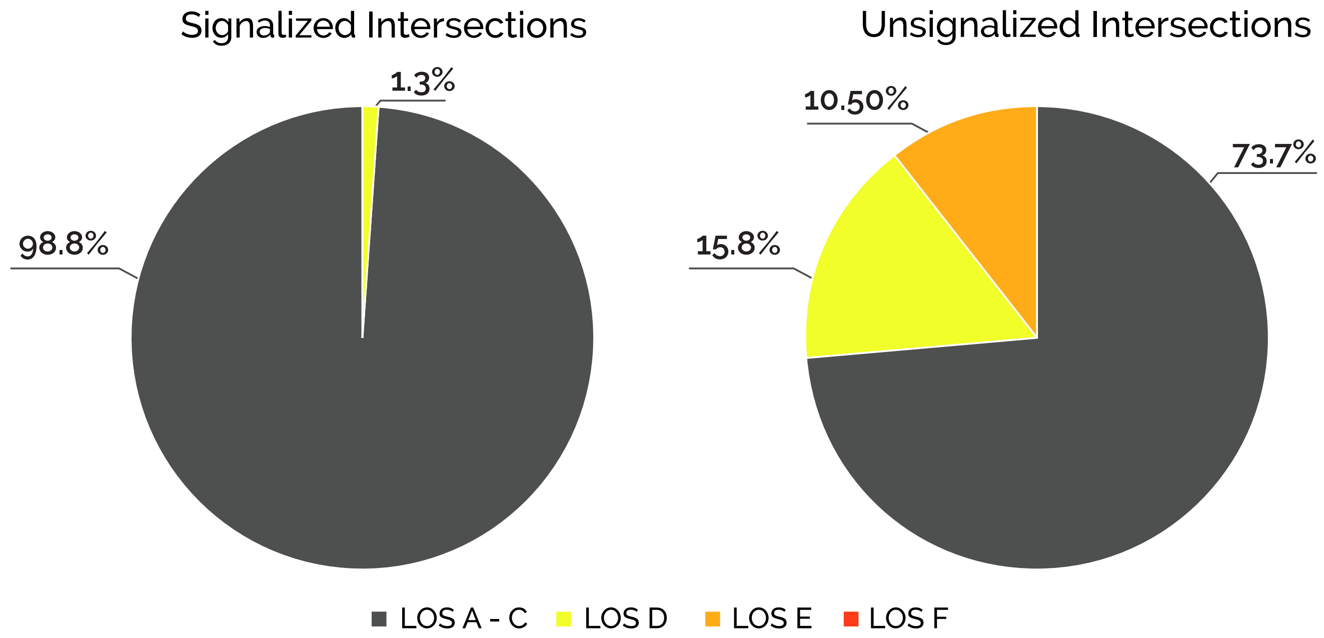
A	B	C	D	E	F
Highly stable, free-flow condition with little to no congestion	Stable, free-flow condition with little congestion	Free-flow condition with moderate congestion	Approaching unstable condition with increasing congestion	Unstable, congested condition	Stop and go condition
Intersection Delay: **Signalized: <10 seconds/vehicle**	Intersection Delay: **Signalized: 10-20 seconds/vehicle**	Intersection Delay: **Signalized: 20-35 seconds/vehicle**	Intersection Delay: **Signalized: 35-55 seconds/vehicle**	Intersection Delay: **Signalized: 35-55 seconds/vehicle Unsignalized:**	Intersection Delay: **Signalized: >80 seconds/vehicle Unsignalized: >50 seconds/vehicle**

The LOS results for signalized and unsignalized intersections are shown in **Table 11.** Note that the estimated delay for unsignalized intersections reflects the worst-case approach.

Table 11: Signalized and Unsignalized Intersections by Estimated Level of Service

Intersection Level of Service	Signalized Intersections	Unsignalized Intersections
LOS A to C	79	14
LOS D	1	3
LOS E	0	2
LOS F	0	0
Total	**80**	**19**

Figure 26: Percent of Signalized and Unsignalized Intersections by Level of Service

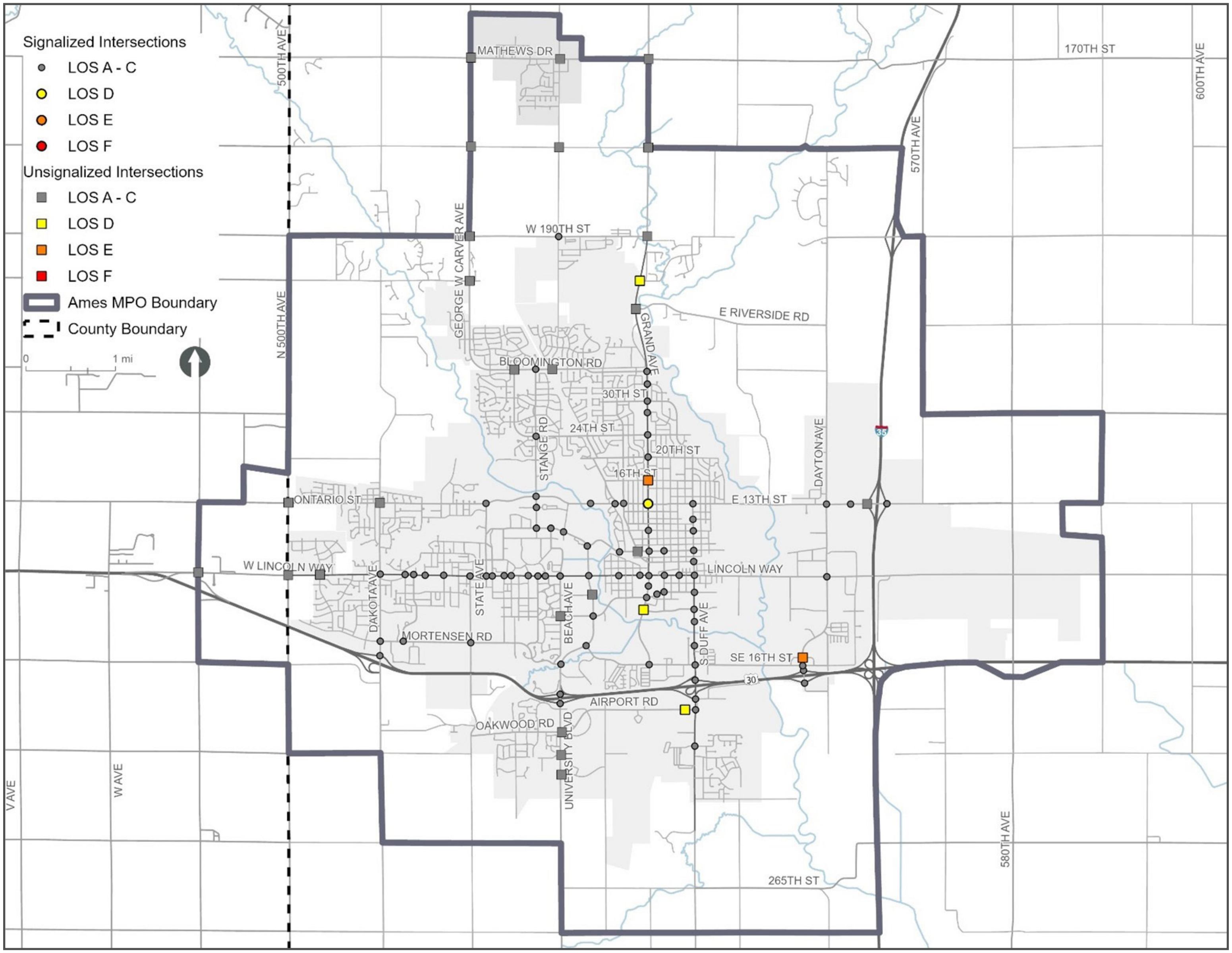


Signalized and unsignalized intersections that currently operate at LOS D or worse are listed in **Table 12**, while **Figure 27** shows their locations in the AAMPO region.

Table 12: Signalized/Unsignalized Intersections Operating at Level of Service D or Worse

Intersection Location	Level of Service	Context
S Grand Avenue and S 5th Street (two-way stop-controlled)	D	Limited gaps for westbound left-turning traffic to head south on Grand Avenue causes an LOS D on the westbound approach.
Grand Avenue and 13th Street (signalized intersection)	D	Split-phased signal in the northbound and southbound direction (needed for moderate left-turn volume) is inefficient for heavy through movements and creates long wait times, resulting in an LOS D.
U.S. 69 and Ada Hayden Access/ Arrasmith Trail (two-way stop-controlled)	D	Limited gaps for westbound left-turning traffic to head south on U.S. 69 causes an LOS D on the low-volume westbound approach.
Lowe's Access/Sam's Club Access and Airport Road (two-way stop-controlled)	D	Limited gaps for the heavy southbound left-turn movement due to heavy volumes on Airport Road results in a southbound approach LOS D.
Grand Avenue and 16th Street (two-way stop-controlled)	E	Limited gaps for the eastbound and westbound approaches to turn onto Grand Avenue due to heavy volumes on Grand Avenue results in an LOS E for the low-volume eastbound and westbound approaches.
S Dayton Avenue and Isaac Newton Drive (two-way stop-controlled)	E	Limited gaps for westbound left-turning traffic to head south on S Dayton Avenue causes an LOS E on the westbound approach.

Figure 27: Existing Intersection Planning Level of Service, PM Peak Hour



AMES CONNECT 2050

TRAVEL RELIABILITY

"Travel reliability" refers to the dependability and consistency of the region's streets and roadways network to allow travelers to reach their destination. Reliability is an important measure in evaluating the impact of congestion and delays on vehicular traffic and trip planning.

This method of analyzing traffic operations contrasts with the LOS approach because it emphasizes an understanding of how travel times vary along a specific corridor. A corridor that experiences recurring congestion during peak hour travel periods can still be considered reliable if travelers can easily predict this delay and adjust their travel routes accordingly. Where the LOS approach seeks to identify specific locations and corridors where congestion occurs daily, reliability seeks to understand which corridors are demonstrating consistency in travel times and which are not.

Existing reliability of the AAMPO's streets and roadways network was reviewed using these metrics:

- **Level of Travel Time Reliability (LOTTR):** Describes travel reliability conditions for passenger vehicles
- **Truck Time Reliability Index (TTTR):** Describes travel reliability conditions for freight vehicles

Reliability data was sourced from The National Performance Management Research Data Set (NPMRDS), which is a vehicle probe-based travel time dataset acquired by FHWA.

Federal System and Freight Reliability Performance Measures

The AAMPO documents LOTTR and TTTR performance for the Interstate and non-Interstate NHS per federal performance management reporting requirements. The AAMPO is also responsible for setting reliability performance targets, or it can opt to support reliability performance targets identified by Iowa DOT for the state's Interstate and non-Interstate NHS routes under its jurisdiction. The AAMPO currently supports Iowa DOT's reliability targets, which are shown in **Table 13**.

Table 13: System and Freight Reliability Targets (Adopted January 2023)

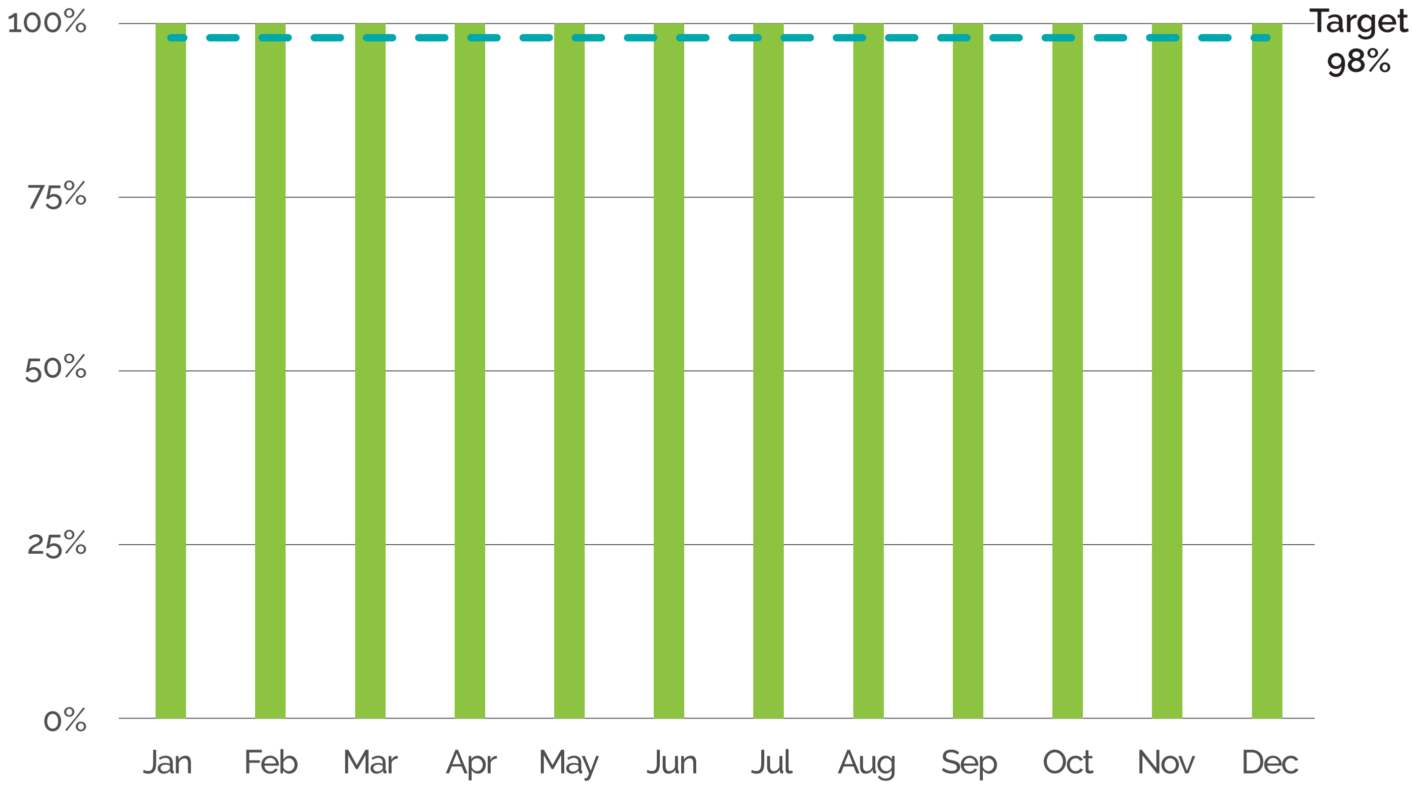
Performance Measure	2021 Baseline	2-Year Target	4-Year Target
Reliable person miles traveled on the Interstate	99.9%	98.0%	98.0%
Reliable person miles traveled on the non-Interstate NHS	96.5%	94.0%	94.0%
TTTR Index	1.13	1.25	1.25

Source: The AAMPO

Interstate and Non-Interstate NHS Reliability

Figure 28 shows the percentage of person miles traveled that were reliable by month for the AAMPO's Interstate routes in 2023. For the Interstate system, the reliability target assumed is the 4-year target of 98.0% (as shown in **Table 13**) of reliable person miles traveled. As **Figure 28** shows, person miles traveled on the AAMPO's Interstate routes were 100% reliable during 2023, exceeding the target of 98% each month. Therefore, Interstate users in the AAMPO region can consistently anticipate delays along these routes and adjust travel plans accordingly.

Figure 28: Percent of Person Miles Traveled That Were Reliable by Month, Interstate System, 2023

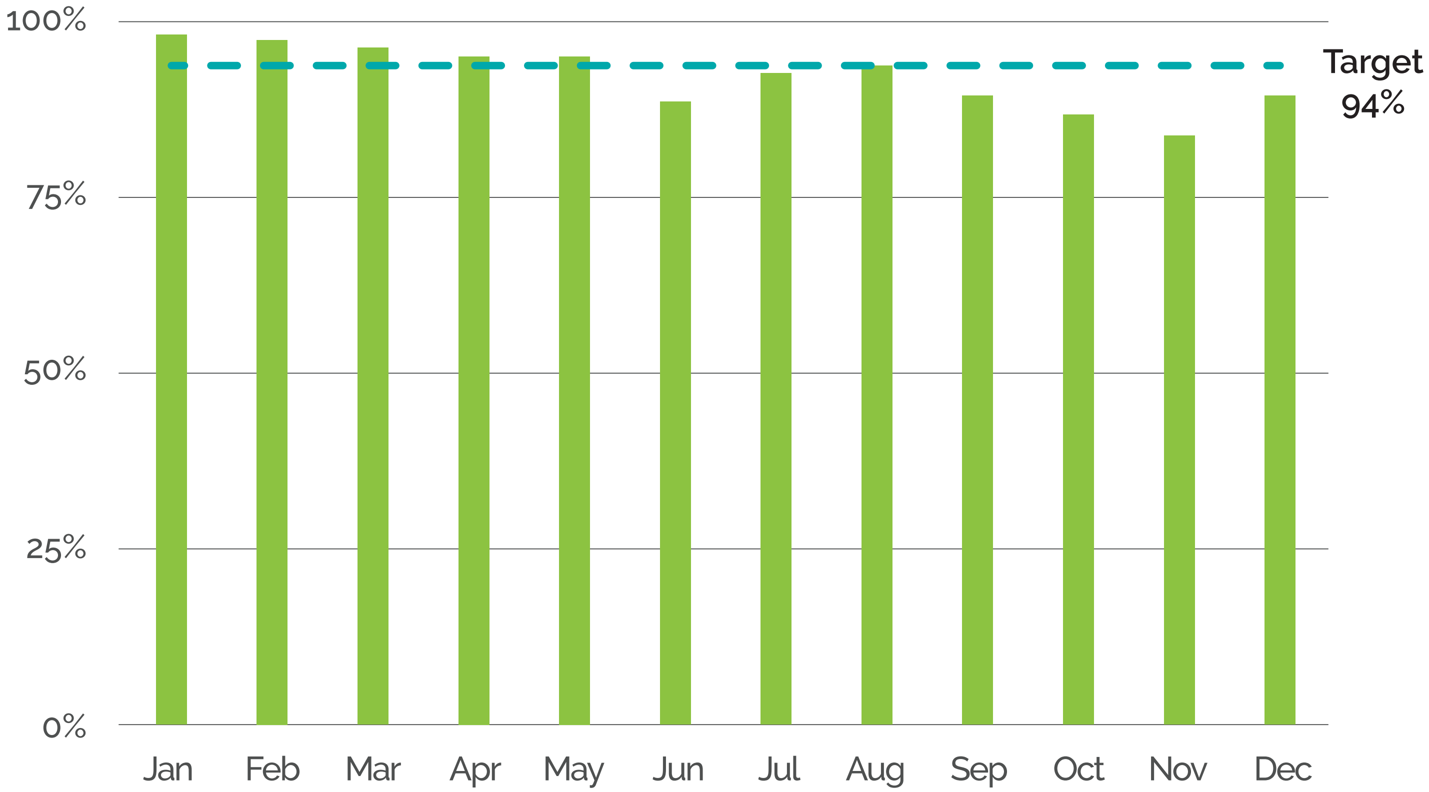


Source: National Performance Management Research Dataset 2023

Figure 29 shows the percentage of person miles traveled on the non-Interstate NHS, by month, that were considered reliable in 2023. For the non-Intestate NHS system, the reliability target assumed is the 4-year target of 94.0% (as shown in **Table 13**) of reliable person miles traveled.

Monthly travel reliability conditions for the non-Interstate NHS demonstrated more variation than the Interstate system, which can be attributed to a range of factors including winter driving conditions and road construction. Half of the months reached the AAMPO target of 94% of vehicle miles traveled as being reliable. The most reliable months were January, February, and March, while October, November, and December recorded the lowest percentages of reliable person miles traveled.

Figure 29: Percent of Person Miles Traveled That Were Reliable by Month, Non-Interstate NHS, 2023



Source: National Performance Management Research Dataset 2023

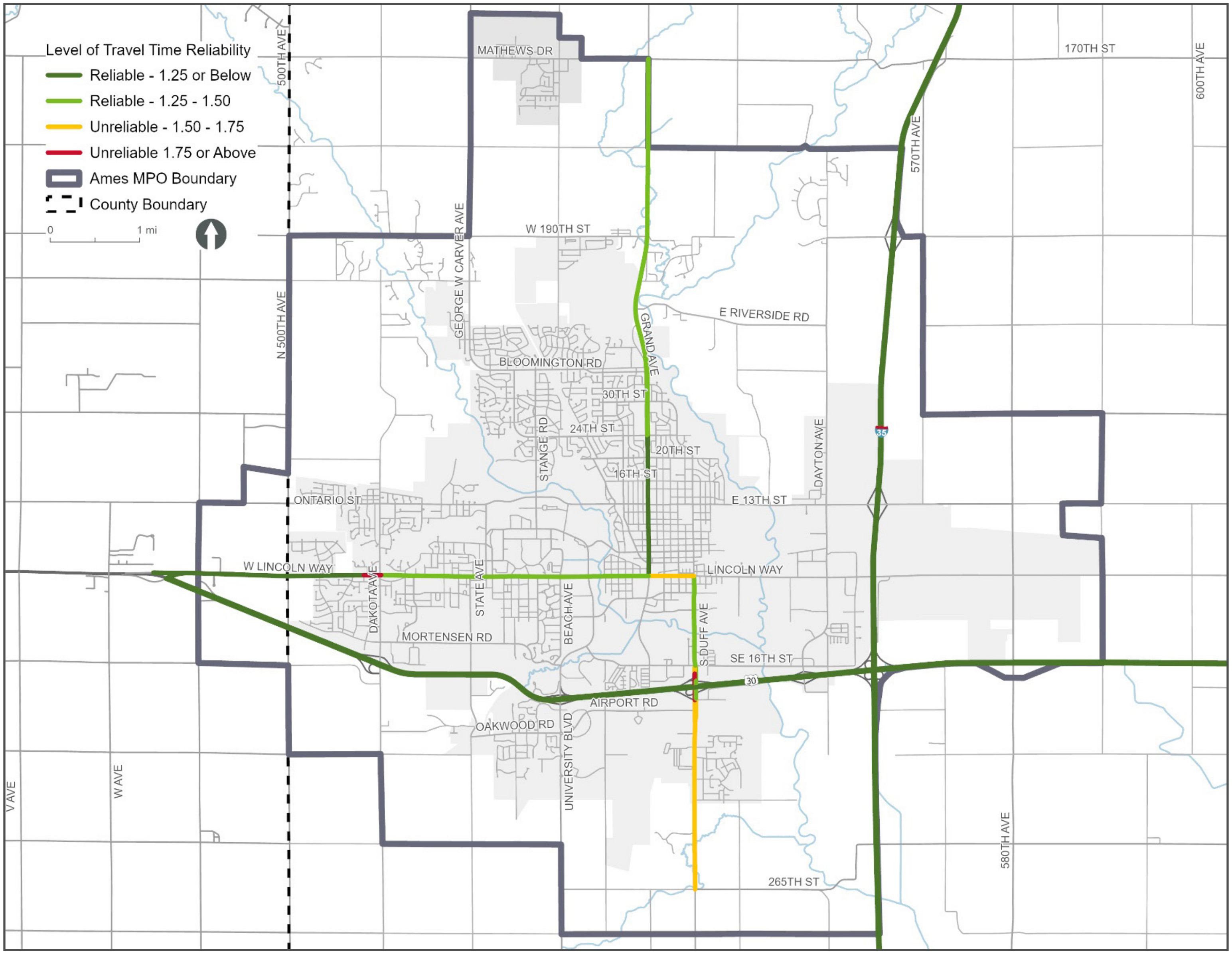
Level of Travel Time Reliability

Figure 30 shows the annual LOTTR results for the AAMPO Interstate and non-Interstate NHS based on the 2023 NPMRDS data. A LOTTR at or less than 1.5 is considered reliable, while anything more than 1.5 is considered unreliable.

The LOTTR for the I-35 corridor in the AAMPO region was less than 1.25, which supports the findings related to monthly person miles traveled shown in **Figure 28**. The AAMPO's non-Interstate NHS routes also supported the findings in **Figure 29** because they saw a substantially higher degree of variability when compared to the region's Interstate system routes. Most non-Interstate NHS segments have a LOTTR ranging between 1.25 to 1.50 and are considered reliable; however, several segments experienced a LOTTR of 1.5 or more in 2023. These corridors, and their worst LOTTR result, include the following:

- **S Duff Avenue**, from U.S. 30 to S 16thth Street; LOTTR of 1.87
- **E Lincoln Way**, from Grand Avenue to S Duff Avenue; LOTTR of 1.54
- **W Lincoln Way**, Alcott Avene to Dakota Avenue; LOTTR of 1.86

Figure 30: Passenger Level of Travel Time Reliability, Interstate and Non-Interstate NHS Routes



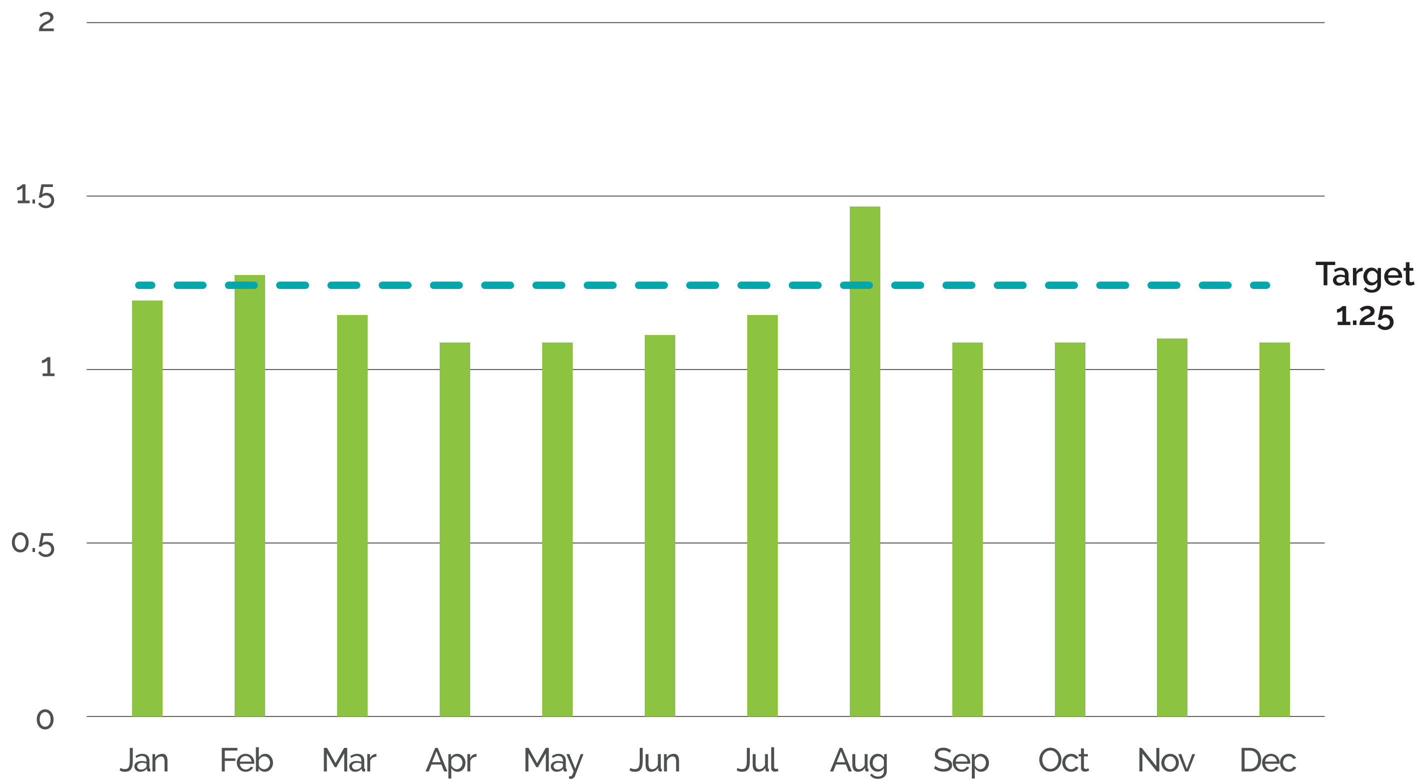
AMES CONNECT2050

Truck Time Reliability Index

The TTTR Index is serves as the measure of reliability for freight vehicles and is only reported for Interstate routes. The TTTR Index for the AAMPO's Interstate routes was calculated using NPMRDS data for the year 2023. The AAMPO's TTTR Index performance target supports the Iowa DOT-established target of 1.25 in determining the reliability of the AAMPO's Interstate routes for freight vehicles.

Figure 31 shows the monthly TTTR Index for the Interstate system in the AAMPO region for 2023. All of I-35 in the AAMPO region was less than the 1.25 target and is considered reliable in 2023, except for the months of February and August.

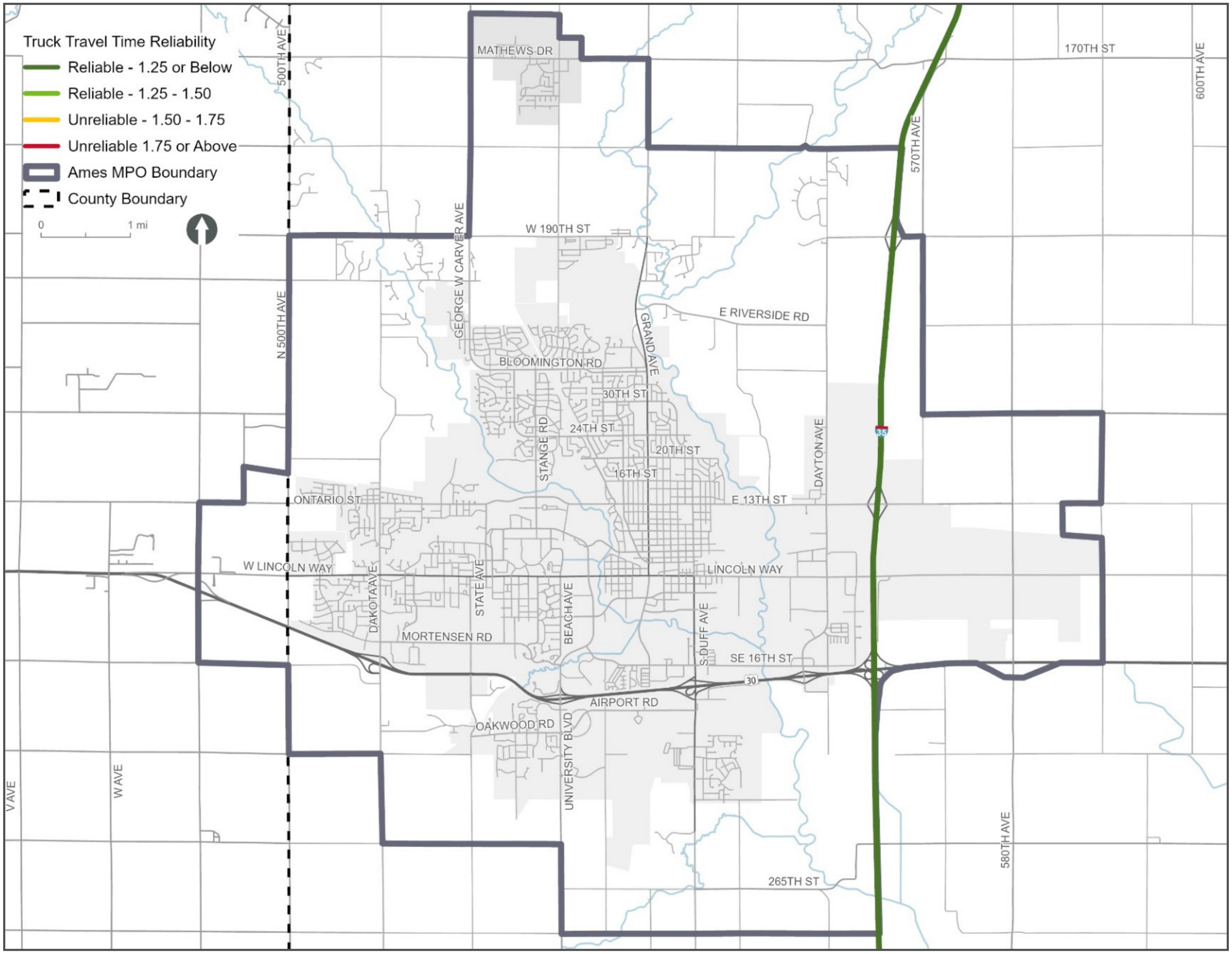
Figure 31: Monthly Truck Travel Time Reliability Index, Interstate System, 2023



Source: National Performance Management Research Dataset 2023

Figure 32 displays the annual TTTR Index performance for the AAMPO's interstate system for 2023.

Figure 32: Truck Travel Reliability Index, The AAMPO Region, 2023



THE AAMPO REGION'S PERFORMANCE – SYSTEM AND FREIGHT RELIABILITY

The AAMPO's current performance toward the 2- and 4-year targets for the region's system and freight reliability measures is summarized in **Table 14**. As **Table 14** shows, the percentage of reliable person miles traveled on the AAMPO's Interstate routes was 100% in 2023 which exceeds both the 2023 2-year and 2025 4-year targets of 98%. For reliable person miles traveled on the AAMPO's non-Interstate NHS routes in 2023, 92.2% were determined to be reliable, which falls short of the 2023 2-year and 2025 4-year targets of 94.0%.

The AAMPO's 2023 2-year and 2025 4-year freight reliability targets, reported for the Interstate only, are both 1.25. The 2023 NPMRDS data used to calculate the AAMPO's systemwide TTTR Index indicates a TTTR of 1.11, well below the 2- and 4-year targets set for the AAMPO region, demonstrating positive progress toward desired freight reliability performance.

Table 14: The AAMPO's Progress Toward the Region's System and Freight Reliability Performance Targets

Performance Measure	AAMPO Performance, 2023	2023 2 Year Target	2025 4 Year Target
Reliable person miles traveled on the Interstate	100.0%	98.0%	98.0%
Reliable person miles traveled on the non-Interstate NHS	92.2%	94.0%	94.0%
TTTR Index	1.11	1.25	1.25

PEAK HOUR SPEED REDUCTION

Peak hour speed reduction data provides an additional approach for understanding traffic operations and considers the decline in vehicle speeds observed during peak hour travel periods. Existing peak hour speed reductions for the AAMPO region were analyzed using Streetlight probe data for the year 2023. This data is reported in hourly intervals and was analyzed to identify the reduction in peak hour speeds, defined as 7 to 8 AM for the AM peak and 4 to 5 PM for the afternoon. Speed reductions were calculated for each segment by comparing the observed 50th percentile, or median speed, for each segment's AM and PM peak period condition to a typical off-peak free flow travel speed. The resulting speed reduction coefficient was used as the delay measure for peak hour speed reductions.

Figure 33 and **Figure 34** display the AM and PM peak hour speed reduction coefficients for the AAMPO's functional classification system. During the AM peak hour, I-35 and U.S. 30 travel speeds were shown to be within 75% of the free-flow speed, meaning these corridors are experiencing minimal recurring delays. Several corridors demonstrated reductions in speed between 60 and 75% compared to off-peak free flow speeds while the following locations saw reductions in AM speeds between 41 and 60%:

- **University Boulevard,** south approach at intersection with Collaboration Place
- **Mathews Drive,** intersection with Grant Avenue / 530th Avenue in Gilbert

The PM peak hour experiences similar delay patterns as the AM peak hour, with I-35 and U.S. 30 exhibiting minimal delay, while portions of major thoroughfares such as S Duff Avenue and Lincoln Way show speed reductions at or less than 60% of free-flow speeds. During the PM peak hour, the following corridors experiences delays between 41 and 60% compared to daily off-peak free flow speeds:

- **University Boulevard**, south approach at intersection with Collaboration Place
- **S Duff Avenue**, north approach at intersection with S 16th Street
- **S Duff Avenue**, at U.S. 30 south ramp terminal
- **Lincoln Way**, from S Hyland Avenue and S Sheldon Avenue
- **Lincoln Way**, from S Sheldon Avenue and Welch Avenue
- **Clark Avenue**, from Main Street to 6th Street
- **265th Street**, from U.S. 69 to 260th Street

Figure 33: AM Peak Hour Speed Reductions

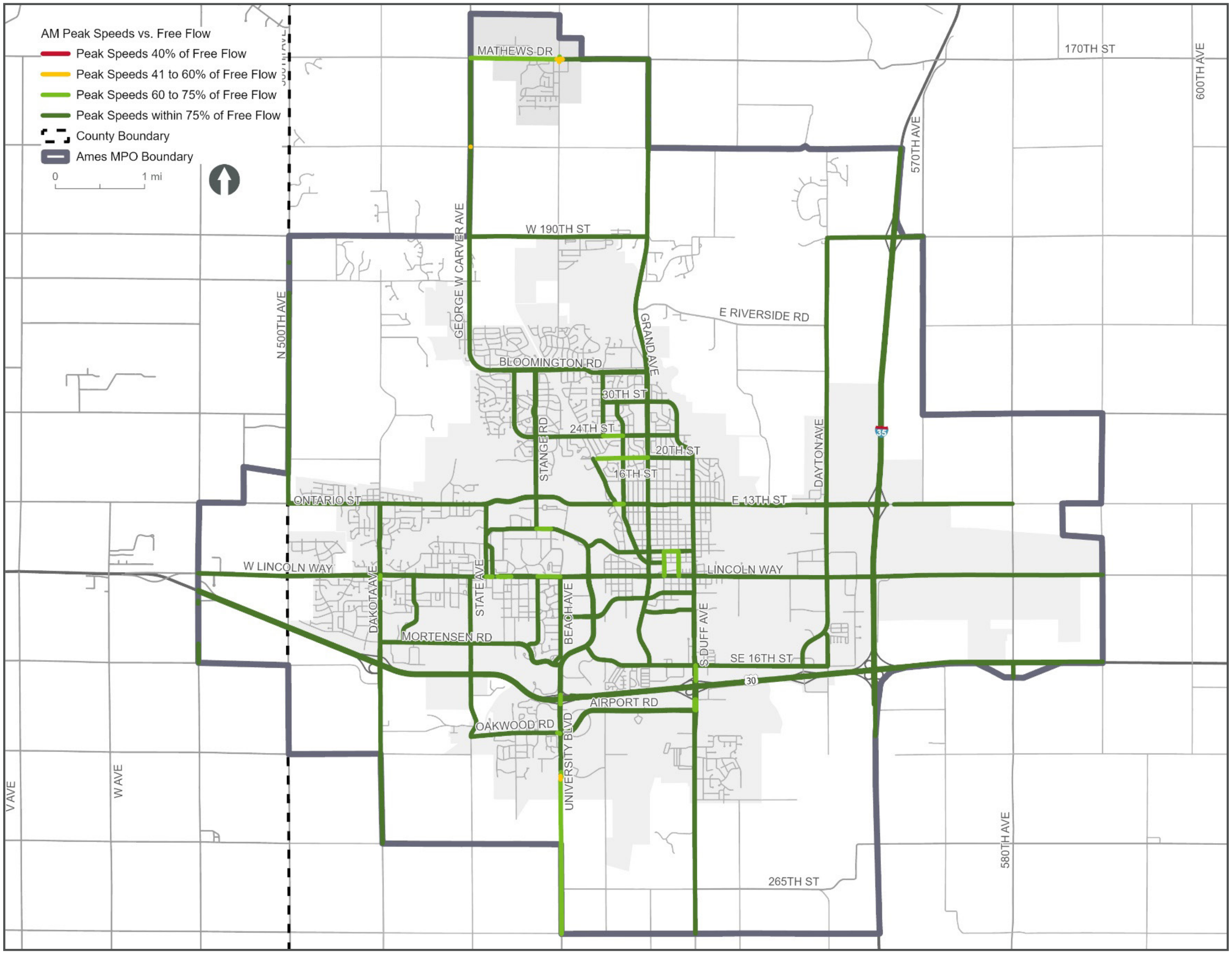
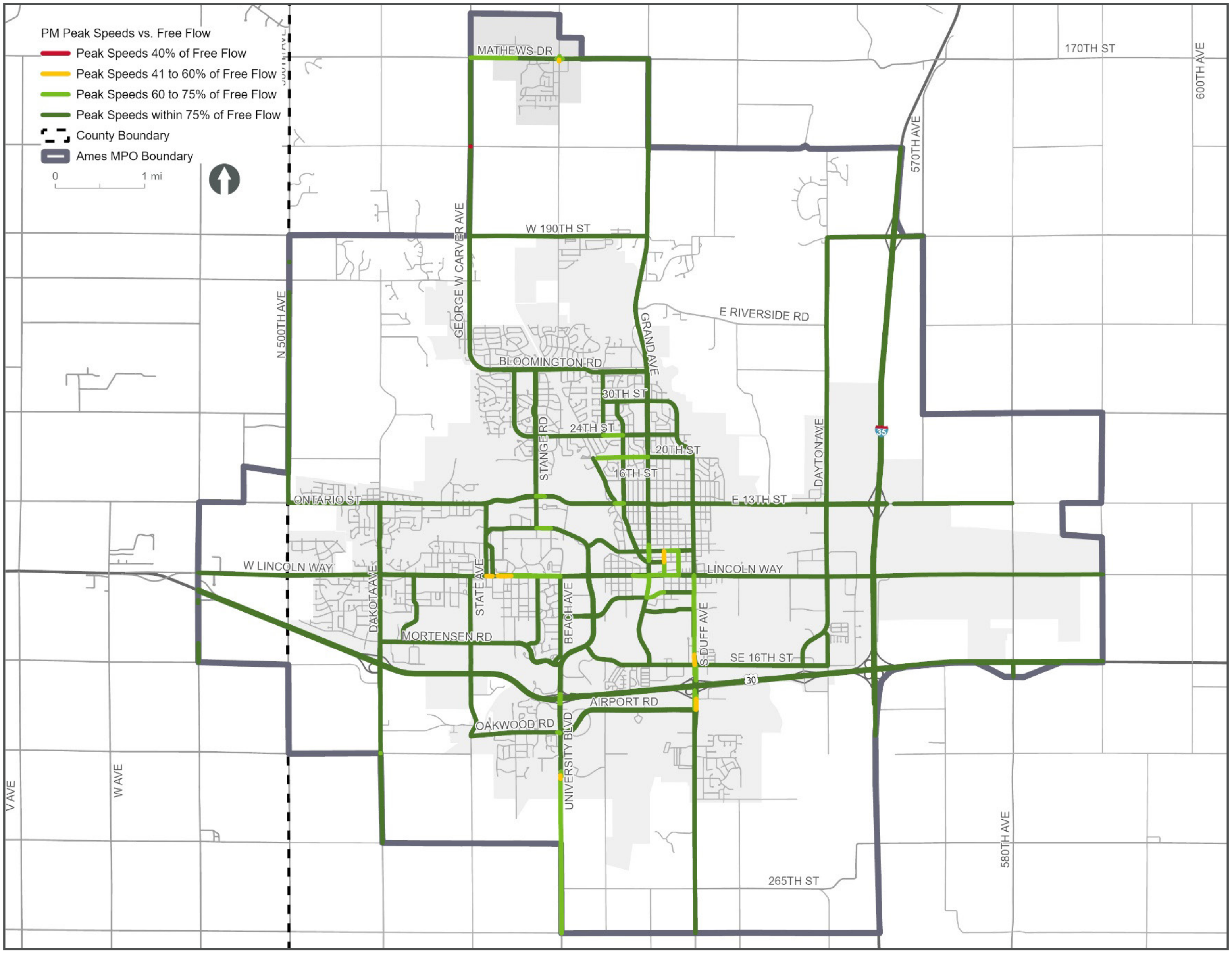


Figure 34: PM Peak Hour Speed Reductions



ASSET CONDITIONS

THE AAMPO'S BRIDGES

Federal Bridge Performance Measures

Monitoring bridge infrastructure conditions is crucial for state departments of transportation (DOT) and MPOs because maintaining and expanding bridge infrastructure demands substantial investment from both state and local sources. Bridges are essential components that enhance vehicle flow, especially in constrained areas, and their condition directly impacts the efficiency and reliability of local transportation networks.

FHWA mandates that state DOTs and MPOs report on the condition of all bridges located in their jurisdictions for the Interstate and non-interstate NHS. These performance measure requirements specify that the following conditions must be reported:

- Percent of NHS bridges by deck area in good condition
- Percent of NHS bridges by deck area in poor condition

The AAMPO documents bridge condition performance for the NHS on an annual basis per federal performance management reporting requirements. The AAMPO is also responsible for setting bridge condition performance targets, or it may opt to support bridge condition performance targets identified by Iowa DOT for the state's NHS routes under its jurisdiction. The AAMPO currently supports Iowa DOT's bridge condition targets, which are shown in **Table 15**.

Table 15: Bridge Condition Targets (Adopted March 2025)

Performance Measure	2021 Baseline	2-Year Target	4-Year Target
NHS bridges classified in Good condition	49.4%	52.5%	48.0%
NHS bridges classified in Poor condition	2.4%	5.0%	6.6%

Source: The AAMPO

Bridge Conditions

There are 66 bridges and culverts in the AAMPO region, with 24 of these bridges located on the NHS. **Figure 35** shows the bridge and culvert locations in the AAMPO region.

Table 16: The AAMPO Bridge Conditions

Bridge Ratings	NHS Bridges		Non-NHS Bridges		All AAMPO Bridges	
Good	8	33.30%	18	42.90%	26	39.40%
Fair	16	66.70%	21	50.00%	37	56.10%
Poor	0	0%	3	7.10%	3	4.50%
Total	24		42		66	

Source: FHWA, ***National Bridge Inventory***.

Table 16 summarizes the condition of the AAMPO's bridges. All NHS bridges are considered as being in at least Fair condition, and almost half of all bridges are in Good condition. Three bridges in the region were identified as being in poor condition:

- **590th Avenue:** North of U.S. 30. Structure is currently load posted.
- **Ken Maril Road:** Over the Skunk River. Structure is currently closed.
- **190th Street:** Over Ioway Creek. Structure is currently closed.

The bridges identified as being in Poor condition do not currently support critical travel needs of the AAMPO region; there are no current plans to replace or rehabilitate these structures.

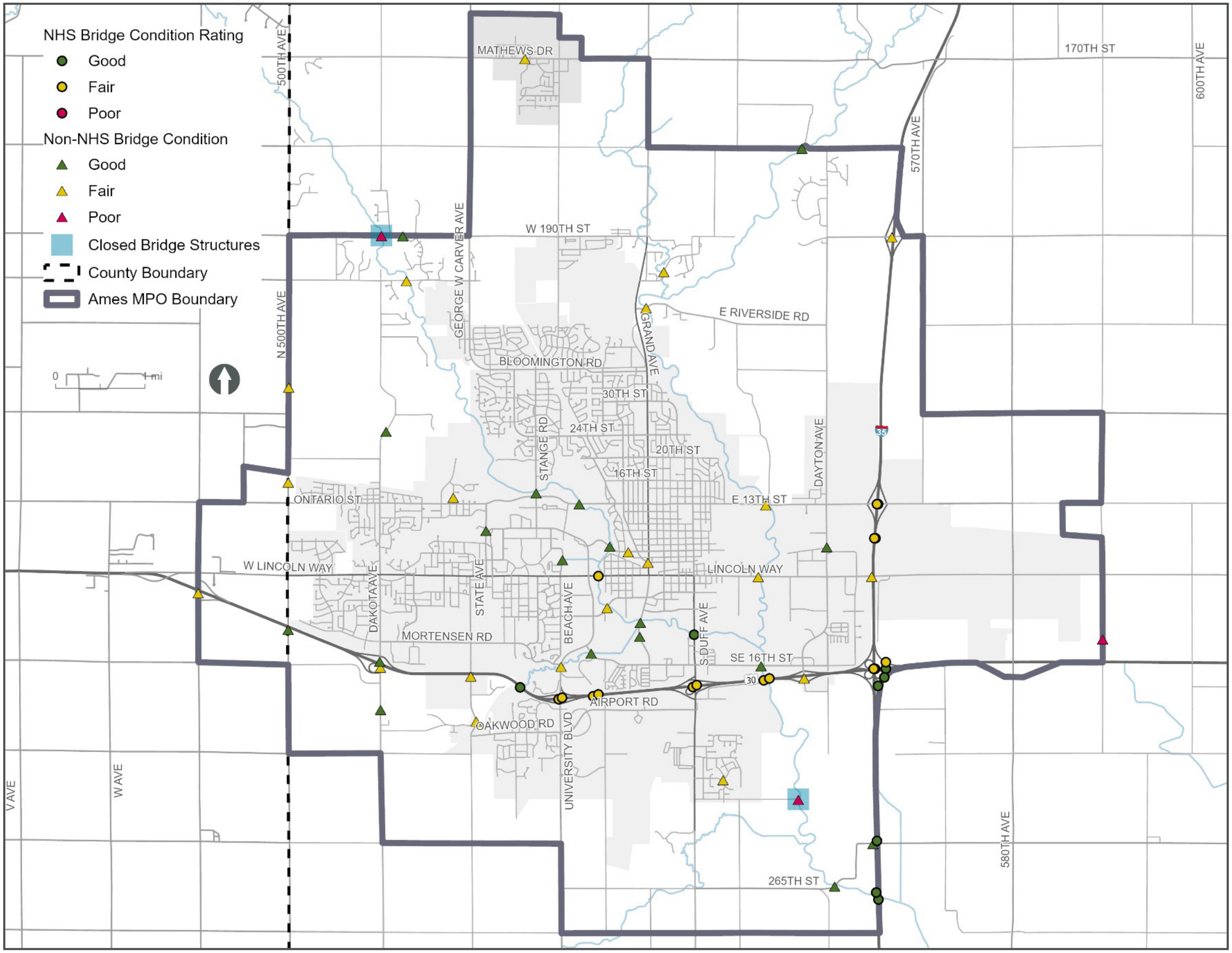
Table 17 summarizes bridge conditions by total deck area. For NHS bridges, 50.1% of the bridges by deck area are rated in Fair condition, while 49.6% of NHS bridges by deck area are in Good condition. The breakdown of conditions by deck area for all the AAMPO bridges is similar, with 51.9% of bridges by deck area rated as being in Good condition and 47.1% of bridges by deck area rated as being in Fair condition. Only 1% of bridges by deck area were determined to be in Poor condition.

Table 17: The AAMPO Bridge Conditions by Total Deck Area

Bridge Ratings	NHS Bridges (sq ft)	% of Total Deck Area	Non-NHS Bridges (sq ft)	% of Total Deck Area	All AAMPO Bridges (sq ft)	% of Total Deck Area
Good	13,093.28	49.9	15,933.00	53.6	29,026.28	51.9
Fair	13,131.21	50.1	13,236.64	44.6	26,367.85	47.1
Poor	0	0	537.38	1.8	537.38	1.0
Total	26,224.49		29,707.02		55,931.51	

Source: FHWA, ***National Bridge Inventory***.

Figure 35: The AAMPO Bridge and Culvert Conditions, 2023



THE AAMPO REGION'S PERFORMANCE – BRIDGE CONDITIONS

The AAMPO's current performance toward the 2- and 4-year targets for the region's NHS bridges is summarized in **Table 18**. As **Table 18** shows, the percentage of NHS bridges in Good condition based on 2023 National Bridge Inventory data was 50%, which is less than both the 2023 2-year and 2025 4-year targets of 52.5% and 48.0%, respectively. National Bridge Inventory data indicates that 0% of NHS bridges are in Poor condition, which is less than the 2023 2-year and 2025 4-year targets of 5.0% and 6.6%, respectively, indicating that the AAMPO is on track to meet the 2025 4-year target for NHS bridges in Poor condition.

Table 18: The AAMPO's Progress Toward the Region's Bridge Condition Performance Targets

Performance Measure	AAMPO Performance, 2023	2023 2 Year Target	2025 4 Year Target
NHS bridges classified in Good condition	50%	52.5%	48.0%
NHS bridges classified in Poor condition	0.0%	5.0%	6.6%

THE AAMPO PAVEMENT

Federal Pavement Performance Measures

Interstate and non-Interstate NHS routes provide critical connections and must be kept in good condition. FHWA sets pavement condition as a federal performance measure through the following two ratings:

- **Good condition:** Suggests no major investment is needed
- **Poor condition:** Suggests major reconstruction investment is needed

The AAMPO documents pavement condition performance for Interstate and non-Interstate NHS routes on an annual basis per federal performance management reporting requirements. The AAMPO is also responsible for setting pavement condition performance targets, or it may opt to support pavement condition performance targets identified by Iowa DOT for the state's Interstate and non-Interstate NHS routes under its jurisdiction. The AAMPO currently supports Iowa DOT's pavement condition targets, which are shown in **Table 19**.

Table 19: Pavement Condition Targets (Adopted March 2025)

Performance Measure	2021 Baseline	2-Year Target	4-Year Target
Pavements in the interstate system in Good condition	58.5%	55.0%	53.0%
Pavements in the interstate system in Poor condition	0.4%	3.0%	3.0%
Pavements in the non-Interstate NHS in Good condition	37.9%	35.0%	30.0%
Pavements in the non-Interstate NHS in Poor condition	3.7%	6.0%	6.0%

Source: The AAMPO

Interstate and Non-Interstate Pavement Conditions

Data from Iowa DOT's Pavement Management Information System was reviewed to analyze the conditions of Interstate and non-Interstate NHS pavements for the year 2023.

Table 20: Interstate and Non-Interstate NHS Pavement Conditions, 2023

Route	Good		Fair		Poor	
	Lane Miles	Percent of Lane Miles	Lane Miles	Percent of Lane Miles	Lane Miles	Percent of Lane Miles
Interstate	18.64	52.9	16.61	47.1	0.00	0.0
Non-Interstate NHS	24.84	31.4	42.97	54.2	11.41	14.4

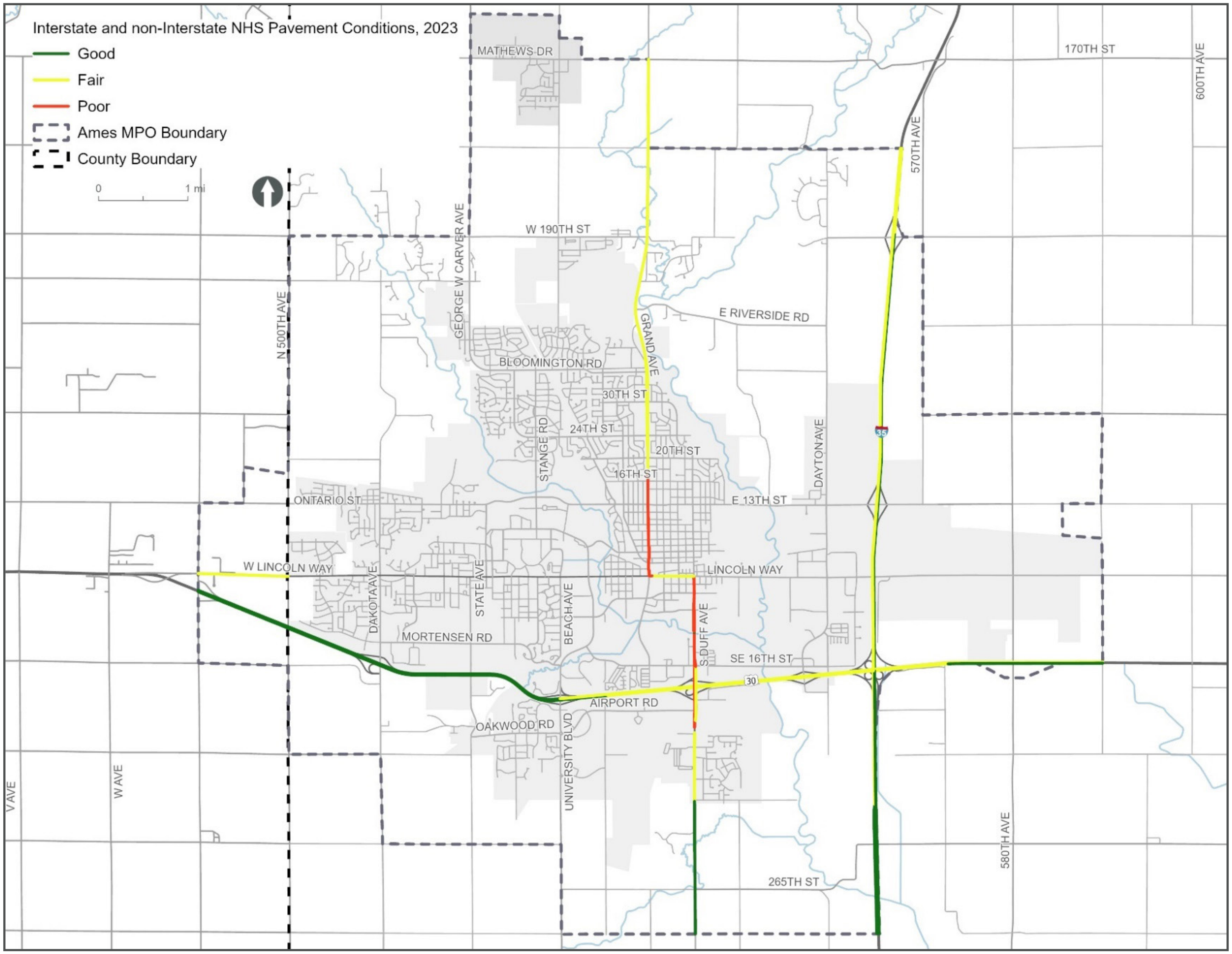
Source: Iowa DOT, Pavement Management Information System.

Interstate and non-Interstate NHS routes in the AAMPO region with pavement in Poor condition include the following:

- **S Duff Avenue**, from Kitty Hawk Drive to Lincon Way
- **Grand Avenue**, from Lincoln Way to 18th Street

Note that Iowa DOT completed pavement rehabilitation projects for both segments after data were collected to calculate pavement conditions.

Figure 36: Interstate and Non-Interstate NHS Pavement Conditions, 2023



Federal-Aid Network Pavement Conditions

Federal-aid roadway pavement conditions, which refers to non-NHS routes that are found on the Federal-aid network, were evaluated using data from the Iowa Pavement Management Program to evaluate pavement conditions using a City Pavement Condition Index (CityPCI) measure. The CityPCI measure differs from the conventional Pavement Condition Index rating because the data collection process for CityPCI calculations is adjusted to accommodate the lower vehicle speeds at which this data is collected. CityPCI ratings are organized into five broad categories that indicate overall pavement condition, shown in **Table 21**.

CityPCI Rating	CityPCI Value
Excellent	Between 81 and 100
Good	Between 61 and 80
Fair	Between 41 and 60
Poor	Between 21 and 40
Very Poor	Between 0 and 20

Table 21: CityPCI Rating

Table 22 summarizes the breakdown of pavement conditions, using the CityPCI measure, for non-NHS Federal-aid routes in the AAMPO region by functional classification, while **Figure 37** shows pavement conditions for Ames' non-NHS Federal-aid routes.

As **Table 22** indicates, the majority of the non-NHS system pavements are in Fair or better condition. Overall, 11.4% of non-NHS pavements are in Poor condition, while 2.6% are rated as being in Very Poor condition.

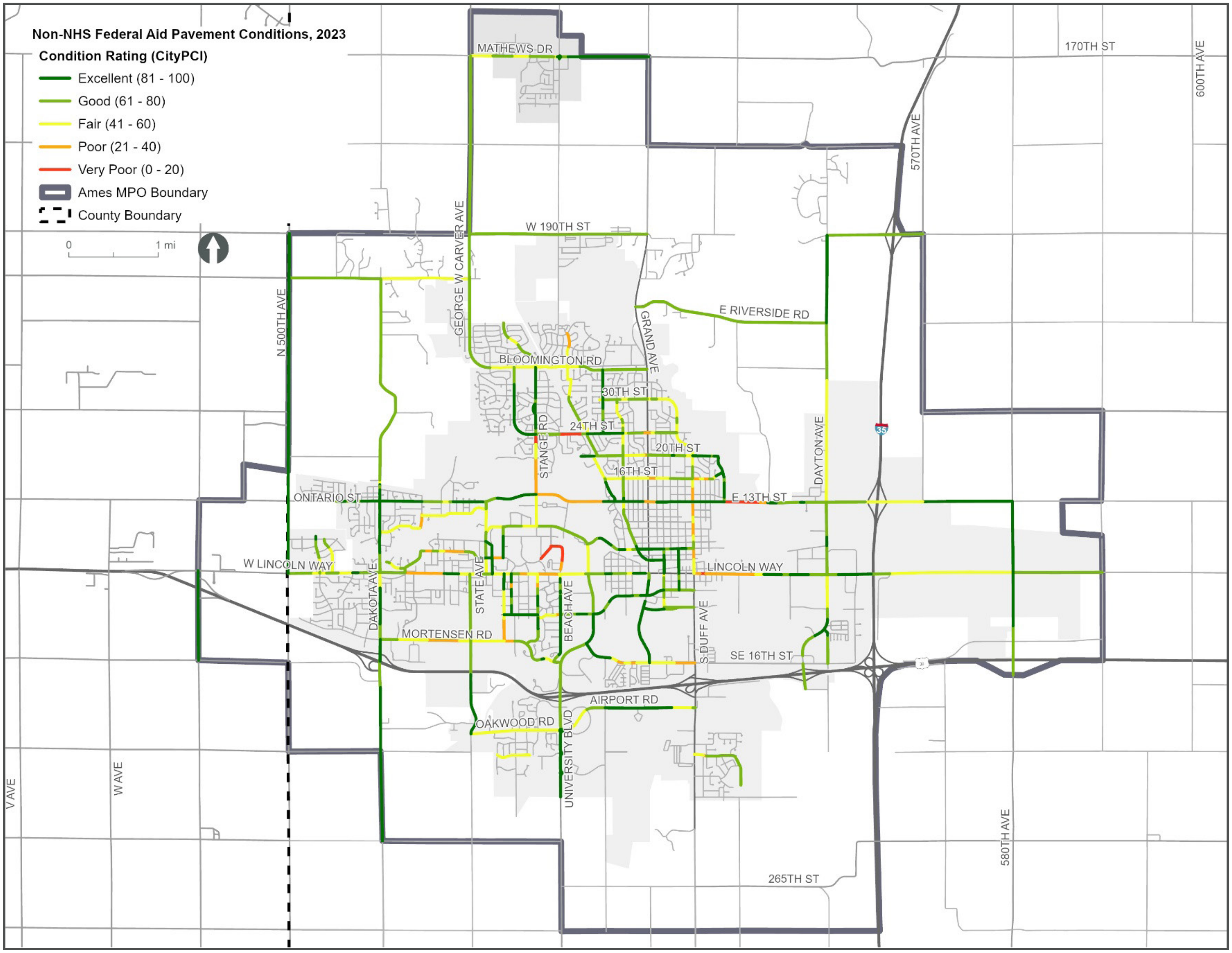
For information pertaining to condition of AAMPO's local streets network, refer to **Appendix C** which contains information on the technical pavement analysis conducted for the local streets network.

Table 22: Pavement Condition Ratings for Non-NHS Federal-Aid Streets and Roads, 2023

Functional Classification	Excellent	Good	Fair	Poor	Very Poor
Collector	26.6%	36.8%	28.3%	7.6%	0.7%
Minor Arterial	32.2%	28.2%	22.4%	12.3%	4.9%
Principal Arterial	11.4%	31.6%	30.4%	26.6%	0.0%
Total	**28.0%**	**32.3%**	**25.7%**	**11.4%**	**2.6%**

Source: The AAMPO

Figure 37: Non-NHS Federal Aid Pavement Conditions, 2023



THE AAMPO REGION'S PERFORMANCE – PAVEMENT CONDITIONS

The AAMPO's current performance toward the 2- and 4-year targets for the region's Interstate and non-Interstate NHS pavement is summarized in **Table 23**. As **Table 23** shows, the percentage of Interstate pavement in Good condition based on 2023 data was 52.8%, which is less than both the 2023 2-year and 2025 4-year targets of 55.0% and 53.0%, respectively. The percentage of Interstate pavement in Poor condition was determined to be 0% in 2023, which is less than the 2- and 4-year targets of 3.0%.

The percentage of non-Interstate NHS pavement in Good condition in 2023 was 31.4%, which is less than the 2023 2-year of 35.0% but exceeds the 2025 4-year target of 30.0%. The percentage of non-Interstate NHS pavement in Poor condition in 2023 was calculated to be 14.4%, substantially higher the 2- and 4-year targets of 6.0%.

Table 23: The AAMPO's Progress Toward the Region's Pavement Condition Performance Targets

Performance Measure	AAMPO Performance, 2023	2023 2 Year Target	2025 4 Year Target
Pavements on the Interstate system in Good condition	52.8%	55.0%	53.0%
Pavements on the Interstate system in Poor condition	0.0%	3.0%	3.0%
Pavements on the non-Interstate NHS in Good condition	31.4%	35.0%	30.0%
Pavements on the non-Interstate NHS in Poor condition	14.4%	6.0%	6.0%

MULTIMODAL CONDITIONS

HIGHWAY FREIGHT

The AAMPO region relies on multimodal freight to support the regional and broader Iowa economy. The multimodal network of truck routes, rail lines, and pipelines in the region are critical to supporting freight mobility both locally and nationally.

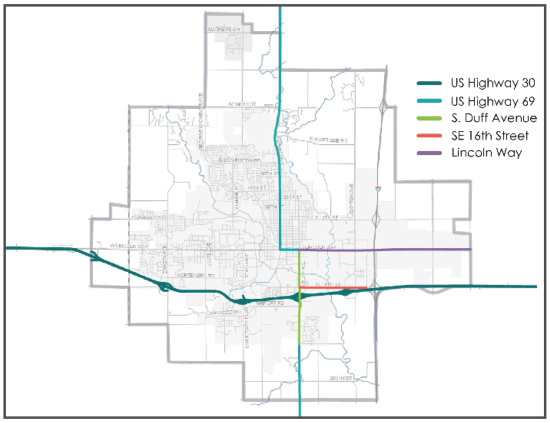
Federal Freight Routes

Ames is located adjacent to I-35, which is a critical freight corridor facilitating truck movements across the nation as evidenced by I-35's inclusion in the National Highway Freight Network. This network was established through the Fixing America's Surface Transportation Act to direct federal resources and policies to improving performance of highway portions of the U.S. freight transportation system.[4]

The National Highway Freight Network is composed of a series of subsystems that include the following:

4 FHWA, ***National Highway Freight Network***.

- **Primary Highway Freight System (PHFS):** Network of highways identified as the most critical highway portions of the U.S. freight transportation system
- **Other Interstate Portions not on the PHFS (non-PHFS):** The remaining portion of interstate roads not included in PHFS
- **Critical Rural Freight Corridors (CRFCs):** Public roads not in an urbanized area that provide access and connection to PHFS and the Interstate with other important ports, public transportation facilities, or intermodal freight facilities
- **Critical Urban Freight Corridors (CUFCs):** Public roads in urbanized areas that provide access and connection to PHFS and the Interstate with other ports, public transportation facilities, or intermodal transportation facilities



Additionally, several other major freight routes serve the Ames region:

- **U.S. 30**
- **U.S. 69**
- **S 16th Street (east of S Duff Avenue)**
- **Lincoln Way (east of S Duff Avenue)**

State Freight Routes

While CRFCs and CUFCs are considered federal freight routes, state DOTs are directed to identify and designate these routes. The most recent designation of CRFCs and CUFCs in Iowa occurred with the publication of the 2022 Iowa State Freight Plan.[5] While no CRFCs were designated in the AAMPO region, several CUFCs were identified:

- **E 13th Street, N Dayton Avenue** from I-35 to Old Bloomington Road
- **Dayton Avenue** from U.S. 30 to E 13th Street
- **U.S. 30, S Dayton Avenue, SE 18th Street** from I-35 to Dayton Avenue

Locally Designated Truck Routes

Ames and Gilbert do not currently have designated truck routes. Certain routes in the communities prohibit truck traffic.

Average Annual Daily Truck Traffic Volumes

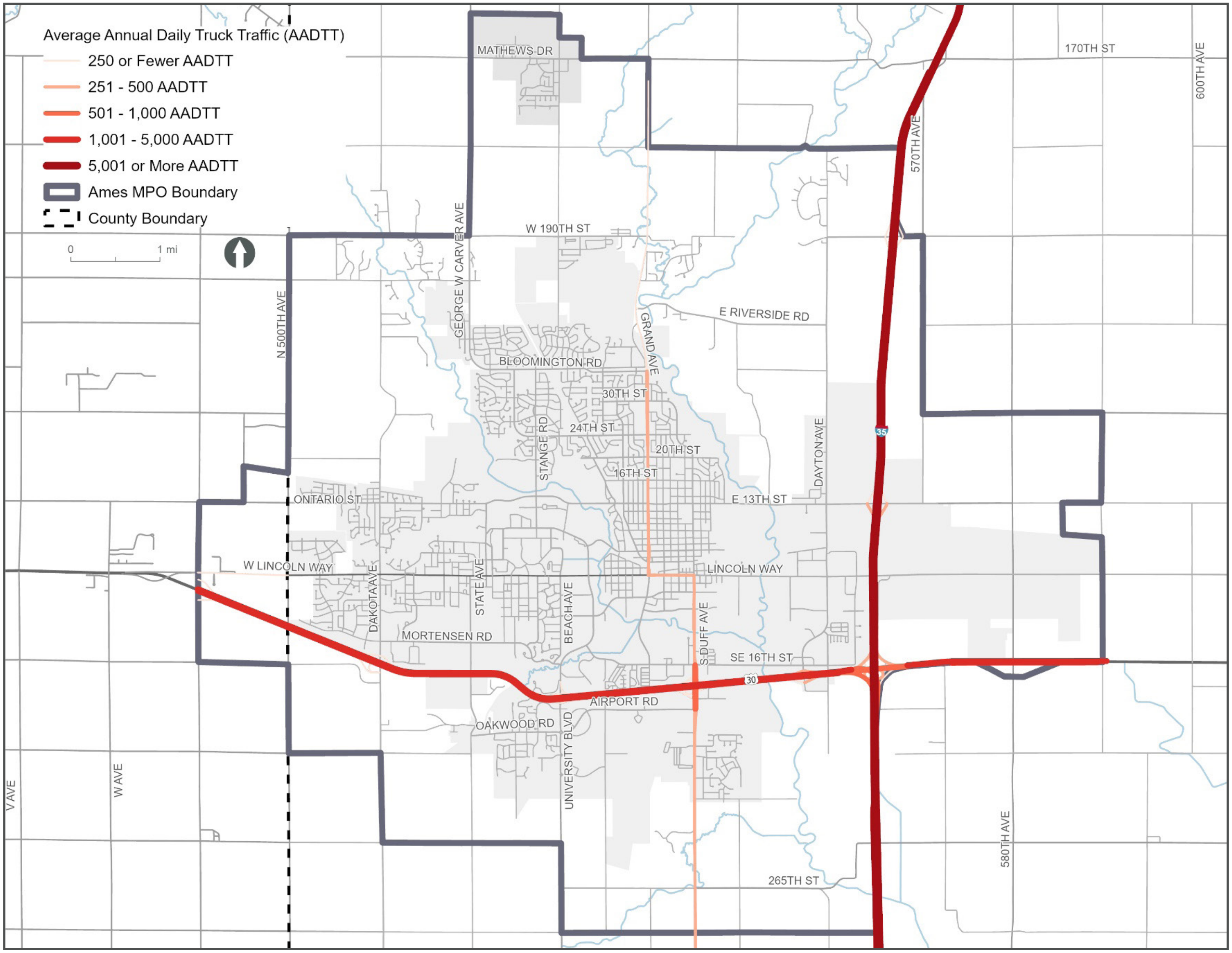
To better understand the current demand for freight-supportive infrastructure in the AAMPO region, average annual daily truck traffic (AADTT) volumes were reviewed using truck volume data from Iowa DOT for the year 2023. **Figure 38** shows the most recent truck volumes for the AAMPO's routes.

In the AAMPO region, I-35 currently carries the highest AADTTs, which exceed 5,000 trucks per day. As **Figure 38** shows, AADTT information was limited to the AAMPO's NHS routes; in addition to I-35, U.S. 30 is another high truck volume corridor in the region with daily truck volumes ranging from 1,000 to 5,000 trucks per day.

The nature of S Duff Avenue and Grand Avenue as freight-supportive routes is reflected by their daily AADTTs ranging from a low of 251 to 500 trucks per day.

5 ***2022 Iowa State Freight Plan***

Figure 38: Average Annual Daily Truck Traffic Volumes, 2023



RAIL FREIGHT

Rail Lines

Rail freight is an additional mode that is critical to the AAMPO regional and broader Iowa economy. Currently, there are three rail lines in the AAMPO region, all owned and operated by Union Pacific Railroad. **Figure 39** shows the Union Pacific lines in the AAMPO region.

The east-west mainline track runs through Ames on its route from Chicago, Illinois, to Oakland, California. The north-south track runs through the AAMPO area on its route from Minneapolis, Minnesota, to Kansas City, Missouri. According to the 2022 Iowa State Freight Plan, the east-west mainline track through Ames is one of two tracks with the highest traffic density of all tracks in Iowa, with more than 40 gross tons per mile. There are currently no intermodal facilities or transloads in Ames that would create additional rail traffic.

Rail Crossings

Locations where rail lines intersect with streets and roadways pose special concern for the safety and operation of the multimodal transportation system. At-grade crossings can result in train-vehicle collisions, while train crossing events can cause delays for vehicular traffic.

Currently, there are 32 public rail crossings in the AAMPO region. An analysis of the rail crossing locations found that 19 of the 32 crossings are at-grade, while 4 crossings are railroad under, and 9 crossings are railroad over as shown in **Table 24**. **Figure 39** includes the AAMPO's public rail crossing locations.

Table 24: Position of Public Rail Crossings, The AAMPO Region

Crossing Position	Count
At-grade	19
Railroad under	4
Railroad over	9
Total	32

Source: Federal Rail Administration, ***Safety Map***.

Further analysis of the AAMPO's public at-grade rail crossings looked at the number of trains recorded at each crossing based on Federal Rail Administration crossing data. Public at-grade crossings along the east-west mainline recorded 43 total trains per day, while 1 train per day traverses the public at-grade crossings along the north-south mainline, as shown in **Figure 40**.

Figure 39: The AAMPO's Rail Freight Facilities

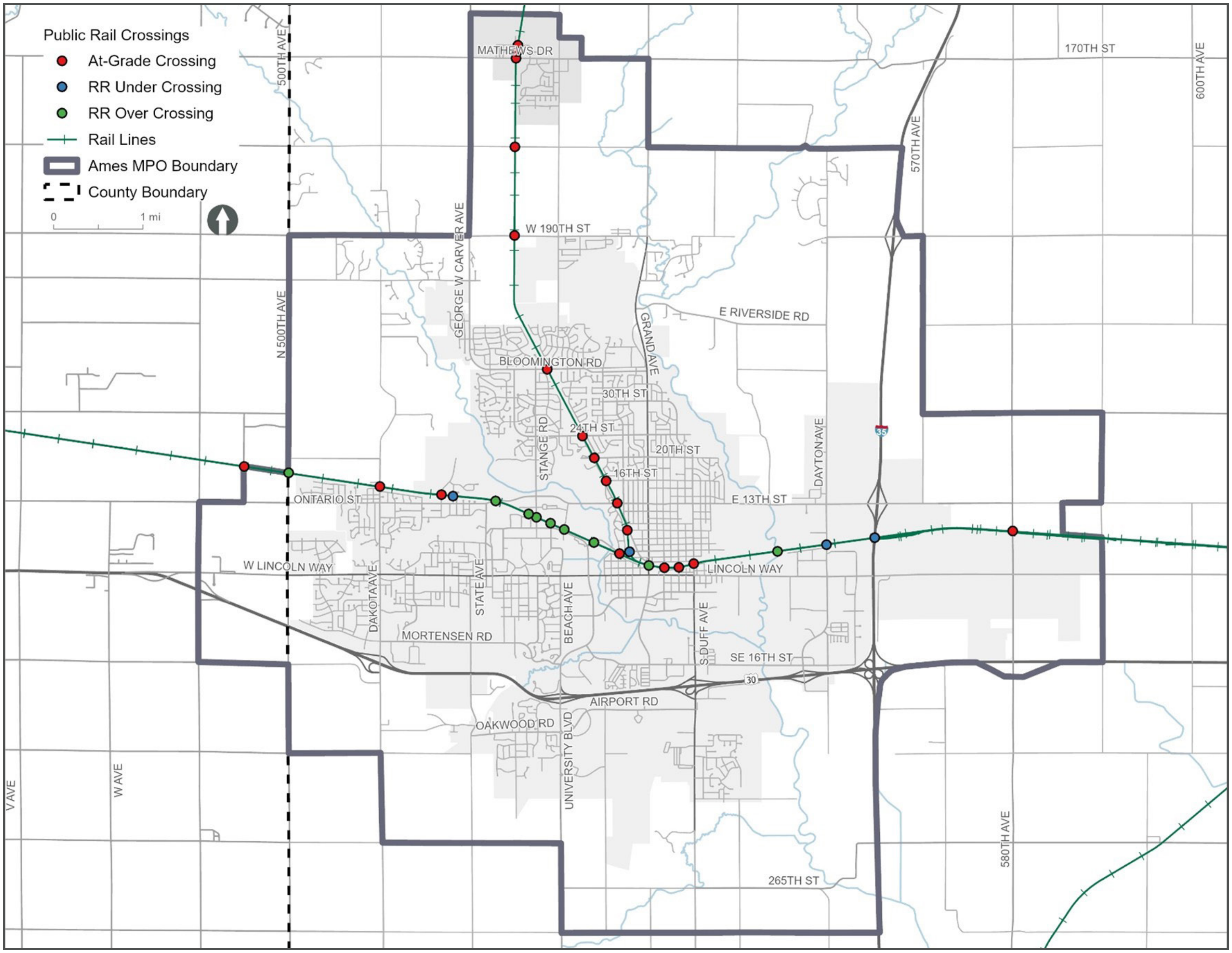
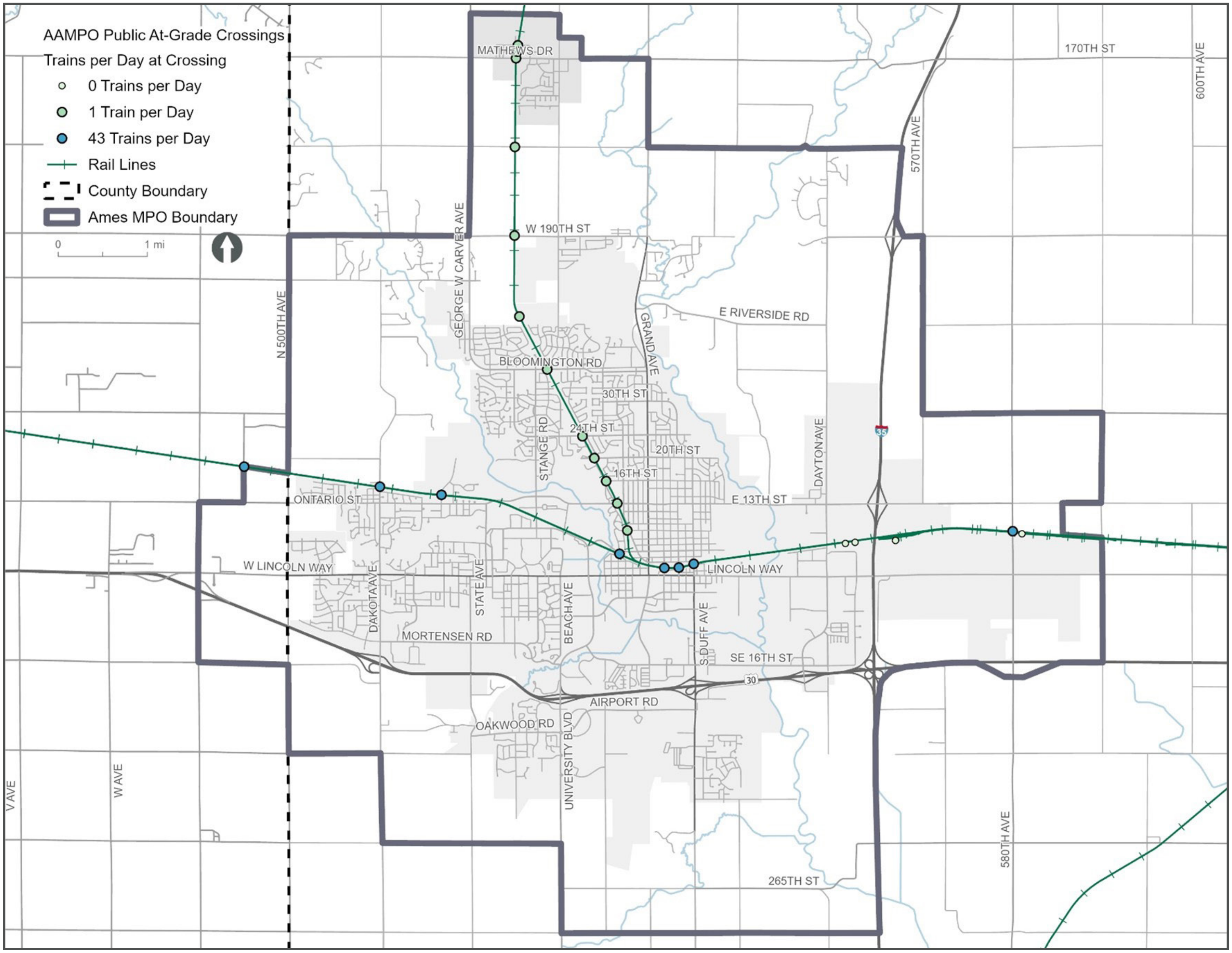


Figure 40: Trains per Day at the AAMPO's Public At-Grade Rail Crossings



Pipelines

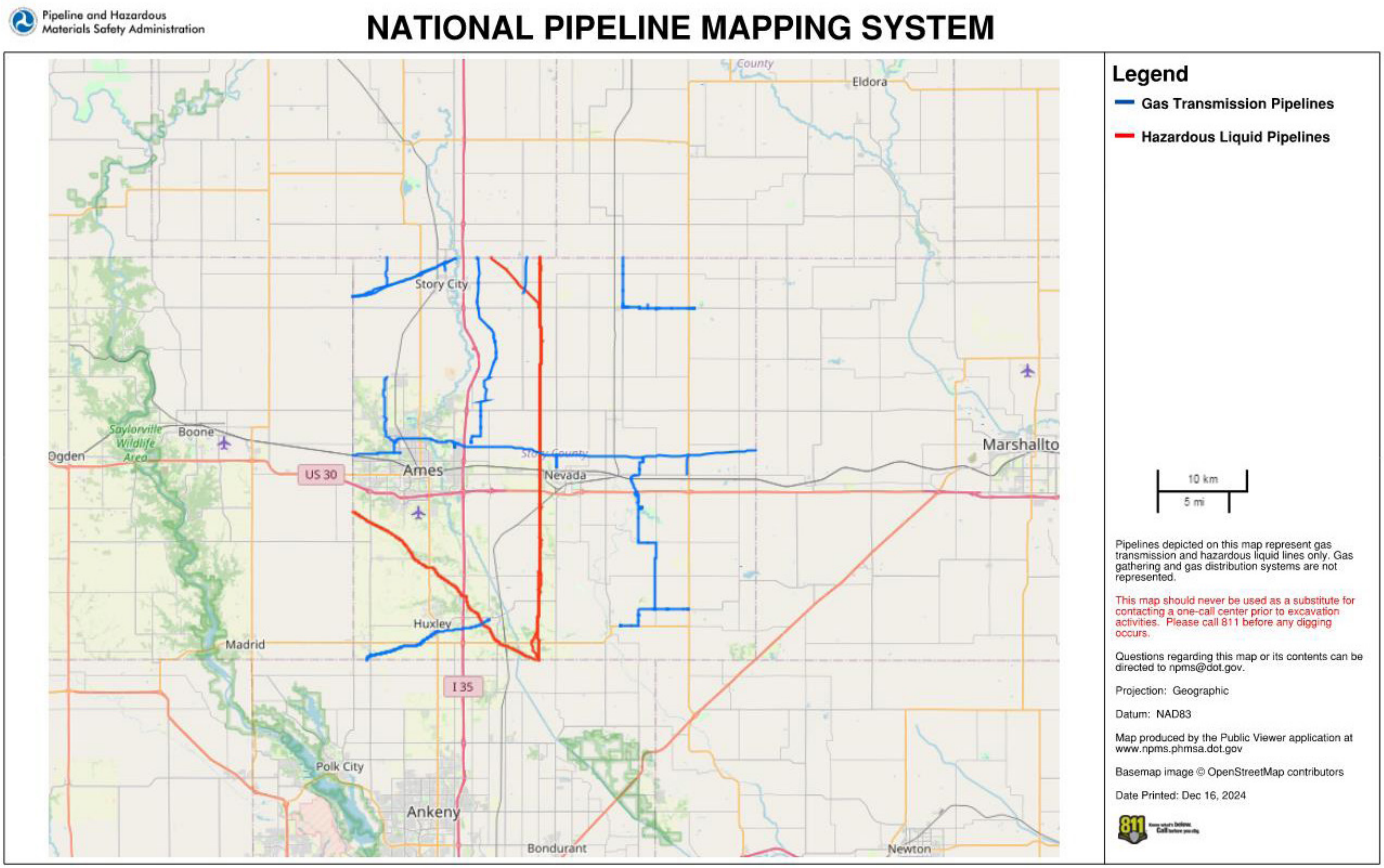
Pipelines serve critical freight functions by facilitating high-volume movement of liquid and gas commodities. Intermodal pipeline facilities have important freight implications because these locations generate the intermodal movement of products among pipeline, truck, and rail modes.

Currently, there are 194.67 total miles of active pipelines in Story County, with 122.73 miles dedicated to natural gas transmission and the remaining 71.94 miles used for hazardous liquids. In Boone County, there are 263.02 total miles of active pipelines: 234.02 miles of gas transmission and 28.82 miles of hazardous liquid pipeline.[6]

Figure 41 and **Figure 42** show the approximate locations of active pipelines in Story and Boone Counties.

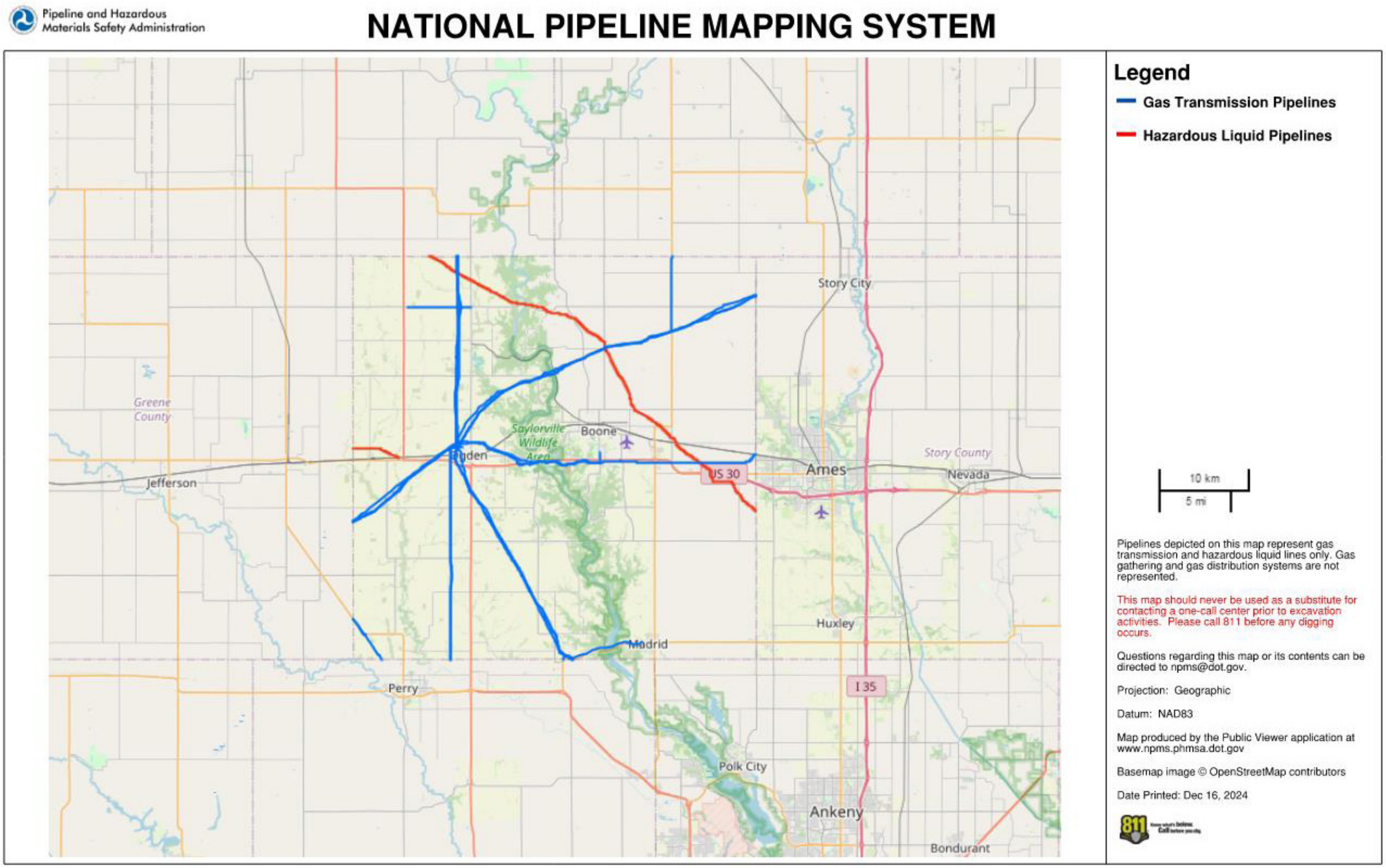
6 Pipeline and Hazardous Materials Safety Administration, ***National Pipeline Mapping System***.

Figure 41: Story County Pipelines



Source: Pipeline and Hazardous Materials Safety Administration, ***National Pipeline Mapping System***.

Figure 42: Boone County Pipelines



Source: Pipeline and Hazardous Materials Safety Administration, ***National Pipeline Mapping System***.

BICYCLE AND PEDESTRIAN

Existing Bicycle Network

The AAMPO region has an extensive network of existing bicycle facilities that can be broadly divided into two categories: on-street and off-street. Off-street bicycle facilities are those that are separated from vehicular travel lanes and include shared-use paths and trails, while on-street facilities are found in the roadway space and include bike lanes, paved shoulders, and shared lanes (sharrows/bike boulevards). **Figure 43** shows the existing bicycle network for the AAMPO region as published in Walk, Bike, Roll Ames,[7] which is the bicycle and pedestrian plan published in 2024.

Table 25. Existing Bicycle Facilities

Facility Type	Description	Mileage in Ames
	On-Street Bikeways	
Bike lanes [a] 	Bike lanes are an on-street dedicated space solely for cyclists. These lanes are usually marked with signs and pavement markings to remind motorists. Bike lanes in Ames connect many destinations where shared-use paths currently have gaps. [a] Source: ***https://coloradosprings.gov/types-bike-lanes***	5 miles
Shared lanes [b] 	Shared bike lanes or "sharrows" are pavement markings used to alert motorists of a shared lane environment for cyclists and motorists. The shared lanes in Ames are found on neighborhood street types, as well as around Iowa State University. [b] Source: ***https://momentummag.com/sharrows-used-to-make-sense-in-theory-but-are-now-useless-in-practice/***	17 miles
Paved shoulders [c] 	Paved shoulders provide a separate space for cyclists, like bike lanes. Paved shoulders are not considered a travel lane and may contain temporary parked vehicles. Paved shoulders in Ames are located on the edges of town and on rural roads to connect regional destinations. [c] Source: ***https://toolkit.irap.org/safer-road-treatments/paved-shoulder/***	8 miles
	Off-Street Bikeways	
Shared-use paths [d] 	Shared use paths are multi-use trails, fully separated from motor vehicle traffic, usually on the side of roads. Shared-use paths also run through Iowa State campus, parks, and other recreation areas. The shared-use paths are found mainly along arterial and collector streets and along greenbelt corridors. [d] Source: ***https://www.nationalrtap.org/Resources%20/Best-Practices-Spotlight/shared-use-paths***	36 miles

7 ***Walk, Bike, Roll Ames***

Existing Pedestrian Network

The existing pedestrian network includes sidewalks and shared-use paths that can be used by both bicycles and pedestrians. Most neighborhoods in Ames have complete sidewalks on both sides of the road. Areas lacking complete sidewalks are in places of higher commercial land use and are mainly on the edges of town. **Figure 44** shows the existing pedestrian facilities in the AAMPO region.

Figure 43: Existing Bicycle Facilities

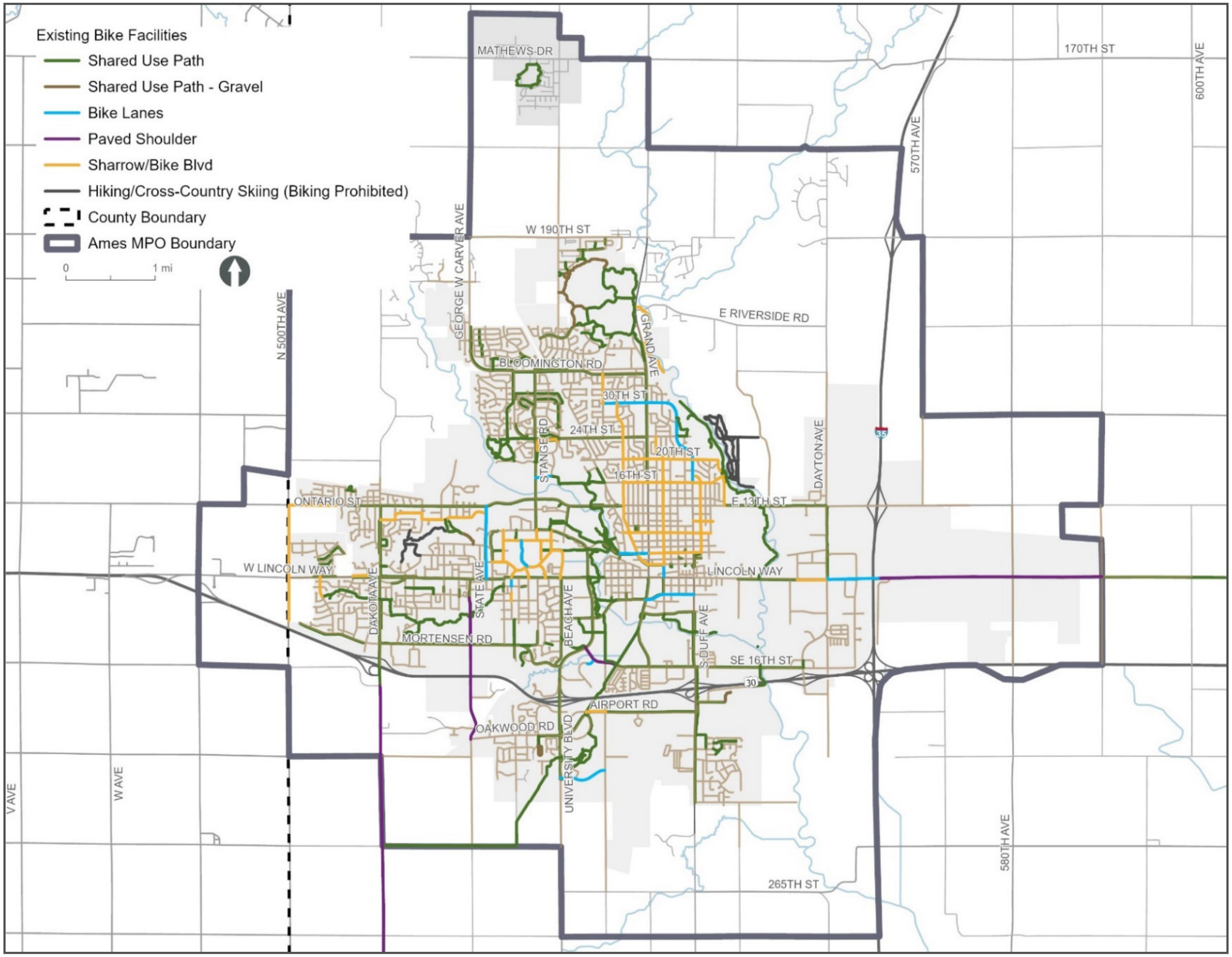
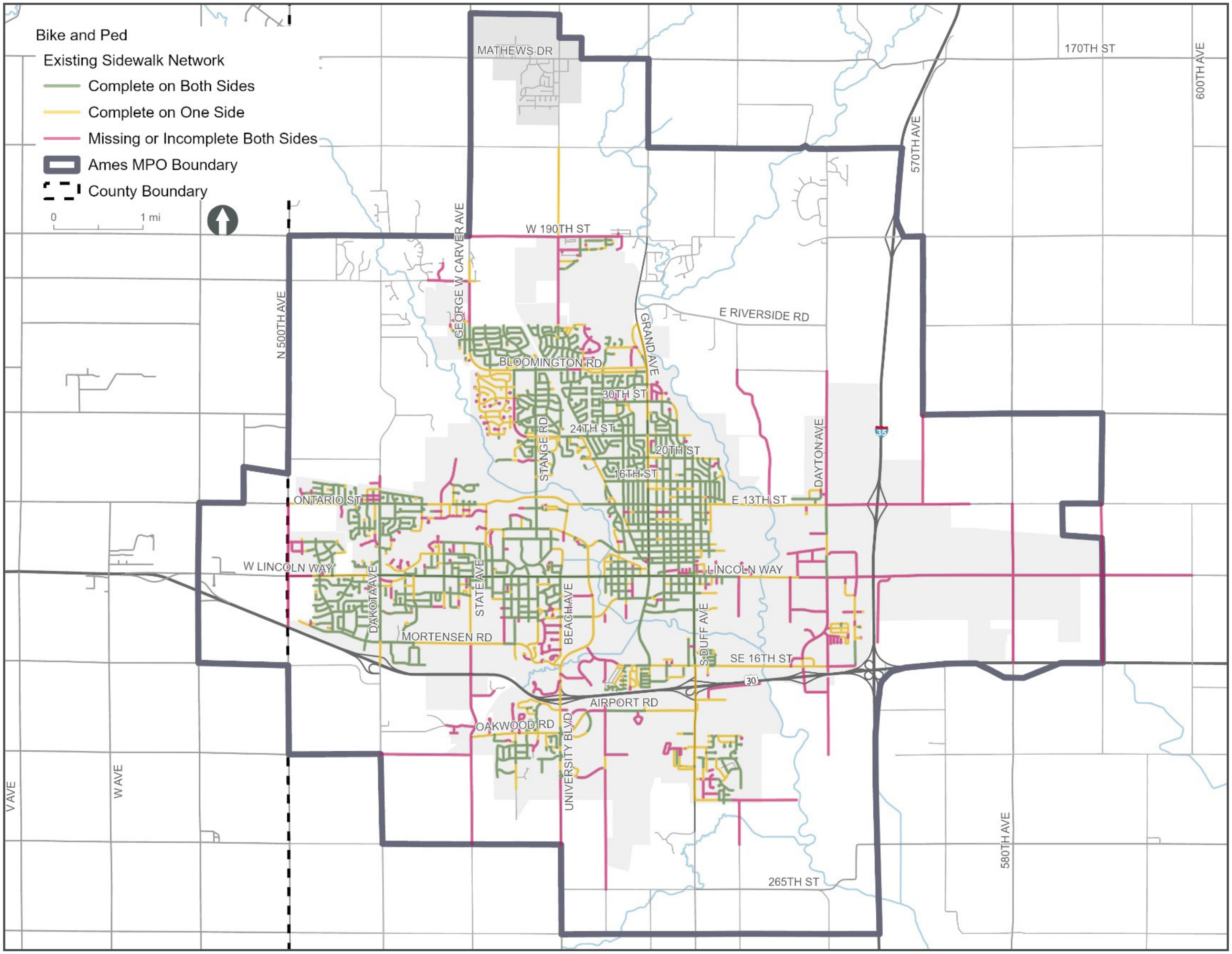


Figure 44: Existing Sidewalk Facilities



Bicycle and Pedestrian Crossing Level of Traffic Stress

The comfort of the bicycle and pedestrian experience is a key factor in whether an individual will decide to walk, bike, or roll as their travel mode. The comfort of an individual's bicycle or pedestrian experience is measured using an estimated Level of Traffic Stress (LTS). LTS is estimated based on a range of roadway and bicycle/ pedestrian facility characteristics, such as number of vehicular travel lanes, traffic volumes, posted speeds, and the presence of a sidewalk, on-street, or off-street bicycle facility. Based on the characteristics associated with route, an LTS is calculated and reported across one of the four LTS ratings, as shown in **Table 26**.

Table 26: Level of Traffic Stress Thresholds

Stress Rating	Stress Level	Simplified Stress Level
LTS 1	Lowest	Low Stress Level
LTS 2	Medium Low	
LTS 3	Medium High	High Stress
LTS 4	Highest	

Two LTS analyses were conducted as part of Walk, Bike, Roll Ames; the results are summarized in the following sections.

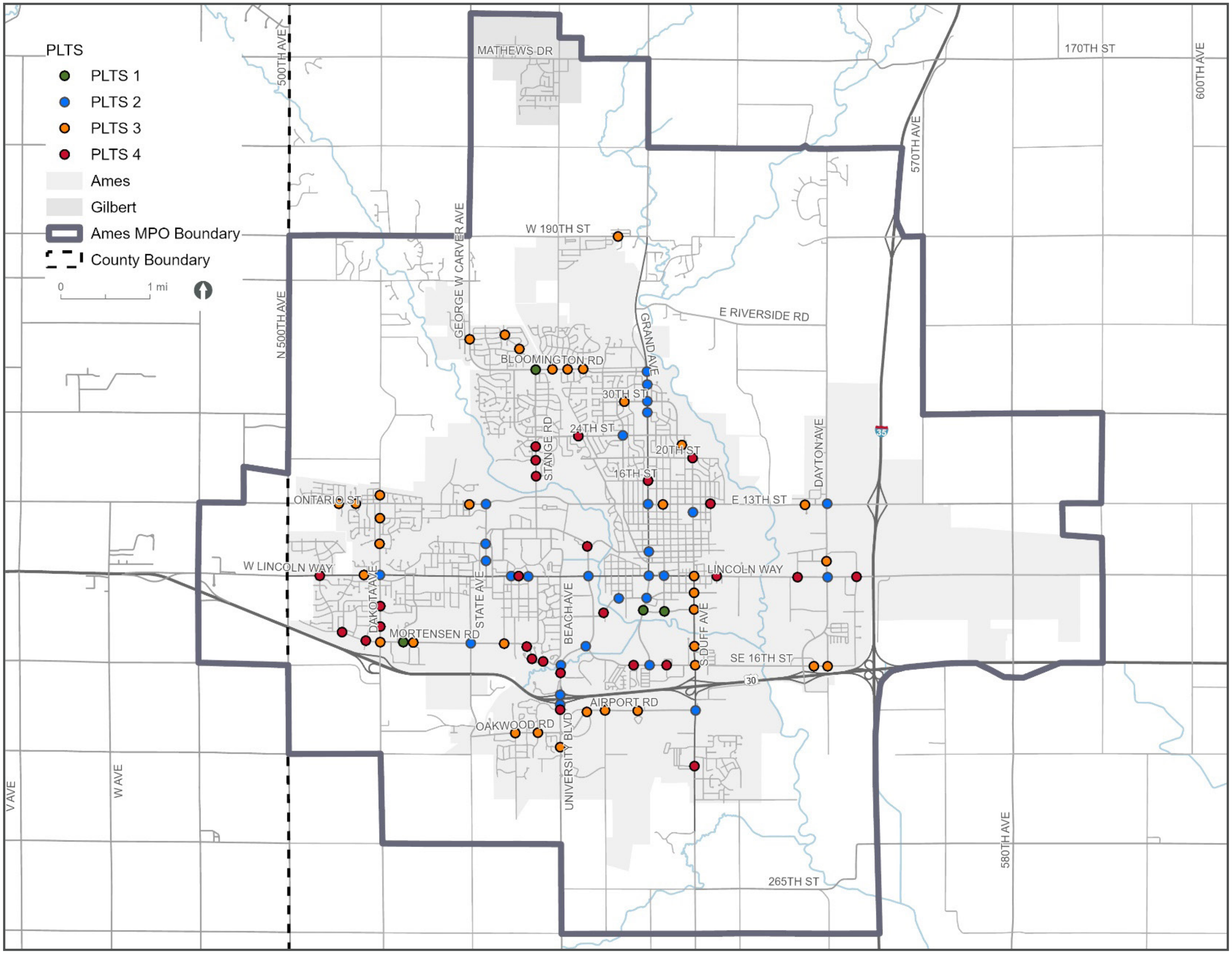
Pedestrian Crossing Level of Traffic Stress

A Pedestrian Crossing Level of Traffic Stress (PLTS) conducted for Ames sought to evaluate locations that pose the highest degree of difficulty for pedestrians in crossing the corresponding street or road.

Figure 45 shows the PLTS at the priority crossings identified in Walk, Bike, Roll Ames. Based on the results of the analysis, corridors in the AAMPO region that contain the highest stress intersections (PLTS 4) are as follows:

- S Duff Avenue
- Lincoln Way
- 13th Street
- Grand Avenue
- Stange Road
- Dakota Avenue
- Mortensen Road
- University Boulevard
- S 16th Street

Figure 45: Pedestrian Level of Traffic Stress for Walk, Bike, Roll Ames Priority Pedestrian Crossings



AMES CONNECT2050

Bicycle Level of Traffic Stress

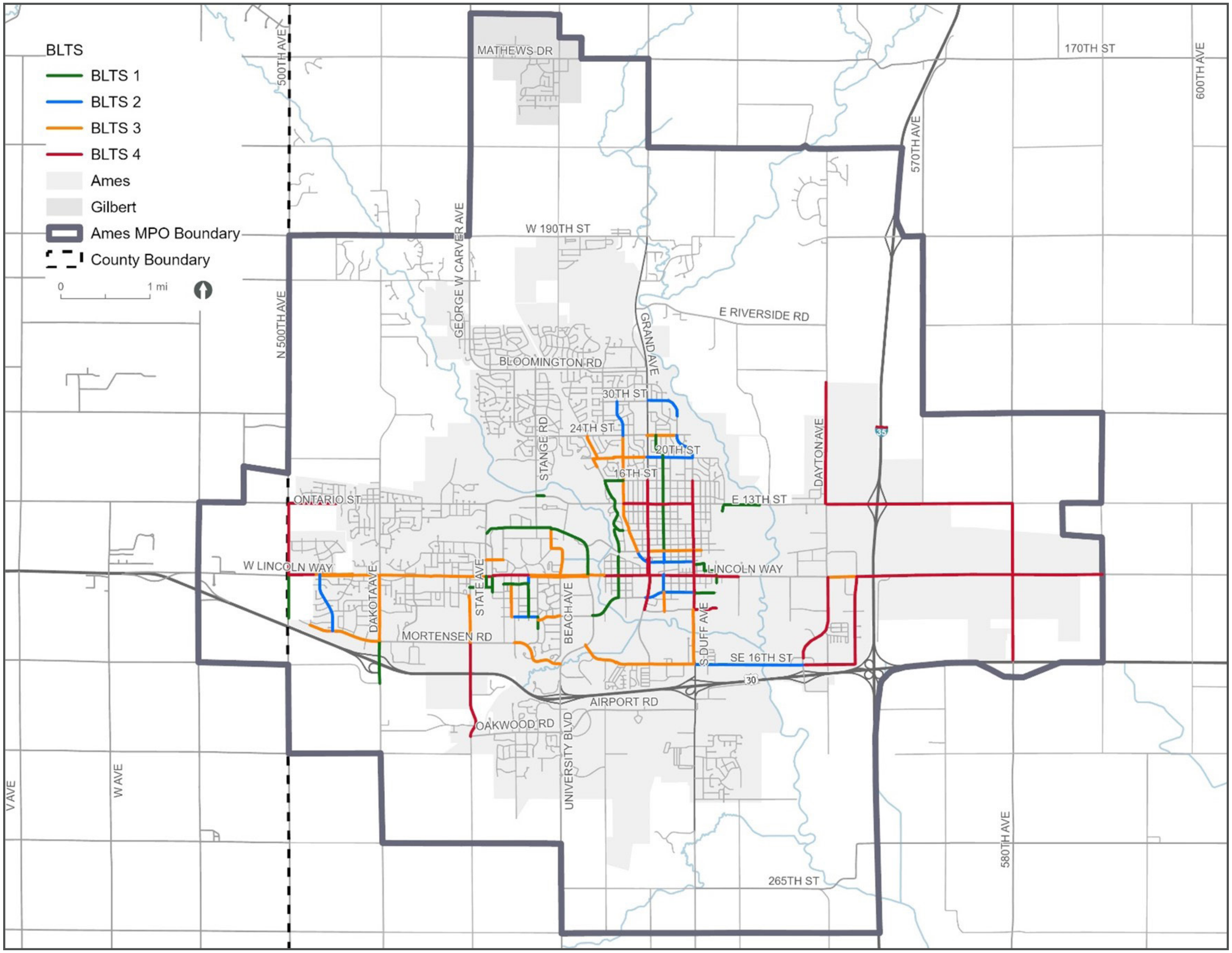
A segment's Bicycle Level of Traffic Stress (BLTS) is influenced by corresponding traffic volumes, posted traffic speeds, the presence of dedicated bike space, and the presence of parking. BLTS ratings are applied to road segments based on the traffic experience of a cyclist using that route. Generalized BLTS levels by facility type are shown in **Figure 46**.

Figure 47 shows the resulting BLTS for priority bicycle routes identified in Walk, Bike, Roll Ames. Neighborhood streets are mostly classified as low stress due to the presence of lower and slower traffic and sidewalks. Higher-stress roads include major collectors and arterial segments that are without shared-use paths or on-street bikeways.

Figure 46: BLTS Ratings on Bicycle Facilities

Source: Walk Bike Roll Ames 2024

Figure 47: Bicycle Level of Traffic Stress for Walk, Bike, Roll Ames Priority Bicycle Routes



PUBLIC TRANSIT

CyRide is the primary urbanized transit provider in the AAMPO region, operating 13 fixed routes, an on-demand service in east Ames, a late-night Moonlight Express, and a paratransit service (Dial-A-Ride) for individuals with disabilities. CyRide operates under a partnership with Ames, Iowa State University, and Iowa State University's student government. A summary of all transit services in the AAMPO region are shown in **Table 27**.

Table 27: The AAMPO's Public Transit Services

Service	Description
Fixed route service	A bus network with 13 fixed routes in Ames.
East Ames service extension (EASE)	On-demand, curb-to-curb service between the Ames City Hall and the eastern part of Ames.
Moonlight Express	Fare-free service with two routes and an additional door-to-door service for Ames residents. This service is offered during the university's fall and spring semesters.
Paratransit	Door-to-door paratransit service contracted through Heart of Iowa Transit Agency (HIRTA), serving individuals with a disability.
Regional public transit service	Additional service provided by HIRTA that includes a regional door-to-door service throughout central Iowa, including Story County and Ames.

Federal Transit Performance Measures

Federal rulemaking under the purview of FTA directs public transit agencies to create safety performance measures that address the following:

- Transit-related fatalities
- Transit-related injuries
- Safety events
- System reliability

In addition to transit safety performance measures, CyRide is required to develop transit asset management targets and share those targets with the AAMPO on an annual basis. The purpose of transit asset performance management is to monitor the condition of CyRide's transit facilities and vehicles.

Table 28 and **Table 29** present the transit safety and asset management performance targets for CyRide public transit and the vehicles leased to HIRTA by CyRide.

Table 28: Public Transit Safety Performance Targets (Adopted September 2024)

Mode of Transit Service	Major Events	Major Events (Rate)	Collisions (Rate)	Pedestrian Collisions (Rate)	Vehicular Collisions (Rate)	Fatalities	Fatalities (Rate)
Fixed Route Bus	0	0.00	0.00	0.00	0.00	0	0.00
Paratransit	0	0.00	0.00	0.00	0.00	0	0.00

Mode of Transit Service	Transit Worker Fatalities (Rate)	Injuries	Injuries (Rate)	Transit Worker Injuries (Rate)	Assaults on Transit Workers	Assaults on Transit Workers (Rate)	System Reliability (Rate)
Fixed Route Bus	0.00	0	0.00	0.00	0	0.00	34,119.55
Paratransit	0.00	0	0.00	0.00	0	0.00	238,798

Source: The AAMPO

Table 29: Transit Asset Management Performance Targets (Adopted March 2025)

Class	2024 Target	2024 Year-End Results	2025 Performance Target	2026	2027	2028	2029
Rolling Stock 40- to 60-ft Bus	27%	26%	43% of fleet exceeds ULB of 15 years	35%	38%	32%	25%
Rolling Stock Cutaways	0%	0%	0% of fleet exceeds ULB of 8 years	0%	0%	0%	0%
Equipment Shop Trucks	0%	0%	0% of fleet exceeds ULB of 10 years	0%	0%	0%	0%
Facilities Admin/ Maint. Facility	0%	0%	0% of facilities rated under 3.0 on TERM scale	0%	0%	0%	0%
Facilities Ames Intermodal Facility	0%	0%	0% of facilities rated under 3.0 on TERM scale	0%	0%	0%	0%

Notes: ULB = useful life benchmark; TERM = Transit Economics Requirements Model
Source: The AAMPO

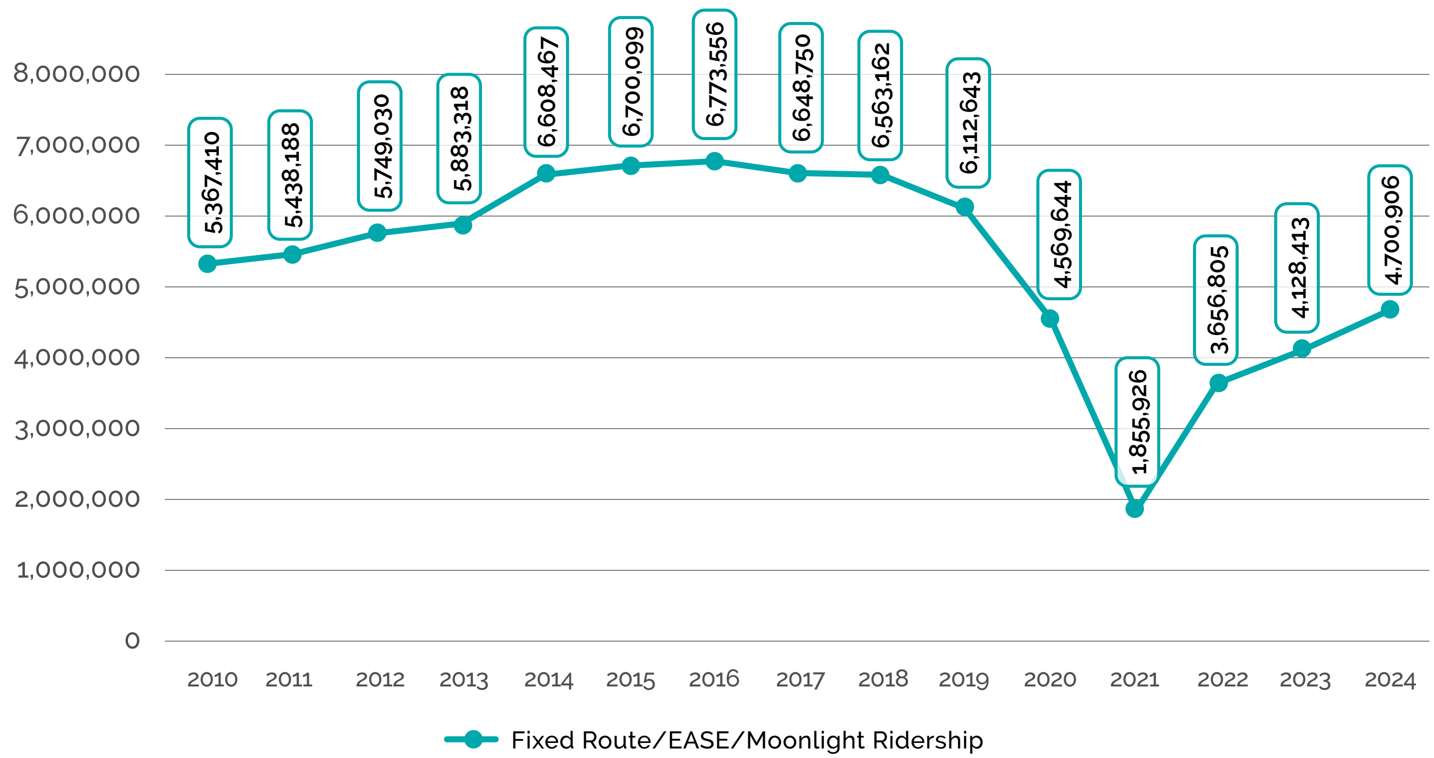
Transit Performance

System Level Performance

Transit ridership steadily increased from 2010 to 2016. This was followed by a gradual decline through 2019, and ridership experienced a sharp drop in 2020 and 2021 due to the COVID-19 pandemic, as shown in **Figure 48** and **Figure 49**. When the pandemic began, approximately 30,000 university students, which represents half of the Ames population, did not return after spring break. Because students account for roughly 93% of CyRide's ridership, this led to a dramatic decline. Additional system-level trends include the following:

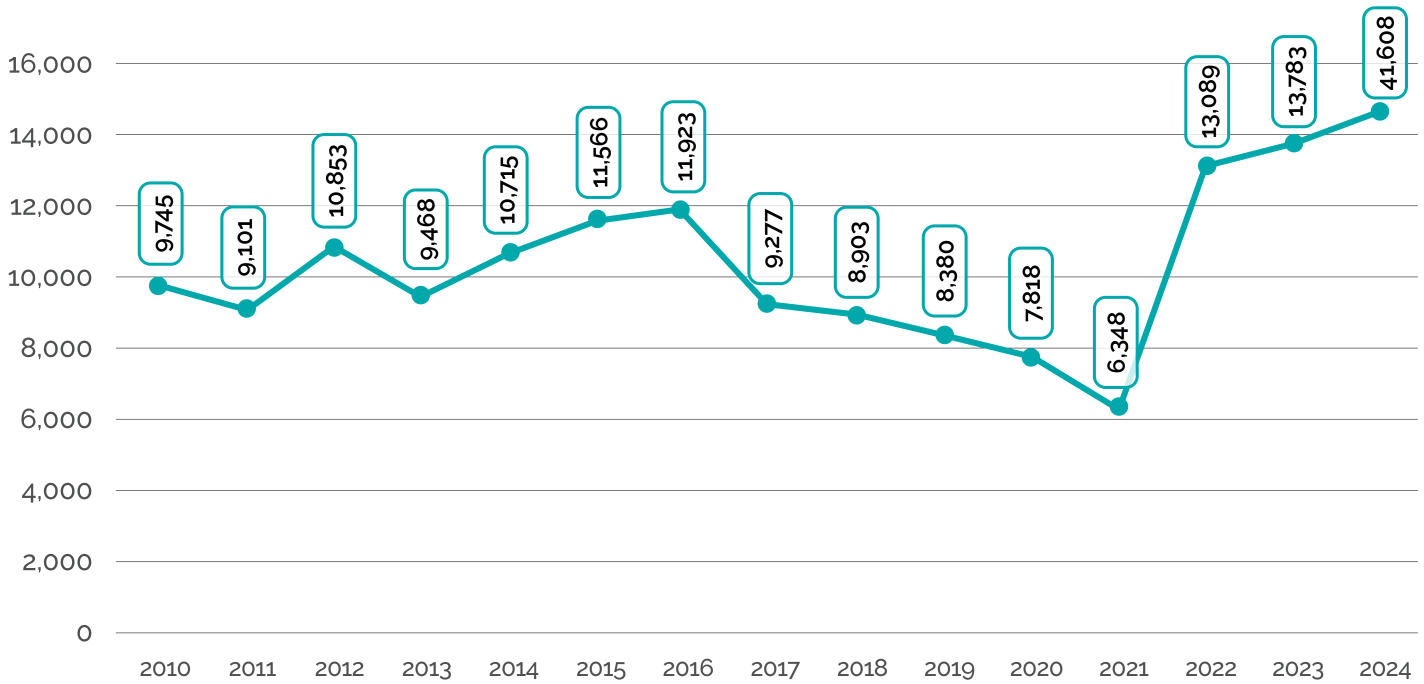
- Fixed route service experienced a 72% decrease in 2020 because many university classes shifted to virtual formats, eliminating the need for students to travel to campus. However, ridership rebounded by 98% between 2021 and 2022 when in-person classes resumed.
- Dial-A-Ride service (paratransit) has remained relatively steady over the years but experienced a significant increase of 106% from approximately 6,300 to 13,089 rides between 2021and 2022. This increase reflects collaborative efforts with HIRTA to raise awareness and transition eligible passengers to Dial-A-Ride, ensuring the service is used by those who need it most while maintaining accessibility for the Ames community.

Figure 48: Annual CyRide Fixed Route/EASE/Moonlight Express Ridership, 2010–2024



Source: CyRide

Figure 49: CyRide Dial-A-Ride Ridership, 2010–2024



Source: CyRide

Historic system performance for CyRide's fixed route service for Fiscal Year (FY)2020 through FY2024 is shown in **Table 30**. CyRide's fixed route services saw a reduction in usage during FY2021 and FY2022, which coincided with the COVID-19 pandemic. After FY2022, transit usage began to trend toward pre-FY2021 levels as indicated by the increases in all key performance metrics shown in **Table 30**.

Another trend observed in the historic performance data is the sustained annual increase in operating expenses per vehicle revenue miles and vehicle revenue hour. This increase reflects the rising costs of providing transit service post-pandemic, including higher expenses for fuel, wages, and maintenance, which align with national trends in transit operations.

Table 30: Annual CyRide Fixed Route Performance, FY2020–FY2024

Fixed Route	FY2020	FY2021	FY2022	FY2023	FY2024
Annual passenger miles	9,856,054	7,357,159	2,988,040	5,887,456	6,223,904
Annual unlinked trips	6,112,643	4,569,664	1,855,926	3,656,805	4,128,413
Annual vehicle revenue miles	1,228,098	1,236,826	1,247,364	1,276,110	1,268,158
Annual vehicle revenue hours	127,538	119,228	121,288	125,314	124,014
Operating expenses per vehicle revenue mile	$8.49	$8.38	$8.20	$8.85	$9.84
Operating expenses per vehicle revenue hour	$85.79	$86.94	$84.34	$90.11	$100.56
Fare revenues	$4,657,646	$4,133,494	$1,597,115	$2,573,303	$6,788,132

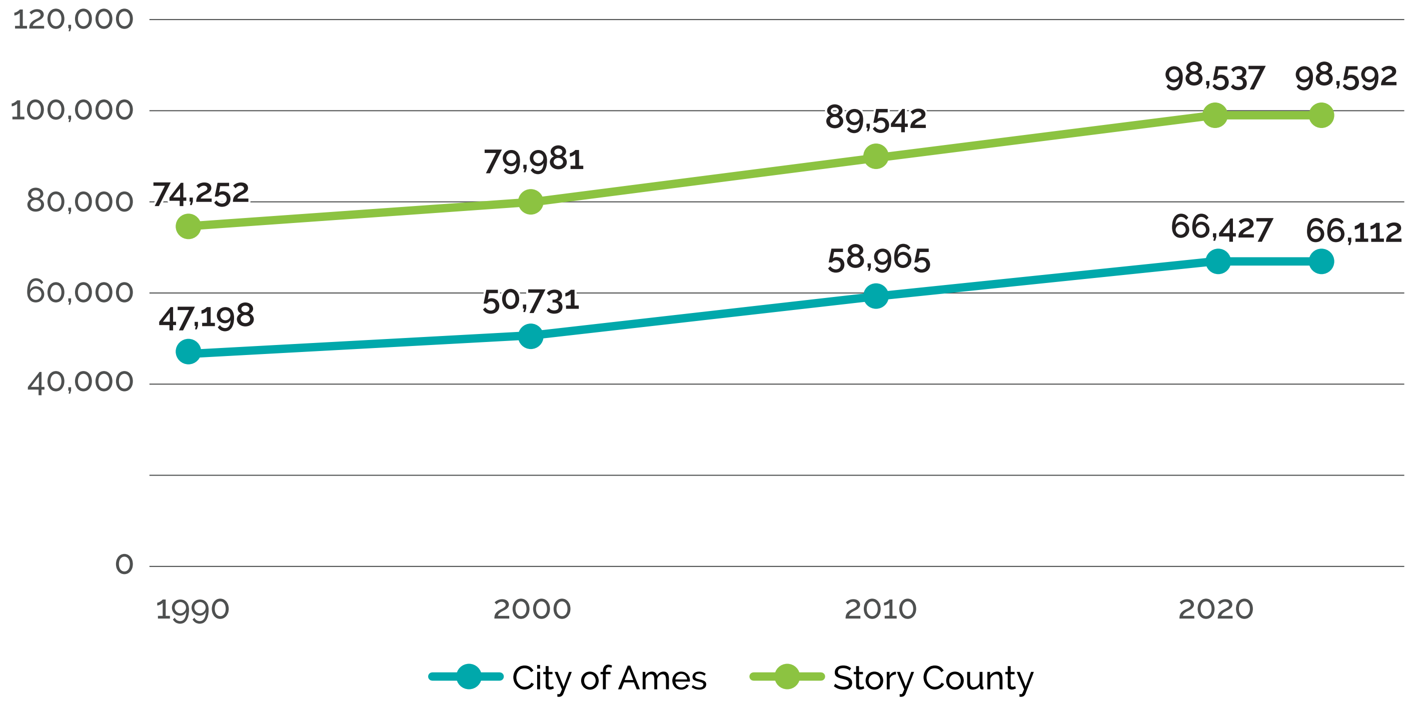
Source: National Transit Database, ***Transit Agency Profile 2019-2023.***

Route Level Performance

Ridership route data for 2023 and 2024 was analyzed and compared to the 2019 ridership reported in AAMPO's 2045 Metropolitan Transportation Plan. **Figure 50** summarizes 2019, 2023, and 2024 ridership by route. The routes with highest ridership for these periods were #23 Orange, #1 Red, and #25 Gold. The routes with the lowest ridership include #8 Aqua, the EASE route, and #14 Peach. The overall trend observed when comparing the time series data is that ridership by route decreased in 2023 and 2024 compared to 2019.

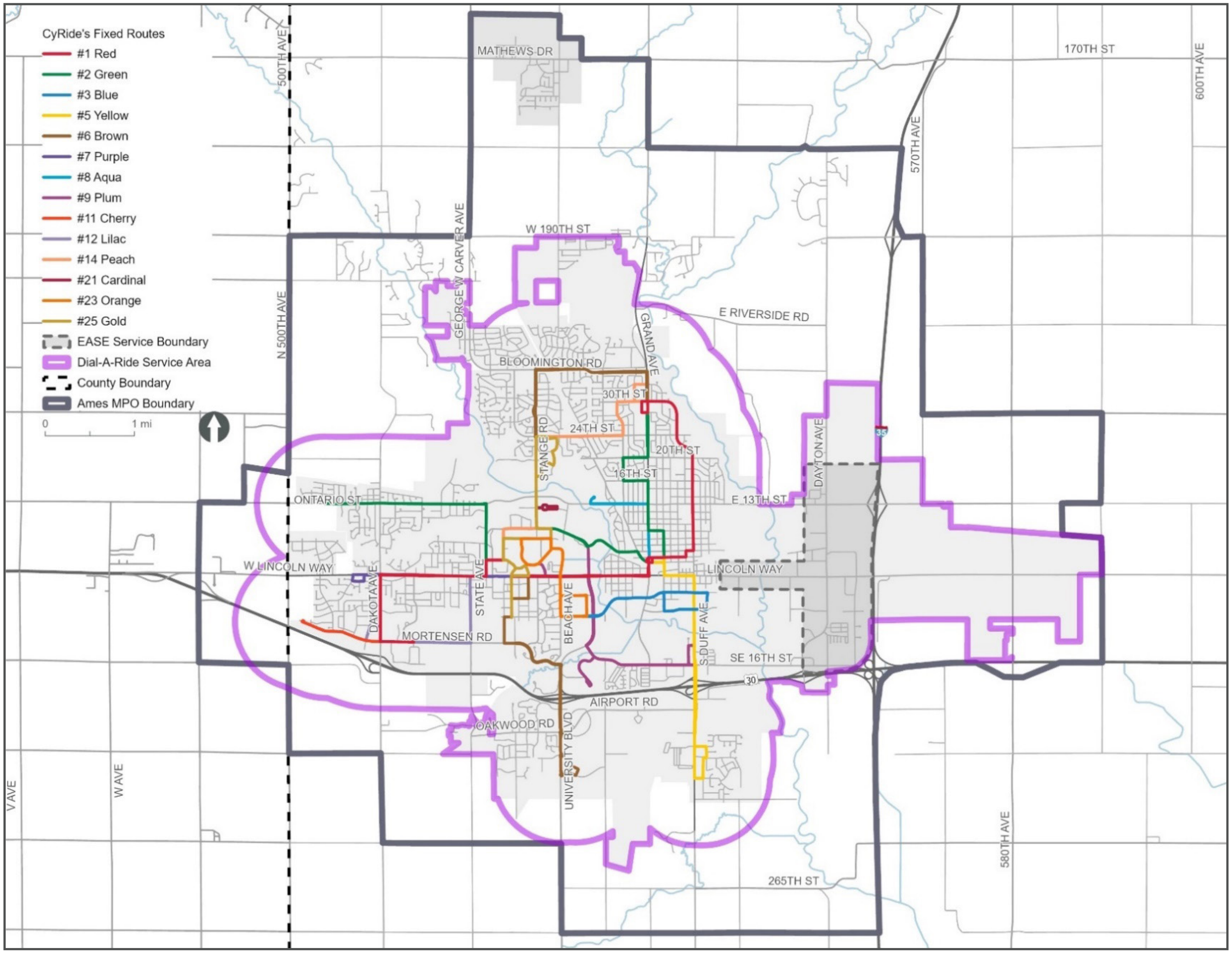
Figure 51 shows CyRide's transit service operating in Ames. The Dial-A-Ride service operates anywhere in Ames or ¾ of a mile from any CyRide fixed route, whichever is greater.

Figure 50: 2019, 2023, and 2024 CyRide Ridership per Route



Source: CyRide

Figure 51: CyRide Transit Service



Source: CyRide

AMES CONNECT 2050

Transit Level of Service

Transit LOS analysis evaluates transit service performance across peak periods, which are generally assumed to be 6 to 9 a.m. and 3 to 6 p.m. on weekdays. Given the high student population of the AAMPO region, peak transit demand occurs in the morning hours through 10 a.m., at which point demand reduces but ridership remains high as CyRide user trips are spread out through the late morning, afternoon, and evening hours.

Figure 52 shows the resulting transit LOS for CyRide's fixed routes. The LOS reflect a.m. peak demand. It is noted that the #8 Aqua route was not included in the analysis as it only operates during summer months, and the EASE service boundary assumes a 60 minute for service which resulted in an LOS exceeding 30 minutes.

Table 31: Transit Level of Service for CyRide Fixed Routes

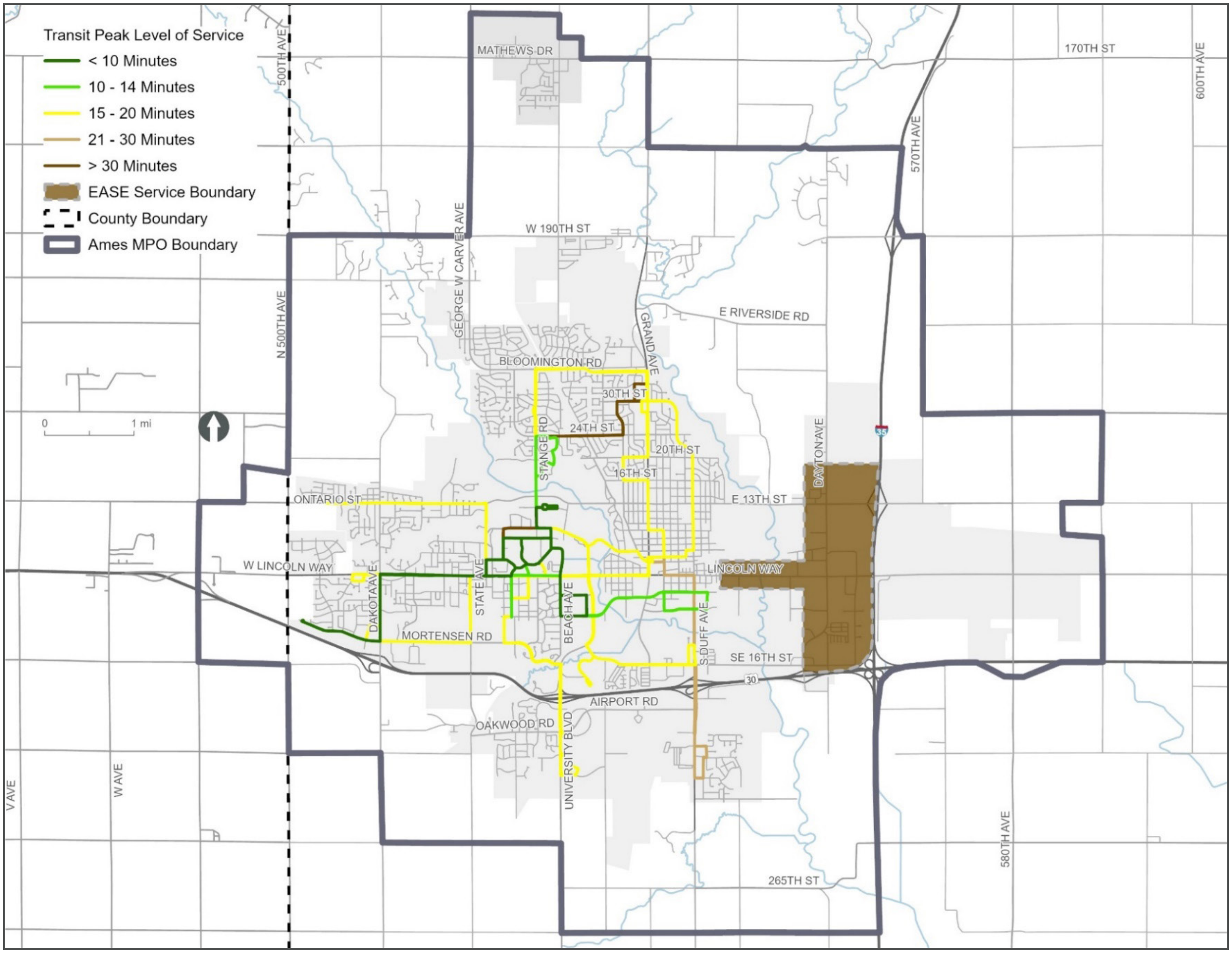
Highest LOS Routes	Lowest LOS Routes
#11 Cherry	#5 Yellow
#21 Cardinal	#14 Peach
#23 Orange	EASE (on-demand service)

Table 32: Transit Level of Service Thresholds

Frequency (Minutes)	Description
<10	No bus schedule needed.
10–14	Passengers may consult schedules.
15–20	Passengers consult schedules to minimize wait time.
21–30	Passengers adapt travel to transit schedule.
31–40	Minimal service to meet basic travel needs.

Source: Transit Cooperative Research Program, ***Transit Capacity and Quality of Service Manual***.

Figure 52: Transit Peak Level of Service



Dial-A-Ride Service

HIRTA is a regional transit agency that operates door-to-door demand-response transit services in central Iowa, including the counties of Boone, Dallas, Jasper, Madison, Marion, Story, and Warren. CyRide contracts with HIRTA to provide complementary Americans with Disabilities Act service, referred to as Dial-A-Ride.[8]

Dial-A-Ride service in Ames is reserved for passengers unable to use fixed route buses due to a disability. To be eligible for this service within the CyRide service boundary, passengers must be approved by CyRide. Outside the CyRide service area, HIRTA provides services directly for Story County.

Dial-A-Ride Historic Performance

Historic Dial-A-Ride performance by fiscal year within the CyRide service boundary was reviewed based on performance statistics provided by CyRide and is presented in **Table 33** for fiscal years 2020 through 2024. Note that starting in 2020, HIRTA began reporting performance statistics for services they directly operate to the NTD while CyRide reports services they directly operate. While the Dial-A-Ride service is CyRide's service, these numbers are embedded in HIRTA's overall performance for the counties they serve in Central Iowa.

The main findings of the review of Dial-A-Ride historic performance within the CyRide service area are that the service saw a substantial increase across all performance metrics since fiscal year 2020; one factor likely influencing limited performance in 2020 is the COVID-19 pandemic that began in mid-March, which saw nationwide reductions in travel. One notable trend regarding historic performance Dial-A-Ride service is the general increase in annual farebox recovery ratios, defined as the percentage of operating expenses covered by passenger fares, which indicates an increase in service efficiency.

Table 33: Historic Dial-A-Ride Performance by Fiscal Year, FY2020–FY2024

Dial-A-Ride	FY2020	FY2021	FY2022	FY2023	FY2024
Passengers	7,818	6,348	13,089	13,783	14,608
Revenue miles	36,413	36,234	73,340	56,953	61,542
Revenue hours	3,341	3,360	6,758	4,807	4,220
Passengers/revenue hour	2.3	1.9	1.9	2.9	3.5
Passengers/revenue mile	0.2	0.2	0.2	0.2	0.2
Expenses	$154,967	$129,217	$243,104	$254,074	$305,030
Farebox revenue	$11,790	$5,050	$15,598	$15,077	$22,741
Farebox recovery ratio	7.6%	3.9%	6.4%	5.9%	7.5%

Source: CyRide

8 Ames Area Metropolitan Planning Agency, ***Ames Area MPO FY2025-2029 Passenger Transportation Plan***.

EXISTING REGIONAL CONNECTIONS

Although personal vehicle travel and CyRide transit are the most preferred modes of travel in the AAMPO region, there are other transportation providers in the region that allow additional connections in Ames and beyond and connect travelers to different modes. The following sections discuss those services.

AVIATION

Aviation services in the AAMPO region are facilitated at the James Herman Banning Ames Municipal Airport. Current services at the site include business aviation that allows users to charter flights across the country. Key airport operation statistics include the following:[9]

- **Aircraft based on field:** 86
- **Aircraft operations:** Average 921/day
- **Single engine airplanes:** 61.25% transient general aviation
- **Multiengine airplanes:** 6.37% local general aviation
- **Jet airplanes:** 2.5% air taxi
- **Gliders:** 13.1% military
- **Ultralights:** 3

INTERCITY BUS SERVICE

Additional operators provide intercity bus services between Ames and surrounding communities. Regional transportation services are centrally located at the Ames Intermodal Facility, located at the intersection of Hayward Avenue and Chamberlain Street. CyRide provides services to the facility, connecting travelers to additional destinations in Ames. The following intercity bus services serve the AAMPO region:

- **Jefferson Lines:** Provides service to Ames primarily through the I-35 corridor, offering transportation to destinations north and south of Ames and providing access to nearby states as well.
- **Executive Express:** Provides one-way and round-trip shuttle service to and from the Des Moines International Airport and picks up travelers at the Ames Intermodal Facility or the Quality Inn & Suites located on E 13th Street.

PASSENGER RAIL

Union Pacific operates several freight lines in the AAMPO region; however, Amtrak does not provide service along any railroads in the area. The Boone & Scenic Valley Railroad does operate seasonal passenger rides, such as a dinner train and the Santa Express. The service operates in Boone and Fraser, Iowa.

WATERWAYS

The Skunk River Water Trail is a recreational waterway located in the AAMPO region. It provides a scenic recreational route for paddlers. Numerous access points to the water trail are located in the AAMPO region and offer recreational opportunities to residents during the spring and summer months.

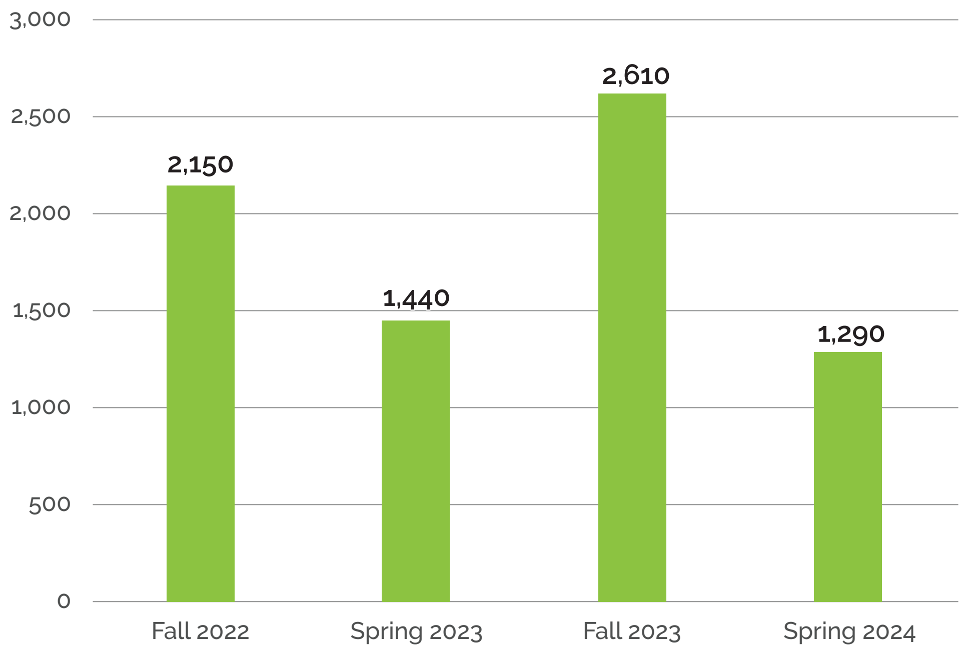
9 City of Ames, ***James Herman Banning Ames Municipal Airport General Information***.

ALTERNATIVE MOBILITY PROVIDERS

Travelers in the AAMPO region have many options available for travel in addition to public transportation services and the bicycle and pedestrian network. Ridesharing services, such as Uber and Lyft, are available and can connect users to drivers via smartphone app. Taxi services are provided by Yellow Cab, whose facility is located at the James Herman Banning Ames Municipal Airport.[10]

Uber, Lyft, and taxi services provide a considerable number of trips to riders in the AAMPO region. Replica was used to estimate the number of trips taken during a typical weekend from fall 2022 through spring 2024, as shown in **Figure 53**. Fall 2023 had the largest number of ridesharing trips on a typical Saturday, with trips falling significantly during the spring of 2023 and 2024.

Figure 53: Rideshare Trips, The AAMPO Region, 2022–2024



Source: Replica HQ

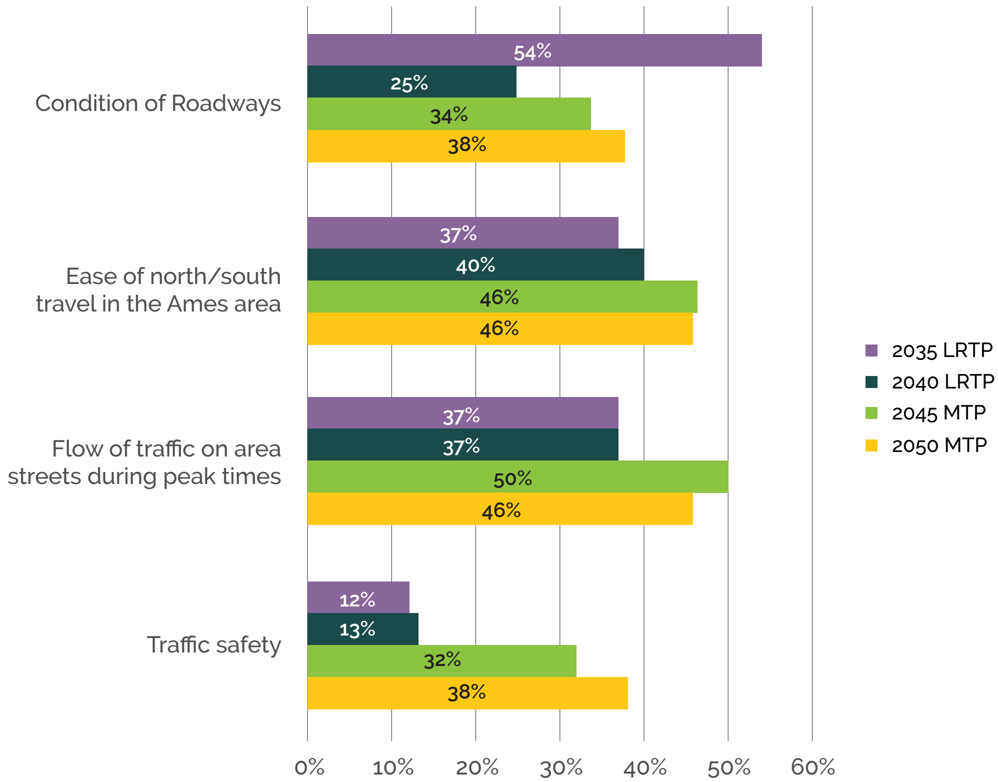
10 The AAMPO, ***FFY2025-2029 Passenger Transportation Plan***.

SUMMARY OF EXISTING SYSTEM PERFORMANCE

Completing existing system performance analyses enabled the identification of the key issues and needs facing the AAMPO's multimodal transportation system. To understand how the perceptions of the region's issues and needs have evolved over time, a review of responses to the travel surveys distributed as part of the 2035 and 2040 long-range transportation plans and 2045 MTP were compared with the results of the 2050 MTP travel survey. Each survey asked participants to name the three most important transportation issues that need addressed. Several common themes were observed across survey responses for each plan.

As **Figure 54** shows, the condition of roadways, ease of north/south travel in Ames, and flow of traffic on area streets during peak times were consistently ranked by survey respondents as top issues in the AAMPO region. Transportation safety was not highly ranked in the 2035 and 2040 long-range transportation plans, but it increased in importance for the 2045 and 2050 MTPs and was a top 3 issue identified in the 2050 MTP travel survey.

Figure 54: Top Transportation Issues Identified by Travel Survey Participants



The key takeaways of the AAMPO's existing multimodal system performance analysis are summarized in **Table 34**.

Table 34: Existing System Performance Analysis Key Findings

Mode	Key Findings
Safety	Fatal and serious injury crashes have illustrated a declining trend since 2019 but are still ocvcurring on the region's higher volume arterial network.
Traffic Operations	AM and PM peak hour congestion is present along the AAMPO's arterial streets and roads, and future growth could exacerbate peak hour traffic operations.
Asset Conditions	The region's bridges and pavement exhibit areas of Poor condition. The AAMPO and local jurisdictions have plans in place to address asset conditions.
Freight	Few barriers to freight mobility exist today, but strategies to accommodate growth in freight usage and freight-generating land uses could help preserve efficient regional freight movements.
Bicycle and Pedestrian	Priority bicycle routes and pedestrian crossings exhibit a range of stress levels. The Walk, Bike, Roll Ames bicycle and pedestrian plan identifies potential treatments that best fit the context of specific corridors/pedestrian crossings.
Public Transit	Fixed route and demand response ridership saw substantial declines in 2020 and 2021 but have begun to trend back toward pre-2020 levels.

CHAPTER 4 PUBLIC ENGAGEMENT

AAMPO is dedicated to making the Ames Connect 2050 Plan a collaborative effort shaped by the community and system users. Public engagement throughout the plan's development focused on informing residents about the MTP's goals and objectives while fostering opportunities for meaningful participation. Guided by the MPO's Public Participation Plan, multiple outreach methods were used to encourage dialogue, generate ideas, and build consensus.

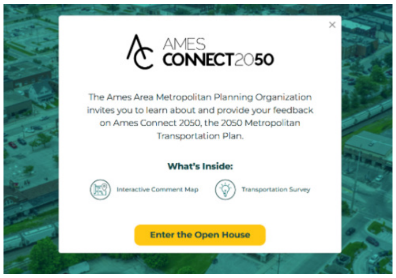
To gather feedback from community members, AAMPO hosted in-person public open houses, online open houses, and presented at several community events. The engagement process was structured around three key milestones:

- Identifying Challenges and Goals
- Developing Strategies
- Reviewing the Draft Plan

Each engagement activity was designed to verify that public input played a central role in shaping transportation priorities.

CONNECT 2050 WEBSITE

A project website was created to provide background and updates throughout the development of Connect 2050. This website also hosted the online engagement events, including online open houses and an engagement survey.



ENGAGEMENT MILESTONE 1: IDENTIFYING CHALLENGES AND GOALS

The first public engagement milestone of the MTP development process sought to solicit input from community members on the current challenges facing multi-modal transportation in the region and to listen to their ideas on the goal areas that should guide Connect 2050. Events held as part of the Identifying Challenges and Goals milestone included:

- In-Person Open House #1 – Visioning
- Online Open House #1 – Visioning
- Ames Eco Fair Engagement Booth
- Engagement Survey

IN-PERSON OPEN HOUSE #1

The in-person Visioning open house was held in November 2024 at the Ames Community Library. The purpose of this event was to provide attendees with an overview of the MTP process and solicit feedback on the vision and priorities they felt should guide Connect 2050. A total of 22 community members attended the open house event.

Educational materials for the event included a series of boards that provided an overview of the MTP process, background on the city of Ames' CSAP, the project schedule, and information on how the region is expected to grow in terms of population, number of households, and employment through 2050.

Activities conducted at Open House #1 included:

- **Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis** – participants were asked to share their thoughts on the strengths and weaknesses of AAMPO's multi-modal transportation system today, and what opportunities and threats could impact the region in the future.
- **Connect 2050 Focus Areas Voting** – Participants were asked to vote for what they believe Connect 2050's focus areas should be; each participant was able to vote for up to three focus areas.
- **Tabletop Mapping Exercise** – Participants were asked to leave comments on a tabletop map related to specific multi-modal issues and needs within the region.

ONLINE OPEN HOUSE #1

The supplementary online meeting for Open House #1 was hosted for two weeks, from November 21 through December 6, 2024. This event presented the same educational materials and used the same activities as the in-person event. A total of 186 users visited the online open house.

AMES ECO FAIR ENGAGEMENT BOOTH

A Connect 2050 engagement booth was set up at the Ames Eco Fair, which took place in September 2024. This booth provided the same educational content and activities as described for Open House #1. The engagement booth totaled 178 attendees.

ENGAGEMENT SURVEY

The final element of the Identifying Challenges and Goals public engagement milestone was an engagement survey posted on the Connect 2050 project website. This survey was available from September 25 through December 6, 2024, and asked respondents questions related to:

- Potential priorities of Connect 2050.
- Strengths, weaknesses, threats, and opportunities facing the region's multi-modal transportation system.
- Safety topics in support of the CSAP.
- Optional demographic information.

The survey received 42 responses.

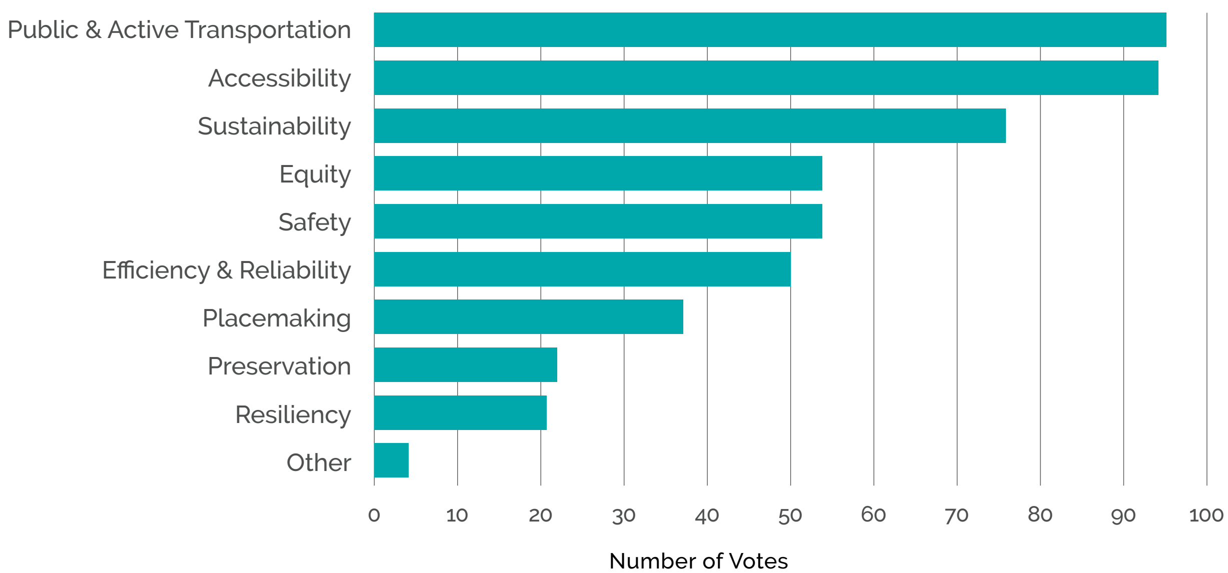
IDENTIFYING CHALLENGES AND GOALS – WHAT WE HEARD

The key themes arising from the Identifying Challenges and Goals public engagement milestone were:

- Residents enjoy having CyRide but want to see it be even more accessible to all residents.
- There is a desire for an increased focus on multi-modal facilities, such as better and more connected bike trails, safer walking and rolling options, and access to transit options that serve beyond the Ames area.

The focus areas that emerged from community input regarding what they felt should be the top priorities guiding Connect 2050 were Public and Active Transportation, Accessibility, and Sustainability. **Figure 55** shows the total votes received for each focus area across the first public engagement milestone events.

Figure 55: Public Prioritization Results - Identifying Challenges and Goals Phase



MPO-WIDE HOUSEHOLD TRANSPORTATION SURVEY

A transportation survey was administered to a random sample of MPO residents during the fall of 2024. The survey's purpose was to gather input from residents regarding issues and opportunities related to transportation planning for the region. Some of the specific topics addressed in the survey included:

- Perceptions of current transportation system and issues.
- Methods of transportation used.
- Detailed perceptions of topics related to traffic safety, public transit, and bicycle and pedestrian options.
- Priorities for potential future transportation improvements.

The survey was mailed to a random sample of residents and completed by 406 recipients, resulting in a statistical precision of at least +/- 4.8% at a 95% level of confidence. A summary report is included in **Appendix E**.

ENGAGEMENT MILESTONE #2: DEVELOPING STRATEGIES

The second public engagement milestone of the MTP development process sought to solicit input from community members on the potential strategies they would like to see recommended as part of Connect 2050. Events held as part of the Developing Strategies milestone included:

- In-Person Open House #2 – Alternatives and Strategies
- Online Open House #2 – Alternatives and Strategies
- Ames Farmers Market Engagement Booth

IN-PERSON OPEN HOUSE #2

The in-person Alternatives and Strategies open house was held in April 2025 at the Ames Community Library. The purpose of this event was to provide attendees with an update on Connect 2050 and solicit feedback on the strategies they would like to see recommended in the MTP. A total of 22 community members attended the open house event.

Educational materials for the event included a series of boards that provided an overview of the MTP's role, additional information on the city of Ames' CSAP, the project schedule, and the key themes identified during the Identifying Challenges and Goals public engagement milestone.

Activities conducted at Open House #2 included:

- **Connect 2050 Strategies Voting** – participants were asked to share their thoughts on potential strategies that could be included in Connect 2050 to address the issues and needs facing the region's multi-modal transportation.
- **Build Your Own Street** – Participants were invited to demonstrate their ideas on how to implement various strategies within the region by designing a street.
- **Tabletop Mapping Exercise** – Participants were asked to leave comments on a tabletop map related to locations where they felt potential Connect 2050 strategies could be applied.

ONLINE OPEN HOUSE #2

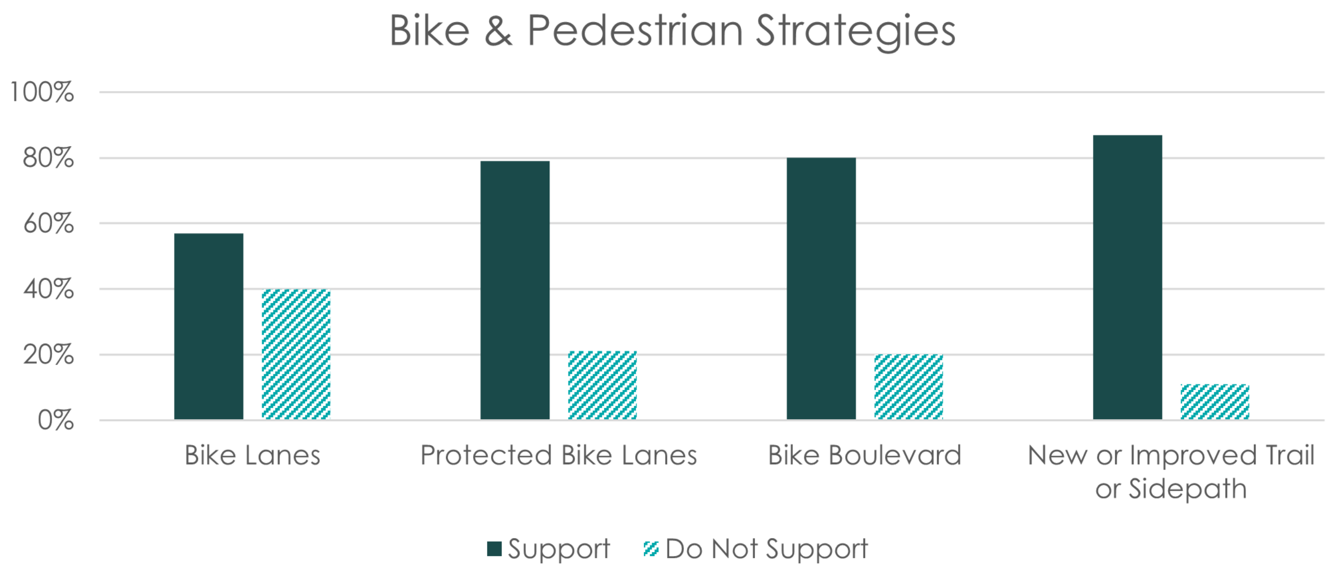
The supplementary online meeting for Open House #2 was hosted for two weeks, from April 29 through May 13, 2025. This event presented the same educational materials and used the same Connect 2050 Strategies Voting and Mapping Exercise activities as the in-person event. A total of 90 users visited the online open house.

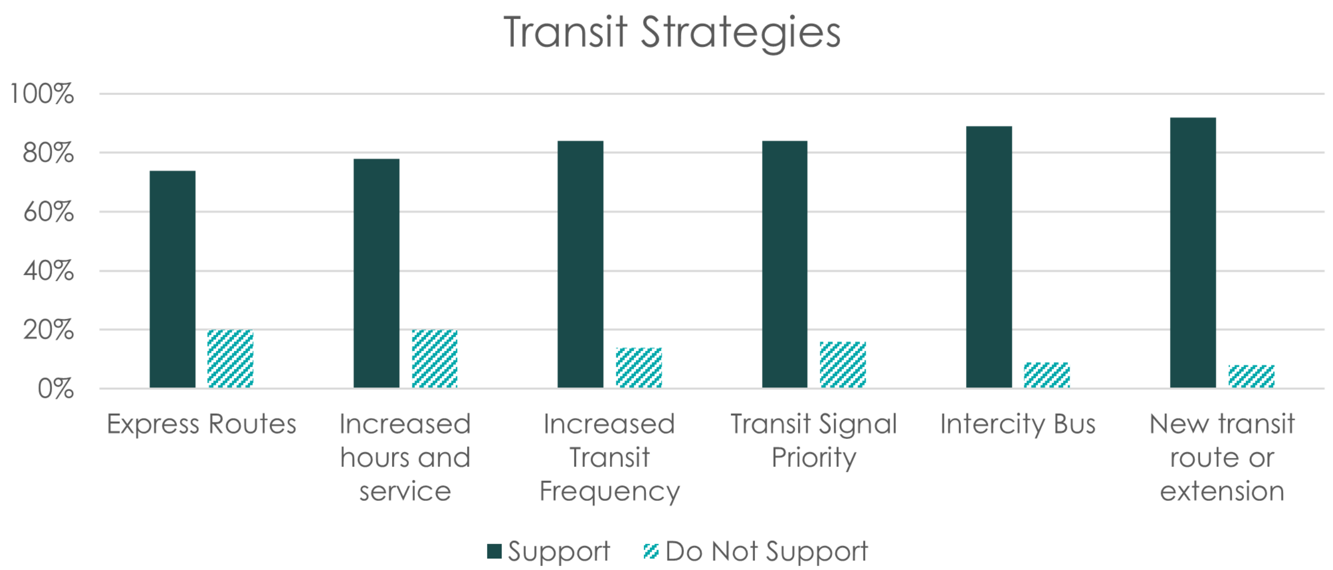
AMES FARMERS MARKET ENGAGEMENT BOOTH

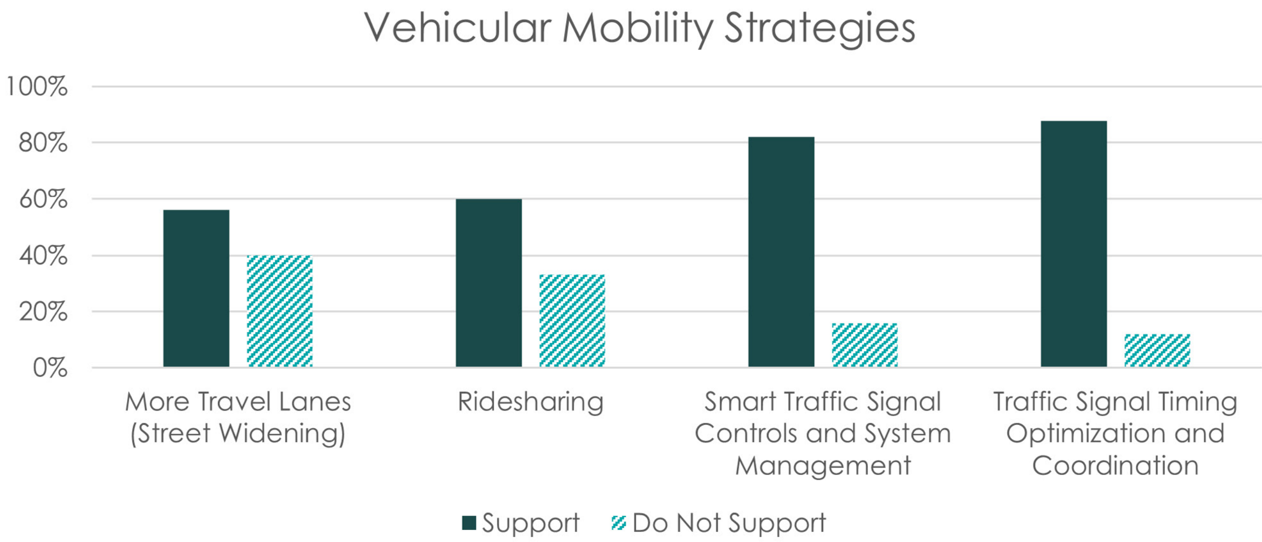
A Connect 2050 engagement booth was set up at the Ames Farmers Market, which took place in May 2025. This booth provided the same educational content and activities as described for Open House #2. A total of 116 Attendees visited the engagement booth.

DEVELOPING STRATEGIES – WHAT WE HEARD

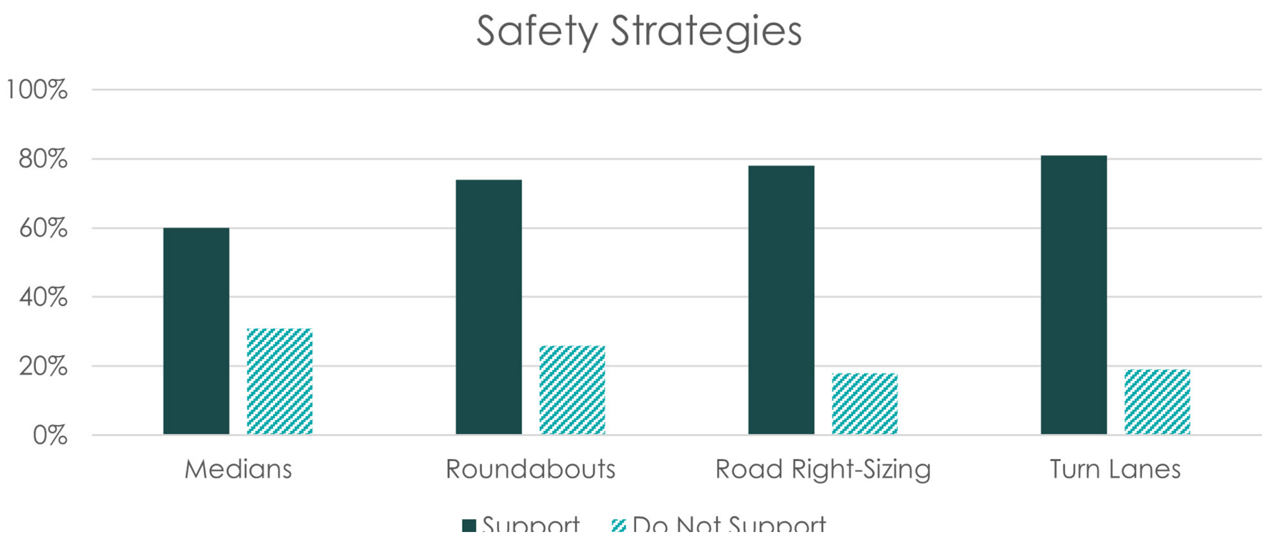
The key theme arising from the Developing Strategies public engagement milestone was that the strategies presented at the engagement events were supported by the majority of participants, with certain strategies receiving higher degrees of support. The results of the Connect 2050 Strategies Voting activity are summarized below by topic.







Vehicular Mobility Strategies
100%
80%
60%
40%
20%
0%
More Travel Lanes (Street Widening)
Ridesharing
Smart Traffic Signal Controls and System Management
Traffic Signal Timing Optimization and Coordination
Support
Do Not Support



Safety Strategies
100%
80%
60%
40%
20%
0%
Medians
Roundabouts
Road Right-Sizing
Turn Lanes

Additional Strategies
100%
80%
60%
40%
20%
0%
Micromobility Options
Wayfinding Signs
Support
Do Not Support

ENGAGEMENT MILESTONE #3: REVIEWING THE DRAFT PLAN

The third public engagement milestone of the MTP development process sought to solicit input from community members on the draft Connect 2050 MTP. Online Open House #3 provided a dedicated review of the Draft Plan milestone.

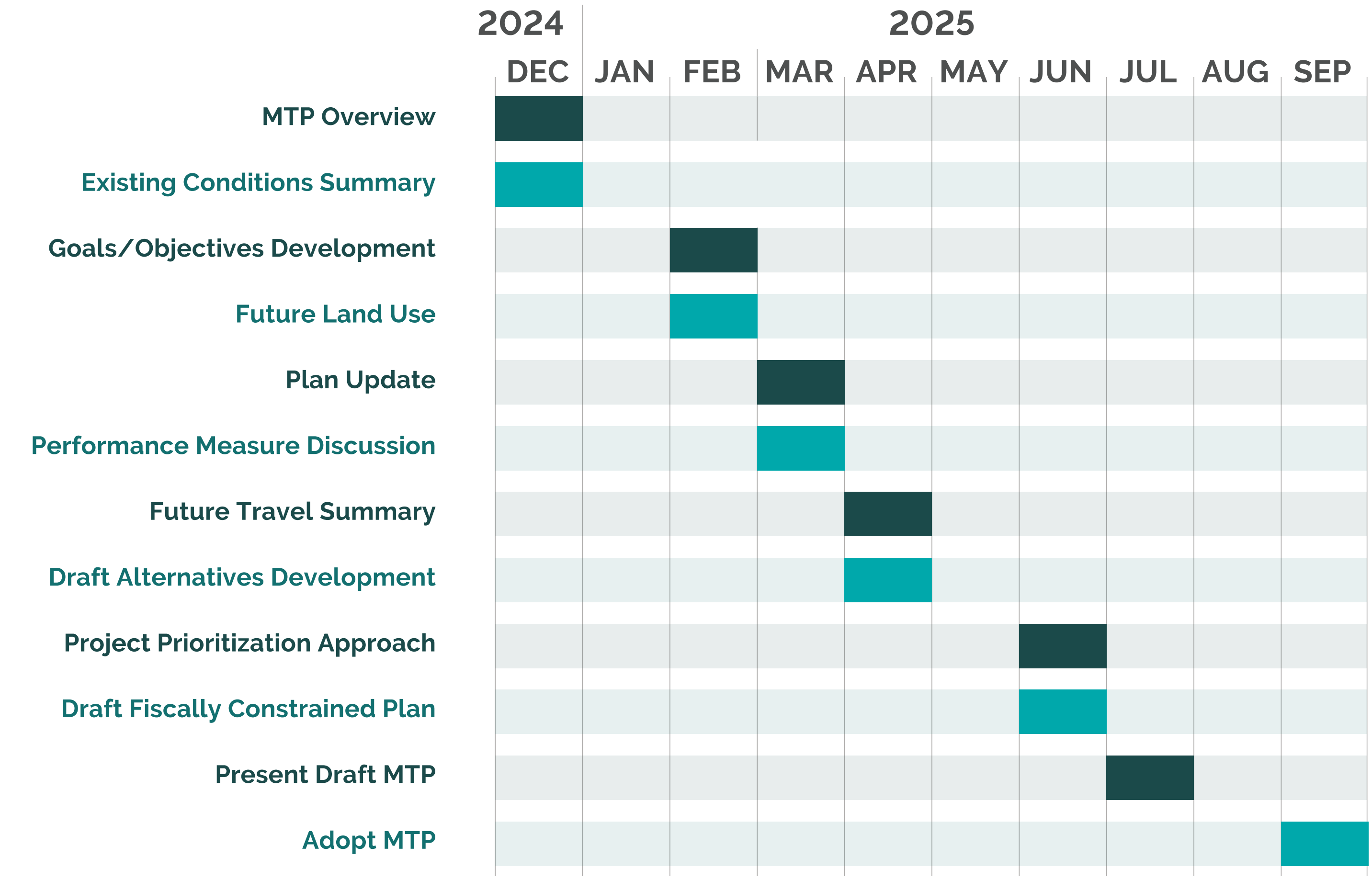
OPEN HOUSE #3 – DRAFT CONNECT 2050 MTP

Online Open Hose

The Draft Connect 2050 MTP launched July 30th and provided the public, resource agencies, and stakeholders the opportunity to review the draft document over a 30 day comment period.

TTC / POLICY COMMITTEE MEETINGS

The MTP team met with and presented to the TTC to get feedback and provide updates at the following milestones:



The MTP team also presented and got feedback from the Policy Committee at the following milestones:

★ JUNE 2025 — Presented the MTP process, draft project list, and draft fiscally constrained plan

★ JULY 2025 — Presented the draft MTP

★ SEPT 2025 — Adopted the final MTP

CHAPTER 5: FUTURE TRENDS AND NEEDS

A future performance analysis was conducted for the Ames Area MPO transportation system to assess how projected growth in employment and households will affect the region's transportation system. This analysis used inputs from the updated Travel Demand Model (TDM), with 2023 as the base year and 2050 as the scenario year.

FUTURE GROWTH

Employment and population in the Ames Area MPO are estimated to continue to grow steadily into 2050. **Table 35** shows the future growth predictions to 2050 that were used as inputs for the TDM. While the estimated employment and household growth levels are not indicative of how future land uses will be planned, zoned, or phased, they inform the travel parameters used in the future system performance analysis presented in this chapter.

Table 35: Projected Regional Growth Trends, 2023–2050

Year	Households	Population	Employment
2023	28,748	73,910	35,879
2050	36,620	94,140	45,700
Growth	27%	27%	27%

*Note – The TDM boundary was larger than the Ames Area MPOs boundary, including additional land in Story County and the town of Kelly, resulting in a larger population and more households than shown in Chapter 2.

As shown in the table above, both households and population are projected to grow by 27% between 2023 and 2050. Similarly, employment is expected to grow by 27%, rising from 35,879 to 45,700 jobs during the same period.

Future growth areas were determined by the Ames Plan 2040, then refined based on input from Ames City Staff. Once growth areas were determined, the amount of growth to occur was calculated using specific land use assumptions based on each land use type. Employment and household projections were then allocated to specific traffic analysis zones (TAZ) based on the geographic locations of the future growth. Project employment growth by TAZ is shown in **Figure 56** and projected Household growth is shown in **Figure 57**.

Figure 56: Growth of Employment (in Jobs) by TAZ, 2023–2050

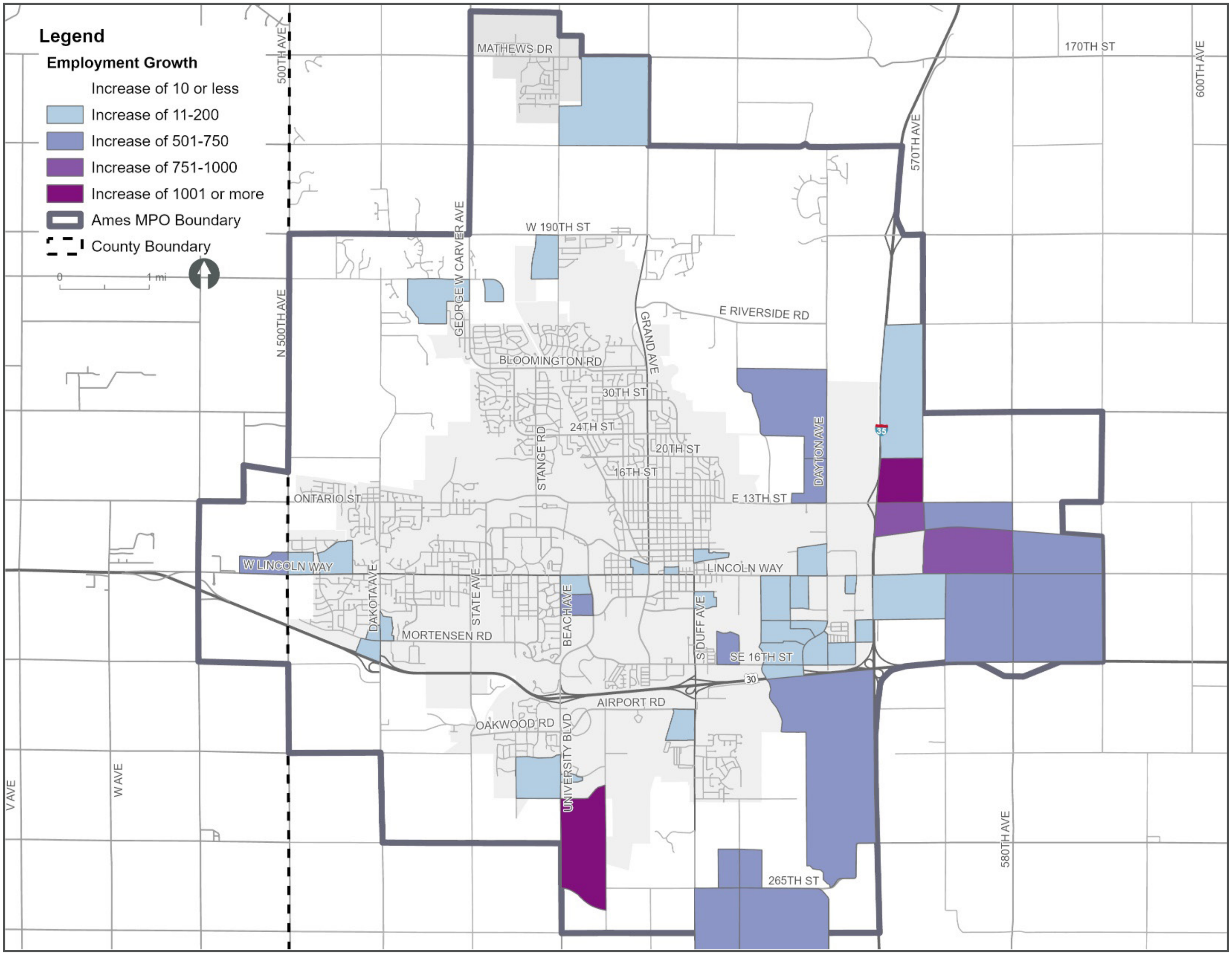
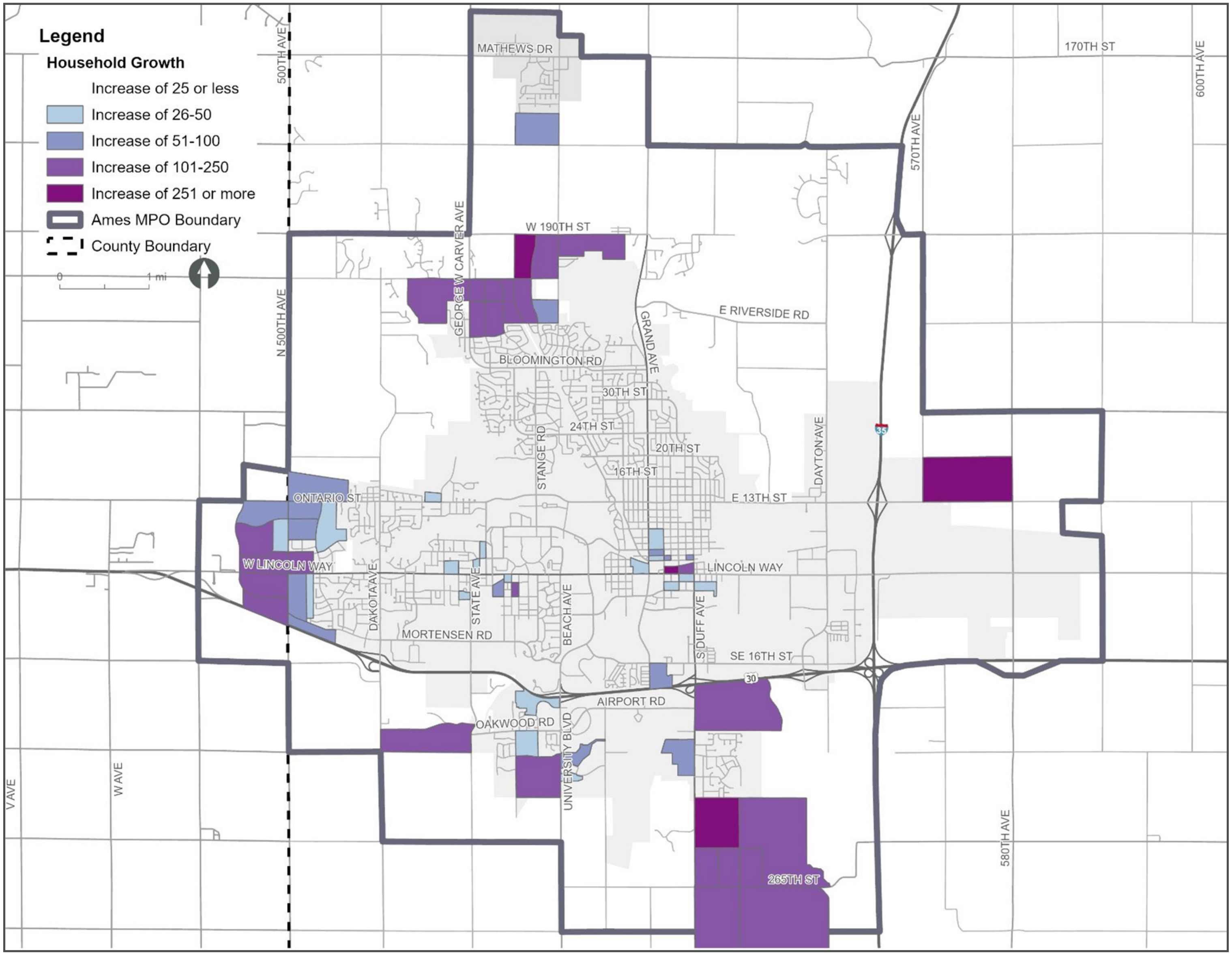


Figure 57: Projected Household Growth by TAZ, 2023–2050



TRAVEL DEMAND MODEL

A TDM is a forecasting tool used to estimate future travel patterns based on the projected change in population, employment, land use, and transportation infrastructure. The TDM simulates the base year travel conditions and behaviors and then models how future growth and transportation system changes will impact travel patterns. This helps planners determine how the area performs today and will perform in future-year scenarios. A TDM is the primary method used to assess the condition and performance of the future transportation system, which is done by predicting the number, purpose, origin and destination, and route of trips made on the system. The TDM's core concept is that land use directly affects the number and types of trips people make, with a "trip" defined as travel between two locations for a specific purpose, such as commuting from home to work, going to school, or traveling from work to a shopping destination.

The TDM roadway network input includes the number of lanes, turn lanes, intersection controls, and speed limits. The transit network input includes bus routes, stop locations, route frequency, and other cost and travel information. The parcel data input includes the land use, number of households, and square footage of non-residential uses. Then, TAZs are developed by aggregating parcel-level land use data and aligning it with the network, verifying each zone reflects travel patterns, accessibility, and connectivity to the surrounding road system.

2050 EXISTING PLUS COMMITTED BASELINE

The existing plus committed (E+C) network represents the network as it is today combined with projects that are already funded or programmed for implementation and included in either the Capital Improvements Program (CIP) and/or TIP. It serves as the baseline network for modeling future travel demand, verifying that only realistic and fiscally constrained improvements are included in the analysis. For this E+C Scenario, the existing roadway system plus the following major roadway projects are included:

- 16th Street from University Boulevard to Apple Place – Widen to 4 lanes
- 13th Street & Grand Avenue – Left turn lanes
- Grand Avenue & S 20th Street – Left turn lanes
- Stange Crescent – Reduction to two lanes
- Airport Road from Sam's Club to S Duff Avenue – Intersection upgrades
- 24th Street from Stange Road to Hayes Avenue – Conversion from 4 to 3 lanes
- East Lincoln Way from S Duff Avenue to S Skunk River – Conversion from 4 to 3 lanes
- Bloomington Road from Hoover to Eisenhower – Conversion from 4 to 3 lanes

FUTURE TRAFFIC OPERATIONS

Future traffic operations for the year 2050 were analyzed by comparing the model outputs from base year 2023 and the 2050 E+C Scenario. To accurately compare the 2023 traffic counts and the estimated traffic counts for the 2050 E+C Scenario, a processing procedure was applied to the 2050 E+C raw model flows. This procedure corrects the differences in the base year 2023 observed traffic counts versus the modeled traffic flows and applies those differences to the 2050 modeled flows. Growth in average daily traffic levels between 2023 and 2050 are shown in **Figure 58** while percent growth in average daily traffic levels for this same period are shown in **Figure 59**. System-wide statistics are provided in **Table 36**. Vehicle miles traveled (VMT) is projected to increase by 35%, which means the average trip distance will be longer, thus the distance traveled will be longer in 2050.

- Vehicle hours traveled (VHT) is projected to increase by 37%, which means the average trip time will be longer, thus the time spent traveling will increase in 2050.
- The number of trips is projected to increase by 25%, from 327,624 to 407,950 trips. The total number of trips will increase due to population growth.
- Average trip length is projected to increase by 8%, which is consistent with the future growth happening at the urban fringe, increasing the travel distance needed to reach certain locations.
- The average travel speed is estimated to remain the same at 28 mph, suggesting that committed infrastructure improvements are expected to offset future growth patterns and prevent additional congestion.

Table 36: System-Wide Statistics for the E+C 2050 Scenario

Performance Measure (Annual)	2023	2050	Change
Vehicles Miles Traveled	1,762,390	2,371,325	35%
Vehicle Hours Traveled	62,374	85,512	37%
Trips	327,624	407,950	25%
Average Trip Length (miles)	5.38	5.81	8%
Average Travel Speed (MPH)	28	28	0%

Source: Ames Area MPO Travel Demand Model Outputs

Appendix F provides additional information on the travel demand model and methodology for forecasting future year traffic volumes; included in the Appendix is a figure comparing base year 2023 ADTs to forecasted 2050 ADTs.

Figure 58: Growth in Average Daily Traffic, 2023-2050

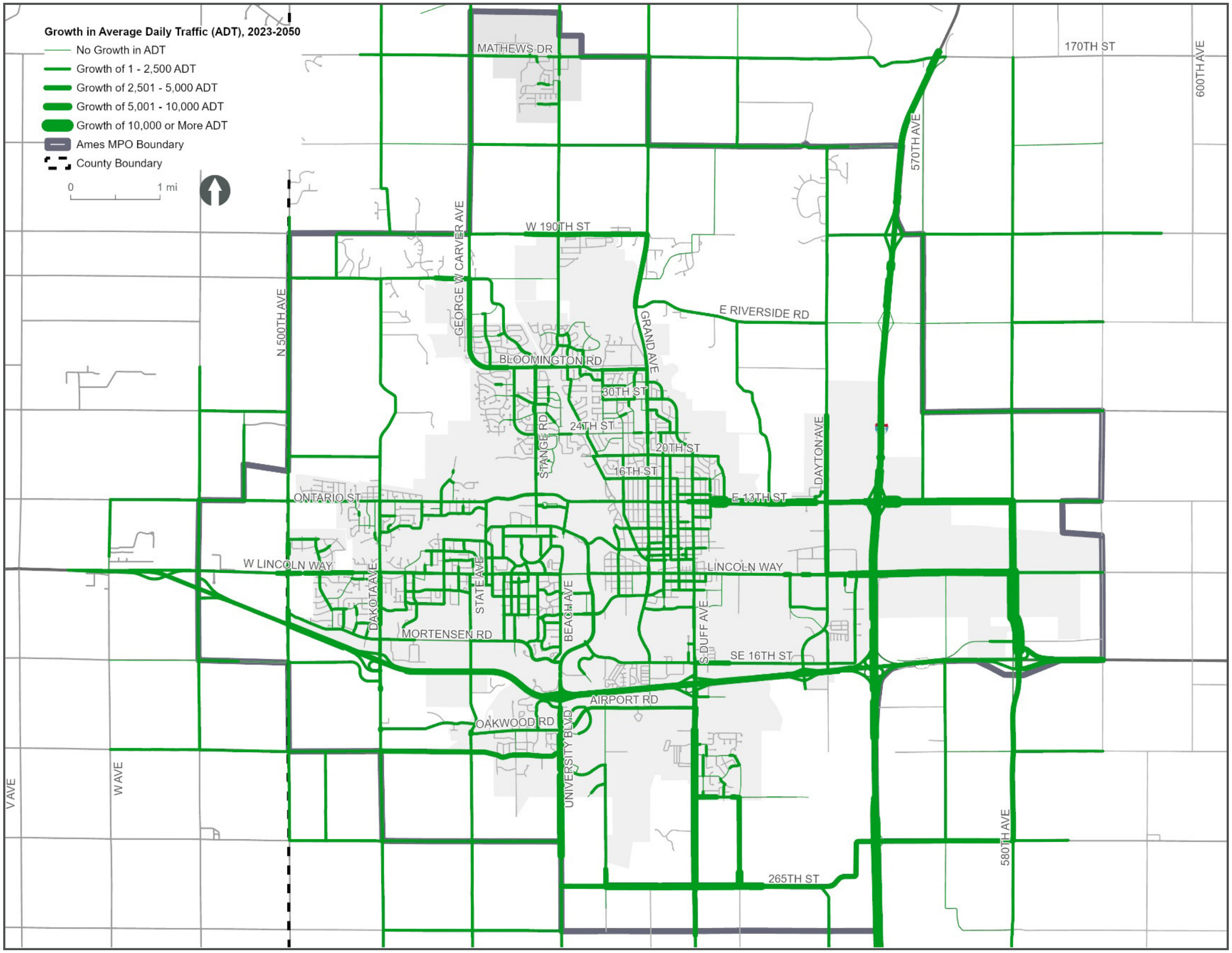
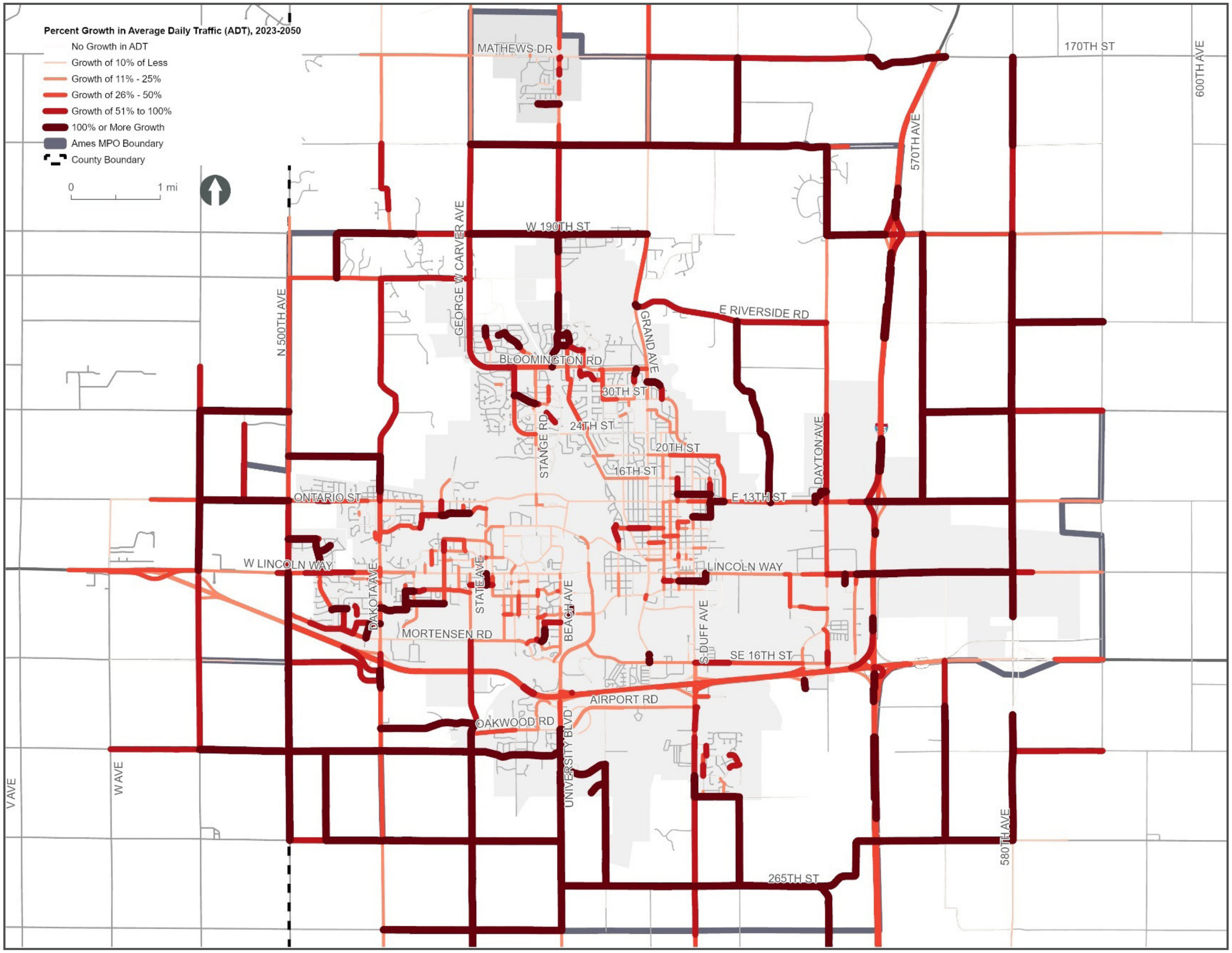


Figure 59: Percent Growth in Average Daily Traffic, 2023-2050



E+C 2050 TRAFFIC OPERATIONS

Intersection peak hour traffic operations in the 2050 E+C Scenario were analyzed using the same Synchro 12 software and methodology used for the baseline conditions in Chapter 3, Existing Systems Performance. The LOS results for signalized and unsignalized intersections are shown in **Table 37**. The intersections projected to experience significant delays are rated an LOS D or worse.

Table 37: 2050 E+C Scenario Signalized and Unsignalized Intersections by Estimated LOS

Intersection Level of Service	Signalized Intersections	Unsignalized Intersections
LOS A to C	80	20
LOS D	2	1
LOS E	0	1
LOS F	0	5
Total	**82**	**27**

The signalized intersections that will be operating with a LOS D or worse under the 2050 E+C Scenario are:

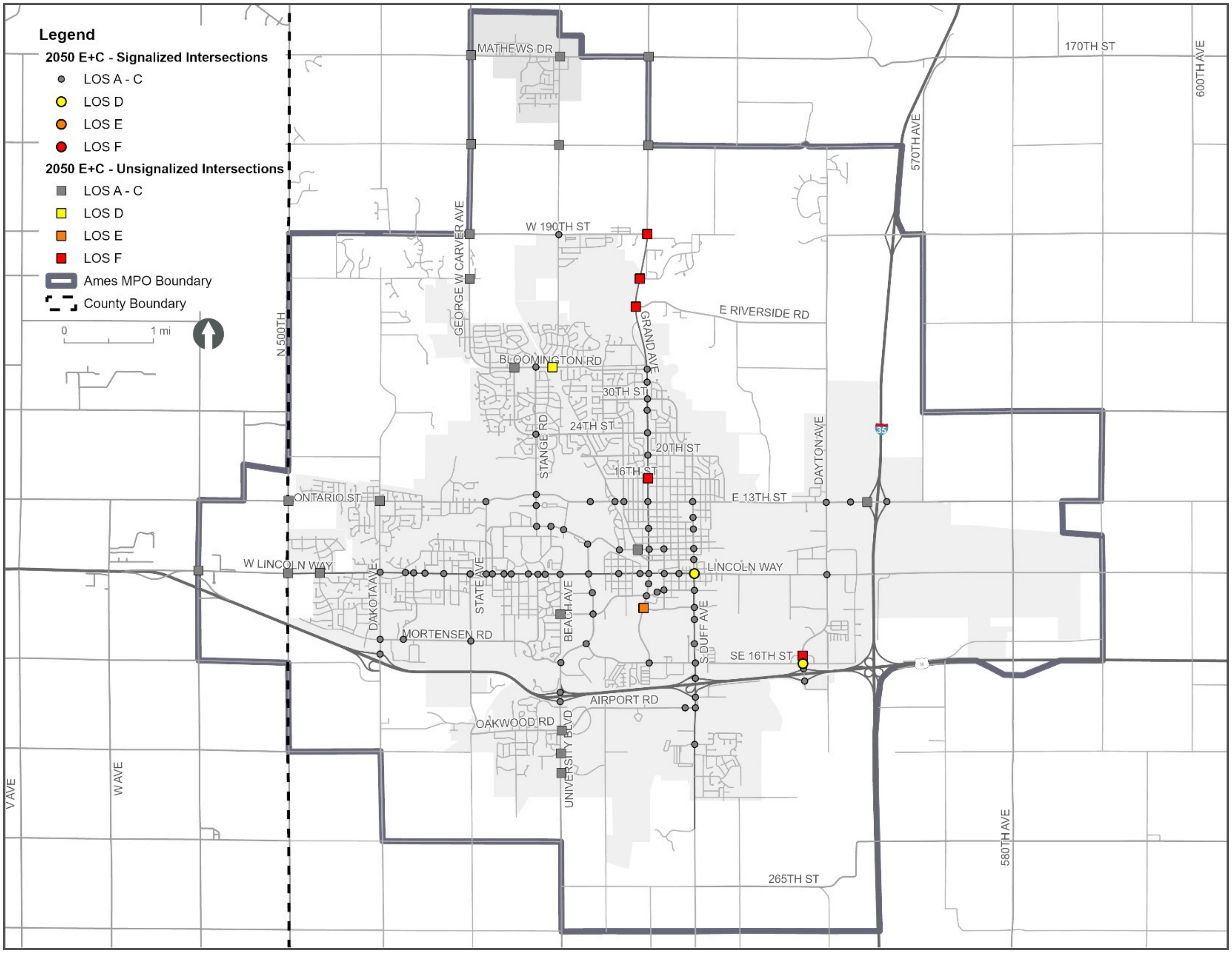
- S Duff Avenue/Duff Avenue & Lincoln Way/E Lincoln Way
- S Dayton Avenue & SE 16th Street

The unsignalized intersections that will be operating with a LOS D or worse under the 2050 E+C Scenario are:

- Church Access/Hyde Avenue & Bloomington Road
- S Grand Avenue & S 5th Street
- Grand Avenue & 16th Street
- U.S. 69 & W Riverside Road
- U.S. 69 & Ada Hayden Access/Arrasmith Trail
- U.S. 69 & 190th Street/Rookwood Drive
- Dayton Avenue & Isaac Newton Drive

The locations of the intersections operating at an LOS of D or worse are shown in **Figure 60**.

Figure 60: Peak Hour Traffic Operations for the E+C Scenario



TRANSPORTATION TRENDS AND TECHNOLOGY

The transportation industry is undergoing a transformative shift driven by rapid advancements in technology and evolving societal needs. Emerging trends, such as autonomous vehicles, Mobility as a Service (MaaS), and electric vehicles (EV), are revolutionizing how we move people and goods. As communities and regions strive for more efficient solutions, these technologies promise to reshape the future of transportation, making it smarter, safer, and more sustainable.

This section provides an overview of the ongoing changes in transportation-related trends and technologies that may impact the Ames Area MPO. Although it is difficult to measure the exact effect of changing technology in the future, outlining current trends is useful for understanding what future transportation may evolve.

TRAVEL TRENDS

Increased Focus on Safety

Between 1994 and 2023, the number of fatal motor vehicle crashes per year increased significantly throughout the United States. The period between pre-COVID-19 (2016 2019) and post-COVID-19 (2020-2023) saw a 10.5% increase in fatal crashes. Iowa's share of fatal motor vehicle crashes rose just slightly during this period and Ames' fatal crashes decreased by 1 to mark a 33.9% decrease (National Highway Traffic Safety Adminstration, 2023).

Figure 61: Number of Fatal Motor Vehicle Crashes, Pre- and Post-COVID-19 Pandemic

	Number of Fatal Motor Vehicle Crashes 2016-2019	Number of Fatal Motor Vehicle Crashes 2020-2023	% Change
U.S.	136,714	152,796	10.5%
Iowa	1,260	1,272	0.9%
Ames	3	2	-33.3%

The National Roadway Safety Strategy (NRSS) aims for zero traffic deaths through the Safe System Approach, but traffic fatalities increased by 12% from 2020 to 2021, totaling 31,720 deaths in the first nine months of 2021. To combat these trends, FHWA has identified several proven safety countermeasures to reduce fatal crashes. As examples, installing roundabouts can reduce fatal crashes by 82%, while adding bike lanes can decrease total crashes by up to 49%. Enhanced lighting at intersections can reduce pedestrian nighttime injury crashes by 42%, and rumble strips on rural roads can cut head-on fatalities by 44 to 64%. AAMPO has implemented numerous safety countermeasures to improve traffic safety, such as a roundabouts in key areas and a recently constructed pedestrian bridge near Jack Trice Stadium and Hilton Coliseum.

Figure 62: FHWA Safe System Approach

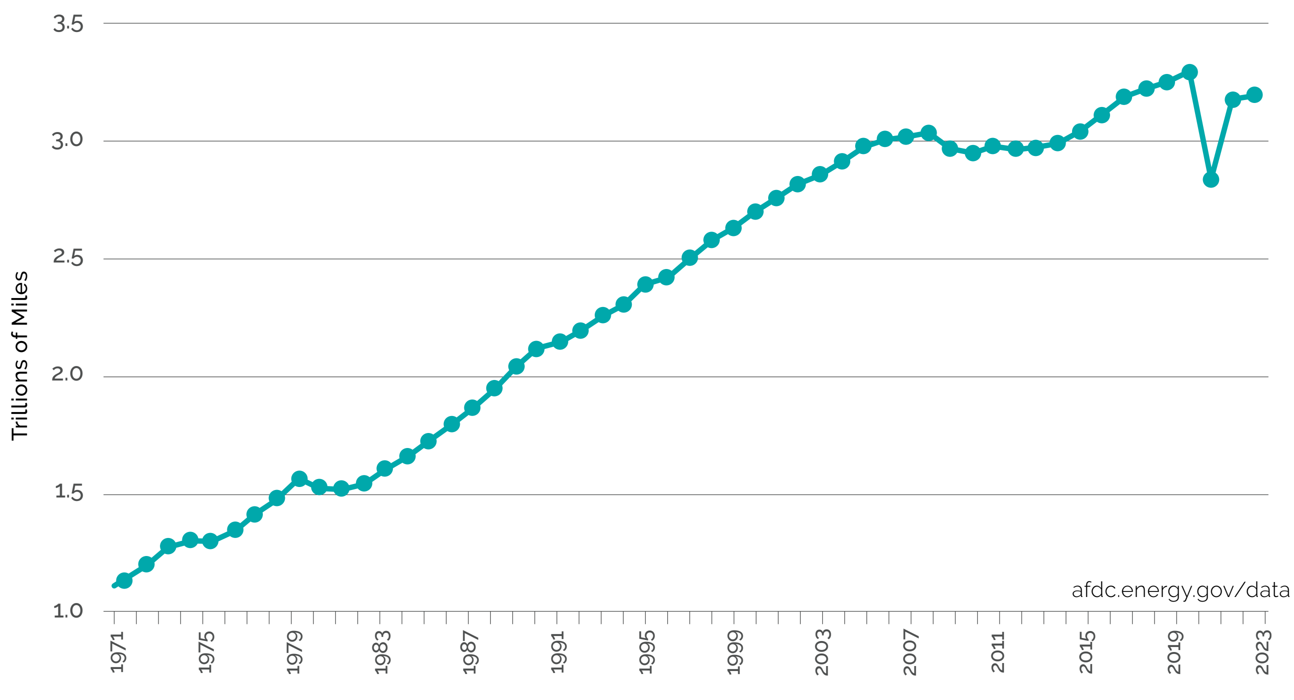
Source: FHWA

There has been a more recent emphasis on bicyclist and pedestrian safety. Over the past 20 years, hundreds of U.S. jurisdictions have adopted Complete Streets policies, with two-thirds of states now designing roads to be safe and accessible for all users. Complete Streets policies facilitate street configurations and facilities such as sidewalks, bike lanes, bus lanes, crosswalks, and accessible pedestrian signals.

Shifting Travel Behaviors

Over time, there has been a noticeable change in the total VMT nationwide. In 2022, households reported 37% fewer person trips and 32% fewer vehicle trips compared to 2017. This decline was also reflected in the significant drop in both person miles of travel (PMT) and VMT. Travel behaviors shifted with the COVID-19 pandemic, with 30% of workers and 15% of students traveling less frequently than they did before the COVID-19 pandemic. The surge in e-commerce also played a role in these changes, as online shopping doubled from 2017 to 2022. This increase in online shopping led to fewer in person trips, particularly for shopping and errands (National Household Travel Survey, 2022). **Figure 63** shows the overall trend of nationwide VMT recorded between 1971 and 2023. This figure illustrates the significant rise in VMT that occurred during this period as well as the impact of the COVID-19 pandemic on VMT in 2020.

Figure 63: Historic Annual Vehicle Miles Traveled in the United States, 1971-2023



The United States has had a significant increase in its aging population, with over 54 million Americans age 65 and older in 2022. This demographic shift has resulted in travel pattern changes across the country. As people age, their travel frequency diminishes, leading to a noticeable reduction in overall travel demand per capita. This trend is particularly pronounced among those over the age of 75, where both VMT and the number of person trips drop significantly. Along with stagnant overall population growth and the increase in remote or hybrid working conditions, per capita travel metrics, such as trips per person and VMT per driver, have seen a downward trend (National Household Travel Survey, 2022).

Commuting trends in Iowa generally mirror national trends. In 2023, 76.2% of workers drove alone to work, down from 81.6% in 2018. Carpooling in Iowa dipped during the COVID-19 pandemic but rebounded to near pre-COVID-19 levels by 2023. Public transportation and walking commutes have dipped since the COVID-19 pandemic but are seeing a slow rebound. Commuting by walking or bicycling has remained relatively stable between 2018 and 2023. Working from home rose dramatically in Iowa pre- to post pandemic with 10.5% doing so in 2023 versus 5.1% in 2018, though the trend is declining as people return to offices (U.S. DOT Bureau of Transportation Statistics, 2024).

United States and Iowa Commuting Trends

United States	2018	2019	2020	2021	2022	2023
Drove Alone	80.7%	75.9%	69.0%	67.8%	68.7%	69.2%
Carpool	9.8%	8.9%	7.9%	7.8%	8.6%	9.0%
Public Transit	1.3%	5.0%	3.2%	2.5%	3.1%	3.5%
Walk	1.5%	2.7%		2.2%	2.4%	2.4%
Bicycle	0.2%	0.5%		0.4%	0.5%	0.5%
Worked at Home	5.2%	5.7%	15.8%	17.9%	15.1%	13.8%

Iowa	2018	2019	2020	2021	2022	2023
Drove Alone	81.6%	80.2%	76.3%	74.4%	76.1%	76.2%
Carpool	8.1%	8.6%	7.0%	7.5%	8.0%	8.2%
Public Transit	1.0%	1.1%	0.6%	0.5%	0.8%	0.8%
Walk	3.0%	3.2%		2.8%	2.9%	2.8%
Bicycle	0.4%	0.3%		0.3%	0.4%	0.4%
Worked at Home	5.1%	5.8%	11.9%	13.4%	11.0%	10.5%

U.S. DOT Bureau of Transportation Statistics, ***State Transportation by the Numbers | Bureau of Transportation Statistics***

EMERGING TRANSPORTATION TECHNOLOGIES

The U.S. transportation system is seeing continuous changes driven by the advent of emerging technologies. Innovations such as electric and autonomous vehicles, micromobility, and connected vehicle technologies are revolutionizing the way we travel and transport goods. These advancements promise to enhance the efficiency, safety, and sustainability of the transportation system.

Electric Vehicles

EVs, which encompass battery electric and plug-in/hybrid EVs, continue to constitute an increasing share of vehicles on roadways. From 2021 to 2023, there was a 145% increase in the number of EVs registered in the United States. As **Table 38** shows, there were approximately 3.5 million EVs on U.S. roads by the end of 2023, a 145% increase from the 1.5 million in 2021. From 2021 to 2023 there was a 143% increase in the number of registered EVs in Iowa, slightly lower than the nationwide increase (Alternative Fuels Data Center, 2023).

Table 38: EVs Registered – United States and Iowa

	2021	2023	Percent Change, 2021 to 2023
United States	1,454,000	3,555,900	145%
Iowa	3,700	9,000	143%

Alternative Fuels Data Center: TransAtlas

In 2023, transit vehicles continued to transition to cleaner alternatives. The majority of transit buses, however, are still powered by internal combustion engines. Over the past two decades, approximately half of the diesel-powered transit buses in the United States have been replaced by alternatives powered by natural gas, biodiesel, or hybrid-electric powertrains. Supported by the BIL and federal programs, such as the FTA's Low and No Emission Program and the Grants for Bus and Bus Facilities Program, the U.S. electric bus fleet grew 12 percent from 2022 to 2023 (**Table 39**). The Ames municipal transit fleet, including CyRide, currently has 12 hybrid EVs. In addition to electrification, CyRide has continued to invest in biodiesel fuel, solar powered shelters, and Leadership in Energy and Environmental Design (LEED) certified offices.

Table 39: U.S. Zero-Emission Bus Fleets: 2021–2023

Bus Type	2021	2022	2023	Increase, 2022 to 2023	Percent Increase, 2022 to 2023
Battery Electric	3,168	5,269	5,775	506	9.6%
Fuel Cell Electric	129	211	372	116	76.3%
Full Size					
Total	3,297	5,480	6,147	667	12.2%
Small					
Total	**615**	**876**	**1,010**	**134**	**15.3%**

Source: U.S. DOT Bureau of Transportation Statistics, Transportation Statistics Annual Report 2024

Connected and Autonomous Vehicle Technologies

Connected and Automated Vehicles (CAV) leverages both Connected Vehicle (CV) and Automated Vehicle (AV) technologies by communicating with nearby vehicles and infrastructure, thus providing vehicle automation to make driving decisions.

CV are "connected" to receive and send alerts by communicating in the following ways:

- Vehicle-to-Vehicle (V2V): Information on speed, location, and heading
- Vehicle-to-Infrastructure (V2I): Information on signal timing, work zones, crashes, congestion, and weather conditions
- Vehicle-to-Pedestrian (V2P): Information between vehicles and non-motorized crosswalks and bicyclists
- Vehicle-to-Everything (V2N to V2E): Data is transmitted to a central location for analysis, including demand management, travel times, and incident response

AV are driverless or self-driving vehicles that are artificial intelligence or computer-driven and do not require a human to operate the vehicle safely. There are six levels of driving automation ranging from 0 (No Automation) to 5 (Full Automation). Most newer cars today have some automation, usually Level 1 (Driver Assistance) or Level 2 (Partial Driver Automation). Fully autonomous vehicles are in the research and testing stages but are not available to the public. It is anticipated that additional automated features will be available to consumers over time as safety and reliability testing ensures roadworthiness (California Department of Transportation, 2025).

Development of autonomous freight corridors and driverless trucks have made great strides in research, development, and implementation. In early 2024, Aurora Innovation, Inc., began deploying fully autonomous trucks and driverless operations along an Interstate 45 corridor between hubs in Dallas and Houston, Texas. As additional autonomous freight corridors are implemented, autonomous heavy-duty trucks are projected to account for 13 percent of trucks on U.S. roads by 2035, according to McKinsey projections (Axios, 2025).

MICROMOBILITY

In 2023, a total of 157 million trips were taken on shared micromobility devices across the U.S. and Canada, marking an increase from 131 million trips in 2022. Of these, 133 million trips occurred in the U.S., representing a 16% increase. This figure surpasses the pre-pandemic peak of 147 million trips in 2019. Since 2010, over 887 million trips have been taken on shared bikes and scooters. The COVID-19 pandemic caused a 36% drop in micromobility systems between 2019 and 2021. However, ridership rebounded by 2021, with scooter systems showing the strongest recovery. By 2023, both system availability and ridership surpassed pre-pandemic levels (National Association of City Transportation Officials, 2023).

Shared Bikes & E-Bikes (Station-Based)

Station-based bike-share ridership in the U.S. increased to 61 million trips in 2023, up from 53 million in 2022. E-bike trips saw a significant 40% rise, reaching 28 million in 2023, and now account for 46% of station-based bike share trips. E-bikes are notably more popular than pedal bikes in systems that offer both options. Ames does not currently offer a bike share service within the MPO area; however, it could be a possible service in the future.

Dockless E-Scooters and E-Bikes

In 2023, there were 69 million dockless e-scooter trips, marking a 15% increase from 2022. E-scooters are a popular mobility mode that allows users to complete shorter trips. Scooter trips are gaining popularity in large metropolitan areas and spreading to smaller communities as well. Similar to bike-share programs, users can locate an e scooter using a mobile device and then rent the e-scooter to complete their trip. An e-scooter service is not currently offered in the Ames region but may be an additional alternative to providing micromobility in the future.

MOBILITY AS A SERVICE

MaaS is a comprehensive mobility solution that enables travelers to access different transportation options via a single digital platform. It allows users to plan, book, and pay for journeys across various modes, including public transportation, ridesharing, and car and bike-sharing, aiming to offer seamless and flexible mobility tailored to individual needs.

As cities continue to grow and expand, congestion continues to increase, which creates the demand for integrated mobility solutions. Continued growth in the use of smartphones, advancements in artificial intelligence, and increasing environmental challenges are some of the factors fueling the adoption of MaaS solutions. The market outlook is expected to grow significantly in North America between 2025 and 2035, with projections indicating a robust compound annual growth rate of 38 percent from 2025 to 2035. The market's exponential growth is attributed to the widespread adoption of subscription-based transport models, increasing investments in electric and autonomous vehicles, and rising consumer preference for cost-effective and flexible mobility solutions (Future Market Insights, Inc., 2025).

CHAPTER 6 ALTERNATIVES DEVELOPMENT

The alternatives included in Ames Connect 2050 were informed by public input received through several engagement activities, as well as past plans and studies completed for AAMPO. The past plans and studies that were reviewed to guide the alternatives' development include:

- AAMPO 2045 MTP "Forward 2045"
- City of Ames Bicycle-Pedestrian Master Plan "Walk Bike Roll Ames"
- AAMPO Comprehensive Safety Action Plan
- Iowa Counties Comprehensive Safety Action Plan
- AAMPO 2024 Passenger Transportation Plan
- City of Ames 2040 Comprehensive Plan "Ames Plan 2040"
- 190th Street (GW Carver Avenue – U.S. 69) Corridor Study
- Grand Avenue (9th Street – 24th Street) Corridor Study
- S Duff Avenue (S 16th Street – Airport Road) Corridor and U.S. 30 Interchange Study
- Story County Conservation Trails Master Plan

Potential projects were categorized by mode (i.e., roadway, bicycle and pedestrian, and transit) and then evaluated against the MTP's goals and objectives. The alternatives development process identified issues through the engagement and technical processes. The alternatives themselves were influenced by the project's context in its surrounding built and natural environment and how the project would accommodate transportation demand and the nearby existing network. The alternatives were then put through a prioritization process that is rooted in performance-based planning and attempts to identify projects that align with several plan objectives.

PRIORITIZATION PROCESS

The prioritization process scored each potential project alternative using a performance-based system that aligns with the MTP's goals and objectives. Alternatives were evaluated and awarded points based on their alignment with the plan objectives and prioritized based on total points. Once priorities were assigned, the alternatives with medium to high priority scores that aligned best with the long-range priorities of the AAMPO and its member agencies were recommended for the fiscally constrained plan.

CONNECT 2050 UNIVERSE OF ALTERNATIVES

Connect 2050's universe of alternatives was identified using input from the public, regional stakeholders, AAMPO staff and committees, regional agencies, State and federal partners, and previous plans and a data-driven approach using the baseline and future conditions analyses described in previous chapters regarding traffic, bicycle and pedestrian connectivity and safety, and transit system needs in the AAMPO region.

Street and Roadway Projects

Roadway project alternatives were developed to address key issues facing the AAMPO region, such as traffic congestion, vehicular safety, bicycle and pedestrian safety, improving multimodal options, and reducing environmental impacts. Examples of strategies aimed at addressing these issues are organized into intersection and roadway strategies and outlined below.

INTERSECTION STRATEGIES

Grade Separation

- Requires constructing an overpass or underpass to separate vehicular traffic from a railroad or other roadway. Grade-separated crossings remove conflict points and reduce travel delays; however, they are often costly and can be more difficult to implement.

Interchange Reconfiguration

- Involves a change in access and/or design to an interchange and may not necessarily change the number of access points.

Intersection Control

- May require implementing or adjusting methods used to manage traffic flow, such signs, traffic signals, geometric access control, and/or lane reconfigurations.

Roundabout

- A road treatment that converts a traditional intersection into a circular configuration that moves traffic efficiently and safely by reducing speeds and channeling traffic into curved approaches.

Turn Lanes

- Provide a constructed turn lane designed to allow for deceleration before making a turn. They also improve traffic flow by providing additional space for turning vehicles to queue.

STREET AND ROADWAY STRATEGIES:

Traffic Calming

- Encompasses a range of roadway safety strategies that aim to reduce vehicle speeds or volumes on a single street or within a street network.

Management

- Strategies aimed at managing roadway safety, speed, access to cross streets or driveways, or improved traffic flow and can include road diets or adding travel lanes.

Construct New Corridors

- Projects that construct new streets or roadways.

Pave

- Converting an unimproved street (dirt or gravel) to concrete or asphalt.

Turn Lanes

- Constructing turn lanes (either left or right) at intersections or access points along a corridor to improve traffic flow and safety.

Widen

- Adding lanes to existing roadways, such as the conversion of a 2-lane road to 4 lanes.

System Management Strategies

In addition to the intersection and roadway strategies discussed above, operational strategies, otherwise known as Transportation System Management and Operations (TSMO), are available for future strategy considerations. These strategies aim to improve the roadway system's operational abilities without the need to add system capacity. TSMO is a cost-effective strategy that addresses congestion issues across a system, outside of peak hour congestion. TSMO strategies fall into three categories: System Performance Monitoring, Management of Recurring Issues, and Management of Non Recurring Issues. **Table 40** provides examples of TSMO strategies that target each category.

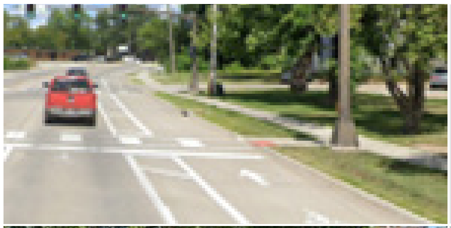
Table 40: TSMO Strategy Types and Treatments

System Performance Monitoring	Management of Recurring Issues	Management of Non Recurring Issues
Active Traffic Management	Managed Lanes	Traffic Incident Management
Traveler Information	Traffic Signal Coordination	Work Zone Management
Transportation Management Centers	Active Transportation and Demand Management	Special Event Management

AMPO is currently developing a TSMO Plan dedicated to evaluating these strategies, with plan adoption anticipated in spring or summer 2026.

BICYCLE AND PEDESTRIAN PROJECTS

Bicycle and pedestrian projects were selected based on their ability to improve existing bike and pedestrian facilities around Ames, improve safety for non-motorized users, improve network connectivity, and expand the existing network. Bicycle and pedestrian project types that were screened include the following.



Bike Lane

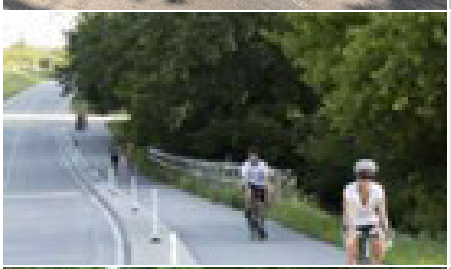
Provides dedicated space within the street for exclusive use by bicyclists.

Source: Google Earth

Bike Boulevard

Includes traffic calming features, such as signage or speed bumps, to optimize local streets for bicycle travel by reducing speeds and volumes.

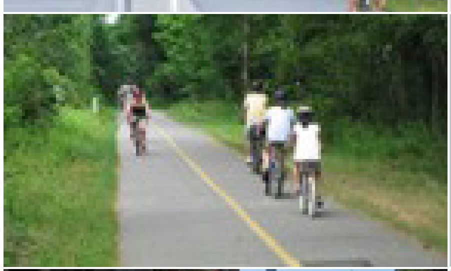
Source: City of Lincoln NE F Street Bicycle Boulevard



Separate Bike Lane

Provides a dedicated space within the street for exclusive use by bicyclists with a physical barrier between traffic and bicyclists.

Source: The Gazette -Johnston Protected Bike Lane



Greenbelt Trail

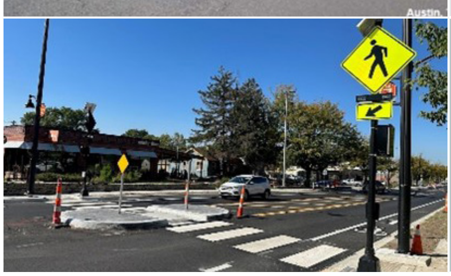
Constructs or extends off-street trails for both pedestrians and bicyclists.

Source: Iowa DOT

Bike Route

Provides designated routes for bikes marked by signage or shared lane markings such as sharrows. Does not provide designated space for bicyclists and are designed for streets with low traffic speeds and volumes.

Source: NACTO



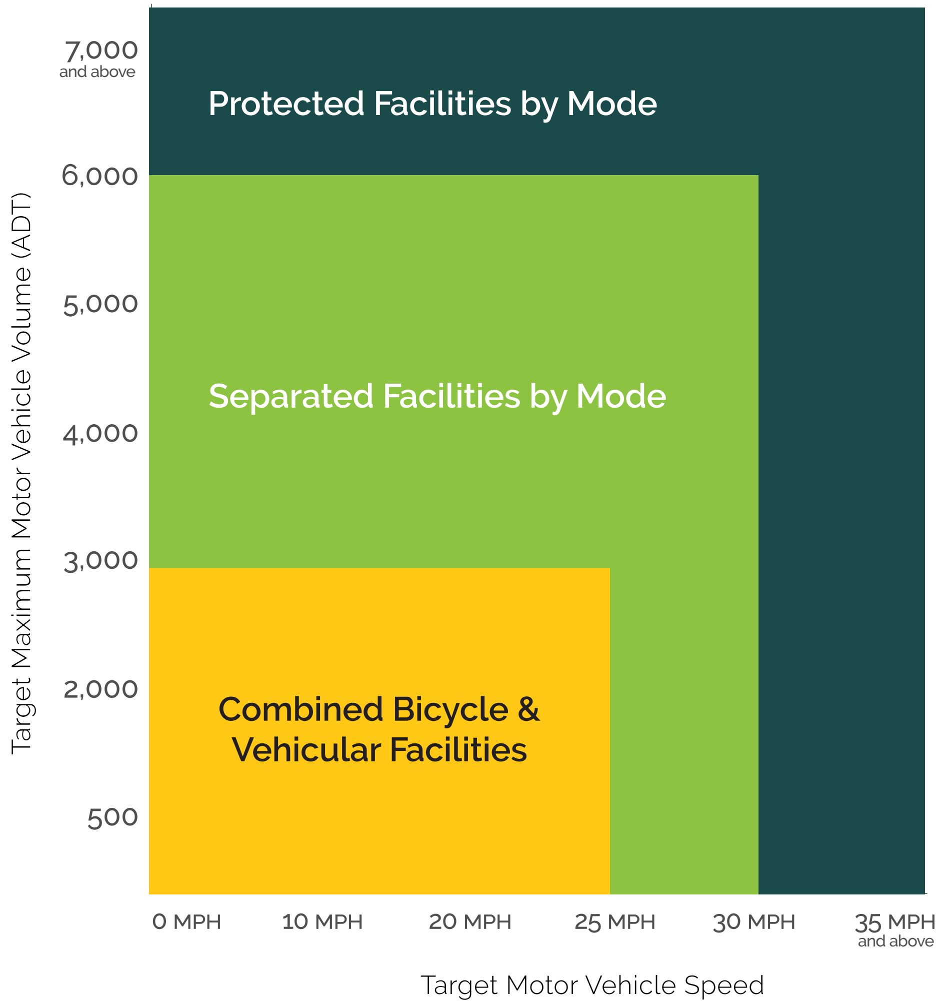
Crossing Improvements

Includes projects such as improved intersection markings, pedestrian signals, curb extensions, and improved visibility.

Source: Institute of Traffic Engineers

The bike facilities recommended within Connect 2050 are based on FHWA guidance (shown in **Figure 64**), which uses the daily volume of vehicle traffic and posted speed limit of a roadway to provide a standard for the appropriate bike facility.

Figure 64: FHWA Bikeway Selection Guidance



In addition to improved bicycle facilities, various pedestrian countermeasures are available that aim to reduce conflicts between pedestrians and motor vehicles.

- **Leading Pedestrian Interval** – Signal interval that allows pedestrians 3 to 7 seconds to enter a crosswalk prior to vehicular traffic being given a green indication.
- **Pedestrian Refuge Island** – A median with a sufficiently wide refuge area to help project pedestrians crossing multilane streets or roads.
- **Lane Reconfiguration** – Conversion of existing street lanes to other uses, such as converting a four lane undivided street or road to a three-lane cross-section with two through lanes and a center two-way left-turn lane.
- **Pedestrian Hybrid Beacon (PHB)** – Traffic control device installed along higher-speed streets and roads at midblock crossings and uncontrolled intersections. PHBs contain two red lenses above a single yellow lens and remain "dark" until activated by a pedestrian. Once activated, the PHB conducts a lighting sequence to direct motorists to slow down and stop, allowing for the

pedestrian to cross safely.

- **Rectangular Rapid Flashing Beacons** – Pedestrian warning signs installed at uncontrolled, marked crosswalks that consist of flashing indicators to alert motorists to the presence of pedestrians within the crossing.
- **Raised Crosswalks** – Ramped crosswalk facility with a flat top that spans the full width of the street or road. These crossing features elevate users, allowing for better visibility of pedestrians by motorists.
- **High-Visibility Crosswalk Markings** – Crosswalk markings that use bar pairs, continental, ladder, or other patterns to enhance visibility for both pedestrians and motorists. High visibility crosswalk markings are typically used at midblock pedestrian crossings or uncontrolled intersections.
- **Curb Extensions** – Curb extensions are locations where the street is narrowed to create safer and shorter pedestrian crossings. They make pedestrians more visible to drivers and provide visual cues for slower speeds. They are often located at mid-block crossings and intersections where there is on-street parking.

The countermeasures described above should be applied based on the guidelines outlined in the FHWA Pedestrian Safety Guide and Countermeasures Selection System, which provides selection criteria for improved pedestrian safety and mobility, as shown in **Figure 65**. Locations for proposed safety treatments are based on factors such as vehicle annual average daily traffic (AADT), speed, and number of lanes. These factors are then considered when selecting an appropriate countermeasure to improve overall pedestrian safety.

Figure 65: FHWA Pedestrian Safety Guide and Countermeasures Selection System

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2. Raised crosswalk
3. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

Source: Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (FHWA)

TRANSIT PROJECTS

Transit connectivity is a critical link in the Ames area's multimodal system. CyRide is the AAMPO area's regional transit provider, offering fixed-route, Dial-A-Ride, and late-night services.

While specific project alternatives were identified for roadway and bicycle and pedestrian modes, transit needs were assessed to identify capital and operational transit system improvements to enhance multimodal connections and improve mobility for all transportation system users. Transit projects were identified and assessed based on their funding requirements, ability to improve overall transit access, and connectivity to other modes. Potential transit improvements by project type include the following:

- **Increased Service Levels** – Increasing bus service frequency or hours of operation (nights and weekends).
- **Express Routes** – Express routes make fewer stops than regular routes and connect key destinations.
- **Intercity Bus** – A longer-distance bus service that connects several cities or regions. An example of this would be a bus route that connects Ames to Des Moines.
- **New Route or Extension** – New bus routes or current route expansions improve accessibility and connectivity by increasing the total number of people and land area served.

Connect 2050 Project Alternatives

The list of project alternatives evaluated as part of Connect 2050 are shown in **Figure 66** and **Figure 67**. Refer to **Appendix A** for further details on the alternatives, including extents and project descriptions. **Table 41** provides the transit alternatives.

Table 41: Transit Alternatives

ID	Description	Type
1	Vehicle Replacement/Expansion	Rolling Stock
2	Preventative Maintenance, Real-Time Passenger Information	Technology
3	Passenger Amenity Improvements	Technology
4	Battery Electric Buses Expansion	Rolling Stock
5	Light Duty Vehicles	Rolling Stock
6	Articulated Bus Replacement/Expansion	Rolling Stock
7	Install Benches and Shelters	Passenger Amenities
8	Lincoln and Beach – Add Transit Signal Priority	Transit Signal Priority
9	Lincoln and Welch – Add Transit Signal Priority	Transit Signal Priority
10	Ames Intermodal Facility Improvements	Facilities
11	South 16th Street – Add Innovative Transit Service Zone	Service
12	North Ames (Somerset/Northridge/Valley View) – Add Innovative Transit Service Zone	Service
13	Applied Sciences – Add Innovative Transit Service Zone	Service
14	Stange Road from Bloomington to University – Corridor Service Improvements	Service
15	University Boulevard from ISU/ISC to ISU Research Park – Corridor Service Improvements	Service
16	South Duff from Lincoln to Crystal – Corridor Service Improvements	Service
17	Airport Road from South Duff to University – Corridor Service Improvements	Service

ID	Description	Type
18	Ames to Ankeny and Des Moines Intercity/Commuter Service	Service
19	Amtrak Thruway from Ames to Osceola Intercity/Commuter Service	Service
20	ISU to College of Veterinary Medicine – Corridor Service Improvements	Service
21	Additional Vehicle Replacement/Expansion	Rolling Stock
22	Additional Battery Electric Buses	Rolling Stock
23	Battery Electric Bus Charging Infrastructure (Chargers/Wiring)	Facilities
24	Facility Expansion/Modifications	Facilities
25	Automatic Passenger Counters (APC) Replacement/Expansion	Technology
26	Automatic Vehicle Location (AVL) Technology Replacement/ Expansion	Technology
27	Provide Free Fares for Youth (18 and Under) Study/ Implementation	Fares
28	Install Benches and Shelters	Passenger Amenities
29	Add LED Signage and Real-Time Passenger Information at Major Bus Stops	Passenger Amenities
30	System Redesign 3.0	Planning
31	Target/Walmart on S. Duff to ISU Campus – Increase Frequency of Service (weeknight)	Service
32	Target/Walmart on S. Duff to ISU Campus – Increase Frequency of Service (weekday)	Service
33	Service to S Lots and Reiman Gardens	Service
34	Oakwood Road and ISU Kent Feed Mill – Add Innovative Transit Service Zone	Service
35	Provide Free Fares for Low-Income Study/Implementation	Fares
36	B100 Infrastructure	Rolling Stock

Figure 66: Connect 2050 Roadway and Intersection Alternatives

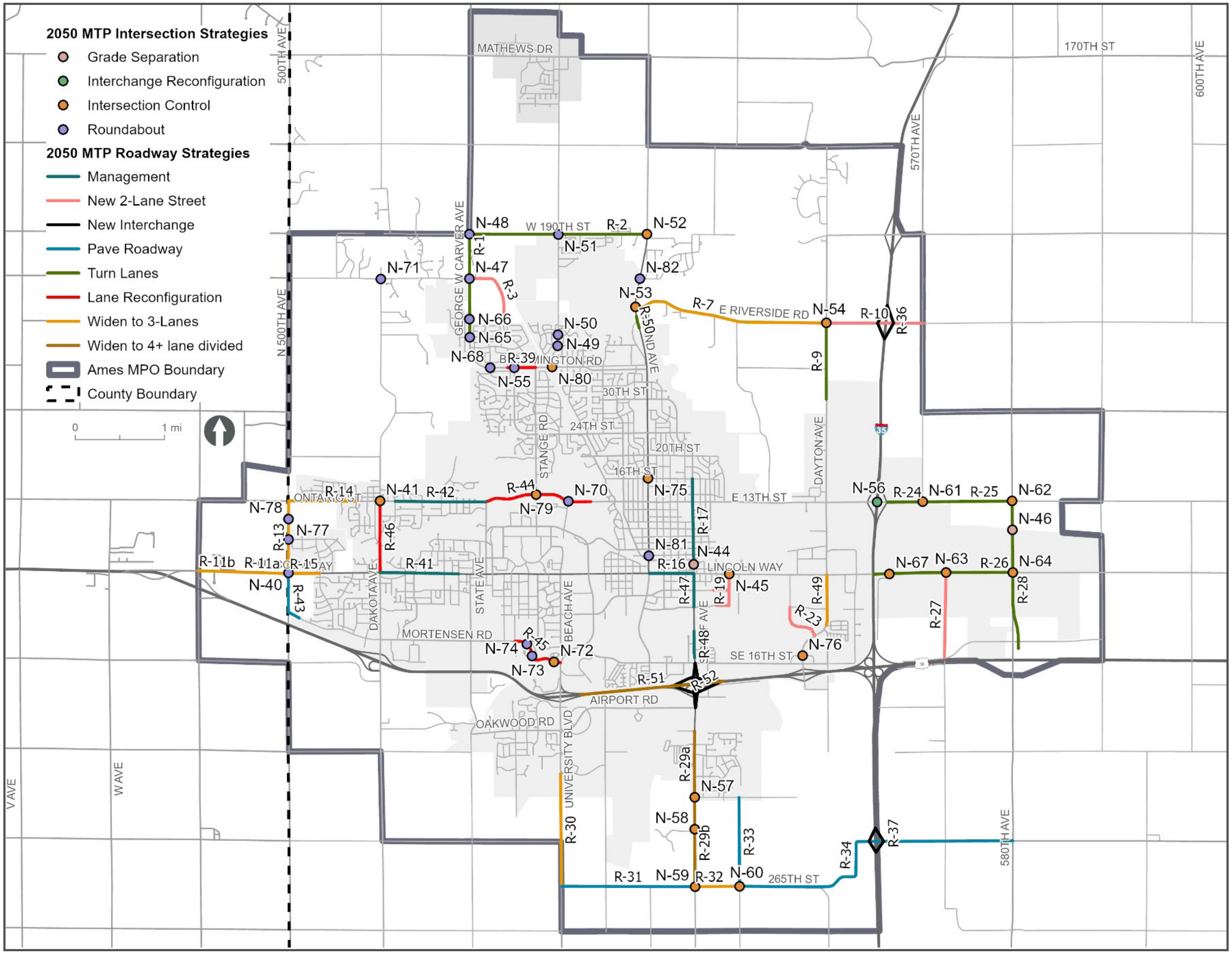
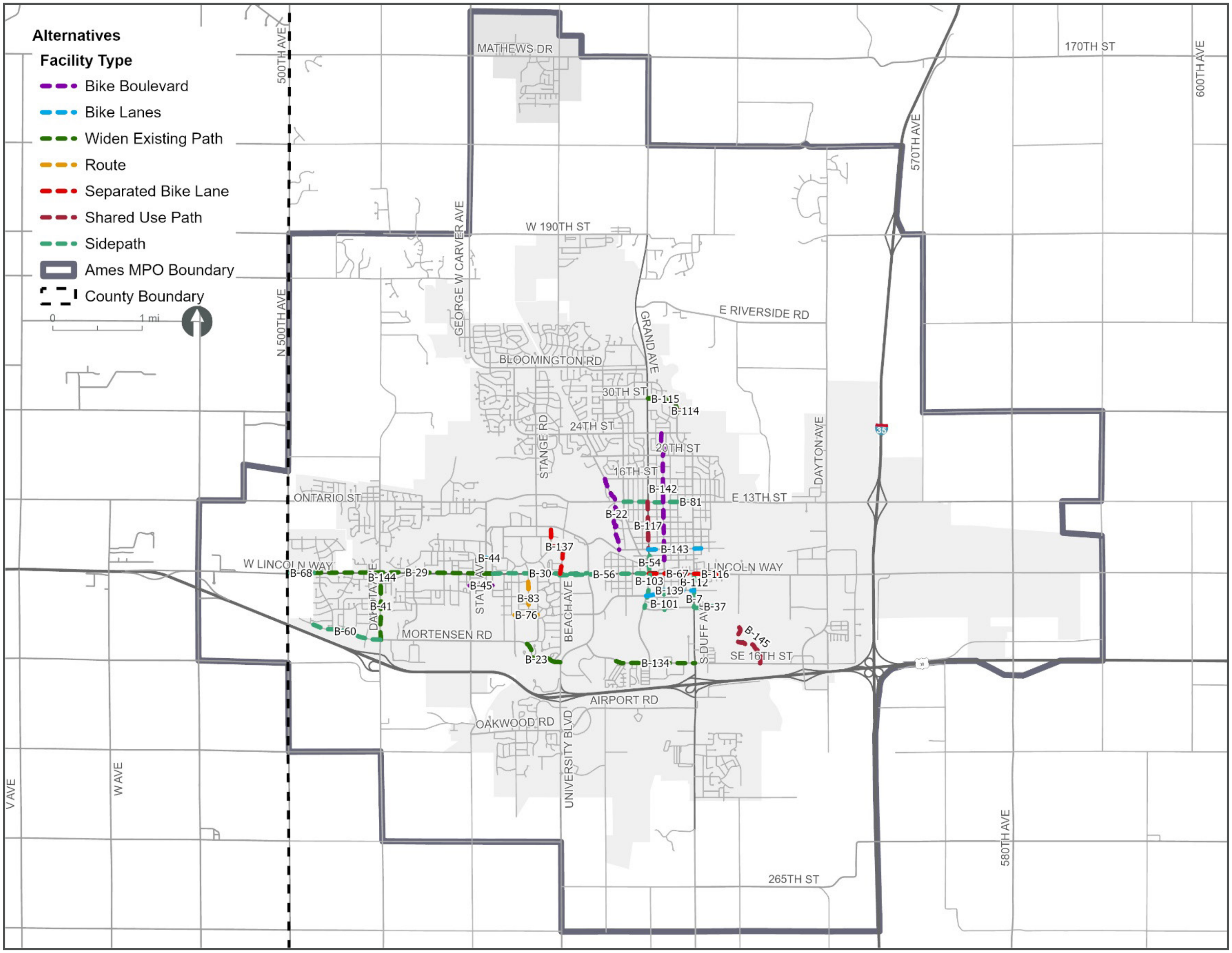


Figure 67: Connect 2050 Bicycle and Pedestrian Alternatives



EVALUATING AND PRIORITIZING CONNECT 2050'S UNIVERSE OF ALTERNATIVES

Evaluating Connect 2050's Universe of Alternatives

Once the universe of alternatives was identified, these projects were evaluated against the scoring criteria shown in **Appendix A**. This process included consultation with AAMPO staff and a desktop analysis that sought to gauge each alternative's ability to address existing and potential future issues related to safety, traffic operations, traffic, enhancing multimodal options, and reducing environmental impacts.

Each roadway and intersection alternative was scored using the project scoring criteria, with final scores reflecting the total points gained through the assessment of each alternative's alignment with Connect 2050's goal areas and objectives.

Bicycle and pedestrian alternatives were carried over from the City of Ames' ***2024 Walk, Bike, and Roll Plan***. Identified projects were prioritized as part of the plan development process. Connect 2050's bicycle and pedestrian alternatives carried forward projects that received a "medium" or "high" prioritization score in the Walk, Bike, and Roll Plan and helped advance non-motorized safety on the CSAP's HPN.

Prioritization Results

The resulting prioritization scores for each Connect 2050 alternative are shown in **Figure 68** and **Figure 69**.

Refer to **Appendix B** for the full results of the alternatives prioritization evaluation.

Prioritization reflects a performance-based scoring approach to how many goals and objectives each project matches. It does a good job of showing how well a project aligns with the Ames area's transportation goals, but does not reflect the timing, feasibility, or project readiness of an alternative.

Alignment with Comprehensive Safety Action Plan

The CSAP identified an HPN that focuses capital safety projects on a small portion of the street network that has the highest number of fatal and serious injury crashes. This approach provides a substantial public benefit through crash reduction and can help accelerate progress for community-wide safety goals. While the MTP may include a broad range of transportation needs covering a larger network of streets, the CSAP will often target a subset of those streets through the HPN.

From a strategy perspective, effective safety projects reduce severe conflicts between vehicles and bicycles and pedestrians. Separate facilities are often desired by those users, which aligns these strategies across the MTP and CSAP. On arterial streets, the shared MTP and CSAP strategies include street reconfiguration, road diets, and access management. While the CSAP prioritizes high priority locations, the principles of Complete Streets design, access and speed management, and reduced-conflict intersections are applicable for the MTP in both near-term projects and for mid- and long-term projects that may be driven by growth or land development.

Figure 68: Prioritization Results for Roadway and Intersection Alternatives

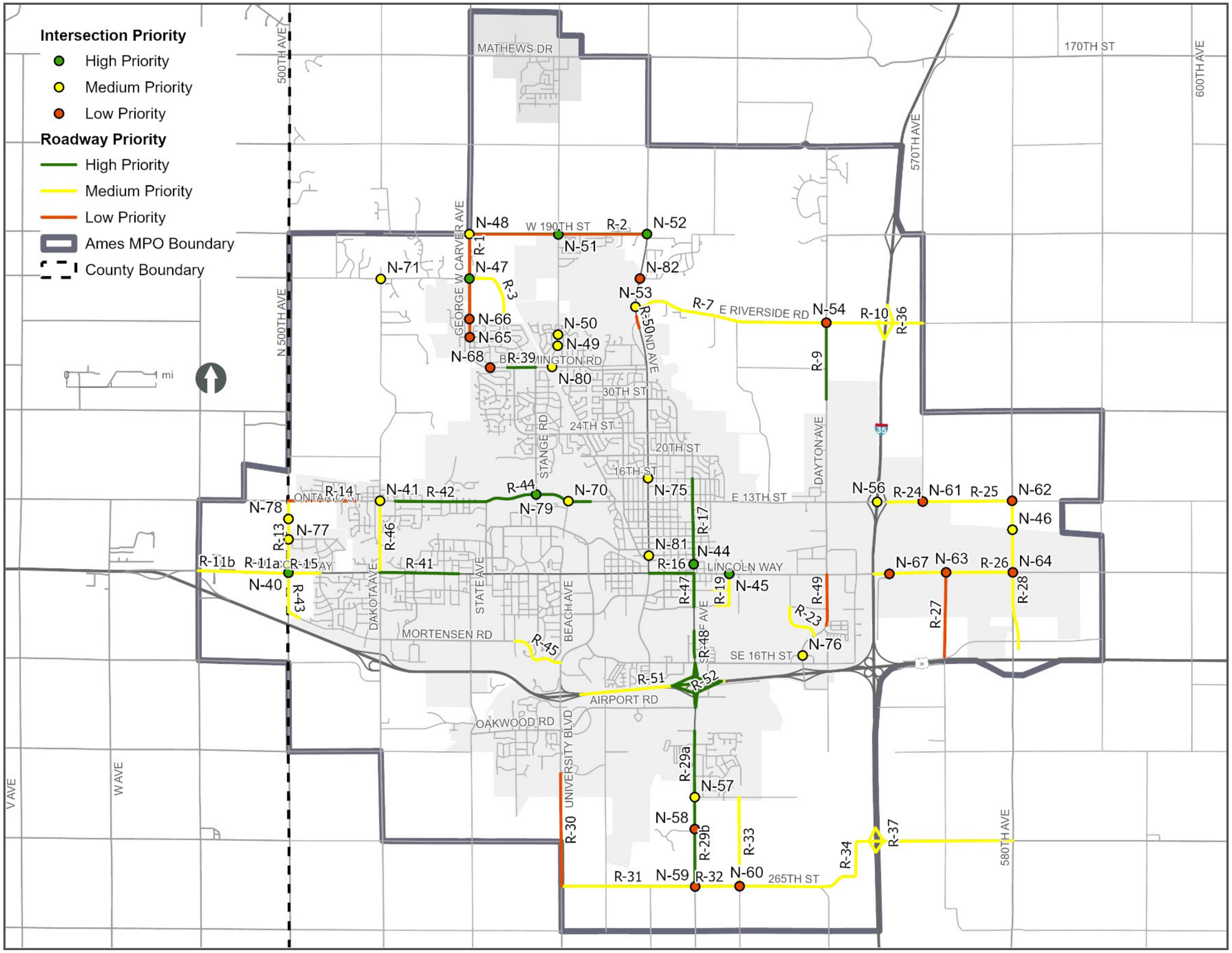
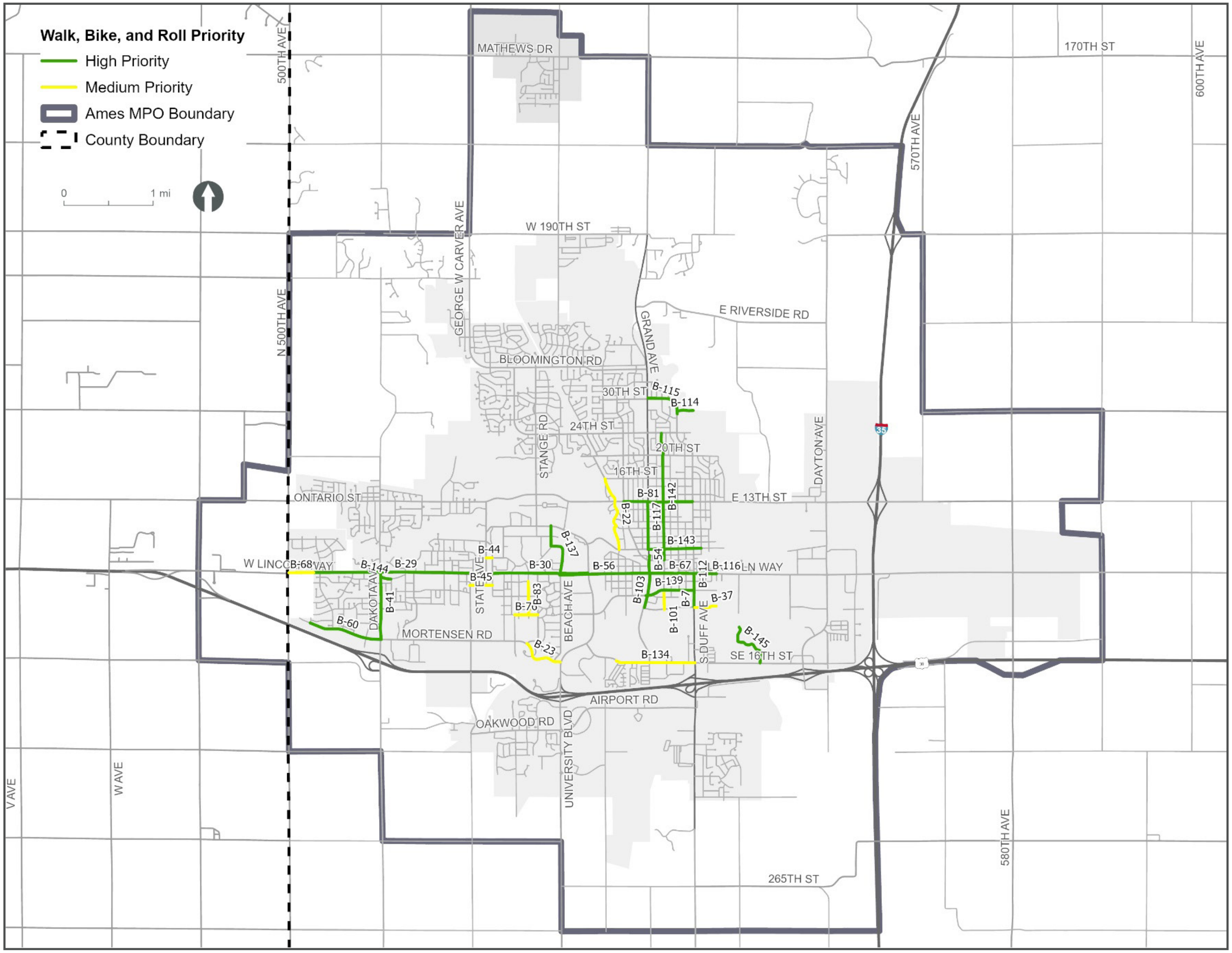


Figure 69: Walk, Bike, and Roll High and Medium Priority Projects



CHAPTER 7 FUNDING ANALYSIS

A key element of the Metropolitan Transportation Planning process is the creation of a fiscally constrained plan of projects that identifies multimodal improvements meeting the priorities of the AAMPO and its member agencies while being feasible for implementation regarding the constraints of reasonably expected future revenue levels. The fiscally constrained plan must also identify reasonably expected system-level costs related to the operation and maintenance of the federal-aid system. Developing a financial plan is the MTP's first step toward achieving fiscal constraint. This section documents the data, approach, and results for the financial plan.

AAMPO'S FUNDING TARGETS AND HISTORIC FUNDING TRENDS

AAMPO receives revenues from several funding sources on a relatively consistent, targeted annual basis while other sources of transportation revenues are competitive or discretionary programs that may or may not provide funding for projects in the AAMPO region any given year. Thus, an analysis of historic funding levels can serve as a baseline for understanding trends in revenues received and to forecast potential future funding levels. This section discusses the federal, State, and local funding programs that the AAMPO and its member agencies typically leverage in programming annual multimodal transportation improvements.

FEDERAL, STATE, AND LOCAL FUNDING PROGRAMS

Federal Funding Programs

AAMPO receives a significant portion of its annual funding from three federal programs. As part of the annual TIP process, Iowa DOT provides AAMPO with targeted amounts of these funds for each year of the TIP cycle. These funds are:

- **Surface Transportation Block Grant (STBG):** Funding for roads, bridges, transit capital improvements, and transportation planning activities for MPOs. The formula-based funds are distributed to MPOs across the state, with individual projects selected annually by the MPO through an application process.
- **Transportation Alternatives Program (TAP):** Funding for projects and programs defined as transportation alternatives, which includes pedestrian and bicycle facilities, improving non-driver access to public transportation, Safe Routes to School projects, community improvement activities, and environmental mitigation projects. TAP funds are formula-based, with projects selected annually by the AAMPO through an application process.
- **Carbon Reduction Program (CRP):** Funding for projects designed to reduce transportation emissions, defined as carbon dioxide emissions from on-road highway sources. AAMPO receives targeted CRP funds annually and is given the authority to award funds at its own discretion, similar to STBG and TAP.

There are additional discretionary federal funding programs that Iowa DOT distributes across the state at their discretion, because needs vary across the state by time. These programs include:

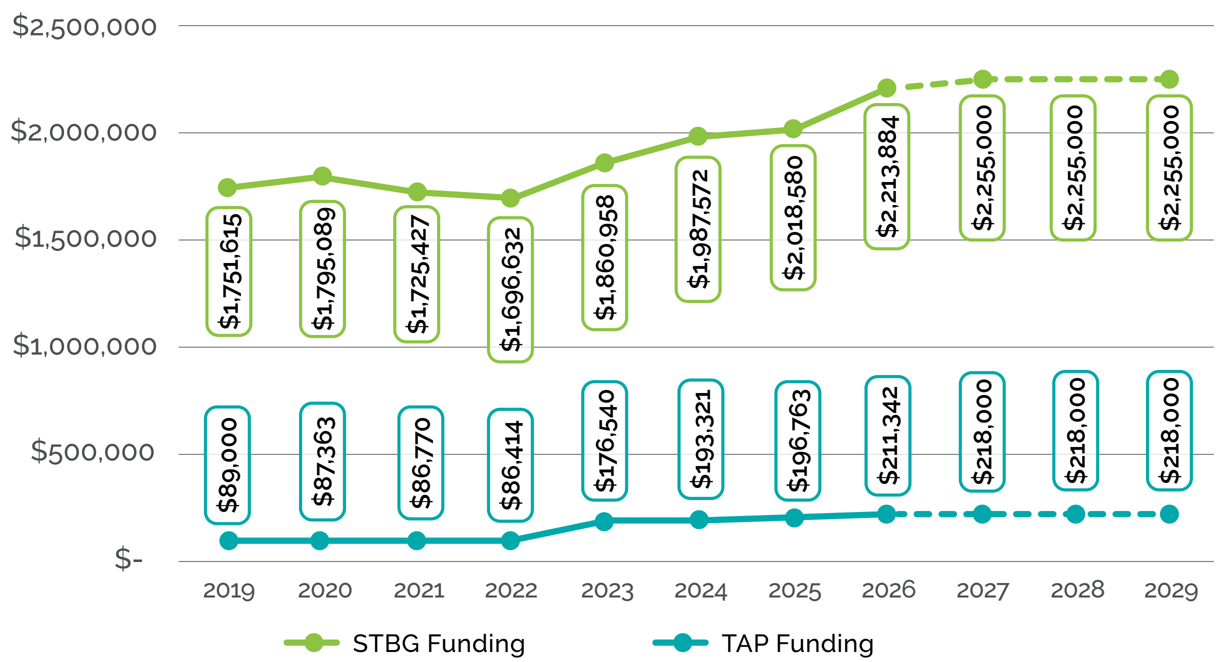
- **National Highway Performance Program (NHPP):** Funding support for the condition and performance of the NHS, as well as construction of new facilities on the system. Iowa DOT directs NHPP funding for use on the NHS system in the AAMPO.

- **Congestion Mitigation Air Quality (CMAQ):** Funding for transportation projects and programs at the state and local levels that help meet the requirements of the Clean Air Act. Iowa DOT administers a portion of CMAQ funds through its Iowa Clean Air Attainment Program (ICAAP).
- **Highway Safety Improvement Program (HSIP):** Funding for transportation projects that achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned roads and roads on tribal land. Iowa DOT administers a portion of CMAQ funds through its ICAAP.

Historic Federal Funding Levels

Historic STBG and TAP funding levels received by AAMPO for the years 2019 to 2026 were reviewed to understand how these revenue levels have changed in recent years. **Figure 70** shows the STBG and TAP funding amounts targeted for distribution to the AAMPO by Iowa DOT between 2019 and 2025, while the levels of STBG and TAP funds for the years 2026 through 2029 represent current targets for these funding sources.

Figure 70: Historical and Targeted STBG and TAP Funding Levels, 2019-2029



Source: Ames Area MPO Transportation Improvement Programs, 2019-2025, and Iowa DOT

Revenues from discretionary sources, such as CMAQ/ICAAP, NHPP, PRF, and HSIP, supplement the formula-based STBG and TAP revenues AAMPO receives annually. **Table 42** contains historic annual funding amounts expended on projects within the AAMPO region between 2015 and 2025. The table demonstrates average funding levels within each year of expenditure (YOE) dollars, as well as the annual average normalized to 2025 dollars.

As of fiscal year 2026, AAMPO has accrued $750,336 in CRP funds. Due to recent changes at the federal level, these funds are not assumed to be available during the 2029 to 2050 planning horizon.

Table 42: MPO TIP Funding Expenditures by Federal Source, 2015–2025

Year	STBG/STBG-SWAP	TAP	CMAQ/ICAAP	NHPP	HSIP
2015	$1,750,594	$ -	$861,000	$ -	$2,492,000
2016	$1,060,000	$360,000	$ -	$22,890,000	$ -
2017	$1,171,394	$ -	$1,081,000	$ -	$ -
2018	$932,878	$306,121	$293,000	$3,431,000	$ -
2019	$2,400,000	$ -	$703,000	$ -	$ -
2020	$3,725,000	$159,000	$ -	$ -	$ -
2021	$1,774,669	$ -	$847,918	$ -	$ -
2022	$1,125,000	$159,000	$2,666,215	$ -	$ -
2023	$1,825,000	$728,000	$ -	$16,936,800	$ -
2024	$1,911,000	$ -	$1,495,280	$15,636,803	$ -
2025	$5,502,230	$ -	$1,521,280	$4,592,730	$ -
Average YOE $	**$2,107,070**	**$155,647**	**$860,790**	**$5,771,576**	**$226,545**
Average 2025 $	**$2,284,119**	**$171,233**	**$930,733**	**$6,314,557**	**$276,158**

Source: Ames Area MPO Transportation Improvement Program, 2015-2025

Federal Transit Funding Programs

The AAMPO region's public transit operator (CyRide) receives funds administered by the FTA under the following funding programs:

- **Section 5307 – Urbanized Area Formula Grants Program**: Funds for transit activities (capital, planning, access to employment, operating expenses) in urbanized areas exceeding 50,000 in population.
- **Section 5310 – Enhanced Mobility of Seniors and Individuals with Disabilities Program**: Funding program designed to meet the needs of certain transit dependent populations in rural and/or urbanized areas.
- **Section 5339 – Bus and Bus Facilities Program**: Funds for purchasing replacement transit equipment and to construct transit facilities.

In addition to these FTA funding programs, CyRide can request STBG, CRP, and ICAAP funds for the purposes of fleet vehicle procurement and maintenance from the AAMPO.

A summary of federal transit funds programmed by CyRide in the AAMPO's annual TIPs for years 2020 through 2025 is provided in **Table 43**. The table organizes historic funds into operating, elderly and disabled, and bus funding categories to demonstrate how CyRide programmed federal dollars during this period.

As **Table 43** shows:

- CyRide has programmed an average of $3.6 million per year on operations which are funded through Section 5307.
- Elderly and disabled services funding, which uses Section 5310 revenues, averaged just over $400,000 per year.
- Funding to purchase and maintain fleet vehicles averaged $2.3 million per year between 2020 and 2025. These are funded with Section 5339, STBG, 5307, CRP, and ICAAP sources.

Table 43: Historic FTA Funding, 2020–2025

Year	Operating Funding	Elderly and Disabled Funding	Bus Funding
2020	$2,494,129	$267,676	$1,938,160
2021	$2,502,489	$557,007	$3,607,435
2022	$4,135,821	$284,772	$4,044,458
2023	$4,226,994	$414,717	$3,657,714
2024	$4,194,044	$424,159	$225,000
2025	$4,271,813	$477,669	$377,050
Average YOE $	**$3,637,548**	**$404,333**	**$2,308,303**
Average 2025 $	**$3,799,827**	**$423,741**	**$2,458,123**

Source: Ames Area MPO Transportation Improvement Programs, 2020-2025

State Funding Programs

Several State funding sources were identified throughout the TIP documents from previous years. The primary State DOT funding programs are the Primary Road Fund, Time-21, and ICAAP funds. These funds are used for the operation, maintenance, and construction of the Primary Road System. These funding sources are described further below:

- **Primary Roads Fund (PRF):** Largest funding source for supporting the primary road system within Iowa. A portion of overall funds are received through an annual formula-based distribution of revenues from the Road Use Tax Fund (RUTF).
- **Time-21:** Funding created by Iowa DOT and other State agencies used to fund transportation projects throughout the state.
- **Iowa Clear Air Attainment Program (ICAAP):** Competitive funding source administered by Iowa DOT for projects that demonstrate potential for reducing transportation-related congestion and air pollution. Roadway, bicycle, pedestrian, transit, and railroad projects are eligible for ICAAP funds. AAMPO has traditionally received these funds for transit projects and traffic signal enhancements.
- **Other State Grants:** There are additional grant programs administered by Iowa DOT and other State agencies to fund transportation projects throughout the state.

Local Funding Programs

Local funding is an additional funding source to supplement State and federal funds (and in some cases to match federal funds) in the AAMPO region. Local funding sources used for transportation projects are generated primarily from bond funds and City funds. Local funding sources from Ames and Gilbert available for transportation projects include:

- **City Funds**: City funds consist of general fund revenues, road use taxes (RUT Fund), local option sales tax (LOST) revenues, local transit fund, parking reserve fund, airport improvement fund, and utility funds.
- **Bond Proceed Funds:** General obligation bonds make up the local bond proceed funds for the MPO.
- **Miscellaneous Funding Sources**: City assessments and similar sources.

Historic annual funding from the main sources of local revenues for the city of Ames are shown in **Table 44** while **Table 45** shows historic local revenues for the city of Gilbert. Local revenue information for the city of Ames was provided by the City's finance department for the years 2015 though 2024 while the city of Gilbert's local funding information was sourced from Iowa DOT's annual road fund receipts for the years 2021 through 2024.

Table 44: Historic Local Funding for the City of Ames, 2015-2024

Year	LOST Fund	RUT Fund	Bonds
2015	$169,066	$570,289	$5,881,149
2016	$484,984	$1,772,879	$12,677,067
2017	$456,052	$1,116,273	$6,750,960
2018	$331,919	$2,607,346	$5,621,249
2019	$344,297	$1,627,642	$5,253,276
2020	$575,808	$1,255,099	$4,733,266
2021	$470,690	$1,636,771	$8,819,898
2022	$482,354	$2,302,059	$9,877,900
2023	$915,290	$1,383,678	$11,220,577
2024	$847,984	$2,064,179	$10,229,717
Average YOE $	$507,844	$1,633,622	$8,106,506
Average 2025 $	**$556,335**	**$1,809,526**	**$8,996,583**
Average 2025 $	**$930,733**	**$6,314,557**	**$276,158**

Source: City of Ames

Table 45: Historic Local Funding for the City of Gilbert, 2021-2024

Year	General Fund	RUT Fund	Other (LOST, Benefits, TIF)	Service Debt	Capital Projects
2021	$0	$161,935	$14,810	$4,472	$683,515
2022	$30,000	$164,185	$19,875	$50,424	$0
2023	$44,438	$211,085	$24,577	$49,580	$0
2024	$0	$17,107	$33,410	$83,452	$1,400,000
Average YOE $	$18,610	$138,578	$23,168	$46,982	$520,879
Average 2025 $	$19,517	$146,645	$24,193	$48,764	$541,965

Source: Iowa DOT

Additional Funding Sources

There are additional discretionary programs that can fund transportation projects in the AAMPO area. These programs are made available through federal programs, with additional funding administered by Iowa DOT:

Federal Sources:

- **Bridge Formula Program (BFP):** Provides funding for highway bridge replacement, rehabilitation, preservation, and construction projects.
- **Recreational Trails Program:** Provides federal funding for trail projects.

Iowa DOT Administered Grant Program Funding Sources:

- **City Bridge Program:** STBG funding dedicated to local bridge projects set aside for the replacement or rehabilitation of City-owned bridges classified as poor.
- **Highway Safety Improvement Program – Local (HSIP):** Uses a portion of Iowa's HSIP apportionment to fund low- to medium-cost systemic safety improvements in cities and counties. Federal HSIP funds used for these projects are swapped for Primary Road Fund dollars.

FUTURE FUNDING FORECASTS

Future funding levels for the formula-based STBG and TAP revenues the AAMPO receives on an annual basis were forecasted through the year 2050 to derive the reasonably expected revenues anticipated to be available to the AAMPO over the life of Connect 2050. These forecasted revenues provide the underlying basis of the MTP's fiscal constraint.

The forecasts, presented in **Table 46**, were developed by applying the observed annual growth rate associated with the STBG and TAP target amounts for the years 2015 through 2029 (**Figure 70**), using the 2029 STBG and TAP targets as the launch point. The observed growth rate for STBG funds was 2.5% while the observed growth rate for TAP was 6.5%. Given the relatively high historic annual growth rate for TAP funds, the 2.5% growth rate associated with historic STBG funds was also applied in forecasting future TAP revenues. Forecasted revenue amounts shown in **Table 46** were rounded down to the nearest $1,000 value.

The forecasted STBG and TAP funds were organized into time bands that will be used to direct the MTP's fiscally constrained plan and calculate future YOE costs for individual projects included in the fiscally constrained plan. These time bands are:

- **Current TIP**: 2026–2029
- **Short-Term:** 2030–2034
- **Mid-Term:** 2035–2042
- **Long-Term:** 2043–2050

As shown below, STBG funding is estimated to total $62.8 million between 2026 and 2050, with TAP funding totaling approximately $6.1 million. Total revenues for STBG and TAP for the MTP's short-, mid-, and long-term time bands were forecasted at just under $68.8 million.

Table 46: Federal Funding Forecasts for STBG and TAP

Time Period/Years		STBG	TAP	Total
Current TIP	2026-2029	$8,978,000	$865,000	$9,843,000
Short-Term	2030-2034	$12,148,000	$1,172,000	$13,320,000
Mid-Term	2035-2042	$22,842,000	$2,206,000	$25,048,000
Long-Term	2043-2050	$27,832,000	$2,688,000	$30,520,000
Total*		$62,822,000	$6,066,000	$68,888,000

Source: Ames Area MPO Transportation Improvement Program, 2026-2029
*Totals shown only reflect the Short-, Mid-, and Long-Term forecasted revenues and costs

Funds for NHPP, HSIP, and ICAAP (the program Iowa DOT administers with federal CMAQ funds) are not forecasted because these programs are discretionary and directed by Iowa DOT. NHPP funds are directed to projects on the NHS while HSIP and ICAAP-funded projects are awarded funds through a competitive, discretionary process. Although not forecasted, the ICAAP program serves as a potential source of future revenues for the AAMPO, which could use ICAAP funds for projects such as:[11]

- Traffic flow improvements
- Planning and project development activities
- Travel demand management
- Transit improvements
- Ride-share activities
- Bicycle and pedestrian facilities and programs
- Intermodal freight
- Alternative fuels
- Vehicle inspection and maintenance programs
- Outreach activities
- SIP transportation projects and programs
- Transportation control measures
- Other projects and programs using promising technologies and feasible approaches to reduce air pollution emissions, and implementing transportation-related air quality improvement strategies

11 Iowa DOT, ***Iowa's Clean Air Attainment Program Application Handbook.***

An example use of ICAAP funds used within the AAMPO region are the recently awarded rounds of ICAAP funding to build the region's traffic fiber network.

Local Funding Programs

Local revenues were forecasted through the planning horizon year 2050 based on historic local revenue levels for the cities of Ames and Gilbert. Forecasts for the city of Ames were based on historic 5-year rolling average revenue levels for the city's LOST, RUTF, and Bond funding sources for the years 2019 through 2024. Revenue levels for the year 2025 were forecasted based on the historic 5-year rolling average trends then increased by 3.5% per year between 2026 and 2050.

Forecasts for the city of Gilbert were based on revenue levels for the city's General Fund, RUTF, LOST, Service Debt, Capital Projects, and Utilities funds for the years 2020 through 2025, as reported in Iowa DOT's annual road fund receipts. The baseline levels used for launching the city of Gilbert's local revenue forecasts were the average revenue level observed for each fund, then increased by 3.5% per year through 2050.

Table 47 presents the resulting forecasts for the cities of Ames and Gilbert's local revenues. As the table indicates, the city of Ames anticipates total local revenues in excess of $472 million between 2026 and 2050 while the city of Gilbert anticipates just over $30 million in local revenue capacity. Collectively, just over $500 million in local revenue capacity was forecasted for the two cities.

Table 47: Forecasted Local Revenue for the Cities of Ames and Gilbert by Time Period

Agency	TIP Years (2026–2029)	Short-Term (2030–2034)	Mid-Term (2035–2042)	Long-Term (2043–2050)	Total
City of Ames	$51,112,000	$74,621,000	$149,599,000	$196,996,000	$472,328,000
City of Gilbert	$3,262,000	$4,762,000	$9,550,000	$12,575,000	$30,149,000
Total	**$54,374,000**	**$79,383,000**	**$159,149,000**	**$209,571,000**	**$502,477,000**

Source: Ames Area MPO

OPERATIONS AND MAINTENANCE FUNDING

Operations and maintenance (O&M) refers to the routine, daily service and repair required to support AAMPO's multimodal transportation system. O&M costs represent a significant portion of the AAMPO and its member agencies' annual financial obligations. In the context of Metropolitan Transportation Planning, system-level estimates of O&M costs and revenue sources reasonably expected to be available to adequately operate and maintain federal-aid highways and public transportation is a required element of an MTP.[12]

Historic Federal-Aid O&M Expenditures

Historic O&M expenditures for the cities of Ames and Gilbert for the years 2015 through 2025 were reviewed to develop historic trends to guide forecasts of reasonably expected future O&M

12 ***23 CFR Part 450 Subpart C***

expenditures for these cities. The historic O&M expenditures for Ames and Gilbert represent actual costs and were sourced from Iowa DOT. **Table 48** shows the annual historic O&M expenditures.

As **Table 48** shows, O&M expenditure information was not available in the years 2020 and 2025. The annual averages shown in the table below were calculated to exclude those years and remove influence on the historic trend due to data unavailability.

Table 48: Historic Annual Federal-Aid O&M Expenditures for the Cities of Ames and Gilbert, 2015–2025

Year	City of Ames Total O&M Costs	City of Gilbert Total O&M Costs
2015	$1,541,388	$12,907
2016	$1,465,569	$14,358
2017	$2,129,262	$15,713
2018	$1,992,592	$16,813
2019	$2,412,347	$10,498
2020	Not Available	Not Available
2021	$2,620,414	$27,862
2022	$3,094,634	$143,537
2023	$3,711,142	$33,080
2024	$3,607,128	$218,718
2025	Not Available	Not Available
Average (2015–2019 & 2021–2024)	**$2,508,275**	**$54,832**

Source: Iowa Department of Transportation

Forecasted Federal-Aid O&M Expenditures

Forecasted federal-aid O&M expenditures were derived by applying a linear forecast that launched off the reported federal-aid O&M expenditure levels for both cities as reported for the year 2024. The assumed growth rate was 4.0% to reflect the growth rate used to identify short-term O&M expenditure forecasts reported in the AAMPO's annual TIP publications. The resulting federal-aid O&M forecasts for Ames and Gilbert are organized by MTP time band in **Table 49**.

Table 49: Forecasted Federal-Aid Operations and Maintenance Expenditures for the Cities of Ames and Gilbert

Agency	TIP Years (2026–2029)	Short-Term (2030–2034)	Mid-Term (2035–2042)	Long-Term (2043–2050)	Total
City of Ames	$16,565,000	$24,719,000	$51,165,000	$70,021,000	$162,740,000
City of Gilbert	$1,003,000	$1,496,000	$3,099,000	$4,243,000	$9,841,000
Total	**$17,568,000**	**$26,215,000**	**$54,264,000**	**$74,264,000**	**$172,311,00**

Based on the 4% annual growth rate assumed in forecasting reasonably expected future O&M revenues, Ames and Gilbert anticipate a total of approximately $74.3 million in O&M costs between 2026 and 2050, with $26.2 million incurred in the short-term, roughly $54.3 million in the mid-term, and roughly $74.3 million in the long term. Overall forecasted federal-aid O&M expenditures for both Ames and Gilbert are expected to be just over $172.3 million over the life of the MTP.

The forecasted federal-aid O&M expenditures were further broken down into O&M categories, as shown in **Table 50**, to demonstrate how forecasted local revenues are balanced with forecasted federal-aid O&M expenditures.

The overall distribution of total forecasted federal-aid O&M costs for the cities of Ames and Gilbert sees roughly 51% of future forecasted federal-aid O&M costs being dedicated to maintenance while the remaining 49% is dedicated to operations. Given future local revenue forecasts, the cities of Ames and Gilbert are expected to generate an additional $330 million in local revenues over their forecasted federal-aid O&M expenditures through the year 2050.

Table 50: Forecasted Local Revenue and Forecasted Federal-Aid O&M Costs for the Cities of Ames and Gilbert

Agency	TIP Years (2026–2029)	Short-Term (2030–2034)	Mid-Term (2035–2042)	Long-Term (2043–2050)	Total
Total Maintenance Costs	$9,013,000	$13,450,000	$27,838,000	$38,105,000	$88,406,000
Total Operations Costs	$8,551,000	$12,761,000	$26,414,000	$36,151,000	$83,877,000
Forecasted Local Revenues	$54,374,000	$79,383,000	$159,149,000	$209,571,000	$502,477,000
Revenue in Excess of O&M	**$36,810,000**	**$53,172,000**	**$104,897,000**	**$135,315,000**	**$330,194,000**

Source: Ames Area MPO

CHAPTER 8 FISCALLY CONSTRAINED PLAN

The fiscally constrained plan is the cornerstone of Connect 2050 and provides the roadmap for the AAMPO and its member agencies to navigating future multimodal investments. This plan identifies a range of projects anticipated to use federal funds for implementation through 2050, including a general timeframe for their implementation.

Fiscal constraint is a core requirement of the federal Metropolitan Transportation Planning process and aims to verify that future investments that leverage federal funds are within reasonably expected future revenue levels.

SELECTING FISCALLY CONSTRAINED PROJECTS

The selection of fiscally constrained projects was driven by the results of the prioritization evaluation detailed in the **Alternatives Development** chapter. Alternatives determined to be a high or medium priority were first considered for inclusion in the fiscally constrained plan. Projects were then matched with anticipated timing of the need, each project's estimated YOE cost, and available funding by source.

2025-2050 FISCALLY CONSTRAINED PLAN

The summary of Connect 2050's fiscally constrained plan organizes projects by their anticipated MTP time band used to identify their implementation timing. These time bands are:

- **Short-Term:** 2030-2034
- **Mid-Term:** 2035-2042
- **Long-Term:** 2043-2050

The summary also includes each project's current (2025) estimated project cost, estimated YOE project cost, and anticipated federal and non-federal cost share amounts. Project costs are projected to increase by 4% per year for YOE cost estimation.

BALANCING IMPROVEMENT AND PRESERVATION

Connect 2050's fiscally constrained plan balanced the needs of preserving existing transportation infrastructure with improving the region's multimodal transportation system to address emerging safety and mobility needs. Connect 2050 included updates to and analysis of the Ames pavement management application (dTIMS), and scenarios were considered along with historical funding needs to determine baseline preservation needs. AAMPO identified target allocations of future transportation revenues that balance preservation and improvement needs. These allocations were developed for

System Improvement vs. System Preservation

System Improvement refers to a range of future multimodal projects that will modify the existing multimodal network through lane reconfiguration, safety improvements, additional capacity, creating new connections, or improving intersections.

System Preservation refers to major projects that focus on maintaining existing infrastructure, such as resurfacing, restoring, and rehabilitating streets and bridges.

future STBG and TAP revenues and assume:

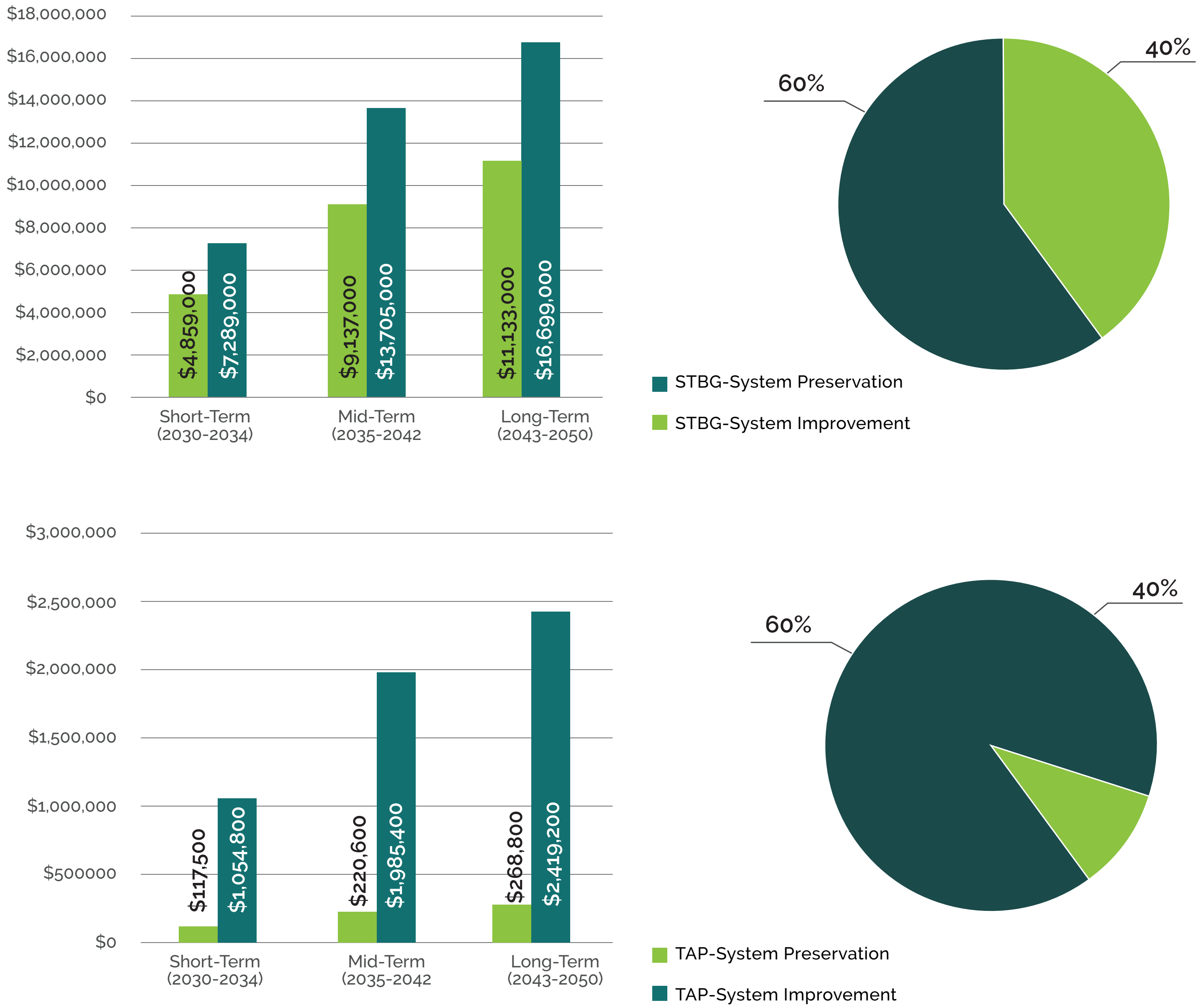
- 60% of future STBG revenues toward system improvement.
- 40% of future STBG revenues toward system preservation.
- 90% of future TAP revenues toward system improvement.
- 10% of future TAP revenues toward system preservation.

Under this allocation scenario, **Table 51** summarizes the resulting amounts of future STBG and TAP funds estimated for preservation and system improvement. **Figure 71** shows a breakdown of Preservation and Improvement funding from different perspectives.

Table 51: Balancing Preservation and Improvement Needs for Future STBG and TAP Revenues

MTP Time Band	STBG		TAP	
	Improvement	Preservation	Improvement	Preservation
Short-Term (2030–2034)	$7,289,000	$4,859,000	$1,054,800	$117,200
Mid-Term (2035–2042)	$13,705,000	$9,137,000	$1,985,400	$220,600
Long-Term (2043–2050)	$16,699,000	$11,133,000	$2,419,200	$268,800
Total	**$37,693,000**	**$25,129,000**	**$5,459,400**	**$606,600**
Percent	60%	40%	90%	10%

Figure 71: Funding Breakdown



2025-2028 TRANSPORTATION IMPROVEMENT PROGRAM

AAMPO's current TIP documents projects that are programmed or "committed" for implementation and covers the years 2026 through 2029. Given the timeframe covered by the current TIP, the short-term time band for the fiscally constrained plan begins in 2030 and provides the basis for the development of AAMPO's next several TIP cycles.

The roadway projects considered as committed for the purposes of the fiscally constrained plan are detailed in **Table 52**, with their locations shown in **Figure 72**. Committed bicycle and pedestrian projects are detailed in **Table 53** and their locations are shown in **Figure 73**.

Table 52: Committed Roadway Projects

ID	Project Location	Type
C-1	Bloomington Road from Hoover Avenue to Eisenhower Avenue	Reconstruction of Bloomington Road
C-2	E Lincoln Way from Duff Avenue to Skunk River	Repair and reconstruction of E Lincoln Way
C-3	Stange Road from Northridge Parkway to Aspen Road	Lane reconfiguration from 4 lanes to 2 lanes with Complete Streets elements
C-4	Freel Drive from Lincoln Way to SE 5th Street	Paving
C-6	U.S. 30 from east Duff Avenue ramp terminals to east S Dayton Road ramp terminals	Widen to 6 lanes
C-7	Grand Avenue/13th Street Intersection	Intersection improvements
C-9	Grand Avenue/24th Street Intersection	Intersection improvements
C-10	Grand Avenue/20th Street Intersection	Intersection improvements
C-11	S 16th Street from University Boulevard to Vet Med Trail	Widen to 4 lanes
C-12	Multiple Corridors in the city of Ames	Fifth phase deployment of Ames Traffic Signal Master Plan
C-13	Wilder Boulevard from Thackeray Drive to Clemens Boulevard	Mini-roundabouts corridor improvement

Figure 72: Committed Roadway Projects

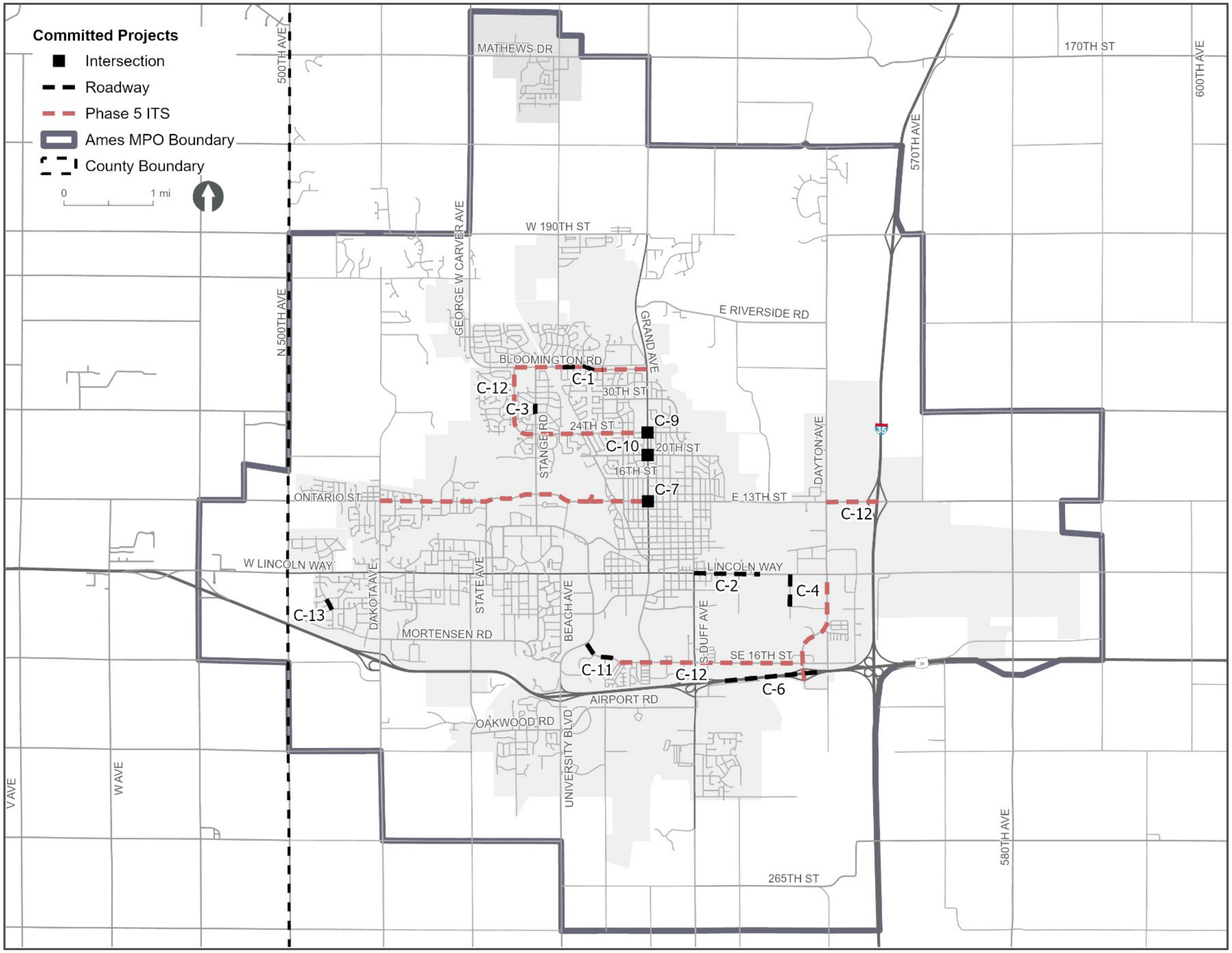
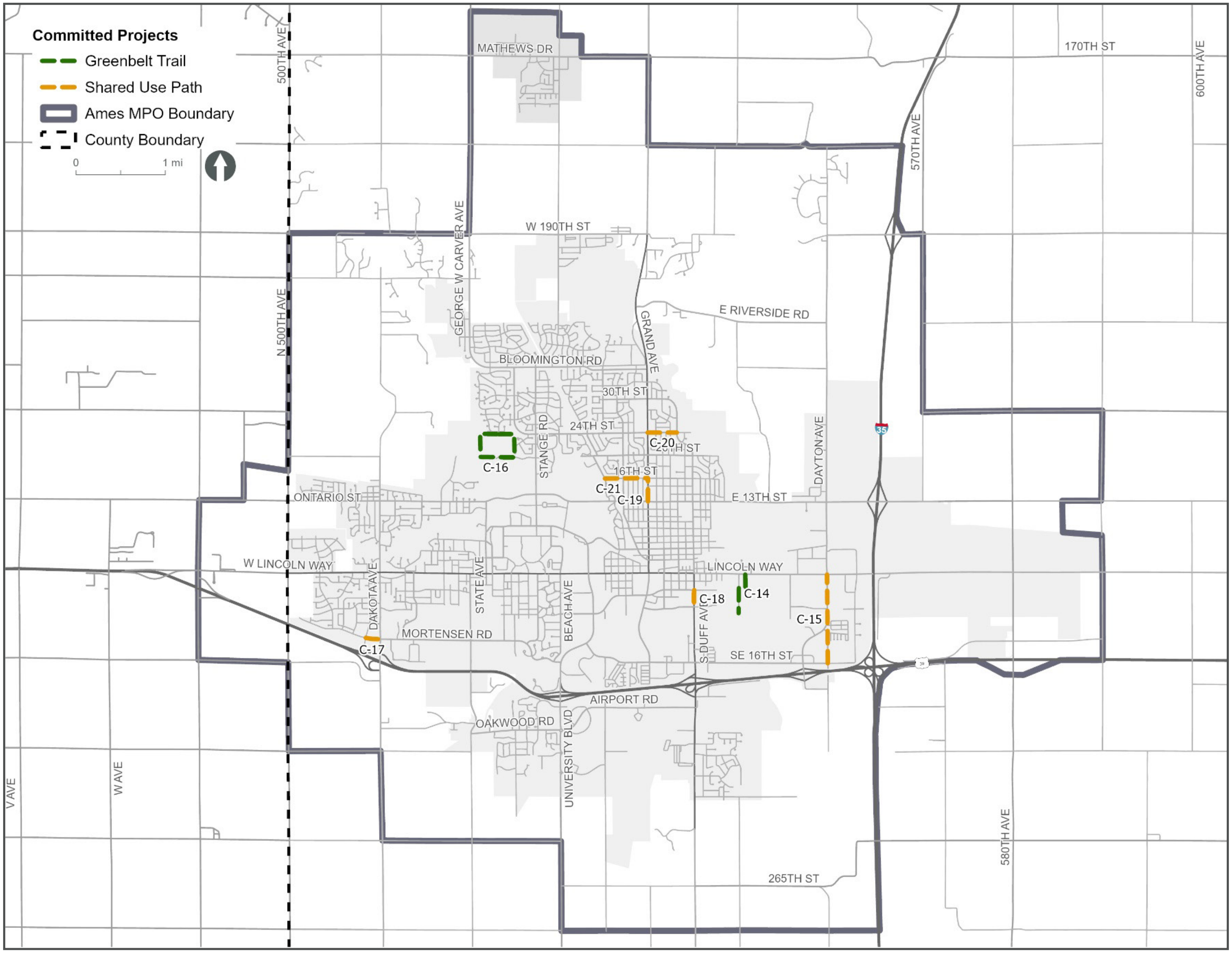


Table 53: Committed Bicycle and Pedestrian Projects

ID	Project Location	Type
C-14	Well Access Road from Lincoln Way to Ioway Creek	Greenbelt Trail
C-15	S Dayton Avenue from SE 16th Street to E Lincoln Way	Shared Use Path
C-16	Moore Memorial Park to Ioway Creek Trail	Greenbelt Trail
C-17	Mortensen Road from Dickinson Road to South Dakota Avenue	Shared Use Path
C-18	S Duff from S 5th Street to S 3rd Street	Shared Use Path
C-19	Grand Avenue from 13th Street to 16th Street	Shared Use Path
C-20	24th Street from Grand Avenue to Duff Avenue	Shared Use Path
C-21	16th Street from Grand Avenue to Ridgewood Avenue	Shared Use Path

Figure 73: Committed Bicycle and Pedestrian Projects



FISCALLY CONSTRAINED PLAN – STREETS PROJECTS

Streets projects selected for inclusion in Connect 2050's fiscally constrained plan are detailed in **Table 54** while their locations within the AAMPO region are shown in **Figure 74**.

Short-Term Streets Projects

Short-term streets projects identified for the fiscally constrained plan represent those improvements that are AAMPO's top priorities in meeting the region's most pressing needs. These projects are anticipated to use $6.4 million in STBG funding between 2030 and 2034, with $1.6 million provided by AAMPO's member agencies to meet federal cost sharing agreements, which assumes an 80/20 split for future STBG funds.

The short-term streets projects also include two projects that are anticipated to be directed by Iowa DOT and include an interchange reconfiguration at U.S. 30 and S Duff Avenue as well as widening U.S. 30 to 6-lanes from S Duff Avenue to University Avenue. Total YOE project costs for these improvements are calculated to be just over $48 million.

Mid-Term Streets Projects

Mid-term streets projects identified for the fiscally constrained plan represent those improvements that are planned for implementation between the years 2035 and 2042. These projects are anticipated to use $14.6 million in STBG funding with $5.7 million provided by AAMPO's member agencies to meet federal cost sharing agreements.

Long-Term Streets Projects

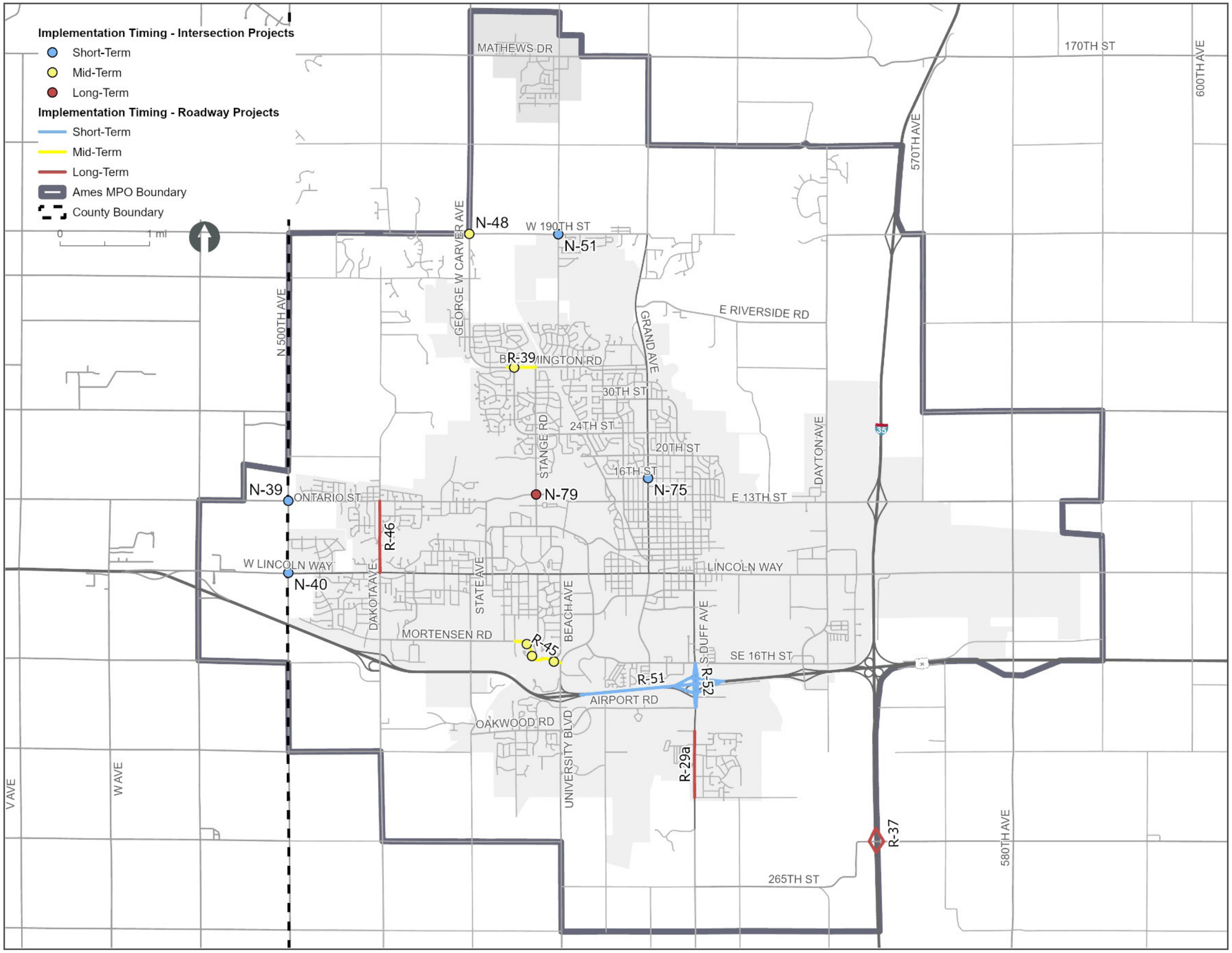
Long-term streets projects identified for the fiscally constrained plan represent those improvements that are planned for implementation between the years 2043 and 2050. These projects are anticipated to use $16.7 million in STBG funding with $16.2 million provided by AAMPO's member agencies to meet federal cost sharing agreements.

The long-term streets projects also include a project that is expected to leverage a cost share by Iowa DOT. This improvement will widen a section of Duff Avenue from Ken Maril Road to Kitty Hawk Drive to a 4-lane divided roadway. Total YOE project costs for this improvement are calculated to be $18.2 million, with AAMPO using $1.4 million in STBG revenues, $12.3 million in local revenues, and $4.6 million in Iowa DOT-sourced revenues.

Table 54: Fiscally Constrained Streets Projects

ID	Corridor	Location	Project Type	Cost (2025$)	Cost (YOE)	STBG Share	Local Share	State Share
Short-Term Projects								
N-40	W Lincoln Way	Y Avenue	Roundabout	$1,950,000	$2,570,000	$2,056,000	$514,000	$0
R-52	S Duff Avenue	U.S. 30	Interchange Reconfiguration	$18,000,000	$23,690,000	$0	$0	$23,690,000
N-39	Ontario Street	N 500th Avenue	Roundabout	$1,950,000	$2,570,000	$2,056,000	$514,000	$0
N-51	W 190th Street	Grant Avenue / Hyde Avenue	Roundabout	$1,950,000	$2,570,000	$2,056,000	$514,000	$0
N-75	Grand Avenue	16th Street	Intersection Improvements	$234,000	$310,000	$248,000	$62,000	$0
R-51	U.S. 30	Duff Avenue to University Avenue	Widen to 6-lanes	$18,500,000	$24,340,000	$0	$0	$24,340,000
					Short-Term Total	$6,416,000	$1,604,000	$48,030,000
Mid-Term Projects								
R-39	Bloomington Road	Valley View Road to Stange Road	Lane Reconfiguration and Roundabouts	$4,006,000	$6,800,000	$5,440,000	$1,360,000	$0
N-48	W 190th Street	George Washington Carver Avenue	Roundabout	$1,950,000	$3,310,000	$2,648,000	$662,000	$0
R-45	Mortensen Parkway	Welch Avenue to Beech Avenue	Lane Reconfiguration and Roundabouts	$6,000,000	$10,190,000	$6,521,600	$3,668,400	$0
					Mid-Term Total	$14,609,600	$5,690,400	$0
Long-Term Projects								
R-29a	Duff Avenue	Ken Maril Road	Widen to 4-Lane Divided	$7,861,750	$18,270,000	$1,370,250	$12,332,250	$4,567,500
N-79	13th Street	Stange Road	Intersection Improvements	$3,000,000	$6,970,000	$5,576,000	$1,394,000	$0
R-46	N Dakota Avenue	Lincoln Way to Ontario Street	Lane Reconfiguration	$5,219,000	$12,130,000	$9,704,000	$2,426,000	$0
R-37	I-35	260th Street	New Interchange	$16,000,000	$37,180,000	$0	$0	$37,180,000
					Long-Term Total	$16,650,250	$16,152,250	$41,747,500

Figure 74: Fiscally Constrained Streets Projects



FISCALLY CONSTRAINED PLAN – BICYCLE AND PEDESTRIAN PROJECTS

Bicycle and pedestrian projects selected for inclusion in Connect 2050's fiscally constrained plan are detailed in **Table 55** while their locations within the AAMPO region are shown in **Figure 75**.

Short-Term Bicycle and Pedestrian Projects

Short-term bicycle and pedestrian projects identified for the fiscally constrained plan are anticipated to use $1.0 million in TAP funding between 2030 and 2034, with $250,000 provided by AAMPO's member agencies to meet federal cost sharing agreements, which assumes an 80/20 split for future TAP funds.

Mid-Term Bicycle and Pedestrian Projects

Mid-term bicycle and pedestrian projects identified for the fiscally constrained plan represent those improvements that are planned for implementation between the years 2035 and 2042. These projects are anticipated to use $1.8 million in TAP funding with $452,000 provided by AAMPO's member agencies to meet federal cost sharing agreements.

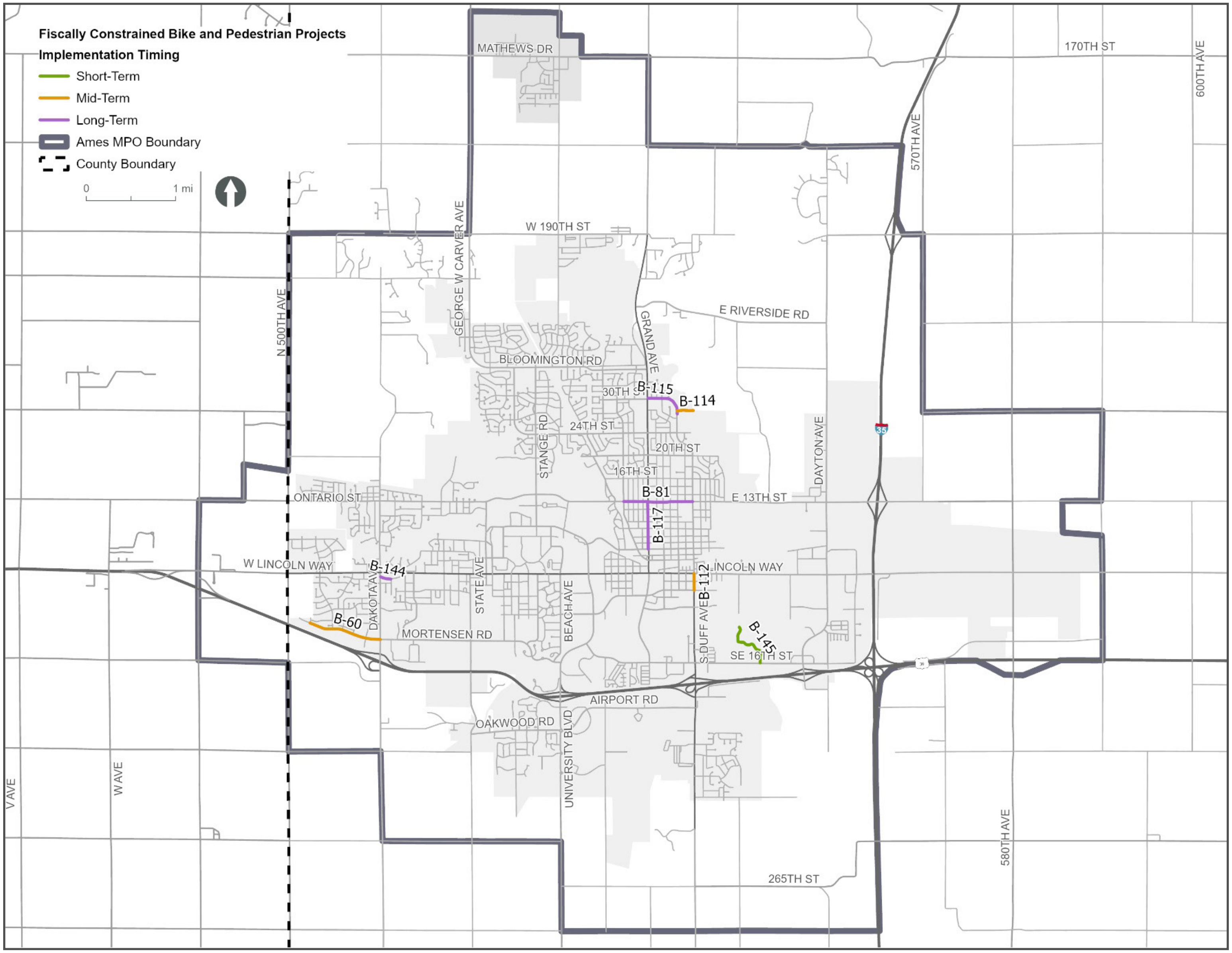
Long-Term Bicycle and Pedestrian Projects

Long-term bicycle and pedestrian projects identified for the fiscally constrained plan represent those improvements that are planned for implementation between the years 2043 and 2050. These projects are anticipated to use $2.6 million in TAP funding with $648,000 provided by AAMPO's member agencies to meet federal cost sharing agreements.

Table 55: Fiscally Constrained Bicycle and Pedestrian Projects

ID	Corridor	From	To	Project Type	Cost (2025$)	Cost (YOE)	TAP Share	Local Share	State Share
Short-Term Projects									
B-145	Skunk River Trail	Ioway Creek	S 16th Street	Greenbelt Trail	$1,200,000	$1,580,000	$1,264,000	$316,000	$0
						Short-Term Total	$1,264,000	$316,000	$0
Mid-Term Projects									
B-60	Mortensen Road	Rowling Drive	S Dakota Avenue	Shared Use Path	$532,688	$900,000	$720,000	$180,000	$0
B-112	S Duff Avenue	Lincoln Way	S 3rd Street	Shared Use Path	$123,058	$210,00	$168,000	$42,000	$0
B-114	Skunk River Trail	North Side Inis Grove Park	Duff Avenue	Greenbelt Trail	$825,000	$1,400,000	$1,120,000	$280,000	$0
						Mid-Term Total	$2,008,000	$502,000	$0
Long-Term Projects									
B-81	13th Street	Northwestern Avenue	Grand Avenue	Shared Use Path	$175,700	$410,000	$328,000	$82,000	$0
B-115	Duff Avenue	Grand Avenue	Northwood Drive	Shared Use Path	$289,159	$670,000	$536,000	$134,000	$0
B-117	Grand Avenue	13th Street	6th Street	Shared Use Path	$410,215	$950,000	$760,000	$190,000	$0
B-144	Lincoln Swing	S Dakota Avenue	Abraham Drive	Shared Use Path	$100,000	$230,000	$184,000	$46,000	$0
						Long-Term Total	$1,808,000	$452,000	$0

Figure 75: Fiscally Constrained Bicycle and Pedestrian Projects



FISCALLY CONSTRAINED PLAN – TRANSIT PROJECTS

Transit projects that were selected for Connect 2050's fiscally constrained plan are described below in **Table 56**. Due to funding availability, the projects included in the fiscally constrained transit projects would all take place in the short-term (2030–2034). Additional transit projects after that period will be selected from the illustrative project list, which is detailed in **Appendix A**.

Table 56: Fiscally Constrained Transit Projects

Time Frame	Description	Project Type	Total 2025 Annual Cost	Federal 2025 Annual Cost	%	Fund Type
Short-Term (2030-2034)	Vehicle Replacement/ Expansion	Rolling Stock	$2,136,000	$1,815,600	85%	5339, CRP
	Dial-A-Ride ADA Paratransit	Operating	$331,250	$265,000	80%	5310
	Preventative Maintenance-Real-Time Passenger Information	Technology	$132,000	$105,600	80%	5310
	Passenger Amenity Improvements	Technology	$100,000	$80,000	80%	5310
	Battery Electric Buses Expansion	Rolling Stock	$1,200,000	$1,020,000	85%	5339, CRP, STBG
	Light Duty Vehicles	Rolling Stock	$225,800	$191,930	85%	5310
	Articulated Bus Replacement/ Expansion	Rolling Stock	$1,100,000	$935,000	85%	5339, CRP, STBG
	Install Benches and Shelters	Passenger Amenities	$80,000	$64,000	80%	5310
	Operating Funding for Fixed Route Service	Operating	$8,543,626	$4,271,813	50%	5307
	Partial Vehicle Replacement/ Expansion	Rolling Stock	$471,313	$377,050	80%	STBG

ILLUSTRATIVE PROJECTS

Because of limited availability of federal and local funding levels throughout the timeline of the fiscally constrained plan, not all projects can receive allocated funding. These projects are moved to an illustrative project list, meaning they are eligible to be selected as projects in the future should funding become available. Further detail on illustrative projects is provided in **Appendix A**.

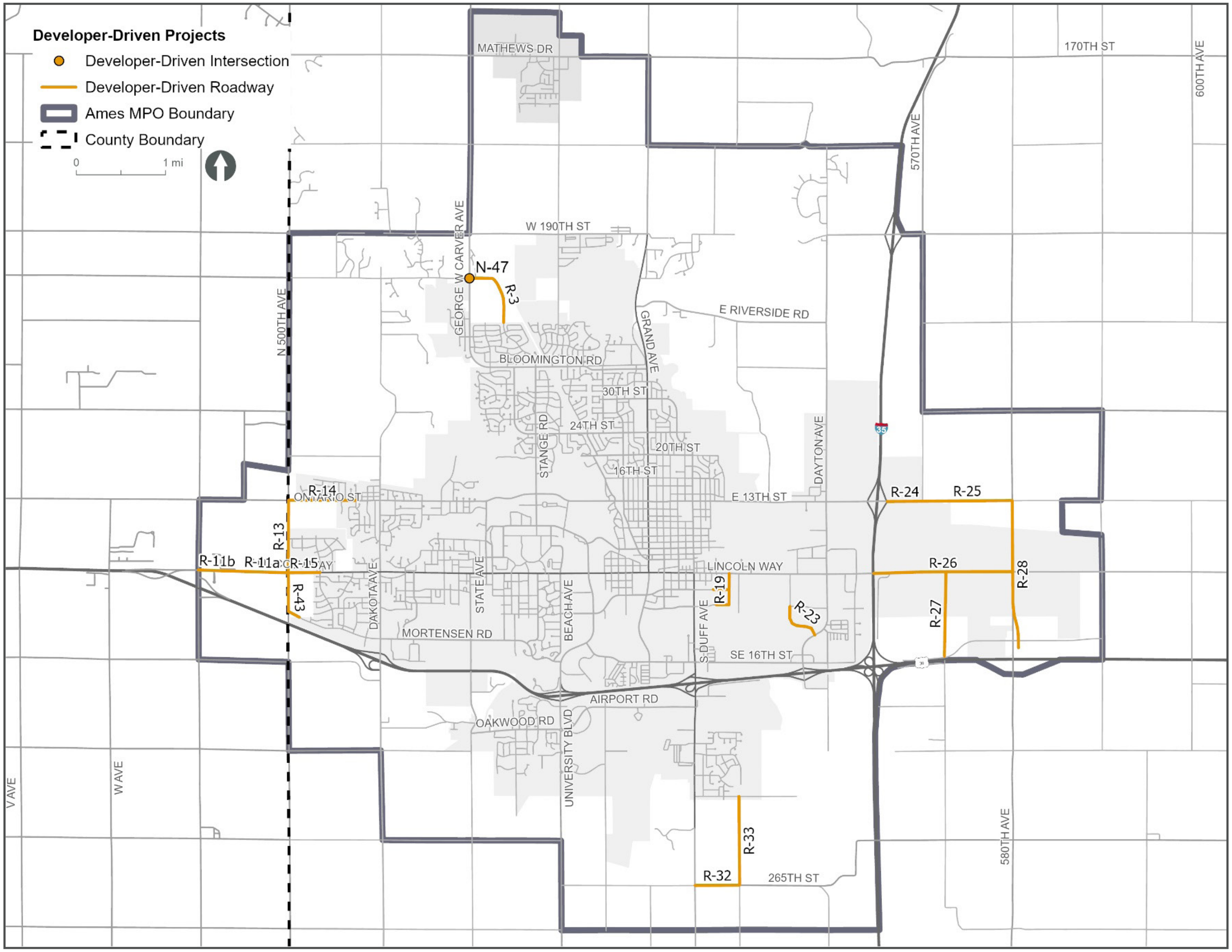
DEVELOPER-DRIVEN PROJECTS

Developer-driven projects represent improvements that are expected to be implemented based on development needs. As such, implementation and project costs are expected to be, at least in part, the responsibility of the developer and are excluded from the fiscally constrained plan because they are not anticipated to use federal funds. Identified developer-driven projects are summarized in **Table 57** and shown in **Figure 76**.

Table 57: Developer Driven Projects

ID	Corridor	From	To	Project Type	Cost (2025 $)
N-47	Cameron School Road	GW Carver Avenue		Roundabout	$1,950,000
R-11a	Lincoln Way	X Avenue	0.5 mile west of X Avenue	Widen to 3-Lanes	$3,276,000
R-11b	Lincoln Way	0.5 mile west of X Avenue	Y Avenue	Widen to 3-Lanes	$3,276,000
R-13	Y Avenue	Lincoln Way	Ontario Street	Widen to 3-Lanes	$5,289,000
R-14	Ontario Street	Y Avenue/500th Avenue	Idaho Avenue	Widen to 3-Lanes	$4,910,000
R-15	Lincoln Way	Y Avenue/500th Avenue	Wilder Boulevard	Widen to 3-Lanes	$2,315,000
R-19	New Backage Road System	Lincoln Way	S 5th Street	New 2-Lane Street	$4,110,000
R-23	Freel Drive	SE 5th Street	S Dayton Avenue	New 2-Lane Street	$2,304,000
R-24	E 13th Street	I-35 Ramp Terminal	570th Avenue	Turn Lanes	$1,040,000
R-25	E 13th Street	570th Avenue	580th Avenue	Turn Lanes	$1,040,000
R-26	Lincoln Way	I-35 Ramp Terminal	580th Avenue	Turn Lanes	$1,040,000
R-27	Sand Hill Trail	Turing Street	Lincoln Way	New 2-Lane Street	$5,345,000
R-28	580th Avenue	U.S. 30	13th Street	Turn Lanes	$3,120,000
R-3	Stange Road	Weston Drive	George Washington Carver Avenue	New 2-Lane Street	$4,080,000
R-32	265th Street	Duff Avenue	550th Avenue	Widen to 3-Lanes	$4,295,000
R-33	550th Avenue	Ken Maril Road	265th Street	Pave	$4,534,000
R-43	Y Ave	Mortensen Road	Lincoln Way	Pave and Widen to 3-Lanes	$3,770,000

Figure 76: Developer Driven Projects



POTENTIAL IOWA DOT PROJECTS

Iowa DOT manages investments and O&M for the statewide highway network through administration of the NHPP program and other funding sources. The needs across the state are evaluated, and funding is allocated to address the state's most critical highway needs. These funds are State-directed, and Iowa DOT works with Local Public Agencies (LPA), such as AAMPO, to program improvements. Given the nature of this program, Connect 2050 did not identify all State-directed projects. Connect 2050 instead forecasts reasonably expected future revenue levels for the MPO region that could fund eligible projects. Projects funded through the State funding program are intended to address Iowa DOT's investment priorities and include:

- Preventative maintenance
- Minor rehabilitation
- Safety improvements
- Bicycle and pedestrian improvements

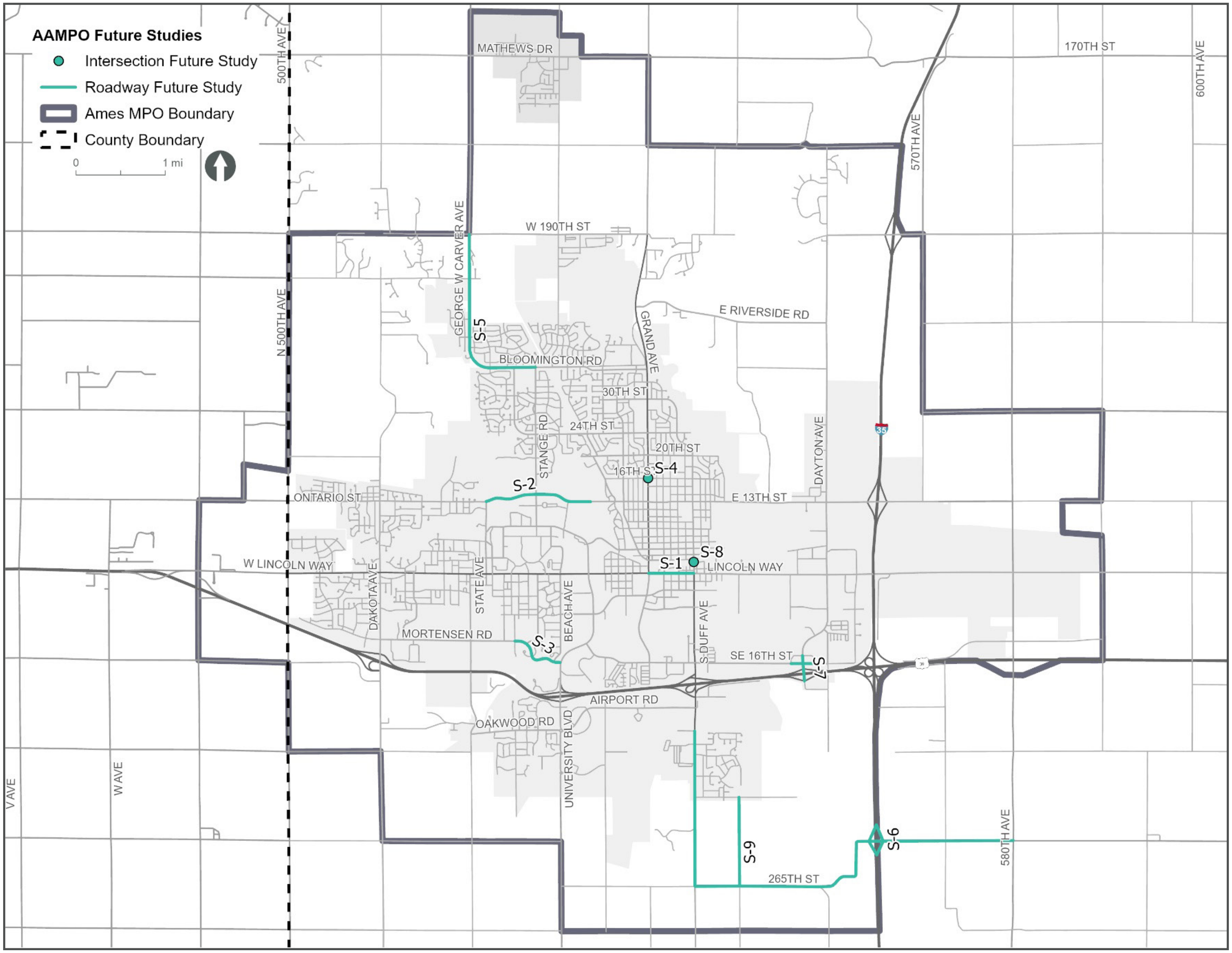
FUTURE STUDIES

To supplement the multi-modal improvements recommended as part of Connect 2050, a series of future studies were identified for AAMPO to consider over the life of the MTP. These studies are detailed in **Table 58** and **Figure 77**. To conduct one of these studies, AAMPO will program it in a Transportation Planning Work Program (TPWP) as a special study in order to access federal planning funds in that study's fiscal year.

Table 58: Recommended Future Studies

Study ID	Timeline	Study Name	Study Description
S1	Near-Term (FY27)	Lincoln Way Corridor Study (Duff Avenue to Grand Avenue)	Corridor study to guide future street/intersection design, pedestrian/bike improvements, and access management, and will inform illustrative projects R-16 and B-67.
S2	Medium-Term (FY30-34)	13th Street Corridor Study (Hyland Avenue to Furman Aquatic Center)	Corridor study to guide future street/intersection design, pedestrian/bike improvements, access management, and feasibility of roundabouts and lane reconfiguration on 13th Street; will inform projects R-42, R-44, N-70, and long-term project N-79.
S3	Near-Term (FY29)	Mortensen Parkway (University Boulevard to Welch Avenue)	Corridor study to guide future street/intersection design, pedestrian/bike improvements, and access management, including evaluating roundabouts and a lane reconfiguration on Mortensen Parkway. The study will support mid-term project R-45 and inform medium priority bike/pedestrian project B-23.
S4	Medium-Term (FY30-34)	Grand Avenue & 16th Street Intersection Study	Study to reassess the Grand Avenue & 16th Street intersection after nearby corridor upgrades, focusing on safety and multimodal improvements. It will form the basis for short-term project N-75.
S5	Medium-Term (FY30-34)	Bloomington Road & GW Carver Avenue Corridor Study (Stange Road to 190th Street)	Corridor study to evaluate roundabouts and lane reconfiguration on Bloomington Road and GW Carver Avenue; will support R-39 and may inform N-47, N-48, and R-1.
S6	Long-Term (≥FY35)	I-35 & 260th Street Interchange Study & Interchange Justification Report (IJR)	Study and IJR for a potential I-35 interchange at 260th Street to support Ames south and east industrial growth; coordinated with S9 and informs long-term project R-37.
S7	Near-Term (FY28)	S Dayton Avenue & U.S. 30 Interchange Area Study	Study of S Dayton Avenue & U.S. 30 interchange operations, including nearby intersections, to guide future design and access improvements; informs illustrative project N-76.
S8	Near-Term (FY27-29)	Duff / UPRR Grade Separation Study	Feasibility study for a Duff Avenue–Union Pacific Railroad grade separation, building on the current corridor study and following FRA guidelines; required to pursue grant funding for project N-44.
S9	Long-Term (≥FY35)	Ames South Growth Area Study (S Duff Avenue, U.S. 69, 260th Street, 265th Street)	Study of Ames south growth area focused on S Duff Avenue/U.S. 69 and 260th/265th Street, coordinated with S6; informs long-term project R-29a and illustrative projects R-29b, R-32, R-33, and R-34.

Figure 77: Recommended Future Studies



CHAPTER 9 ENVIRONMENTAL SCREENING

ENVIRONMENTAL ANALYSIS

The AAMPO study area was evaluated for environmental resources in the natural and built environment. Federal, state, and tribal agencies concerned with management, regulation, and wildlife resources will be consulted in the draft plan phase of the MTP update.

Under the National Environmental Policy Act (NEPA) of 1969, federal agencies are required to consider environmental resources and potential impacts on them during the planning design phase of any project receiving federal funding. As such, this analysis highlights potential environmental resources that could require further consideration for future implementation.

ENVIRONMENTAL SCREENING AND CONSIDERATIONS

Environmental resources that could potentially be affected by transportation projects in the study area are discussed in this section. **Figure 78** and **Figure 79** show some of the environmentally sensitive natural and human-built areas in the study area. Discussion regarding the resources shown in the figures, such as historic resources and waters of the United States, are detailed as well.

ARCHAEOLOGICAL AND HISTORICAL RESOURCES

The consideration of impacts on cultural resources is subject to several federal laws, regulations, and guidelines. Principal among these are NEPA and Section 106 of the National Historic Preservation Act. Section 106 requires federal agencies (and agencies receiving federal assistance for projects) to consider the effects of their undertakings on historic properties (any prehistoric or historic district, site, building, structure, or object listed on or eligible for listing on the National Register of Historic Places). Through consultation with agency officials and other parties, the effects of the project on historic properties are considered, beginning with the earliest stages of project planning. The goal is to identify historic properties in the area of potential effect (APE) as early as possible in project development, evaluate the historic significance of the properties, assess the expected project impacts, and seek ways to avoid, minimize, or mitigate any adverse effects.

Archaeological and historical data from the ISites Public Data Web Map[13], maintained by the Iowa Office of the State Archaeologist, were reviewed to determine the number of historic sites in proximity to the study area. The study area includes numerous historic structures and archaeological sites.

As transportation projects are developed, an APE would be proposed by sponsoring agencies (Iowa DOT and local governments). Coordination with the Iowa State Historic Preservation Office (SHPO) would confirm the APE. Records of known historic sites would be searched to determine the presence of historic resources in the APE.

The potential for unknown archaeological sites would be determined through site-specific cultural resource surveys. Through consultation with Iowa SHPO, the potential for projects to affect historic resources would be determined (No Historic Properties Affected, No Adverse Effect on Historic Properties, or an Adverse Effect on Historic Properties [when a historic resource cannot be avoided]).

13 Iowa Office of the State Archaeologist, ***ISites Public Data Web Map.***

In the event of an adverse effect on historic properties, FHWA must contact the Advisory Council to advise it of the situation and offer an opportunity for participation in the consultation with SHPO and others to plan measures to minimize harm and, ultimately, to mitigate the adverse effects. The agency sponsoring the project would consult with SHPO and other interested parties to formulate a mitigation plan that would become the basis for a Memorandum of Agreement among FHWA, SHPO, and the DOT or local agency. Execution of the Memorandum completes consultation under Section 106 unless there are changes or additions to the project.

SECTION 4(F) AND SECTION 6(F) RESOURCES

The Department of Transportation Act of 1966 included a provision – Section 4(f) – that is intended to protect any publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or any land of a historic site of national, state, or local significance (as determined by the federal, state, or local officials having jurisdiction over the park, area, refuge, or site). DOT agencies, including FHWA, cannot approve any program or project that requires the use these lands unless the following is met:

- There is no feasible and prudent alternative to the use of such land, and the program or project includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use; or
- FHWA determines that the use of the property, including any measures to minimize harm (such as avoidance, minimization, mitigation, or enhancement measures), would have a de minimis impact (a determination that the project would not adversely affect the activities, features, or attributes qualifying a park, recreation area, or refuge for protection under Section 4(f) or a Section 106 finding of no adverse effect or no historic properties affected on a historic property).

There are three types of Section 4(f) impacts:

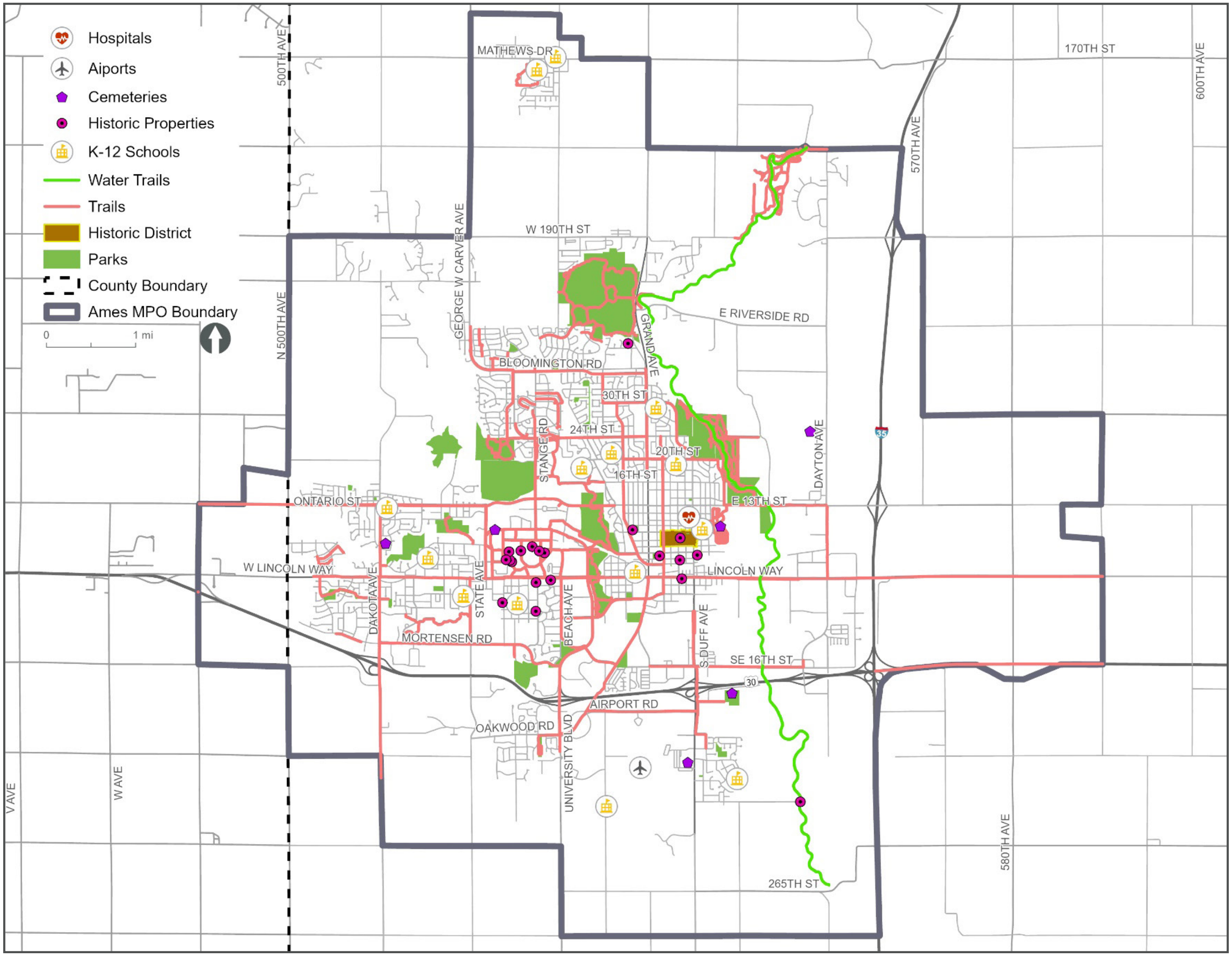
- **Direct use:** Conversion of public park land into a transportation use and may include de minimis impacts
- **Temporary occupancy:** Temporary use of Section 4(f) land for construction operations
- **Constructive use:** Proximity impacts, such as noise, of a proposed project that is adjacent, or nearby, to a Section 4(f) property resulting in a substantial impairment to the property's activities, features, or attributes that qualify the property for protection under Section 4(f)

The study area includes parks and other Section 4(f)-protected properties. Transportation projects would be further evaluated in the project planning phase.

Section 6(f), which was created as a part of the Land and Water Conservation Act, protects state- and locally sponsored projects that were funded as part of the Land and Water Conservation Fund. These lands cannot be converted to non-park/ recreation use without the approval of the National Park Service. Conversion of these lands is allowed if it is determined that there are no practicable alternatives to the conversion and that there would be a provision of replacement property. Mitigation for Section 6(f) lands impacted by a project must include replacement with land of at least the same fair market value and reasonably equivalent usefulness and location relative to the impacted land.

The potential presence of Section 6(f) lands was evaluated by determining the presence of public parks, recreation areas, and refuges using GIS data from Ames and the Iowa Department of Natural Resources (DNR). The study area includes properties that may be Section 6(f)-protected lands; further evaluation would be needed in the project planning phase.

Figure 78: Human Environmental Constraints



REGULATED MATERIALS SITES

Regulated materials are hazardous substances that are regulated by federal, state, or local entities based on their potential to result in environmental contamination and to affect public health. The purpose of an initial regulated materials review is to identify properties that are, or may be, contaminated with regulated materials in the study area so that the presence of these properties may be factored into subsequent transportation selection and design considerations. It is preferable to avoid highly contaminated sites to minimize potential additional costs, liability, or schedule delays due to site remediation.

The study area was evaluated using GIS data from Iowa DNR to determine the presence of any national priority sites, non-national priority sites, contaminated sites, and leaking underground storage tanks as defined by Iowa DNR and U.S. Environmental Protection Agency. The study area includes regulated material sites.

More detailed assessments of transportation projects during the planning process would be needed in future environmental reviews.

WETLANDS AND WATERS OF THE UNITED STATES

For purposes of the Clean Water Act (CWA) and its implementing regulations, the term "waters of the United States" means:

> all waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all interstate waters, including interstate wetlands; the territorial seas; all impoundments of waters otherwise identified as waters of the United States in the CWA; and all tributaries, as defined in the CWA.

Waters of the United States are subject to the CWA and are under the jurisdiction of the U.S. Army Corps of Engineers (USACE). A permit from USACE is necessary for all projects that would discharge dredged or fill material into waters of the United States, including wetlands.

The National Wetlands Inventory and aerial photography were reviewed for the study area to determine potential project impacts on wetlands and other waters of the United States. The study area includes potential wetlands and other waters of the United States.

Wetland delineations are recommended in the initial stages of transportation projects to determine the boundaries of the wetlands and other waters of the United States in the project area and to coordinate with USACE to determine who has jurisdiction over these areas.

FLOODPLAINS

Development in floodplains is regulated by the Federal Emergency Management Agency (FEMA) and Iowa DNR. Iowa DNR floodplain regulations affect only those transportation projects in the floodplains of streams draining more than 100 square miles in rural areas and 2 square miles in urban areas. Projects on streams with drainage areas less than these thresholds are regulated by cities and counties.

A floodplain permit from Iowa DNR or the city or county is required for most projects in a floodplain. A hydraulic review must be completed for projects in floodplains to determine the effect of the project on the water surface elevation of the 100-year flood. FEMA regulations prohibit encroachments in regulated floodways unless it is accompanied by a no-rise analysis that demonstrates the project would cause no increase in the 100-year flood level.

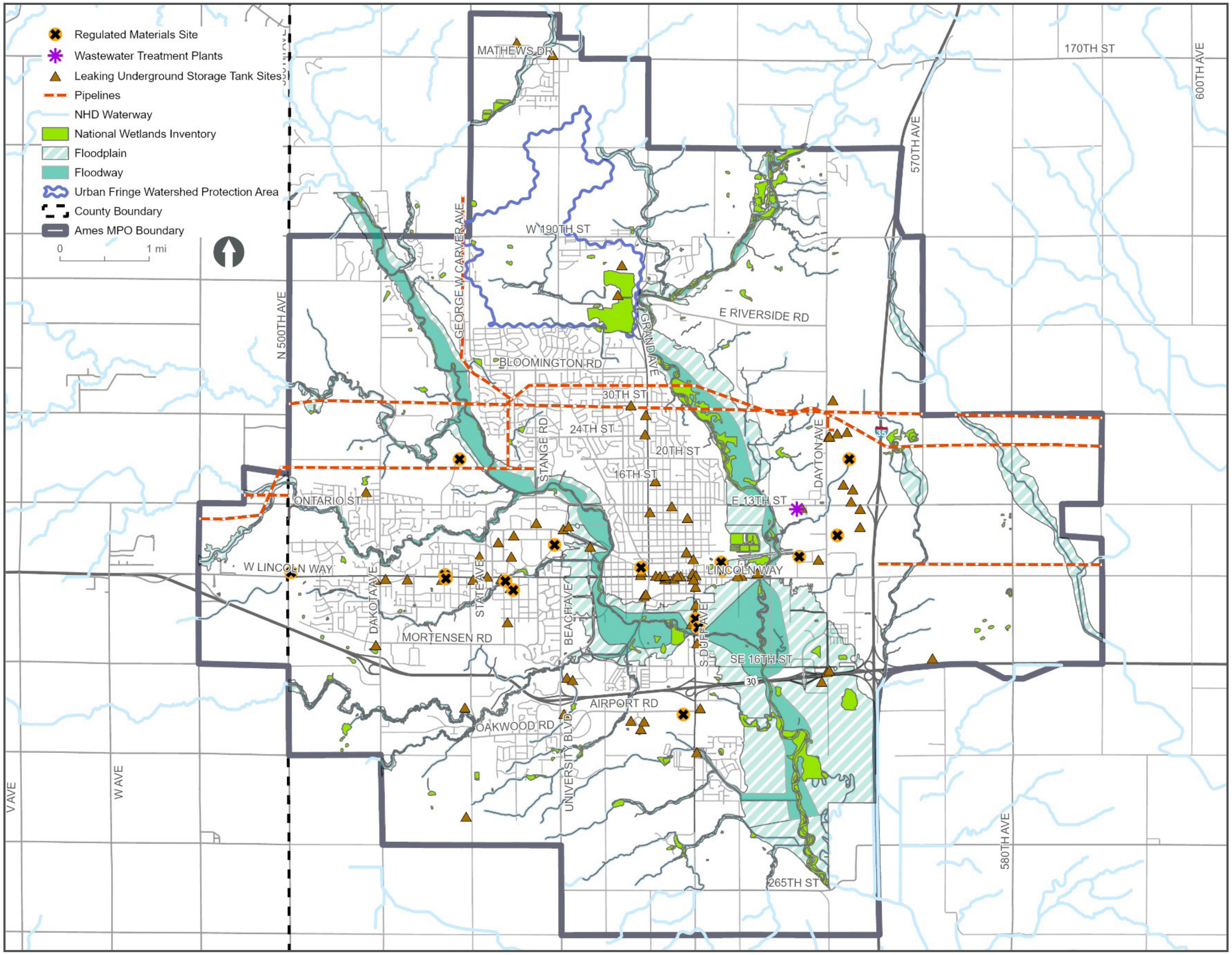
The study area was reviewed to determine the extent that occurs in the 100-year floodplain using the latest Flood Insurance Rate Maps showing the extent of the 100 year floodplain in Story County. Portions of the study area are in floodplains and would need to further evaluation.

THREATENED AND ENDANGERED SPECIES

Threatened and endangered species listed under the federal Endangered Species Act would need to be considered for each project. Iowa also maintains a list of state-listed threatened and endangered species and species of special concern. Consultation with U.S. Fish and Wildlife Service and Iowa DNR would be required to determine which listed species have the potential to occur in each project area and the potential for the project to affect each species present.

The study area was reviewed for the presence of suitable habitat. Potential habitat does exist in the study area. Road projects moving forward in the planning process would need further review for their potential to affect species by completing habitat surveys and potential consultation with U.S. Fish and Wildlife Service and Iowa DNR.

Figure 79: Physical Environmental Constraints



SOCIOECONOMIC AND COMMUNITY COMPOSITION

The Council on Environmental Quality requires federal, state, and local agencies receiving federal funding to use the NEPA process to identify and assess the effects of a proposed project on the human environment, its relationship to people in the environment, and the reasonable alternatives to proposed projects that would avoid or minimize adverse effects on the quality of the human environment, such as those that disproportionately affect communities with environmental justice concerns.

When assessing socioeconomic and community impacts, particular attention is given to minority and low-income populations because transportation and other types of infrastructure projects have historically had a greater impact on these groups. A review of the community characteristics, including demographic data and income for areas in persistent poverty, was conducted; readily identifiable vulnerable populations, including minority and low-income populations, were identified in the study area.

Census data from the 2020 Decennial Census for total population by race and ethnicity and from the 2019 to 2023 ACS 5-year estimates for low income were analyzed to identify vulnerable populations and communities with environmental justice concerns.

A minority or low-income population exists where the percentage in an affected area either exceeds 50% or is meaningfully greater than an appropriate unit of geographic assessment that represents the general population that would be affected in the study area. For this analysis, the combined study area was used as the representative unit of geographic assessment for comparison. To determine whether a block group is "meaningfully greater," it must have at least 130%, or approximately 1 standard deviation (34%) from the mean, of the corresponding percentage of minorities and low-income residents in the study area. For a block group to contain a minority or low-income population compared to the study area, it would be approximately 28.4% minority or 29.3% low income.

Approximately 21.8% of the population in the study area has been identified as minority. The following groups are considered minority block groups because the percentage of total minority populations is meaningfully greater than the corresponding percentage for the study area:

- Block Groups 1 and 2 of Census Tract 1.05
- Block Group 3 of Census Tract 3
- Block Groups 1 and 2 of Census Tract 5
- Block Group 4 of Census Tract 7
- Block Groups 2, 3, and 4 of Census Tract 10
- Block Group 1 of Census Tract 12
- Block Group 3 of Census Tract 13.03
- Block Groups 1, 2, and 4 of Census Tract 13.04

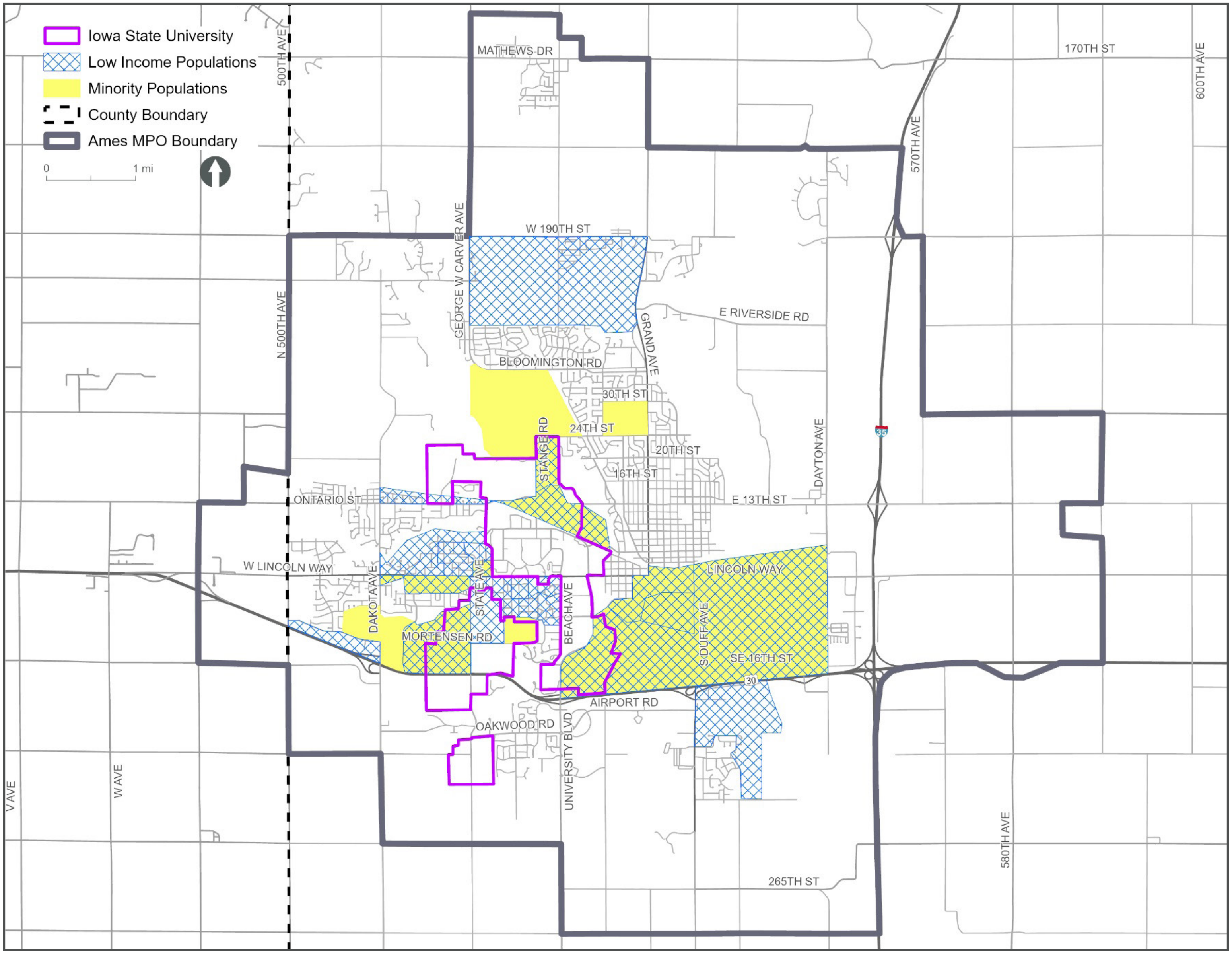
Approximately 22.5% of the residents in the study area have been identified as low income. The following groups are considered low-income block groups because the percentage of low-income populations is meaningfully greater than the corresponding percentage for the study area:

- Block Group 3 of Census Tract 1.02
- Block Groups 1 and 2 of Census Tract 5
- Block Group 1 of Census Tract 6
- Block Groups 1, 2, 3, and 4 of Census Tract 7
- Block Groups 2, 3, and 4 of Census Tract 10
- Block Groups 1 and 2 of Census Tract 11.01
- Block Groups 1 and 2 of Census Tract 11.02
- Block Group 2 of Census Tract 13.02
- Block Group 2 of Census Tract 13.03
- Block Groups 2 and 4 of Census Tract 13.04

Figure 80 shows the minority and low-income populations. Note that the location of university students has an effect on the results for the Ames area. The student population tends to be younger, and those living away from home have limited income and can heavily influence the low-income population results.

The AAMPO's Public Participation Plan would be used to determine the appropriate level of public outreach to allow for meaningful engagement of all persons in the community. The public involvement process would help guide the rest of the community composition analysis, evaluating potential impacts on vulnerable populations and addressing potential impacts on the overall community. The results of the public involvement process would document events conducted with vulnerable populations, and any avoidance or minimization measures to the community characteristics would be summarized in the NEPA document.

Figure 80: Preliminary Identified Vulnerable Populations



ENVIRONMENTAL REVIEW OF FISCALLY CONSTRAINED PROJECTS

A desktop review of Connect 2050's fiscally constrained roadway and bicycle and pedestrian projects was conducted to evaluate potential impacts on the region's identified human and physical environmental constraints, as well as its vulnerable populations, as shown in **Figure 80**.

Key Findings of the Fiscally Constrained Plan Environmental Review – Human and Physical Constraints

The approach to assessing potential impacts on the AAMPO region's environmental resources used a proximity analysis that determined potential impact(s) based on the location of each fiscally constrained project and the region's human and physical resources. During the planning and preliminary phases of project development, additional consideration will need to be given when determining potential impacts on environmental resources.

Key findings from the assessment of potential impacts stemming from the implementation of Connect 2050's fiscally constrained roadway projects on the region's human and physical constraints include:

- **R-52, S Duff Avenue at U.S. 30 Interchange Reconfiguration:** Intersects trails; adjacent to parkland and a cemetery; may be 4(f); National Hydrography Dataset (NHD) waterway is present.
- **N-39, Ontario Street at N 500th Avenue Roundabout:** Trail present; may be 4(f).
- **N-51, W 190th Street at Grant Avenue/Hyde Avenue Roundabout:** NHD waterway just west of alignment.
- **R-51, U.S. 30 from Duff Avenue to University Avenue Widen to 6 Lanes:** Intersects trails; adjacent to park land and cemetery; may be 4(f); NHD waterway is present.
- **R-45, Mortensen Parkway from Welch Avenue to Beach Avenue Land Reconfiguration and Roundabouts:** Trail and park land adjacent. May be 4(f).
- **R-29a, Duff Avenue at Ken Maril Road Widen to 4-Lane Divided Section:** Crosses two NHD waterways; cemetery and trail are adjacent.
- N-79, 13th Street at Stange Road Intersection Improvements: Trail present; may be 4(f).
- **R-46, N Dakota Avenue from Lincoln Way to Ontario Street Lane Reconfiguration:** Cemetery, school, and trail present; school and trail may be 4(f).
- **R-37, I-35 at 260th Street New Interchange:** NHD waterway present.

Key findings from the assessment of potential impacts stemming from the implementation of Connect 2050's fiscally constrained bicycle and pedestrian projects on the region's human and physical constraints include:

- **B-145, Skunk River Trail from Ioway Creek to S 16th Street Greenbelt Trail:** NHD waterway.
- **B-114, Skunk River Trail from Inis Grove Park to Duff Avenue Greenbelt Trail:** Adjacent rails; NHD waterway and parkland present; likely 4(f).
- **B-112, S Duff Avenue from Lincoln Way to S 3rd Street Shared Use Path:** Intersects two trails; may be 4(f).
- **B-115, Duff Avenue from Grand Avenue to Northwood Drive Shared Use Path:** Adjacent rails, NHD waterway, school, and park land present; likely 4(f).
- **B-81, 13th Street from Northwestern Avenue to Grand Avenue Shared Use Path:** Intersects two trails; may be 4(f).
- **B-56, Lincoln Way from Riverside Drive to Grand Avenue Shared Use Path:** Trail, park land, and

school present; may be 4(f); NHD waterway is present.

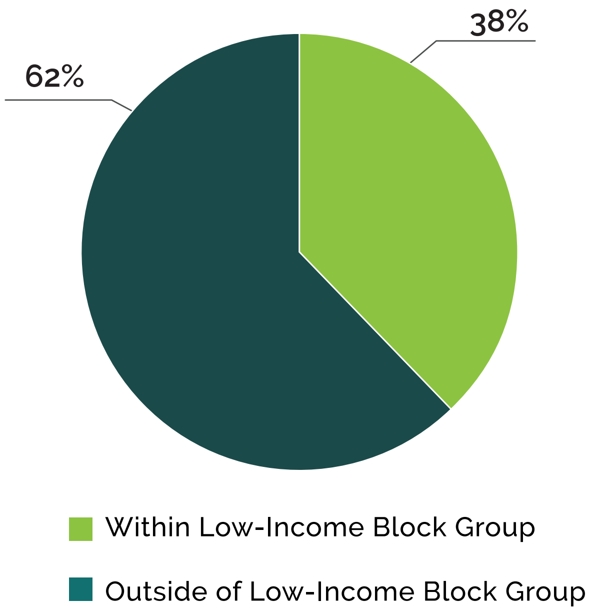
- **B-134, S 16th Street from Apple Place to S Duff Avenue Widen Existing Shared Use Path:** Trails and parkland present; may be 4(f).

Key Findings of the Fiscally Constrained Plan Environmental Review – Vulnerable Populations

Connect 2050's fiscally constrained roadway and bicycle and pedestrian projects underwent a second proximity analysis to identify potential impacts on the AAMPO region's vulnerable populations, defined as low-income and minority block groups. Fiscally constrained projects that fall within low-income and/or minority block groups are identified as having potential for impacting vulnerable populations. Fiscally constrained roadway projects determined to fall within block groups with vulnerable populations include:

- **R-52, S Duff Avenue at U.S 30 Interchange Reconfiguration**
- **R-51, U.S. 30 from Duff Avenue to University Avenue Widen to 6 Lanes**
- **R-39, Bloomington Road from Valley View Road to Stange Road Lane Reconfiguration and Roundabout**
- **N-48, W 190th Street at George Washington Carver Avenue Roundabout**
- **R-45, Mortensen Parkway from Welch Avenue to Beech Avenue Lane Reconfiguration and Roundabouts**
- **R-29a, Duff Avenue from Ken Maril Road to Kitty Hawk Drive Widen to 4-Lane Divided Section**
- **N-79, 13th Street at Stange Road Intersection Improvements**

Percent of Projects in Low-Income Block Groups



Percent of Projects in Minority Block Groups

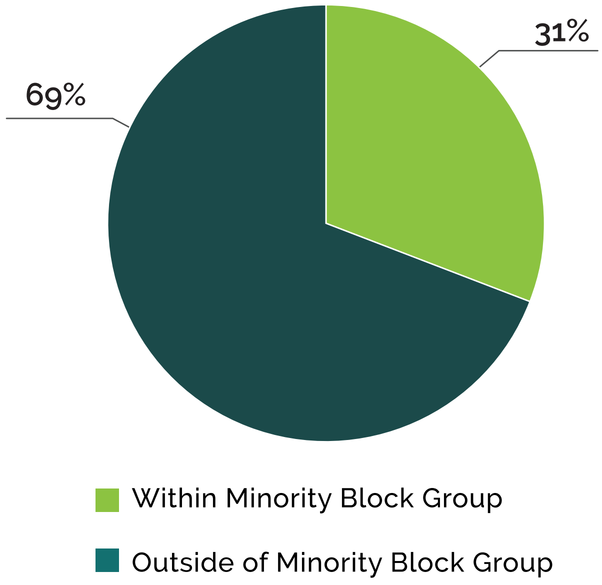
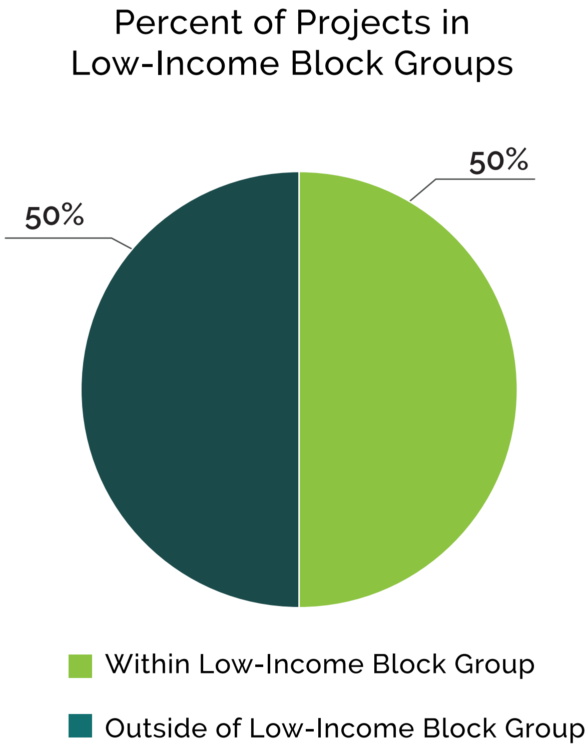


Figure 81 shows the location of the fiscally constrained roadway projects in relation to the AAMPO region's low-income and minority block groups.

Fiscally constrained bicycle and pedestrian projects determined to fall within block groups with vulnerable populations include:

- **B-145, Skunk River Trail from Ioway Creek to S 16th Street Greenbelt Trail**
- **B-112, S Duff Avenue from Lincoln Way to S 3rd Street Shared Use Path**
- **B-60, Mortensen Road from Rowling Drive to S Dakota Avenue Shared Use Path**
- **B-144, Lincoln Swing from South Dakota Avenue to Abraham Drive Shared Use Path**



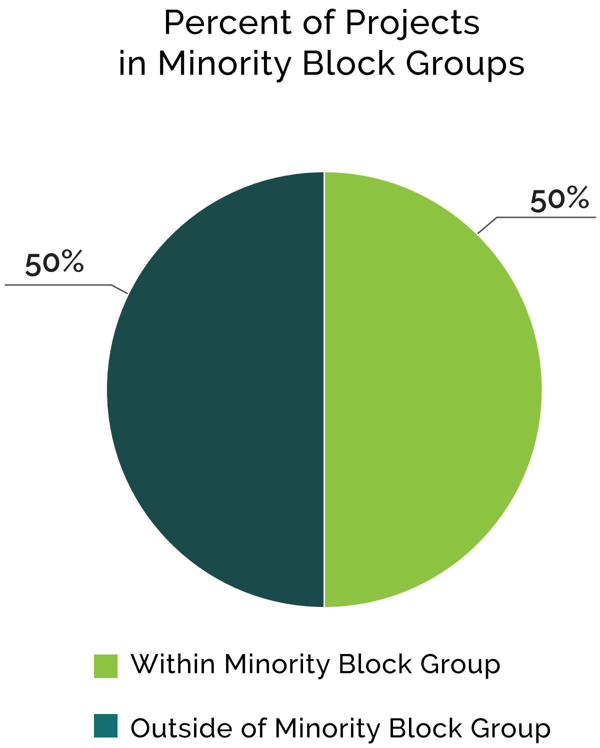


Figure 82 shows the location of the fiscally constrained bicycle and pedestrian projects in relation to the AAMPO region's low-income and minority block groups.

Figure 81:Fiscally Constrained Roadway Projects and the AAMPO's Vulnerable Populations

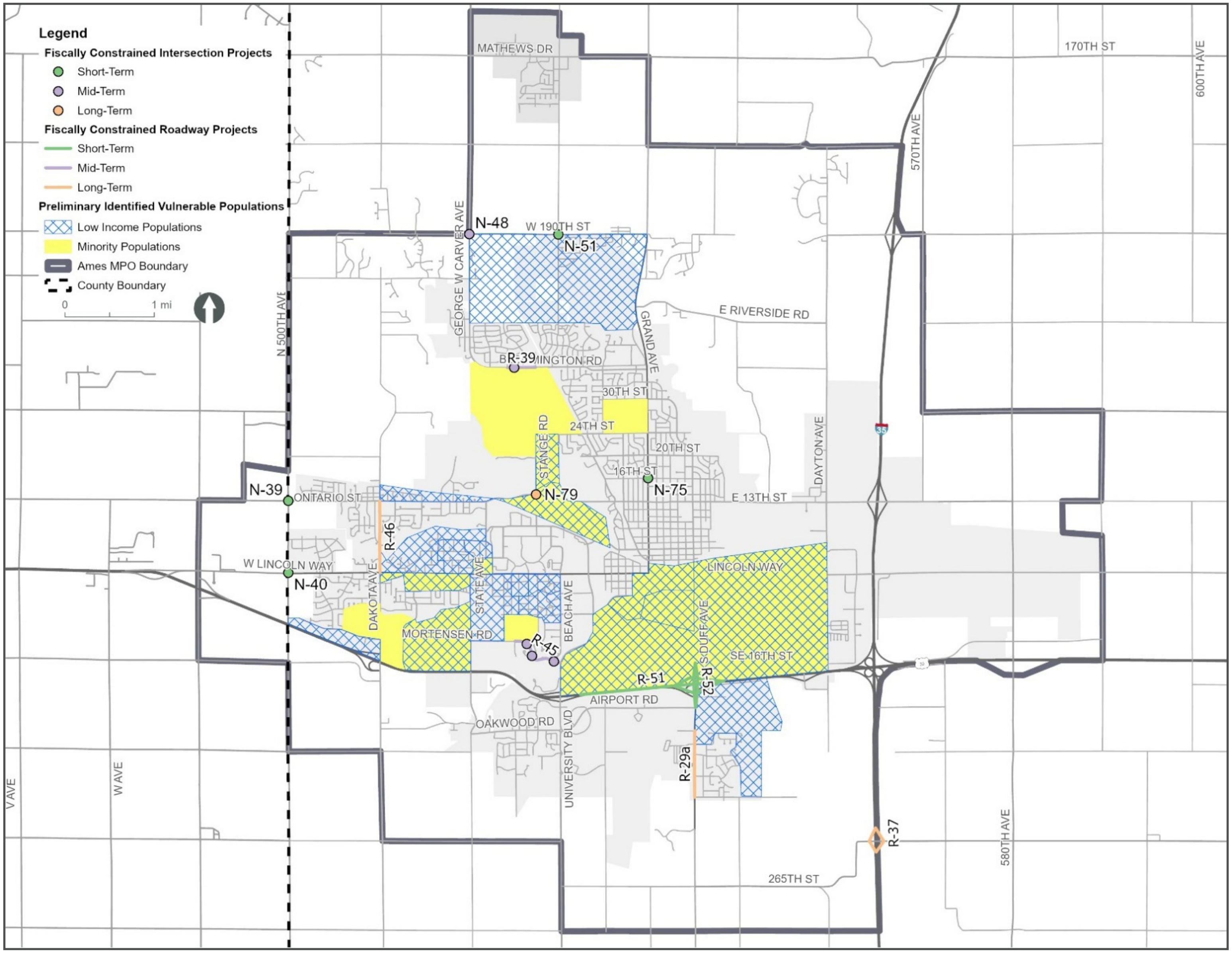
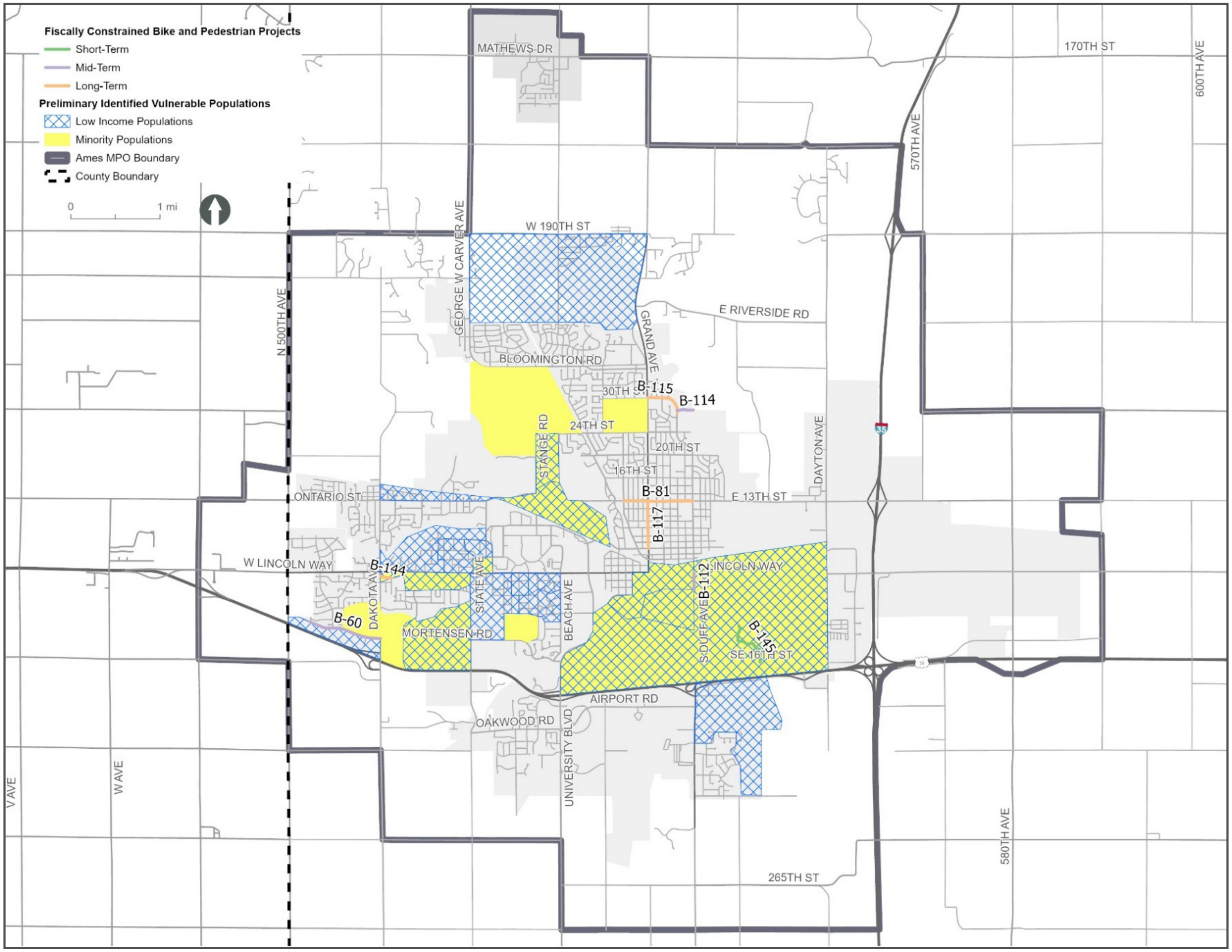


Figure 82: Fiscally Constrained Bicycle and Pedestrian Projects and the AAMPO's Vulnerable Populations



CHAPTER 10 FEDERAL COMPLIANCE

The Connect 2050 plan follows the federal guidelines set by 23 CFR § 450.306, Metropolitan Transportation Planning and Programming, which outlines the process for developing an MTP. AAMPO is federally required to create an MTP document that uses a performance-based approach. Connect 2050 adheres to this requirement by providing objectives and performance measures that align with federal, State, and local requirements.

The following 10 federal planning factors influenced the development of the plan's goals and objectives.

1. Support the economic vitality of the metropolitan area
2. Increase the safety of the transportation system for motorized and non-motorized users
3. Increase the security of the transportation system for motorized and non motorized users
4. Increase the accessibility and mobility of people and freight
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns
6. Enhance the integration and connectivity of the transportation system across modes for people and freight
7. Promote efficient system management and operation
8. Emphasize the preservation of the existing transportation system
9. Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation
10. Enhance travel and tourism

Table 59 demonstrates the alignment of Connect 2050's goal areas and objectives with the ten federal planning factors while **Table 60** illustrates how Connect 2050's fiscally constrained plan aligns with the MTP goal areas and objectives.

Table 59: Alignment of Connect 2050 Goals and Objectives with Federal Planning Factors

Goal Area	Objective	1	2	3	4	5	6	7	8	9	10
Accessibility & Connectivity	Improve walk, bike, and transit connections				X		X				
	Promote land-use policies that support multimodal connectivity				X	X	X				
	Design streets to accommodate all users				X		X				
	Incorporate accessible design standards										
	Incorporate bicycle, pedestrian, and transit-friendly infrastructure			X	X		X				
	Provide reliable access to jobs and services	X		X	X	X					
	Provide balanced transportation funding	X				X		X			
Safety	Reduce fatal and serious injury crashes		X								
	Reduce the number of crashes involving vulnerable road users		X	X							
	Implement a safe system approach		X								
	Eliminate all traffic fatalities and serious injuries		X								
	Focus safety investments on the High Priority Network		X	X							
Sustainability	Promote low-carbon transportation options					X				X	
	Reduce transportation impacts to natural resources					X				X	
	Reduce the number of single-occupant vehicle trips					X				X	
	Build transportation infrastructure to be more resilient									X	
	Promote financially sustainable transportation system investments							X		X	
	Maintain NHS routes in good condition							X	X		
	Maintain NHS bridges in good condition							X	X		
	Prioritize regular maintenance and rehabilitation							X	X		
Efficiency & Reliability	Limit the level of congestion on high-volume arterials and Interstates				X			X			X
	Maintain acceptable travel reliability on Interstate and principal arterial roadways				X			X			X
	Maintain the current high level of transit services				X		X				
	Prioritize freight corridors to minimize delays in goods movements	X			X		X				
	Identify technology solutions to enhance system operation							X			
Placemaking/ Quality of Life	Design transportation projects that preserve the identity of neighborhoods					X					
	Provide transportation strategies and infrastructure that support current adopted plans	X					X				
	Develop infrastructure that supports affordable housing						X				
	Increase percentage of population and employment within close proximity to transit and/or walking and biking system		X		X		X				

Table 60: Fiscally Constrained Projects' Alignment with Regional Goals

Project ID	Corridor	Project Type	Goals Met
R-52	S Duff Avenue	Interchange Reconfiguration	Sustainability; Efficiency & Reliability
R-51	US 30	Widen to 6-lanes	Efficiency & Reliability
R-39	Bloomington Road	Lane Reconfiguration and Roundabout	Accessibility & Connectivity; Safety; Efficiency & Reliability
R-45	Mortensen Parkway	Lane Reconfiguration and Roundabouts	Accessibility & Connectivity; Safety
R-29a	Duff Avenue	Widen to 4-Lane Divided	Accessibility & Connectivity; Efficiency & Reliability
R-46	N Dakota Avenue	Lane Reconfiguration	Accessibility & Connectivity; Safety; Efficiency & Reliability
R-37	I-35	New Interchange	Accessibility & Connectivity; Safety; Efficiency & Reliability
N-40	W Lincoln Way	Roundabout	Accessibility & Connectivity; Safety; Efficiency & Reliability
N-39	Ontario Street	Roundabout	Accessibility & Connectivity; Safety; Efficiency & Reliability

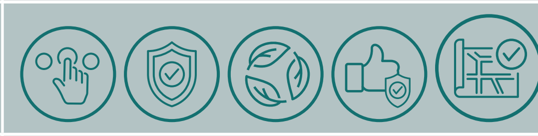
KEY

Accessibility & Connectivity
Efficiency & Reliability
Safety
Sustainability
Placemaking/ Quality of Life

Project ID	Corridor	Project Type	Goals Met
N-51	W 190th Street	Roundabout	Accessibility & Connectivity; Safety; Efficiency & Reliability
N-75	Grand Avenue	Intersection Improvements	Accessibility & Connectivity; Safety; Efficiency & Reliability
N-48	W 190th Street	Roundabout	Accessibility & Connectivity; Safety; Efficiency & Reliability
N-79	13th Street	Intersection Improvements	Accessibility & Connectivity; Safety; Efficiency & Reliability
B-114	Skunk River Trail	Greenbelt Trail	Accessibility & Connectivity; Sustainability; Efficiency & Reliability; Placemaking/Quality of Life
B-112	S Duff Ave	Shared Use Path	Accessibility & Connectivity; Sustainability; Efficiency & Reliability; Placemaking/Quality of Life
B-60	Mortensen Rd	Shared Use Path	Accessibility & Connectivity; Safety; Sustainability; Efficiency & Reliability; Placemaking/Quality of Life
B-117	Grand Ave	Shared Use Path	Accessibility & Connectivity; Safety; Sustainability; Efficiency & Reliability; Placemaking/Quality of Life
B-115	Duff Avenue	Shared Use Path	Accessibility & Connectivity; Safety; Sustainability; Efficiency & Reliability; Placemaking/Quality of Life

KEY

- **Accessibility & Connectivity**
- **Efficiency & Reliability**
- **Safety**
- **Sustainability**
- **Placemaking/ Quality of Life**

Project ID	Corridor	Project Type	Goals Met
B-144	Lincoln Swing	Shared Use Path	
B-81	13th St	Shared Use Path	
B-145	Skunk River Trail	Greenbelt Trail	

KEY

	**Accessibility & Connectivity**
	**Efficiency & Reliability**
	**Safety**
	**Sustainability**
	**Placemaking/ Quality of Life**

APPENDIX A PROJECT ALTERNATIVES

Connect 2050 Universe of Alternatives

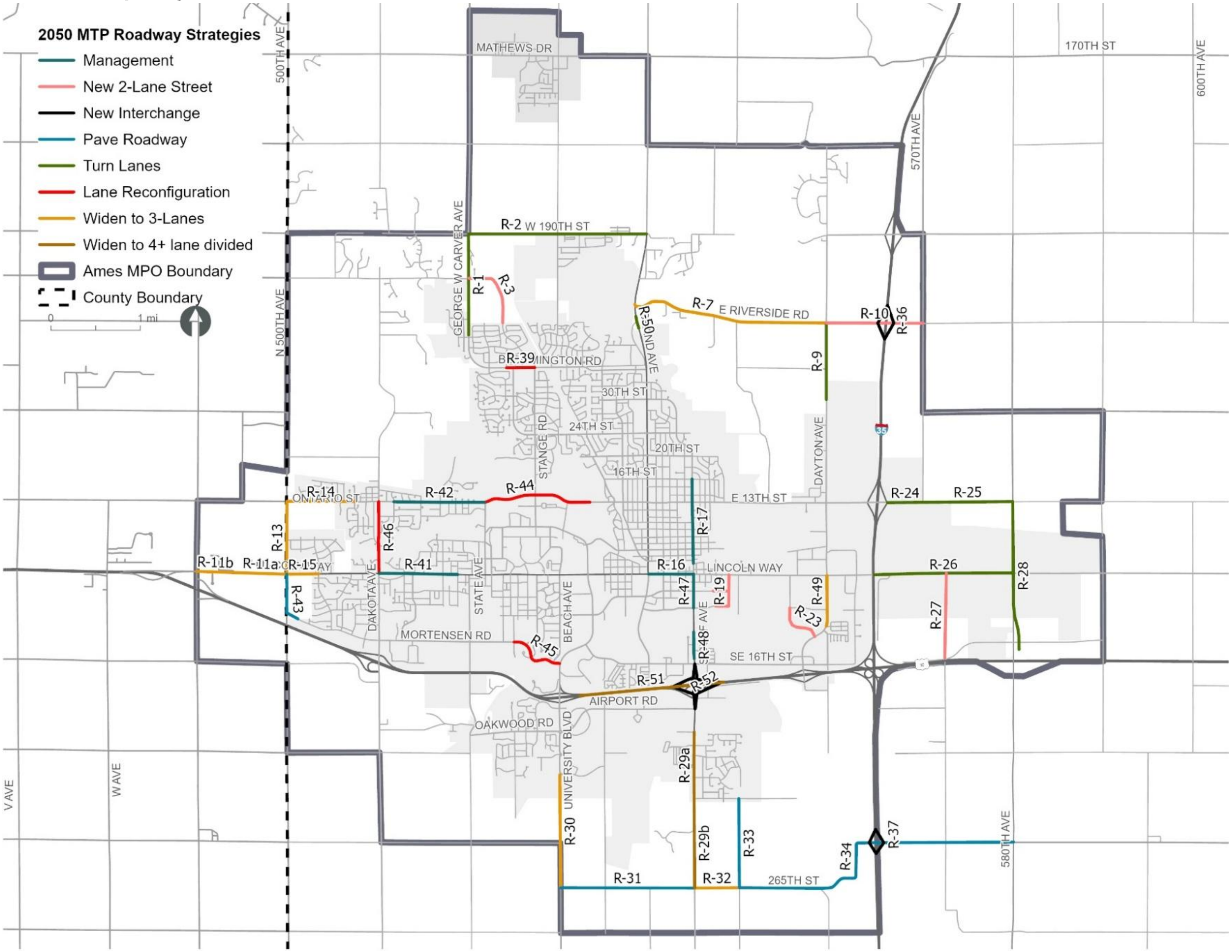
Roadway Alternatives

Table 1: Roadway Project Alternatives

ID	Corridor	From	To	Project Type	Cost
R-1	George Washington Carver Ave	Weston Dr	190th St	Add Turn Lanes	$1,040,000
R-2	W 190th Street	George Washington Carver Ave	US 69	Add Turn Lanes	$1,040,000
R-3	Stange Rd	Weston Dr	George Washington Carver Ave	New Connection	$4,080,000
R-7	Riverside Rd	Grand Ave / US 69	Dayton Ave	Add Turn Lanes	$5,200,000
R-9	Dayton Ave	USDA	Riverside Rd	Add Turn Lanes	$1,040,000
R-10	Riverside Rd	Dayton Ave	570th Ave	New 2-Lane Street	$4,916,000
R-11a	Lincoln Way	Y Ave	1/2 mile east of X Ave	Widen to 3-Lanes	$3,276,000
R-11b	Lincoln Way	X Ave	1/2 mile east of X Ave	Widen to 3-Lanes	$3,276,000
R-13	Y Ave	Lincoln Way	Ontario Street	Widen to 3-Lanes	$5,289,000
R-14	Ontario Street	Y Ave / 500th Ave	Idaho Ave	Widen to 3-Lanes	$4,910,000
R-15	Lincoln Way	Y Ave / 500th Ave	Wilder Boulevard	Widen to 3-Lanes	$2,315,000
R-16	Lincoln Way	Grand Ave / US 69	Duff Ave	Management	$1,000,000
R-17	Duff Ave	Union Pacific RR	16th Street	Management	$7,172,000
R-19	New Backage Road System	Lincoln Way	S 5th St	New 2-Lane Street	$4,110,000
R-23	Freel Drive	SE 5th St	S Dayton Ave	New 2-Lane Street	$2,304,000
R-24	E 13th St	I-35 Ramp Terminal	570th Ave	Add Turn Lanes	$1,040,000
R-25	E 13th St	570th Ave	580th Ave	Add Turn Lanes	$1,040,000
R-26	Lincoln Way	I-35 Ramp Terminal	580th Ave	Add Turn Lanes	$1,040,000
R-27	Sand Hill Trail	Turing St	Lincoln Way	New 2-Lane Street	$5,345,000
R-28	580th Ave	US 30	13th St	Add Turn Lanes	$3,120,000
R-29a	Duff Ave	Ken Maril Rd	Kitty Hawk Drive	Widen to 5-Lanes	$7,861,750
R-29b	Duff Ave	265th St	Ken Maril Rd	Wident to 5-Lanes	$11,313,250
R-30	530th Ave	Collaboration Pl	265th St	Widen to 3-Lanes	$8,194,000
R-31	265th St	530th Ave	Duff Ave	Pave Street / Add Turn Lanes	$7,849,000
R-32	265th St	Duff Ave	550th Ave	Widen Existing Street	$4,295,000
R-33	550th Ave	Ken Maril Rd	265th St	Pave to 2-Lanes	$4,534,000
R-34	260th St / 265th St	550th Ave	580th Ave	Pave to 2-Lanes	$15,801,000
R-36	I-35	E Riverside Rd		New Interchange	$16,405,000
R-37	I-35	260th St		New Interchange	$16,000,000

ID	Corridor	From	To	Project Type	Cost
R-39	Bloomington Rd	Clifton Ave	Stange Rd	Roadway Reconfiguration / Roundabout	$2,056,000
R-41	Lincoln Way	Dakota Ave	Wilmoth Ave	Management	$100,000
R-42	Ontario St	Woodstock Ave	Hyland Ave	Management- Curb Extensions / High Visibility Cross Walks	$139,000
R-43	Y Ave	Mortensen Rd	Lincoln Way	Pave and Widen to 3-Lanes	$3,770,000
R-44	13th St	Hyland Ave	Aquatic Center	Roadway Reconfiguration	$7,846,000
R-45	Mortensen Parkway	Welch Ave	University Ave	Roadway Reconfiguration / Roundabouts	$6,000,000
R-46	N Dakota Ave	Lincoln Way	Ontario Street	Management	$5,219,000
R-47	Duff Ave	S 5th Street	Lincoln Way	Management	$180,000
R-48	Duff Ave	Ioway Creek	S 16th St	Management	$540,000
R-49	Dayton Ave	Browning Street	Lincoln Way	Widen to 3-Lanes	$3,701,000
R-50	Grand Ave	Dawes Drive		Add Turn Lanes	$520,000
R-51	US 30	Duff Ave	University Ave	Widen to 6-lanes	$18,500,000
R-52	S Duff Ave	US 30		Interchange Reconfiguration	$18,000,000

Figure 1: Roadway Project Alternatives



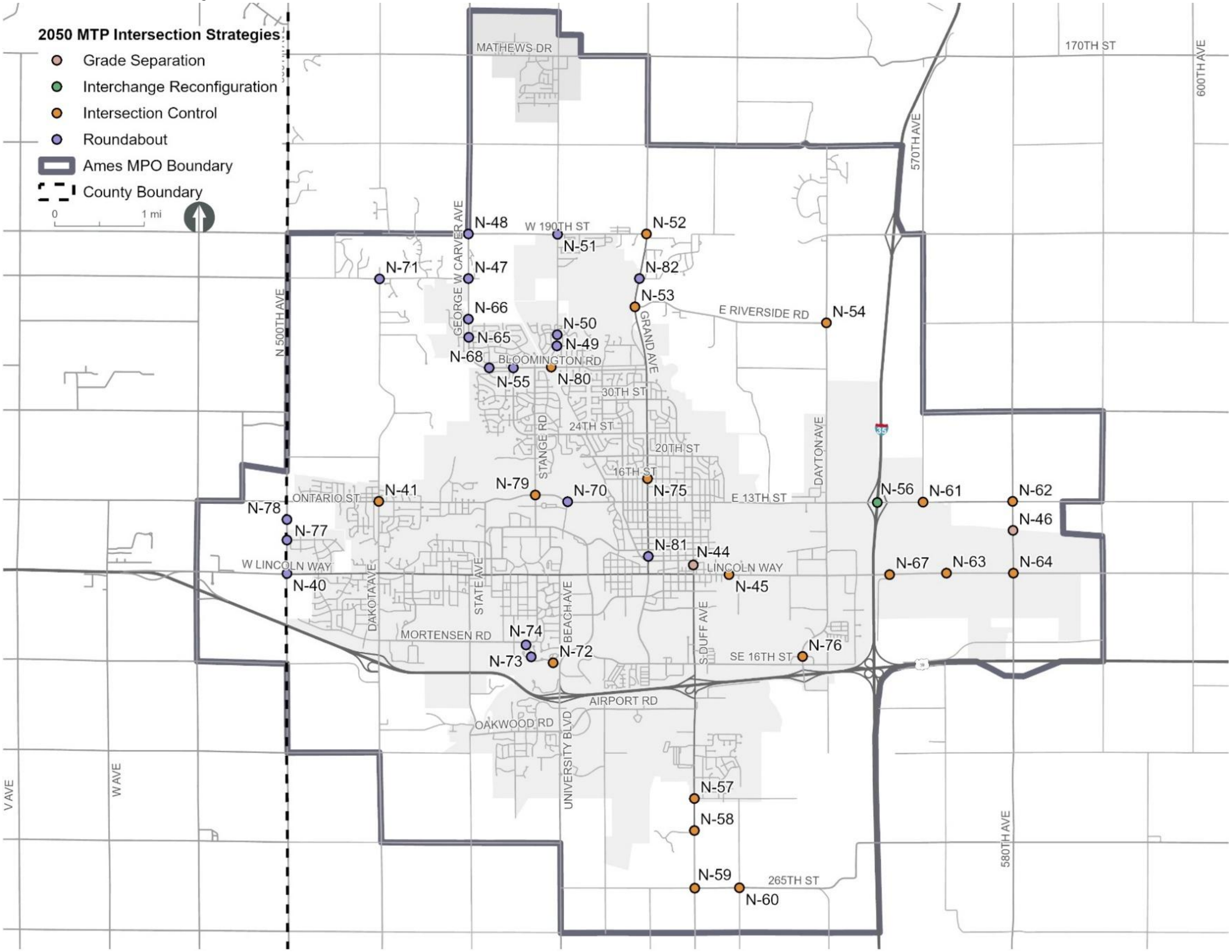
Intersection Alternatives

Table 2: Intersection Project Alternatives

ID	Corridor	Intersection	Strategy Type	Cost
N-39	Ontario Street	N 500th Avenue	Roundabout	$1,950,000
N-40	W Lincoln Way	Y Avenue	Roundabout	$1,950,000
N-41	Ontario Street	North Dakota Avenue	Intersection Control	$520,000
N-44	S Duff Avenue	Union Pacific RR	Grade Separation	$50,000,000
N-45	E Lincoln Way	East of Cherry Avenue	Intersection Control	$520,000
N-46	580th Avenue	Union Pacific RR	Grade Separation	$20,000,000
N-47	Cameron School Road	George Washington Carver Avenue	Intersection Control	$1,950,000
N-48	W 190th Street	George Washington Carver Avenue	Intersection Control	$1,950,000
N-49	Stone Brooke Road	Hyde Avenue	Roundabout	$500,000
N-50	Harrison Road	Hyde Avenue	Roundabout	$500,000
N-51	W 190th Street	Grant Avenue / Hyde Avenue	Intersection Control	$1,950,000
N-52	Grand Avenue	W 190th Street	Intersection Control	$520,000
N-53	E Riverside Road	Grand Avenue	Intersection Control	$520,000
N-54	E Riverside Road	N Dayton Avenue	Intersection Control	$520,000
N-55	Bloomington Rd	George Washington Carver Avenue	Roundabout	$1,950,000
N-56	E 13th Street	I-35 Ramp	Interchange Reconfiguration	$520,000
N-57	S Duff Avenue / US 69	Ken Maril Road	Intersection Control	$520,000
N-58	S Duff Avenue / US 69	Timber Creek Drive	Intersection Control	$520,000
N-59	US 69	265th Street	Intersection Control	$520,000
N-60	265th Street	550th Avenue	Intersection Control	$520,000
N-61	220th Street	570th Avenue	Intersection Control	$520,000
N-62	220th Street	580th Avenue	Intersection Control	$520,000
N-63	E Lincoln Way	Future Collector Road	Intersection Control	$520,000
N-64	E Lincoln Way	580th Avenue	Intersection Control	$520,000
N-65	George Washington Carver Avenue	Weston Drive	Roundabout	$1,950,000

ID	Corridor	Intersection	Strategy Type	Cost
N-66	George Washington Carver Avenue	Barcelos Street	Roundabout	$1,950,000
N-67	E Lincoln Way	566th Avenue	Intersection Control	$520,000
N-68	George Washington Carver Avenue	Valley View Road	Roundabout	$1,950,000
N-70	13th Street	Haber Road	Roundabout	$1,950,000
N-71	Cameron School Road	N Dakota Avenue	Roundabout	$1,950,000
N-72	Mortensen Parkway	Beach Avenue	Intersection Control	$200,000
N-73	Mortensen Parkway	Little Bluestem Court	Roundabout	$1,950,000
N-74	Mortensen Parkway	Ash Avenue	Roundabout	$1,950,000
N-75	Grand Avenue	16th Street	Intersection Control	$234,000
N-76	S Dayton Ave	Isaac Newton Drive	Intersection Control	$520,000
N-77	500th Avenue	Westfield Drive	Roundabout	$1,950,000
N-78	500th Avenue	Future Collector Road	Roundabout	$1,950,000
N-79	13th Street	Stange Road	Intersection Control	$3,000,000
N-80	Bloomington Rd	Hyde Ave	Intersection Control	$520,000
N-81	S Grand Ave	S 5th St	Roundabout	$1,950,000
N-82	US 69	Arrasmith Trail/Ada Hayden	Roundabout	$1,950,000

Figure 2: Intersection Project Alternatives

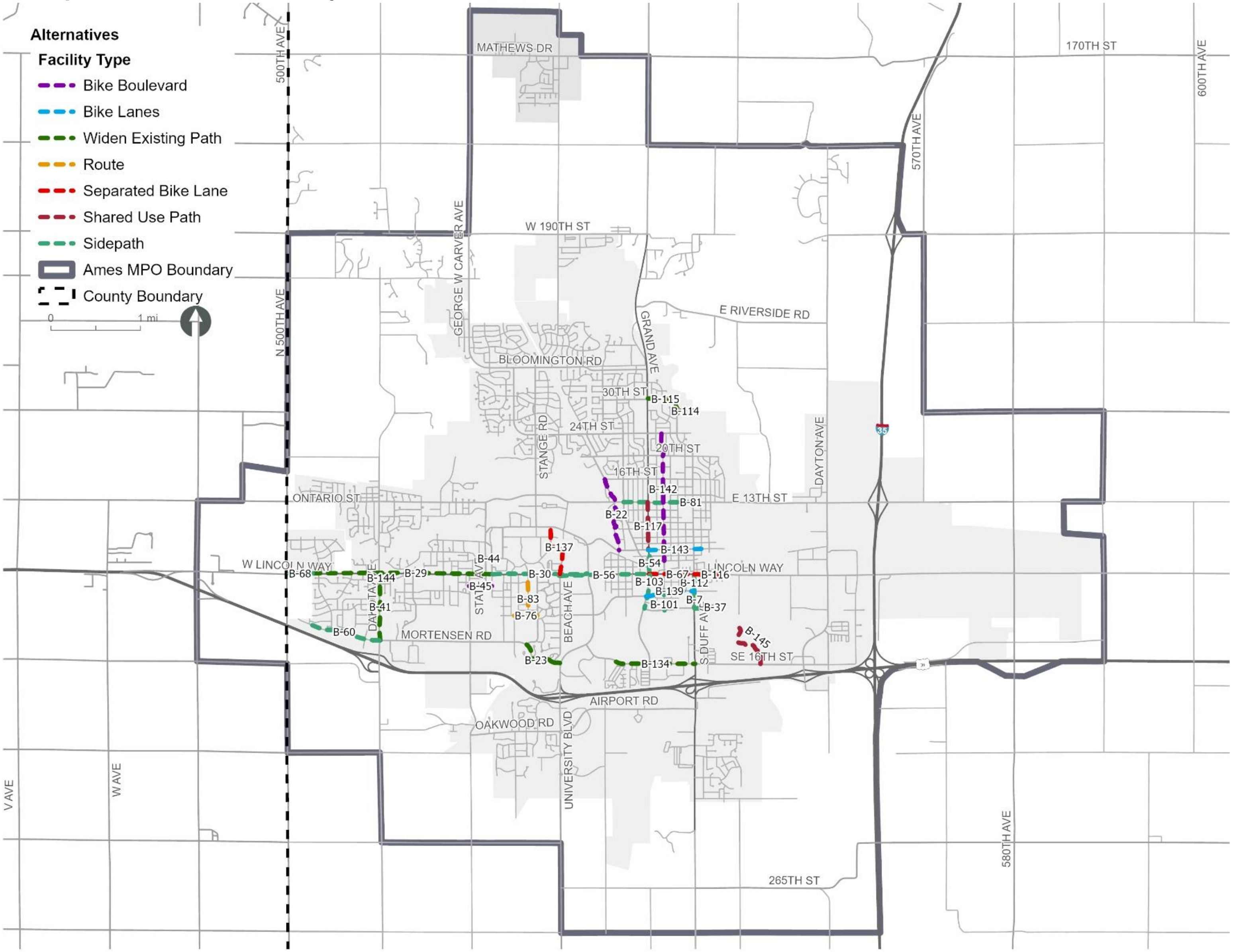


Bicycle and Pedestrian Alternatives

Table 3: Bike and Pedestrian Project Alternatives

ID	Corridor	From	To	Strategy Type	Cost
B-7	S Duff Ave	S 3rd St	S 5th St	Sidepath	$122,309
B-22	Ridgewood Ave	16th St	6th St	Bike Boulevard	$40,040
B-23	Mortensen Pkwy	Ash Ave	University Blvd	Widen Existing Path	$327,248
B-29	Lincoln Way	Dakota Ave	Hickory Dr	Widen Existing Path	$1,314,659
B-30	Lincoln Way	Beach Ave	University Ave	Sidepath	$198,524
B-37	SE 5th St	S Duff Ave	Future trail connection	Sidepath	$159,822
B-41	Dakota Ave	College Creek	Steinbeck St	Widen Existing Path	$492,107
B-44	West St	Hyland Ave	Sheldon Ave	Bike Lanes	$18,097
B-45	Arbor St	State Ave	Sheldon Ave	Bike Boulevard	$11,440
B-54	Grand Ave	5th St	Lincoln Way	Sidepath	$130,024
B-56	Lincoln Way	Riverside Dr	Grand Ave	Sidepath	$641,175
B-60	Mortensen Rd	Rowling Dr	S Dakota Ave	Sidepath	$532,688
B-67	Lincoln Way	Grand Ave	Duff Ave	Separated Bike Lane	$131,627
B-68	Lincoln Way	500th Ave	Wilder Ave	Sidepath	$181,331
B-76	Storm St	Welch Ave	Ash Ave	Route	$17,160
B-81	13th St	Northwestern Ave	Grand Ave	Sidepath	$175,700
B-83	Lynn Ave	Chamberlain St	Storm St	Route	$22,880
B-101	S Walnut Ave	S 3rd St	S 5th St	Sidepath	$142,018
B-103	Grand Ave	Lincoln Way	S 5th St	Sidepath	$246,123
B-112	S Duff Ave	Lincoln Way	S 3rd St	Sidepath	$123,058
B-114	Skunk River Trail	North Side Inis Grove Park	Duff Ave	Shared Use Path	$276,001
B-115	Duff Avenue	Grand Ave	Northwood Ave	Widen Existing Path	$289,159
B-116	Lincoln Way	Duff Ave	S Borne Ave	Separated Bike Lane	$65,962
B-117	Grand Ave	13th St	6th St	Shared Use Path	$410,215
B-134	S 16th St	Apple Pl	S Duff Ave	Widen Existing Path	$578,398
B-137	Beach Rd	Lincoln Way	University Ave	Separated Bike Lane	$168,689
B-139	S 3rd St	S Duff Ave	Grand Ave	Bike Lanes	$143,929
B-142	Clark Ave	24th St	Main St	Bike Boulevard	$85,800
B-143	6th St	Carroll Ave	Grand Ave	Bike Lanes	$154,982
B-144	Lincoln Swing	Abraham Drive	S Dakota Ave	Sidepath	$292,500
B-145	Skunk River Trail	Ioway Creek	S 16th St	Greenbelt Trail	$1,200,000

Figure 3: Bicycle and Pedestrian Project Alternatives



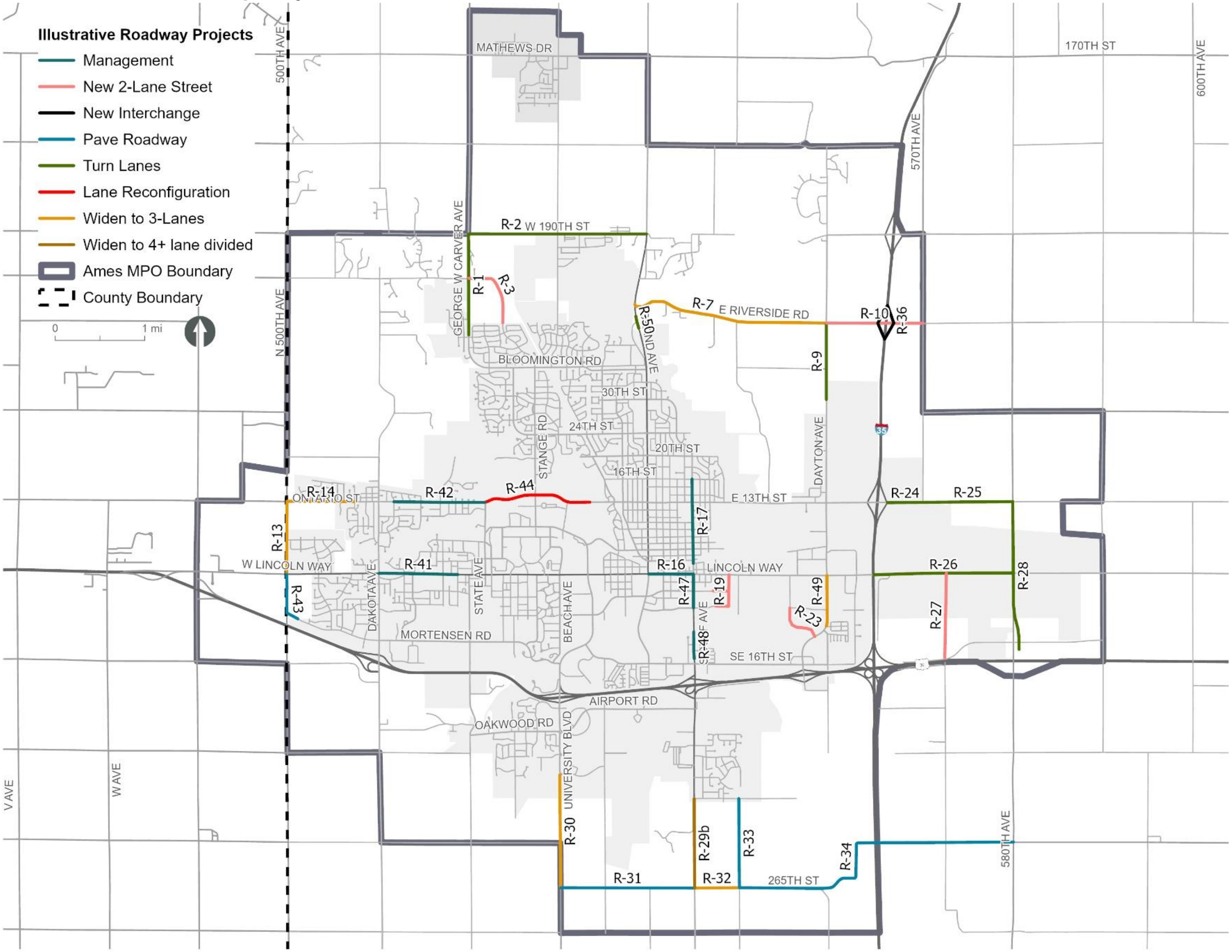
Illustrative Projects

Illustrative Roadway Projects

Table 4: Illustrative Roadway Projects

ID	Corridor	From	To	Project Type	Cost
R-1	GW Carver Ave	Weston Dr	190th St	Add Turn Lanes	$1,040,000
R-2	W 190th Street	GW Carver Ave	US 69	Add Turn Lanes	$1,040,000
R-3	Stange Rd	Weston Dr	George Washington Carver Ave	New Connection	$4,080,000
R-7	Riverside Rd	Grand Ave / US 69	Dayton Ave	Add Turn Lanes	$5,200,000
R-9	Dayton Ave	USDA	Riverside Rd	Add Turn Lanes	$1,040,000
R-10	Riverside Rd	Dayton Ave	570th Ave	New 2-Lane Street	$4,916,000
R-11a	Lincoln Way	Y Ave	1/2 mile east of X Ave	Widen to 3-Lanes	$3,276,000
R-11b	Lincoln Way	X Ave	1/2 mile east of X Ave	Widen to 3-Lanes	$3,276,000
R-13	Y Ave	Lincoln Way	Ontario Street	Widen to 3-Lanes	$5,289,000
R-14	Ontario Street	Y Ave / 500th Ave	Idaho Ave	Widen to 3-Lanes	$4,910,000
R-15	Lincoln Way	Y Ave / 500th Ave	Wilder Boulevard	Widen to 3-Lanes	$2,315,000
R-16	Lincoln Way	Grand Ave / US 69	Duff Ave	Management	$1,000,000
R-17	Duff Ave	Union Pacific RR	16th Street	Management	$7,172,000
R-19	New Backage Road System	Lincoln Way	S 5th St	New 2-Lane Street	$4,110,000
R-23	Freel Drive	SE 5th St	S Dayton Ave	New 2-Lane Street	$2,304,000
R-24	E 13th St	I-35 Ramp Terminal	570th Ave	Add Turn Lanes	$1,040,000
R-25	E 13th St	570th Ave	580th Ave	Add Turn Lanes	$1,040,000
R-26	Lincoln Way	I-35 Ramp Terminal	580th Ave	Add Turn Lanes	$1,040,000
R-27	Sand Hill Trail	Turing St	Lincoln Way	New 2-Lane Street	$5,345,000
R-28	580th Ave	US 30	13th St	Add Turn Lanes	$3,120,000
R-32	265th St	Duff Ave	550th Ave	Widen Existing Street	$4,295,000
R-33	550th Ave	Ken Maril Rd	265th St	Pave to 2-Lanes	$4,534,000
R-34	260th St / 265th St	550th Ave	580th Ave	Pave to 2-Lanes	$15,801,000
R-36	I-35	E Riverside Rd		New Interchange	$16,405,000
R-41	Lincoln Way	Dakota Ave	Wilmoth Ave	Management	$100,000
R-42	Ontario St	Woodstock Ave	Hyland Ave	Management- Curb Extensions / High Visibility Cross Walks	$139,000
R-43	Y Ave	Mortensen Rd	Lincoln Way	Pave and Widen to 3-Lanes	$3,770,000
R-44	13th St	Hyland Ave	Aquatic Center	Roadway Reconfiguration	$7,846,000
R-47	Duff Ave	S 5th Street	Lincoln Way	Management	$180,000
R-48	Duff Ave	Ioway Creek	S 16th St	Management	$540,000
R-49	Dayton Ave	Browning Street	Lincoln Way	Widen to 3-Lanes	$3,701,000
R-50	Grand Ave	Dawes Drive		Add Turn Lanes	$520,000

Figure 4: Illustrative Roadway Projects

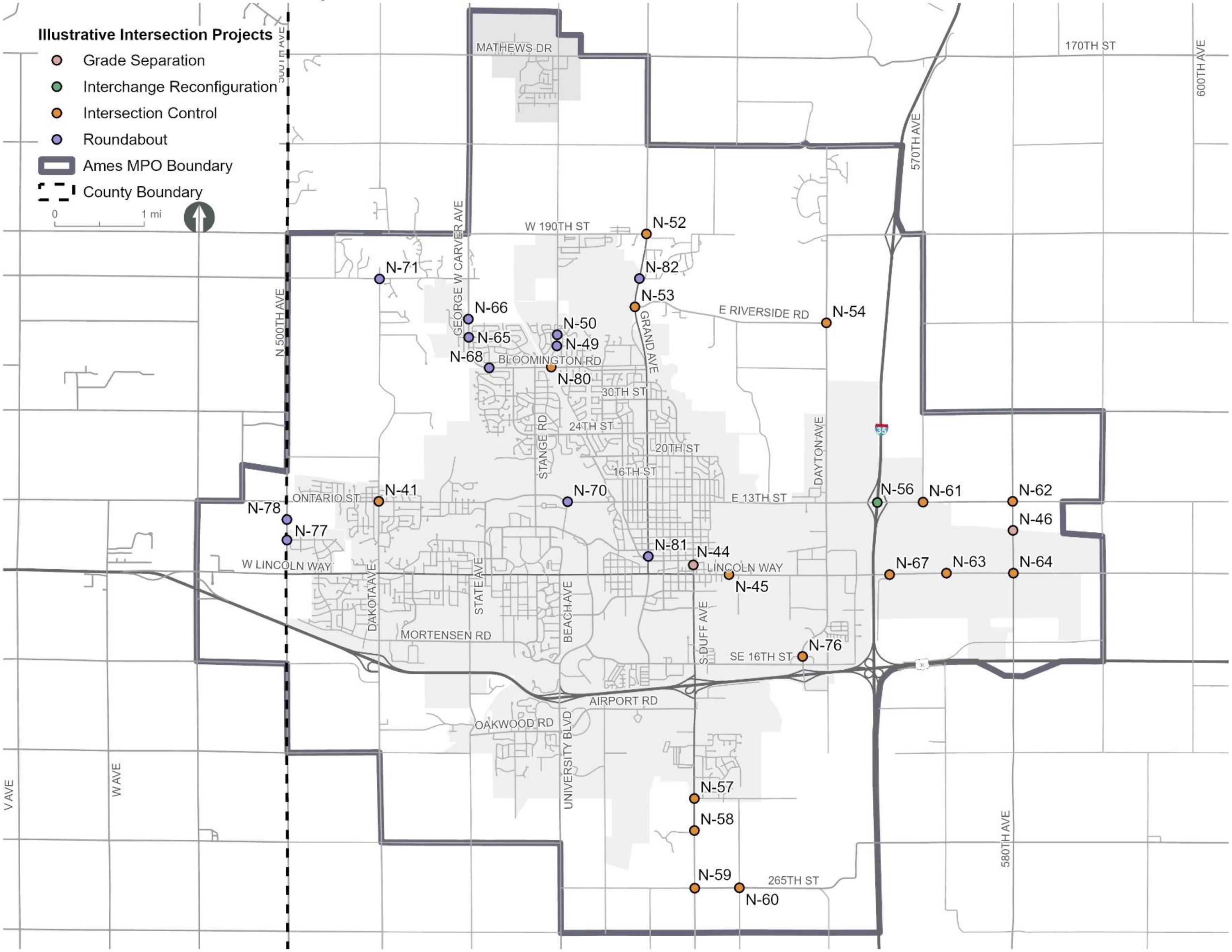


Illustrative Intersection Projects

Table 5: Illustrative Intersection Projects

ID	Corridor	Intersection	Strategy Type	Cost
N-44	S Duff Avenue	Union Pacific RR	Grade Separation	$50,000,000
N-45	E Lincoln Way	East of Cherry Avenue	Intersection Control	$520,000
N-54	E Riverside Road	N Dayton Avenue	Intersection Control	$520,000
N-46	580th Avenue	Union Pacific RR	Grade Separation	$20,000,000
N-50	Harrison Road	Hyde Avenue	Roundabout	$500,000
N-53	E Riverside Road	Grand Avenue	Intersection Control	$520,000
N-49	Stone Brooke Road	Hyde Avenue	Roundabout	$500,000
N-52	Grand Avenue	W 190th Street	Intersection Control	$520,000
N-41	Ontario Street	North Dakota Avenue	Intersection Control	$520,000
N-56	E 13th Street	I-35 Ramp	Interchange Reconfiguration	$520,000
N-57	S Duff Avenue / US 69	Ken Maril Road	Intersection Control	$520,000
N-58	S Duff Avenue / US 69	Timber Creek Drive	Intersection Control	$520,000
N-59	US 69	265th Street	Intersection Control	$520,000
N-60	265th Street	550th Avenue	Intersection Control	$520,000
N-61	220th Street	570th Avenue	Intersection Control	$520,000
N-62	220th Street	580th Avenue	Intersection Control	$520,000
N-63	E Lincoln Way	Future Collector Road	Intersection Control	$520,000
N-64	E Lincoln Way	580th Avenue	Intersection Control	$520,000
N-65	George Washington Carver Avenue	Weston Drive	Roundabout	$1,950,000
N-66	George Washington Carver Avenue	Barcelos Street	Roundabout	$1,950,000
N-67	E Lincoln Way	566th Avenue	Intersection Control	$520,000
N-68	George Washington Carver Avenue	Valley View Road	Roundabout	$1,950,000
N-70	13th Street	Haber Road	Roundabout	$1,950,000
N-71	Cameron School Road	N Dakota Avenue	Roundabout	$1,950,000
N-76	S Dayton Ave	Isaac Newton Drive	Intersection Control	$520,000
N-77	500th Avenue	Westfield Drive	Roundabout	$1,950,000
N-78	500th Avenue	Future Collector Road	Roundabout	$1,950,000
N-80	Bloomington Rd	Hyde Ave	Intersection Control	$520,000
N-81	S Grand Ave	S 5th St	Roundabout	$1,950,000
N-82	US 69	Arrasmith Trail/Ada Hayden	Roundabout	$1,950,000

Figure 5: Illustrative Intersection Projects

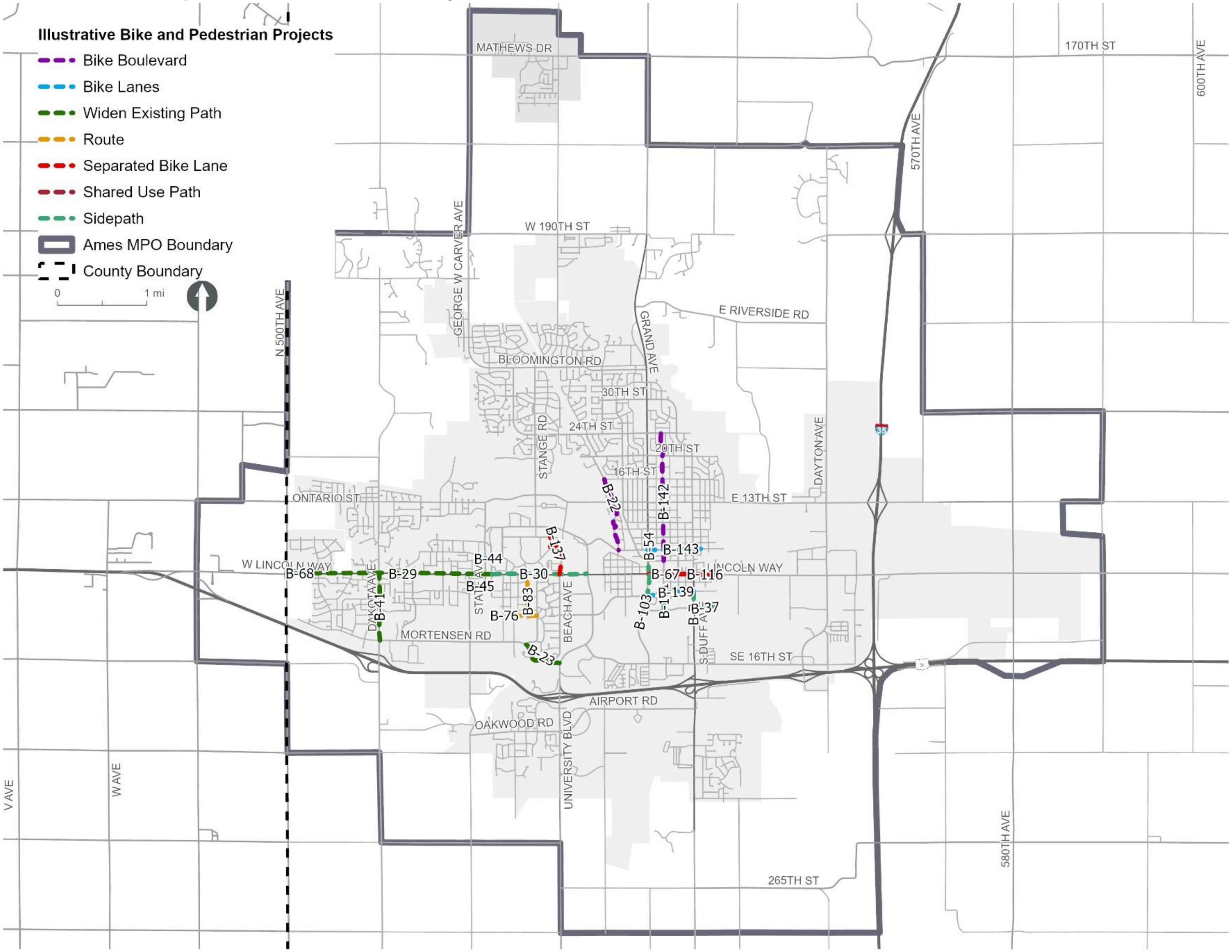


Illustrative Bicycle and Pedestrian Projects

Table 6: Illustrative Bicycle and Pedestrian Projects

ID	Corridor	From	To	Strategy Type	Cost
B-7	S Duff Ave	S 3rd St	S 5th St	Sidepath	$122,309
B-22	Ridgewood Ave	16th St	6th St	Bike Boulevard	$40,040
B-23	Mortensen Pkwy	Ash Ave	University Blvd	Widen Existing Path	$327,248
B-29	Lincoln Way	Dakota Ave	Hickory Dr	Widen Existing Path	$1,314,659
B-30	Lincoln Way	Beach Ave	University Ave	Sidepath	$198,524
B-37	SE 5th St	S Duff Ave	Future trail connection	Sidepath	$159,822
B-41	Dakota Ave	College Creek	Steinbeck St	Widen Existing Path	$492,107
B-44	West St	Hyland Ave	Sheldon Ave	Bike Lanes	$18,097
B-45	Arbor St	State Ave	Sheldon Ave	Bike Boulevard	$11,440
B-54	Grand Ave	5th St	Lincoln Way	Sidepath	$130,024
B-67	Lincoln Way	Grand Ave	Duff Ave	Separated Bike Lane	$131,627
B-68	Lincoln Way	500th Ave	Wilder Ave	Sidepath	$181,331
B-76	Storm St	Welch Ave	Ash Ave	Route	$17,160
B-83	Lynn Ave	Chamberlain St	Storm St	Route	$22,880
B-101	S Walnut Ave	S 3rd St	S 5th St	Sidepath	$142,018
B-103	Grand Ave	Lincoln Way	S 5th St	Sidepath	$246,123
B-116	Lincoln Way	Duff Ave	S Borne Ave	Separated Bike Lane	$65,962
B-137	Beach Rd	Lincoln Way	University Ave	Separated Bike Lane	$168,689
B-139	S 3rd St	S Duff Ave	Grand Ave	Bike Lanes	$143,929
B-142	Clark Ave	24th St	Main St	Bike Boulevard	$85,800
B-143	6th St	Carroll Ave	Grand Ave	Bike Lanes	$154,982

Figure 6: Illustrative Bicycle and Pedestrian Projects



Illustrative Transit Projects

Table 7: Transit Illustrative Projects

ID	Description	Project Type	Notes
1	Lincoln & Beach - Add Transit Signal Priority	Transit Signal Priority	Project funding would be coordinated with City of Ames Public Works
2	Lincoln & Welch - Add Transit Signal Priority	Transit Signal Priority	Project funding would be coordinated with City of Ames Public Works
3	Stange & Bruner - Add New Signal	New Signal	Buses have difficulty exiting Bruner for Gold/Brown route.
4	Stange & Blankenburg - Add Pedestrian Crossing	Pedestrian Crossing	Project funding would be coordinated with City of Ames Public Works
5	South Dakota & Steinbeck - Add Pedestrian Crossing	Pedestrian Crossing	Project funding would be coordinated with City of Ames Public Works
6	Ames Intermodal Facility Improvements	Facilities	Any improvements would be funded from intercity grant; use placeholder cost from TAM if available
7	South 16th Street - Add Innovative Transit Service Zone	Service	Additional vehicle for EASE - East Ames on weekdays 7am-7pm (year-round)
8	North Ames (Somerset/Northridge/Valley View) - Add Innovative Transit Service Zone	Service	Weekdays 7am-7pm (year-round)
9	Applied Sciences - Add Innovative Transit Service Zone	Service	Weekdays 7am-7pm (school year only)
10	Stange Road from Bloomington to University - Corridor Service Improvements	Service	Daily 20-minute service (school year only) - Brown route
11	University Blvd from ISU/ISC to ISU Research Park - Corridor Service Improvements	Service	Daily 20-minute service (school year only) - Brown route; Addition of Sunday service (ISU Research park, Airport Road, S. Riverside Drive/Collaboration Place)
12	South Duff from Lincoln to Crystal - Corridor Service Improvements	Service	Daily 20-minute service (year-round with reduced summer/break schedule) - Yellow route; Add Sunday Service
13	Airport Road from South Duff to University - Corridor Service Improvements	Service	Weekdays 7am-7pm (year-round);
14	Ames to Ankeny and Des Moines Intercity/Commuter Service	Service	Six trips per day; would likely not be funded by CyRide - priority is Ames service

APPENDIX B PRIORITIZATION RESULTS

Developing Project Scoring Criteria

Project scoring criteria were developed in consideration of the Iowa DOT Strategic Highway Safety Plan (SHSP), the Iowa State Long Range Transportation Plan, the Iowa State Freight Plan, and the State Transportation Asset Management Plan.

Goal	Objective	Possible Points
Safety	Project reduces fatal and serious injury crashes	12
	Project reduces the number of crashes involving vulnerable road users	10
	Project is a safety countermeasure on the High Priority Network	8
	Total Points	**30**
Accessibility & Connectivity	Project creates or improves connections between transportation modes (e.g., transit, biking, walking)	6
	Project creates or enhances complete streets, which accommodate all users (e.g., adding bike lanes, wide sidewalks, bus lanes)	5
	Project promotes or supports mixed-use development or encourage economic growth (e.g., by improving access to key development areas)	4
	Project improves access for all members of the community to essential services like healthcare, schools, grocery stores, etc.	5
	Project prioritizes improvements in historically underfunded or underserved neighborhoods	5
	Total Points	**25**
Efficiency & Reliability	Project will reduce congestion or alleviate bottlenecks, particularly in high-volume areas	8
	Project would improve the predictability of travel times, especially during peak hours	7
	Project would improve congestion in freight corridors	5
	Total Points	**20**
Sustainability	Project would improve existing infrastructure (pavement, bridges, etc.)	5
	Project enhances resilience to natural and manmade disasters or creates redundancy in the network.	4
	Project minimizes impact on natural resources and environment	3
	Project would reduce transportation-induced pollution	3
	Total Points	**15**
Placemaking/Quality of Life	Project aligns with or supports previously identified plans, studies, or community/agency goals	5

	Project is a new bike/pedestrian/transit corridor adjacent to housing and / or employment	5
	Total Points	**10**

The following section illustrates how projects were prioritized utilizing the scoring criteria shown above.

ROADWAY PROJECT PRIORITIZATION					
Project ID	**Corridor/Location**	**From**	**To**	**Project Type**	**Priority**
R-29a	Duff Avenue	Ken Maril Road	Kitty Hawk Drive	Widen to 5-Lanes	High
R-16	Lincoln Way	Grand Avenue	Duff Avenue	Management	High
R-9	Dayton Avenue	USDA	570th Avenue	Turn Lanes	High
R-17	Duff Avenue	Union Pacific RR	16th Street	Management	High
R-39	Bloomington Road	Valley View Road	Stange Road	Lane Reconfiguration	High
R-41	Lincoln Way	Dakota Avenue	Wilmoth Avenue	Management	High
R-42	Ontario Street	Woodstock Avenue	Hyland Avenue	Management	High
R-44	13th Street	Hyland Avenue	Aquatic Center	Lane Reconfiguration	High
R-47	Duff Avenue	S 5th Street	Lincoln Way	Management	High
R-48	Duff Avenue	Ioway Creek	S 16th Street	Management	High
R-29b	Duff Avenue	265th Street	Ken Maril Road	Widen to 5-Lanes	High
R-52	US 30	Duff Ave		New Interchange	High
R-7	Riverside Road	Grand Avenue/US 69	Dayton Avenue	Widen to 3-Lanes	Medium
R-34	260th Street/265th Street	550th Avenue	580th Avenue	Pave	Medium
R-24	E 13th Street	I-35 Ramp Terminal	570th Avenue	Turn Lanes	Medium
R-10	E Riverside Road	Dayton Avenue	570th Avenue	New 2-Lane Street	Medium
R-36	I-35	E Riverside Street		New Interchange	Medium
R-23	Freel Drive	SE 5th Street	S Dayton Avenue	New 2-Lane Street	Medium
R-37	I-35	260th Street		New Interchange	Medium
R-31	265th Street	530th Avenue	Duff Avenue	Pave	Medium
R-25	E 13th Street	570th Avenue	580th Avenue	Turn Lanes	Medium
R-3	Stange Road	Weston Drive	George Washington Carver Ave	New 2-Lane Street	Medium
R-11a	Lincoln Way	XG Pl	Y Avenue	Widen to 3-Lanes	Medium
R-15	Lincoln Way	Y Avenue/500th Avenue	Wilder Boulevard	Widen to 3-Lanes	Medium
R-13	Y Avenue	Lincoln Way	Ontario Street	Widen to 3-Lanes	Medium
R-33	550th Avenue	Ken Maril Road	265th Street	Pave	Medium
R-26	Lincoln Way	I-35 Ramp Terminal	580th Avenue	Turn Lanes	Medium
R-28	580th Avenue	US 30	13th Street	Turn Lanes	Medium
R-19	New Backage Road System	Lincoln Way	S 5th Street	New 2-Lane Street	Medium
R-32	265th Street	Duff Avenue	550th Avenue	Widen to 3-Lanes	Medium
R-45	Mortensen Parkway	Welch Avenue	University Avenue	Lane Reconfiguration	Medium
R-46	N Dakota Avenue	Lincoln Way	Ontario Street	Lane Reconfiguration	Medium
R-51	US 30	Duff Ave	University Ave	Widen to 5-Lanes	Medium
R-11b	Lincoln Way	XG Pl	X Ave	Widen to 3-Lanes	Medium
R-43	Y Ave	Mortensen	Lincoln Way	Pave	Medium
R-14	Ontario Street	Y Avenue/500th Avenue	Idaho Avenue	Widen to 3-Lanes	Low
R-1	George Washington Carver	Weston Drive	W 190th Street	Turn Lanes	Low
R-2	W 190th Street	George Washington Carver Avenu	US 69	Turn Lanes	Low
R-30	530th Avenue	Collaboration Place	265th Street	Widen to 3-Lanes	Low
R-27	Sand Hill Trail	Turing Street	Lincoln Way	New 2-Lane Street	Low
R-49	Dayton Avenue	Browning Street	Lincoln Way	Widen to 3-Lanes	Low
R-50	Grand Avenue	Dawes Drive		Turn Lanes	Low

INTERSECTION PROJECT PRIORITIZATION				
Project ID	**Corridor/Location**	**Intersection**	**Project Type**	**Priority**
N-51	W 190th Street	Grant Avenue	Roundabout	High
N-47	Cameron School Road	George Washington Carver Avenue	Roundabout	High
N-40	W Lincoln Way	Y Avenue	Roundabout	High
N-44	S Duff Avenue	Union Pacific RR	Grade Separation	High
N-45	E Lincoln Way	East of Cherry Avenue	Intersection Control	High
N-52	W 190th Street	Grand Avenue	Intersection Control	High
N-79	13th Street	Stange Road	Intersection Control	High
N-48	W 190th Street	George Washington Carver Avenue	Roundabout	Medium
N-46	580th Avenue	Union Pacific RR	Grade Separation	Medium
N-50	Harrison Road	Hyde Avenue	Roundabout	Medium
N-53	E Riverside Road	Grand Avenue	Intersection Control	Medium
N-49	Stone Brooke Road	Hyde Avenue	Roundabout	Medium
N-41	Ontario Street	N Dakota Avenue	Intersection Control	Medium
N-56	E 13th Street	I-35	Interchange Reconfiguration	Medium
N-57	S Duff Avenue / US 69	Ken Maril Road	Intersection Control	Medium
N-70	13th Street	Haber Road	Roundabout	Medium
N-71	Cameron School Road	N Dakota Avenue	Roundabout	Medium
N-75	Grand Avenue	16th Street	Intersection Control	Medium
N-76	S 16th Street	Isaac Newton Drive	Intersection Control	Medium
N-77	500th Avenue	Westfield Drive	Roundabout	Medium
N-78	500th Avenue	Future Collector Road	Roundabout	Medium
N-80	Bloomington Rd	Hyde Ave	Intersection Control	Medium
N-81	S Grand Ave	S 5th St	Roundabout	Medium
N-54	E Riverside Road	N Dayton Avenue	Intersection Control	Low
N-58	S Duff Avenue / US 69	Timber Creek Drive	Intersection Control	Low
N-59	US 69	265th Street	Intersection Control	Low
N-60	265th Street	550th Avenue	Intersection Control	Low
N-61	220th Street	570th Avenue	Intersection Control	Low
N-62	220th Street	580th Avenue	Intersection Control	Low
N-63	E Lincoln Way	Future Collector Road	Intersection Control	Low
N-64	E Lincoln Way	580th Avenue	Intersection Control	Low
N-65	George Washington Carver A	Weston Drive	Roundabout	Low
N-66	George Washington Carver A	Barcelos Street	Roundabout	Low
N-67	E Lincoln Way	566th Avenue	Intersection Control	Low
N-68	George Washington Carver A	Valley View Road	Roundabout	Low
N-82	US 69	Arrasmith Trail/Ada Hayden	Roundabout	Low

BICYCLE AND PEDESTRIAN PROJECT PRIORITIZATION					
Project ID	**Corridor/Location**	**From**	**To**	**Project Type**	**Priority**
B-7	S Duff Ave	S 3rd St	S 5th St	Sidepath	High
B-29	Lincoln Way	Dakota Ave	Hickory Dr	Widen Existing Path	High
B-30	Lincoln Way	Beach Ave	University Ave	Sidepath	High
B-41	Dakota Ave	College Creek	Steinbeck St	Widen Existing Path	High
B-54	Grand Ave	5th St	Lincoln Way	Sidepath	High
B-56	Lincoln Way	Riverside Dr	Grand Ave	Sidepath	High
B-60	Mortensen Rd	Rowling Dr	S Dakota Ave	Sidepath	High
B-67	Lincoln Way	Grand Ave	Duff Ave	Separated Bike Lane	High
B-81	13th St	Northwestern Ave	Grand Ave	Sidepath	High
B-103	Grand Ave	Lincoln Way	S 5th St	Sidepath	High
B-112	S Duff Ave	Lincoln Way	S 3rd St	Sidepath	High
B-114	Skunk River Trail	Inis Grove Park	Duff Ave	Shared Use Path	High
B-115	Duff Ave	Skunk River Trail	Grand Ave	Sidepath	High
B-116	Lincoln Way	Duff Ave	S Borne Ave	Separated Bike Lane	High
B-117	Grand Ave	13th St	Lincoln Way	Shared Use Path	High
B-137	Beach Rd	Lincoln Way	University Ave	Separated Bike Lane	High
B-139	S 3rd St	S Duff Ave	Grand Ave	Bike Lanes	High
B-142	Clark Ave	24th St	Main St	Bike Boulevard	High
B-143	6th St	Carroll Ave	Grand Ave	Bike Lanes	High
B-145	Skunk River Trail	Ioway Creek	S 16th St	Greenbelt Trail	High
B-22	Ridgewood Ave	16th St	6th St	Bike Boulevard	Medium
B-23	Mortensen Pkwy	Ash Ave	University Blvd	Widen Existing Path	Medium
B-37	SE 5th St	S Duff Ave	Future trail connection	Sidepath	Medium
B-44	West St	Hyland Ave	Sheldon Ave	Bike Lanes	Medium
B-45	Arbor St	State Ave	Sheldon Ave	Bike Boulevard	Medium
B-68	Lincoln Way	500th Ave	Wilder Ave	Sidepath	Medium
B-76	Storm St	Welch Ave	Ash Ave	Route	Medium
B-83	Lynn Ave	Chamberlain St	Storm St	Route	Medium
B-101	S Walnut Ave	S 3rd St	S 5th St	Sidepath	Medium
B-134	S 16th St	Apple Pl	S Duff Ave	Widen Existing Path	Medium

APPENDIX C PAVEMENT TECHNICAL ANALYSIS

AAMPO MTP 2050

Pavement Management Technical Memorandum

Historical Pavement Condition Data Analysis

Background

As part of the work to support pavement management, the project team conducted an analysis of historical pavement condition data. This analysis helped better understand recent trends in pavement condition and deterioration rates, as well as differences in pavement performance by functional class.

Methodology

Pavement condition data for all local jurisdictions in Iowa are available from the Iowa Pavement Management Program (IPMP) at the Center for Transportation Research and Education (CTRE) at Iowa State University.

The pavement condition data is collected by a specialized vendor selected by the Iowa Department of Transportation (DOT) to collect all pavement data statewide. Since the late 1990's, pavement distresses have been standardized and there are multiple vendors using similar technology to capture equivalent data. The data collection vendor was selected by Iowa DOT under a competitively-bid procurement and follows national standards for equipment calibration and quality assurance as outlined in Iowa DOT's federally-required Data Quality Management Plan.

There have been changes to the collection process that have created minor variances in the six historical datasets available from the IPMP. Since 2013, changes in technology have improved data collection and allowed for more accurate and rapid data collection. Although the data collection process has changed, the pavement condition data elements and the underlying meaning of measures and indices have essentially stayed the same.

IPMP augments the pavement condition data with other network information, including functional classification, traffic volume (Average Annual Daily Traffic, or AADT), number of lanes, roadway width, etc. These elements provide additional options to group, compare, and analyze the network data.

The project team used the IPMP website[1] to obtain all available historical datasets for the city of Ames. The city's pavement condition data was used to represent the

[1] https://ipmp.ctre.iastate.edu/gisdata/

condition of MPO network as IPMP does not offer datasets corresponding to MPO areas. IPMP had six datasets available for the city of Ames, representing pavement condition data collected in 2013, 2015, 2017, 2019, 2021, and 2023 – over a decade of data history. The project team examined these historical datasets for insights into overall network performance and potential focus areas. Most of the fields of interest were pre-calculated by IPMP, however there were several that required additional calculation such as the Federal Functional Classification categories (Arterial, Collector, Local) based on other values.

Results

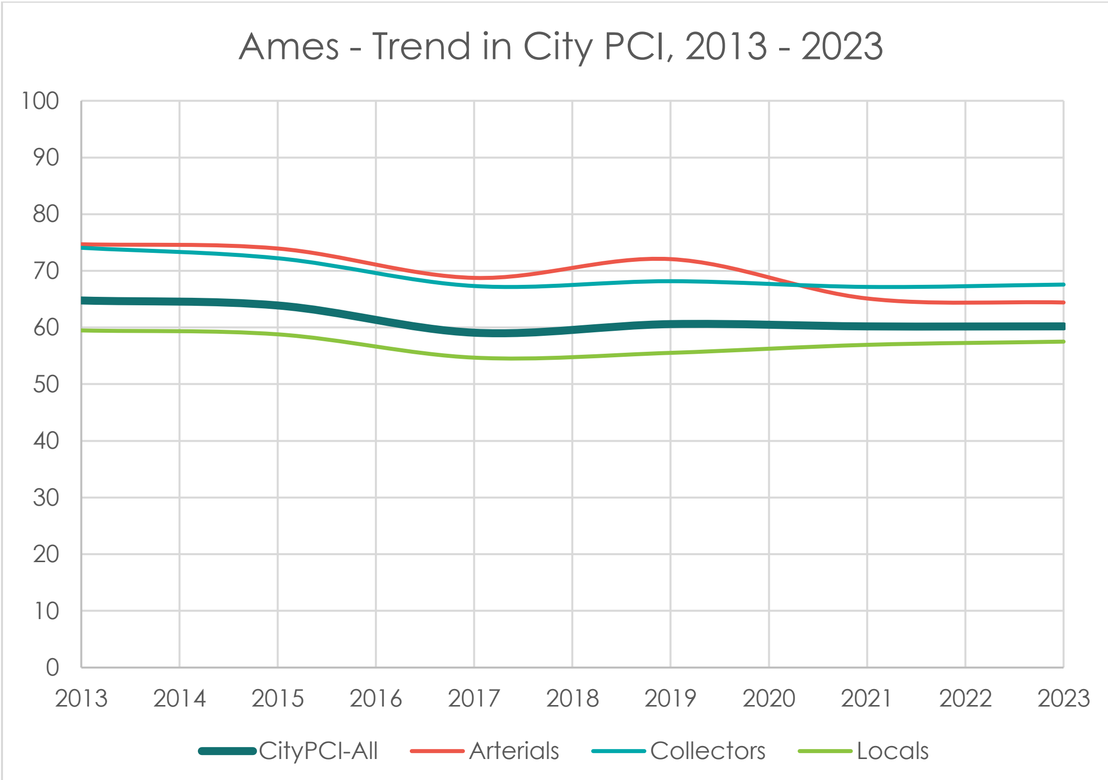
The overall network size measured for the IPMP dataset representing the AAMPO region has grown from 2,097 segments totaling 1,077,152 feet (204 mi) in 2013 to 2,478 segments totaling 1,381,634 feet (261.7 mi) in 2023. In addition to the expected growth of the city network due to new development, this growth can be also attributed to two other factors: 1) the inclusion of Iowa State University's street network, and 2) a bi-directional data collection issue discussed in-depth in the **Bi-Directional Data Collection Creating Multiple Datapoints** section of this memorandum.

A pavement's condition is often summarized by the numerical value Pavement Condition Index (PCI). This index is calculated using multiple condition indicators including smoothness and cracking, into a single value that represents the overall condition of the pavement. CityPCI is a weighted PCI calculation developed in a cooperative effort between IPMP and local government stakeholders to create an index believed to be more representative of city pavement conditions. This weighted CityPCI value was developed to account for the slower travel speeds on city streets compared to the PCI used by the DOT and county governments on higher speed roadways like interstates and highways. On the CityPCI scale, a perfect new pavement would score 100, and a badly deteriorated and failed pavement would score 0. A summary of the CityPCI condition categories are as follows:

- 0-20 - Very Poor
- 21-40 - Poor
- 41-60 - Fair
- 61-80 - Good
- 81-100 - Excellent

Average network condition is rated across all measured segments and weighted by the length of each segment in order to more accurately reflect the overall network. The weighted calculation was done for each of the six data points and the results are shown in **Figure 1**.

Figure 1. Historical Pavement Condition (CityPCI) Trends for the City of Ames



The figure above indicates that the overall average CityPCI has fallen about 5 points between 2013 and 2023 (from 64.8 to 60.2). The largest drop in condition appears to be concentrated in the arterial streets network, while the lowest average condition ratings are observed in the local streets network which consists of about 66% of the network by length. On average, local streets are now at the upper end of the "Fair" condition range, while arterials and collectors are in the lower end of the "Good" range.

The analysis suggests that although the city has been proactive about investing in street infrastructure, there has been a drop in average pavement condition of the overall network and it may be worth investigating alternative strategies (in terms of treatment mix and funding levels) to better understand how to maintain or improve the overall condition of the city's street network. Understanding the trend in pavement condition is made somewhat challenging by the fact that the network has grown and changed (as discussed above). An effective strategy to enhancing the management of pavement condition data is investing in a longitudinal analysis of pavement data to better understand the deterioration of their pavements and the impact/life of treatments. This could lead to improved deterioration curves that better predict future pavement condition, as well as improved treatment decision trees and resets to better model investment strategies.

Existing Pavement Condition

Local Streets and Roads Network Pavement Conditions

Local roadway pavement conditions, which refers to non-NHS routes, were evaluated using data from the Iowa Pavement Management Program to evaluate local network pavement conditions using a City Pavement Condition Index (CityPCI) measure.

Table 1 summarizes the breakdown of pavement conditions, using the CityPCI measure, for non-NHS routes in the AAMPO region by functional classification, while **Figure 2** shows pavement conditions for Ames' non-NHS routes.

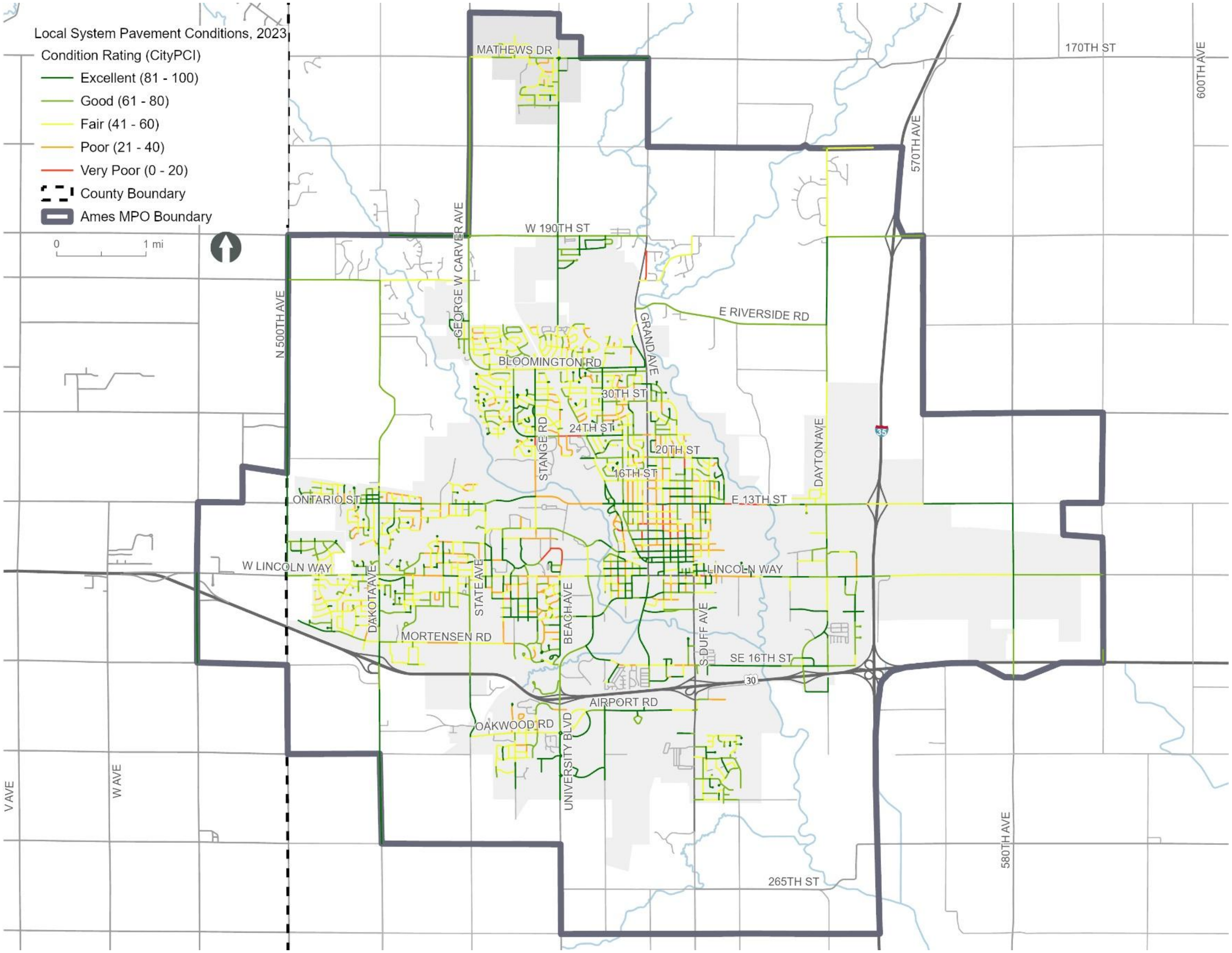
As **Table 1** indicates, the majority of the non-NHS system pavements are in Fair or better condition. Overall, 15% of non-NHS pavements are in Poor condition, while 1% are rated as being in Very Poor condition.

Table 1: Pavement Condition Ratings for Local Streets and Roads, 2023

Functional Classification	Excellent	Good	Fair	Poor	Very Poor
Local	17.8%	24.9%	39.6%	16.4%	1.3%
Collector	26.6%	36.8%	28.3%	7.6%	0.7%
Minor Arterial	32.2%	28.2%	22.4%	12.3%	4.9%
Principal Arterial	11.4%	31.6%	30.4%	26.6%	0.0%
Total	**21.0%**	**27.2%**	**35.3%**	**14.8%**	**1.7%**

Source: The AAMPO

Figure 2: Local Network Pavement Conditions, 2023



Bi-Directional Data Collection Creating Multiple Datapoints

Background

Pavement distress data is collected using a vehicle equipped with instruments such as a profilometer and a laser scanner to detect various aspects of pavement condition including cracking, rutting, faulting, and smoothness. The collection process requires the vehicle to traverse the roads and record the vehicle's position, imagery of the surrounding area, and the condition data. The data from the instruments are analyzed and summarized to create a pavement condition summary for each road segment. Because of the cost and complexity of collecting condition data, it is standard practice for most transportation agencies to collect only one traveled lane on each roadway and use the results from that lane to infer the pavement condition of all other lanes on that roadway segment.

Throughout Iowa, the standard practice since 2020 has been to collect only one lane for roadways with less than four lanes. For roadways with four or more lanes (or any roadway with a physical median separating the travel lanes) data is collected in one lane in each direction. This means road segments with four or more lanes (or divided/median separate road segments), will have two sets of data which can be the basis to infer the overall condition of the roadway segment. This "bi-directional data collection" sets up the issue of deciding which data to use or how to combine the two potential datasets. The project team examined several approaches to this issue, presented below along with our recommendations.[2]

Methodology

The project team has identified three (3) acceptable strategies to address this issue:

1. **Leave Data As-is** – The project team used this strategy to complete the Ames 2050 MTP analysis. This is a commonly used strategy that selects treatments based on the lowest condition rating for each segment. This should theoretically provide the most thorough analysis because it leverages all available data for every segment to select treatments. However, this may unnecessarily complicate the analysis by allowing the same segment to compete with itself if the segment contains multiple data sets. The problem posed with the presence of multiple data sets for a segment is that selection is based on the most efficient treatment alternative, meaning multiple treatments may be selected for the same segment

[2] Note: prior to 2020, data were collected only in one lane for undivided roadways, regardless of the number of lanes. Furthermore, the collection vendor was required to collect only in the "cardinal direction" (increasing milepoint). To help offset the costs of collecting both directions, the vendor was allowed to collect local roads in whatever direction was most efficient for their routing (this was discussed and approved by local agency stakeholders). Now, for any given route the data could be collected in different directions on different cycles, further complicating analysis.

during the analysis period. This could potentially result in the "crowding out" of other candidate projects with similar efficiency.

2. **Eliminate Duplicate Data in Bi-Directional Data** – The elimination of the data collected in a single direction would require little effort. However, this could lead to overstating a segment's overall condition by potentially eliminating the lowest condition rating. This strategy is also more challenging because it requires careful review of the entire network to identify and remove the bi-directional data from those segments with data collected in both directions. This key outcome of this strategy would be the removal of duplication issues and prevent multiple treatments being selected for the same segment.

3. **Develop an Average PCI for Each Segment** – This strategy would use all available data to calculate an average condition rating for each segment. The project team believes using an average value could provide a better representation of a segments overall condition because the condition rating would be based on data collected in both directions when available. Because initial treatment selection is based on the pavement condition, this strategy may change what treatments are available for a segment depending on difference between the average value and the recorded condition rating. However, this may create an analysis that is more representative of treatments that would be selected after a field assessment because both methods consider the condition of the entire segment and not just one direction. This strategy may also be computationally simpler than Strategy 2 because the direction does not have to be selected. Simply averaging the condition data for segments with multiple datasets would be a relatively straightforward calculation.

Recommendations

The project team has estimated the additional effort required to complete each of these strategies, and a brief summary of this estimation is below:

1. **Leave Data As-is** – As stated above in the Methodology section, the project team used this strategy to complete the Ames analysis. Therefore, this method would require no additional effort.

2. **Eliminate Duplicate Data** – This would require additional effort to analyze the available data for each segment and identify the direction with lowest condition rating. This approach would provide the most conservative strategy and would therefore be the optimal approach from a technical perspective, however it would also be the most resource intensive. This strategy would require ongoing support to repeat this effort in managing data from future collection cycles to maintain a consistent pavement management approach. This approach would require the highest level of effort now as well as after any future data collection cycles.

3. **Develop and Average PCI for Each Segment** – This would require additional effort analyze the available data and calculate the average condition of each segment, although less than with Strategy 2. This strategy would require ongoing support to repeat this effort for future collection cycles to maintain a consistent pavement management approach.

Cracking Percent Calculation Used for Treatment Triggers

Background

Pavement treatment selection is based primarily on the CityPCI index that brings together multiple aspects of pavement condition in a single value that describes overall condition. The project team is familiar with the CityPCI calculation (**Figure 3**) and the raw data used to build the index value. Because the CityPCI value is calculated using the available data for each segment, attributes with the most reliable data should create triggers that are more representative of each segment's condition. In this case, the cracking attributes account for a large portion of each segment's CityPCI, and they are reliably collected at relatively low speeds (in contrast to IRI, which is not a reliable indicator of pavement condition when collected at speeds below 25 mph). The types and severity of cracking present on a pavement can indicate numerous issues that may call for different treatment strategies. Therefore, the project team felt it important to incorporate cracking attributes into the treatment triggers for Ames.

The data provided by IPMP provides detailed information about cracking, as well as a summarized index of pavement cracking called "Percent Cracking". The project team's analysis found that this index did not provide results consistent with observed pavement conditions for the city of Ames. This section describes how the project team created a new cracking percent measure to address this issue and develop treatment triggers.

Figure 3: City Pavement Condition Index (CityPCI) Calculation

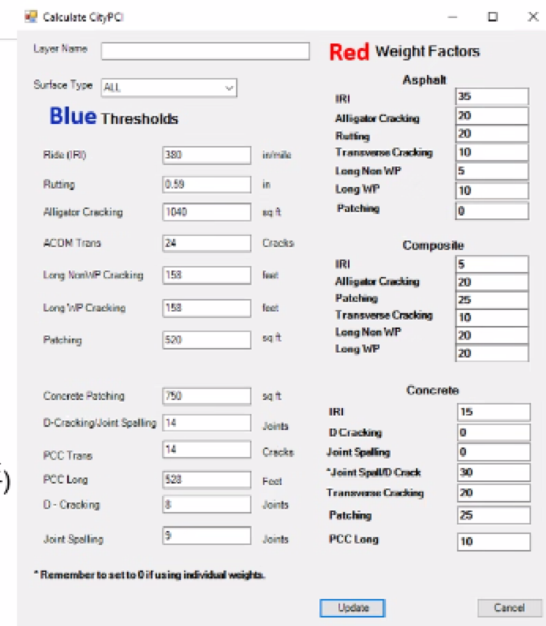
Pavement condition index

CityPCI Equation for PCC:

$$CityPCI = 100 - 15 * \left(\frac{IRI}{380}\right) - 30 * \left(\frac{\#of\ Joint/DCrack\ per\ 528\ ft}{14}\right) - 20 * \left(\frac{\#of\ transverse\ cracks\ per\ 528\ ft}{14}\right) - 25 * \left(\frac{\#\ of\ patches\ per\ 528 ft}{750}\right) - 10 * \left(\frac{\#of\ PCC\ Long\ cracks\ per\ 528\ ft}{528}\right)$$

CityPCI Equation for ACC:

$$CityPCI = 100 - 35 * \left(\frac{IRI}{380}\right) - 20 * \left(\frac{\#of\ Alligator\ cracking\ panels\ per\ 528\ ft}{1040}\right) - 20 * \left(\frac{Rutting\ per\ 528\ ft}{0.59}\right) - 10 * \left(\frac{\#\ of\ transverse\ cracks\ per\ 528 ft}{24}\right) - 5 * \left(\frac{\#of\ Long\ Non\ WP\ cracks\ per\ 528\ ft}{158}\right)\ 10 * \left(\frac{\#of\ Long\ WP\ cracks\ per\ 528\ ft}{158}\right)$$



Methodology

Data from IPMP were analyzed, and the project team found that the cracking attributes with the most data include: [3]

- Moderate and high severity alligator (fatigue) cracks;
- Sealed, low, moderate, and high severity longitudinal cracks;
- sealed, low, moderate, and high severity longitudinal wheel path cracks;
- and sealed, low, moderate, and high severity transverse cracks.

The project team combined the values from each of these attributes and developed a calculation to estimate the approximate area of a segment that includes cracking. When factored by the width of the segment, this result is a percent of the pavement surface that is contains cracks, or "crack percent". As mentioned, IPMP data also includes a cracking percent calculation; however, the project team believes the calculated values were neither representative of the actual network conditions nor were they consistent with national regulations.[4]

The project team's calculation uses weighted values and an assumed deterioration rate as there is limited guidance on calculating cracking percent or crack deterioration. This means engineering judgement was used when developing a calculation that produced a value representative of the measured distresses. A few of the data limitations and assumptions made when calculating the cracking percent are listed below:

- **Data collection**
  Raw data is collected in just one lane for alignments with less than four lanes. For roadways with four or more lanes, data is collected in one lane in each direction (preferentially the outside driving lane). The collection process assumes that the measured area is more-or-less representative of the overall pavement, and that identified distresses can be extrapolated to the entire pavement surface. Data is collected only for areas intended for motor vehicle operation – bicycle lanes, parking, and other roadway features are not evaluated.
  - Consistent with the IPMP data collection process, the project team assumed a 12 foot width for the collection area (**Analysis Expression->a_meas_width**) to calculate the percent cracking within the data collection area for each segment. The resulting value from this one lane width is used to represent the cracking percent for the entire segment.
- **Units of Measurement**
  Calculating a combined cracking value is challenging because the various cracking attributes are measured differently. Alligator cracking is measured in square feet (SF), longitudinal cracking is measured in linear feet (LF) and

[3] The definitions of each cracking type follow the distress identification manual created by Iowa DOT, based on U.S. government publication FHWA-HRT-13-092.
[4] 23 CFR 490.309

transverse cracking is measured by count. Converting these values into a combined SF equivalent is the first step towards calculating a segment's cracking percent.

  - **Transverse Cracking Conversion**
    Since transverse cracks are measured by count, the value needs to be converted to LF by multiplying the count by a conversion factor. The project team used the conversion value recommended by IPMP in the dTIMS™ expressions (**Analysis Expression->a_trck_lane**). Once converted to LF, the transverse cracking and longitudinal cracking values can be converted from LF to SF.
  - **Crack severity and Unit Conversion**
    The project team relied on engineering judgement and field experience to develop an approximate weight for each crack severity; sealed, low, moderate, and high, based on the estimated effort it would take to prepare and seal a 1 LF crack contained within 1 SF of pavement. This weight factor would serve as the conversion factor to transform the LF values to SF values to complete the cracking percent calculation. For example, a high severity crack which is 0.75 inches wide or larger would impact the entire square foot of pavement because it would require the most effort to remedy and would be indicative of significant issues with the pavement, so its weight factor is equal to one (1). A moderate severity crack would impact approximately 70 percent of the SF of pavement making its weight factor 0.7. Low severity cracks and sealed cracks would receive a weight factor of 0.3 and 0.1 respectively. These weight factors can be found in the Analysis Expressions and have a name starting with **a_crpct_lin** for longitudinal and transverse cracking and **a_crpct_sq** for alligator cracking. Because these values are based on engineering judgement, the project team recommends they be modified if additional guidance is found; however, these weights have produced acceptable values to date and demonstrate proof of concept.

- **Deterioration Rate**
  Because the treatment triggers are based on cracking, the project team needed to develop a deterioration rate for the cracking attributes to ensure treatments are selected in the later years of the dTIMS™ analysis. As there is little guidance on pavement crack deterioration and/or propagation, the project team assumed a deterioration rate of 1 percentage point per year for the cracking percent and created a new Analysis Variable, **aav_XCRK** to support the annual calculation process.

Recommendations

The project team used roadway imagery available from Pathweb[5] to review many segments, including different pavement types and distress levels with this new Cracking Percent calculation, and found the calculation to be more representative of cracking distresses than the pre-calculated percent cracking calculation provided by IPMP. The project team believes that there are opportunities to further refine and validate the cracking percent calculation and deterioration rates as part of a future effort.

Because historical pavement condition data dating back to 2013 is available through IPMP, cracking attributes can be analyzed to develop a more accurate deterioration rate for the various cracks and crack severities. The project team would also recommend tracking pavement maintenance and rehabilitation projects in future collection cycles to refine the cracking and CityPCI reset values. In doing so, a more representative approach to developing the treatment triggers can be accomplished by identifying trends in the historic data and future maintenance projects impact on pavement conditions.

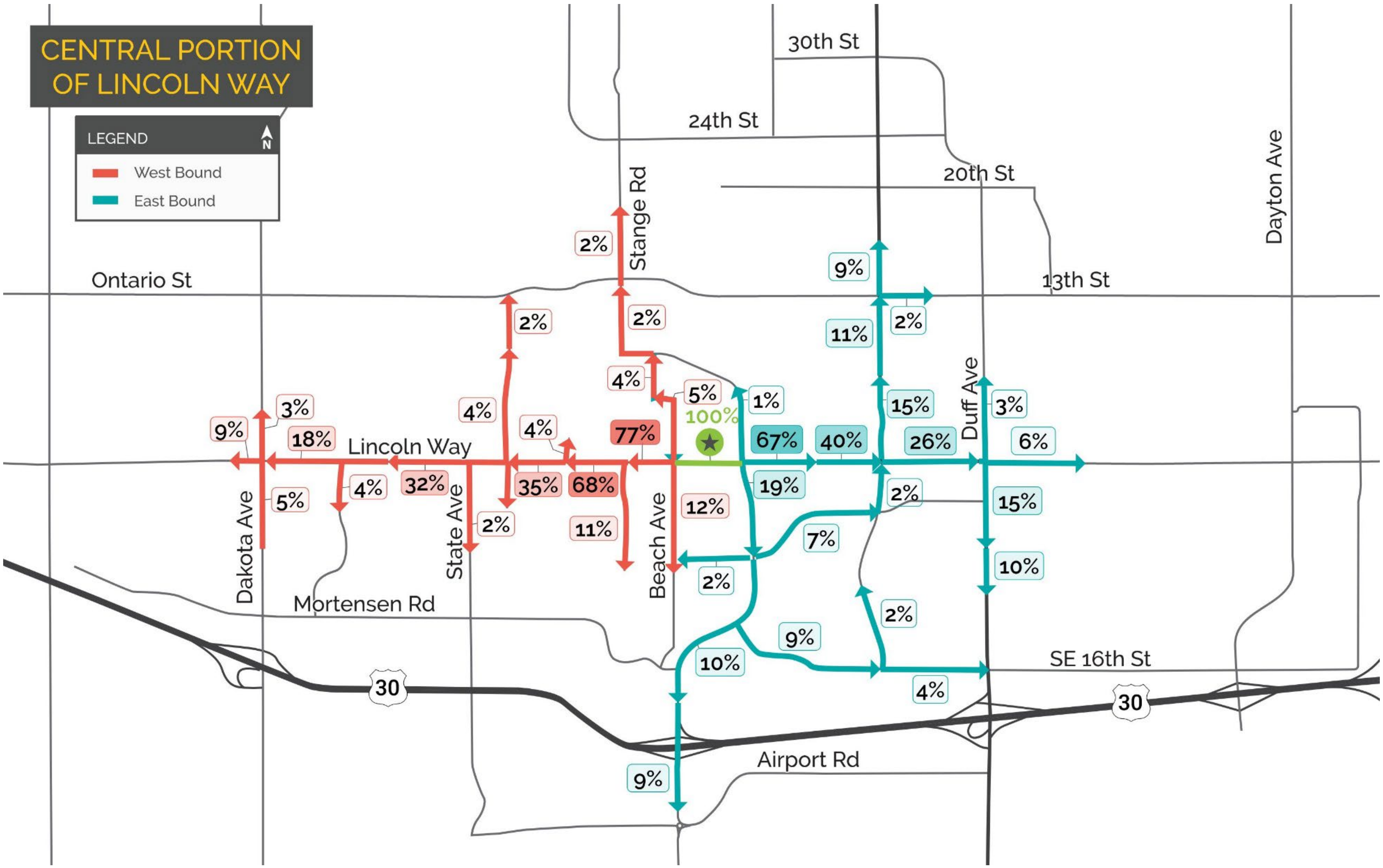
Another potential improvement to the cracking percent calculation may also include the addition of sealed and low severity alligator cracking. Currently the sealed and low severity alligator cracking attributes are not included in the dTIMS™ Inventory Table. Adding these values would require the creation of 2 new attributes in dTIMS™ to assign the associated raw data values to. Once imported, the total alligator cracking calculation can be updated to include the additional data. More data should create a more accurate and representative cracking percent calculation.

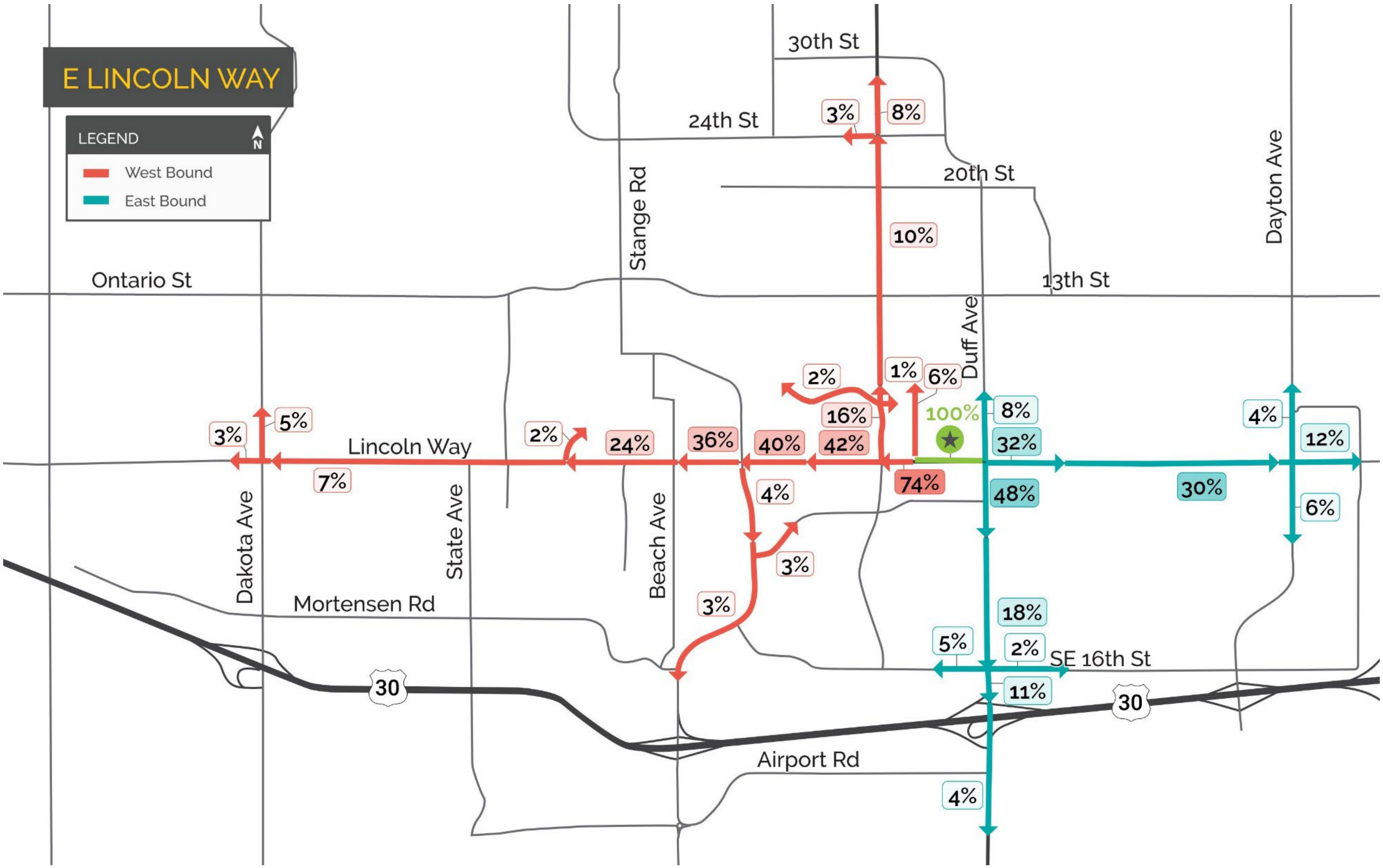
While the deterioration and reset values can be refined using historic and future pavement condition data, the unit conversion / weight factor is still based on engineering judgement and would require additional effort to validate. Because these weight factors have been created as Analysis Expressions in dTIMS™, the values can be easily modified to optimize the cracking percent calculation values.

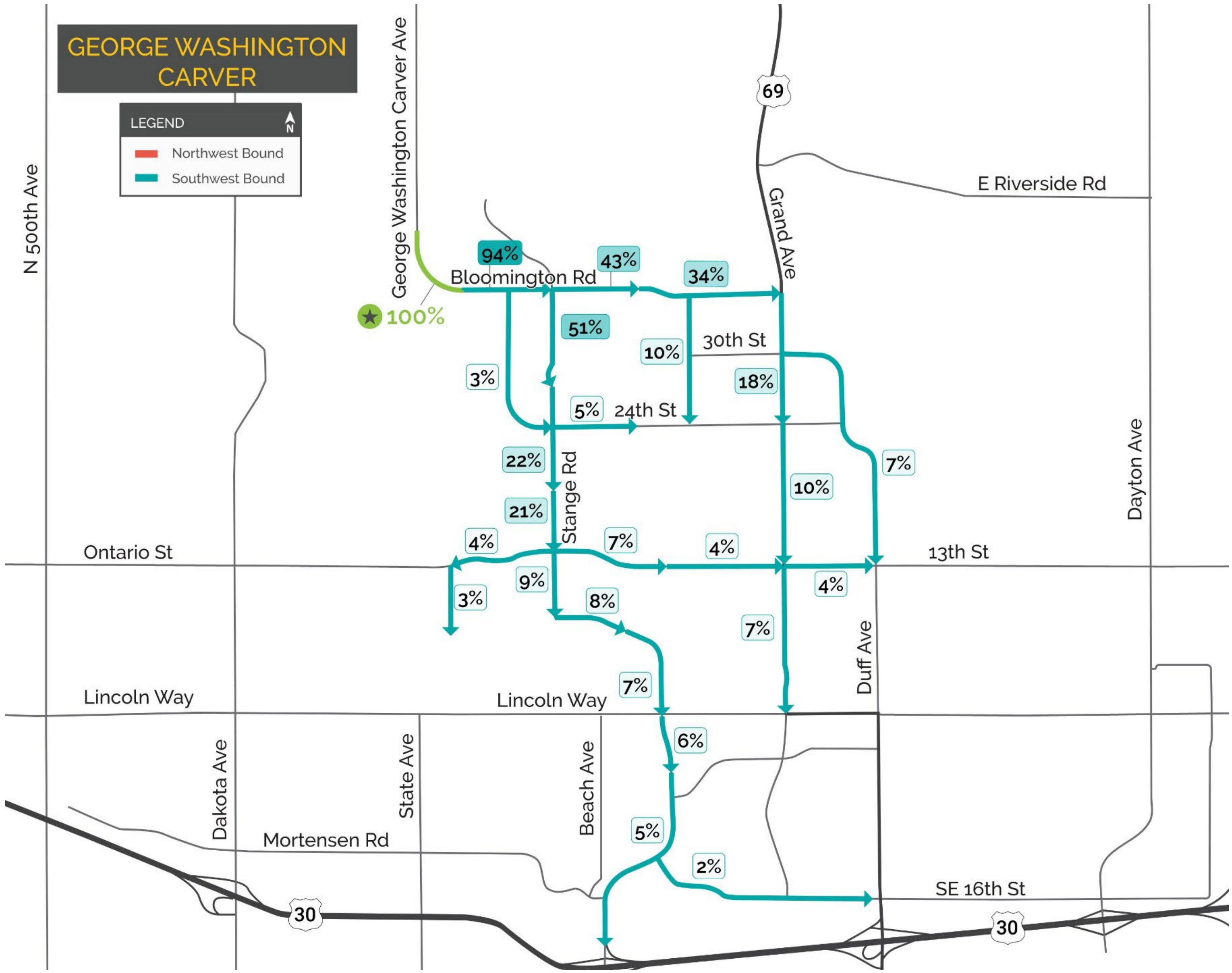
[5] https://rams.iowadot.gov/PathWeb

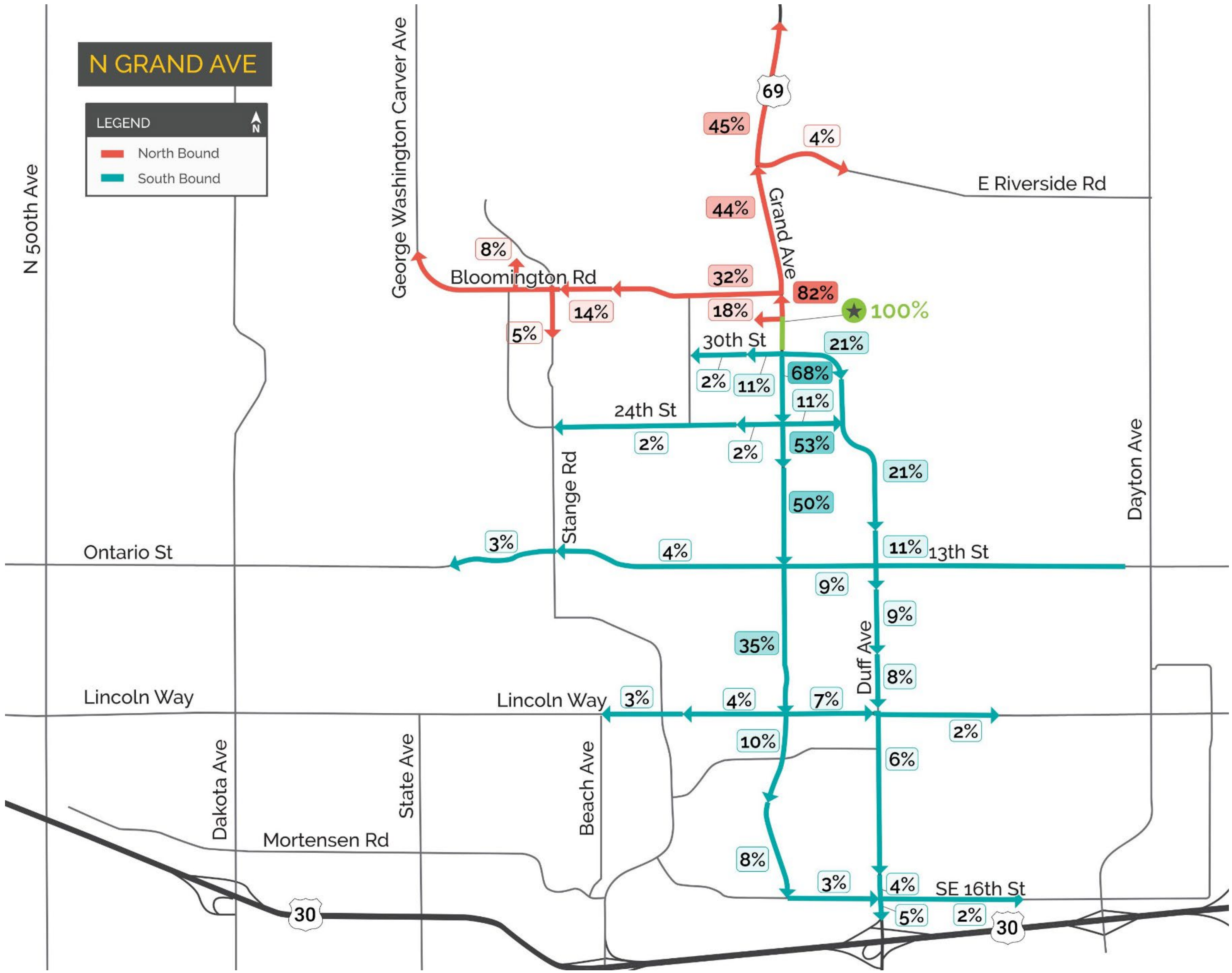
APPENDIX D TRAVEL PATTERNS ANALYSIS

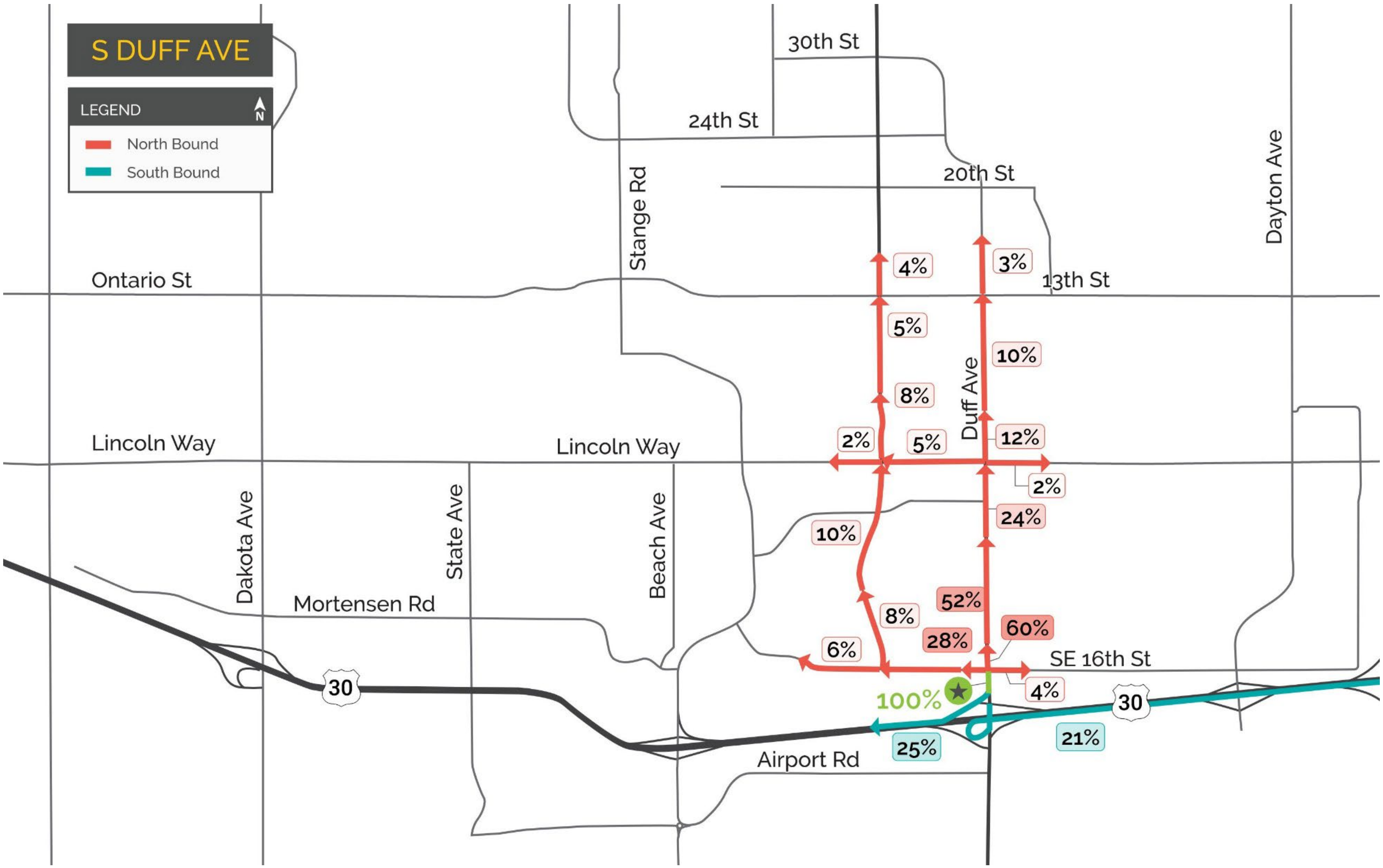
This section illustrates some of the travel patterns observed on major corridors and entry points to the Ames Area. The data source is StreetLight Data, which was used to conduct a Top Routes analysis to understand how vehicular traffic travels through the region. The Top Routes analysis establishes an anchor point which is then used as the basis for determining the routes travelers take to go through the anchor point. Shown in each figure below in green, the Top Routes analysis indicates the routes travelers take to their final destinations. The percentages shown in the figures represent the proportions of travelers with trips beginning at the origin point that continue their travel to that point (i.e. 6% of east-bound trips starting on Lincoln Way between Beach Avenue and University Avenue continue eastbound through Duff Avenue).


CENTRAL PORTION OF LINCOLN WAY
LEGEND
N
West Bound
East Bound
30th St
24th St
20th St
13th St
Ontario St
Stange Rd
Dayton Ave
Lincoln Way
Duff Ave
Dakota Ave
State Ave
Beach Ave
Mortensen Rd
SE 16th St
Airport Rd
30
30
100%
77%
68%
35%
32%
18%
9%
3%
5%
4%
4%
4%
4%
2%
2%
2%
2%
11%
12%
5%
67%
40%
26%
6%
19%
1%
9%
11%
2%
15%
3%
2%
15%
10%
7%
2%
2%
9%
10%
4%
9%

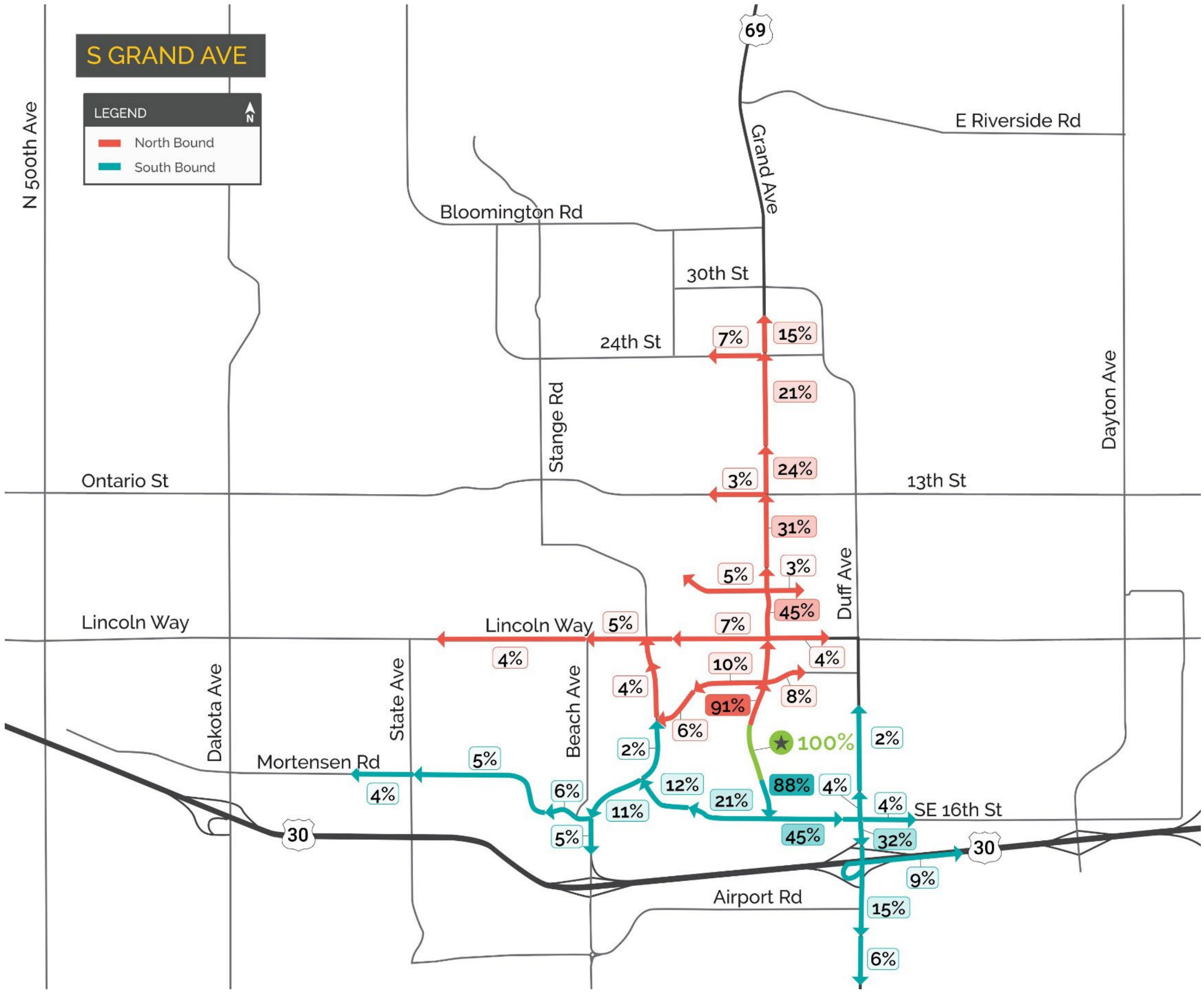

E LINCOLN WAY
LEGEND
N
West Bound
East Bound
30th St
24th St
20th St
13th St
Ontario St
Stange Rd
Duff Ave
Dayton Ave
Lincoln Way
Dakota Ave
State Ave
Beach Ave
Mortensen Rd
SE 16th St
Airport Rd
30
30
3%
8%
10%
2%
1%
6%
16%
100%
8%
32%
4%
12%
3%
5%
7%
2%
24%
36%
40%
42%
74%
48%
30%
6%
4%
3%
3%
18%
5%
2%
11%
4%

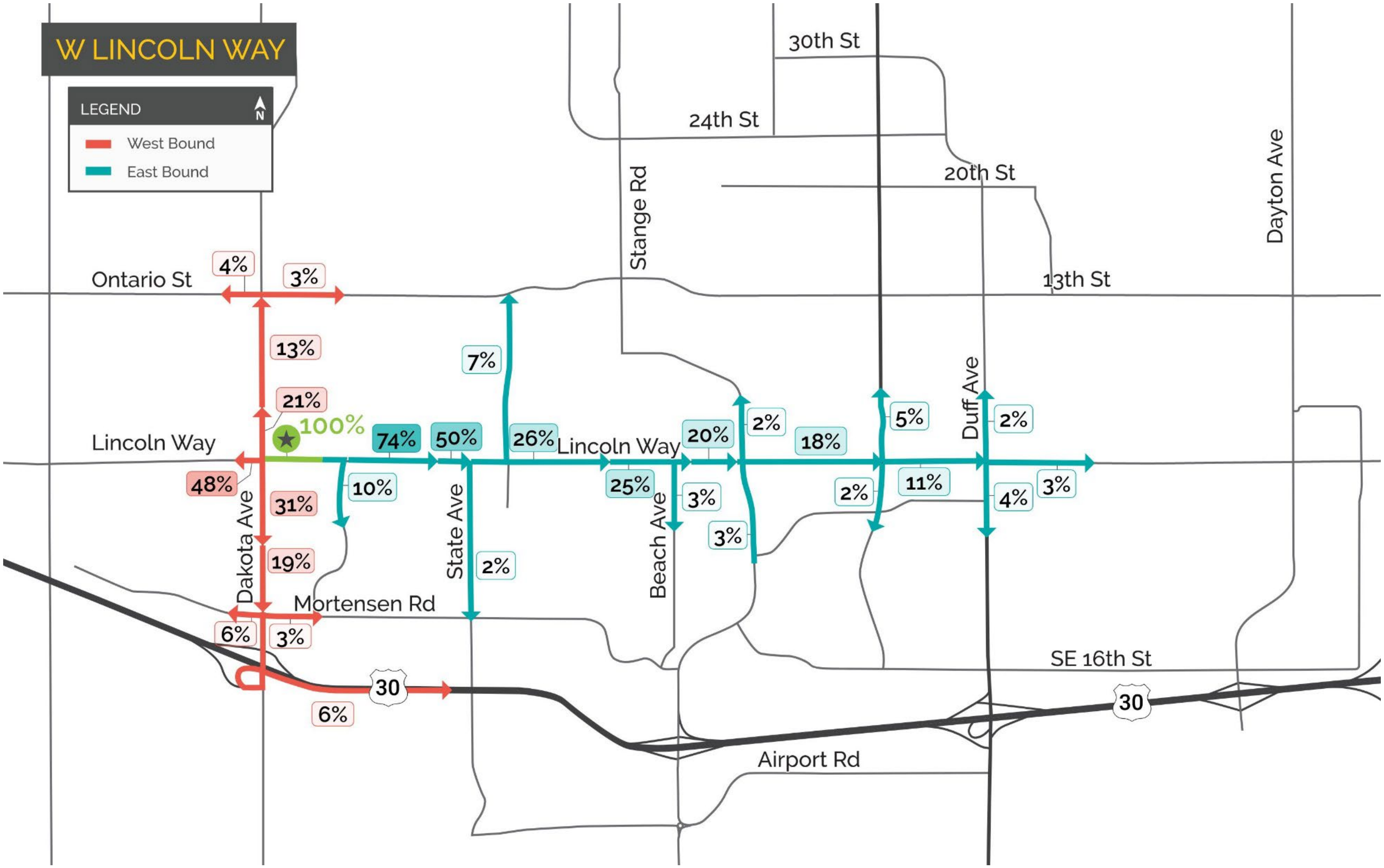

GEORGE WASHINGTON CARVER
LEGEND
Northwest Bound
Southwest Bound
N 500th Ave
George Washington Carver Ave
Grand Ave
69
E Riverside Rd
94%
43%
34%
Bloomington Rd
100%
51%
10%
30th St
3%
18%
5%
24th St
22%
Stange Rd
7%
10%
Dayton Ave
21%
4%
7%
4%
Ontario St
13th St
9%
3%
8%
4%
7%
Duff Ave
Lincoln Way
7%
Lincoln Way
6%
Dakota Ave
State Ave
Beach Ave
Mortensen Rd
5%
2%
SE 16th St
30
30

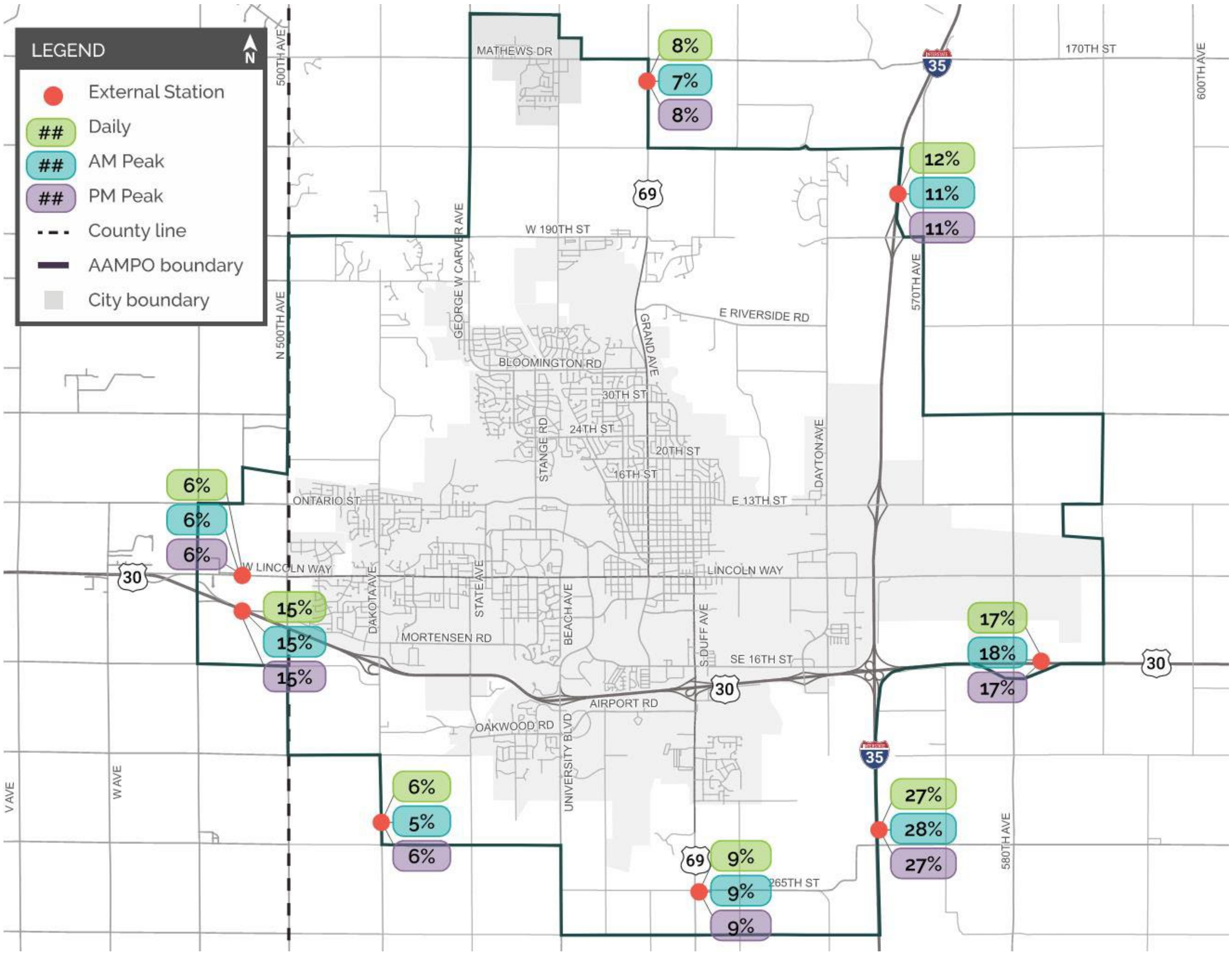

N GRAND AVE
LEGEND
North Bound
South Bound
N 500th Ave
George Washington Carver Ave
Bloomington Rd
E Riverside Rd
Grand Ave
69
45%
4%
44%
8%
32%
82%
14%
18%
100%
5%
30th St
21%
2%
11%
68%
11%
24th St
2%
2%
53%
21%
Stange Rd
50%
Dayton Ave
Ontario St
3%
4%
11%
13th St
9%
9%
35%
Duff Ave
8%
Lincoln Way
Lincoln Way
3%
4%
7%
10%
2%
6%
Dakota Ave
State Ave
Beach Ave
Mortensen Rd
8%
3%
4%
SE 16th St
5%
2%
30
30



S DUFF AVE
LEGEND
N
North Bound
South Bound
30th St
24th St
20th St
13th St
Ontario St
Stange Rd
Dayton Ave
Lincoln Way
Lincoln Way
Dakota Ave
State Ave
Beach Ave
Duff Ave
Mortensen Rd
SE 16th St
Airport Rd
30
30
4%
3%
5%
10%
8%
2%
5%
12%
2%
10%
24%
52%
8%
60%
28%
6%
4%
100%
25%
21%


S GRAND AVE
LEGEND
North Bound
South Bound
N 500th Ave
E Riverside Rd
Grand Ave
69
Bloomington Rd
30th St
24th St
7%
15%
21%
Stange Rd
Dayton Ave
Ontario St
3%
24%
13th St
31%
5%
3%
Duff Ave
45%
Lincoln Way
Lincoln Way
5%
7%
4%
4%
10%
4%
91%
8%
6%
Dakota Ave
State Ave
Beach Ave
2%
100%
2%
Mortensen Rd
5%
4%
6%
12%
88%
4%
11%
21%
4%
SE 16th St
5%
45%
32%
30
30
9%
Airport Rd
15%
6%


W LINCOLN WAY
LEGEND
N
West Bound
East Bound
30th St
24th St
20th St
13th St
Stange Rd
Dayton Ave
Ontario St
Lincoln Way
Lincoln Way
Duff Ave
Dakota Ave
State Ave
Beach Ave
Mortensen Rd
SE 16th St
Airport Rd
30
30
100%
4%
3%
13%
21%
48%
31%
19%
6%
3%
6%
74%
50%
26%
7%
10%
2%
25%
20%
3%
3%
2%
18%
2%
5%
11%
2%
4%
3%



LEGEND
N
External Station
Daily
AM Peak
PM Peak
County line
AAMPO boundary
City boundary
8%
7%
8%
12%
11%
11%
6%
6%
6%
15%
15%
15%
17%
18%
17%
6%
5%
6%
9%
9%
9%
27%
28%
27%
MATHEWS DR
170TH ST
W 190TH ST
E RIVERSIDE RD
BLOOMINGTON RD
30TH ST
24TH ST
20TH ST
16TH ST
E 13TH ST
ONTARIO ST
W LINCOLN WAY
LINCOLN WAY
MORTENSEN RD
SE 16TH ST
AIRPORT RD
OAKWOOD RD
265TH ST
500TH AVE
N 500TH AVE
GEORGE W CARVER AVE
GRAND AVE
STANGE RD
DAYTON AVE
570TH AVE
580TH AVE
600TH AVE
DAKOTA AVE
STATE AVE
BEACH AVE
S DUFF AVE
UNIVERSITY BLVD
V AVE
W AVE
35
69
30

APPENDIX E ETC TRAVEL SURVEY RESULTS

2024

Ames Region, IA
Regional Travel Survey
Findings Report

Contents

1 Executive Summary

Ames Area MPO 2024 Regional Travel Survey Executive Summary

Overview

Purpose. ETC Institute, in association with HDR, conducted a regional transportation survey of residents in the City of Ames during the fall of 2024. The purpose of the survey was to gather input from residents regarding issues and opportunities relating to transportation planning for the region. Some of the specific topics that were addressed in the survey included:

- Perceptions of current transportation issues.
- Commute issues for those who worked outside of the home.
- Methods of transportation used.
- Perception of the current transportation system in Ames.
- Concern about traffic safety.
- Perceived quality of public transit.
- Barriers to using public transit.
- Bicycle and pedestrian issues.
- The importance of various issues to transportation improvements.

Methodology. The survey was mailed to a random sample of residents and completed by 406. The goal of 400 surveys was met, with 406 surveys being completed. The overall results for 406 surveys have a precision of at least +/- 4.8% at the 95% level of confidence.

Contents of the Report. This report contains:

- an executive summary of the methodology and major findings
- charts depicting the overall results of the survey
- tables that show the results of the survey
- a copy of the survey instrument

Major Findings

- **Perceptions of Current Transportation Issues.** Those surveyed were asked about their level of satisfaction with various transportation issues. The issues with which residents were most satisfied included: the ease of travel to work, shopping, and activities (61%), CyRide (57%), and the physical condition of shared use paths and trails (55%). Respondents were least satisfied with on street bicycle facilities (23%) and the flow of traffic on area streets during peak times (23%). **When respondents were asked to name the most important issues, they selected flow of traffic on area streets during peak times, the ease of north/south travel in the Ames area, and traffic safety.**

  TRENDS. There were increases in satisfaction in all perception categories that were measured between 2019 and 2024, with the most notable being the ease of north/south travel in the Ames area.

- **Overall Rating of the Transportation System in Ames.** Sixty-two percent (62%) of those surveyed rated the transportation system in Ames as “excellent” or “good,” compared to 56% who rated it as “excellent” or “good” in 2019.

- **Public Transit.** The availability of public transit was rated “excellent” or “good” by 72% of respondents. Those surveyed were asked how satisfied they were with various aspects of transit in the Ames area; 89% were satisfied (“very satisfied” or “satisfied”) with the physical condition of the bus, 76% were satisfied with the availability of information about public transit services, and 77% were satisfied with the distance to the nearest transit stop from home.

  TRENDS. There was a notable increase in satisfaction with the distance to the nearest stop from your home (77% in 2024 vs. 67% in 2019 and 2014).

- **Bicycling in Ames.** The percentage of respondents who reported riding a bike in the Ames area during the past year was 52%, compared to 47% in 2019. Of the 52% who reported riding a bike, 19% felt safe on major streets without bike lanes; 20% were neutral, and 61% felt unsafe. Additionally, of the 52% who rode a bike in the past year, 37% felt safe bicycling on streets with an on-street bike lane, and 90% felt safe bicycling on a shared-use path or trail.

- **Walking in Ames.** Sixty-seven percent (67%) of those surveyed indicated they felt “very safe” or “safe” walking or using a wheelchair on sidewalks along major streets; 24% were neutral, and 8% felt unsafe. Additionally, 61% felt safe using pedestrian crossings on major streets, and 79% felt safe walking or using a wheelchair on a shared-use path, trail or sidewalk in the area where they live.

- **Support for System Enhancements.** Those surveyed indicated the most important system enhancements of 8 that were presented were: 1) implementing targeted safety improvements at high crash locations, 2) adding more turn lanes at critical intersections to improve traffic operations, and 3) adding more shared use paths and trails.

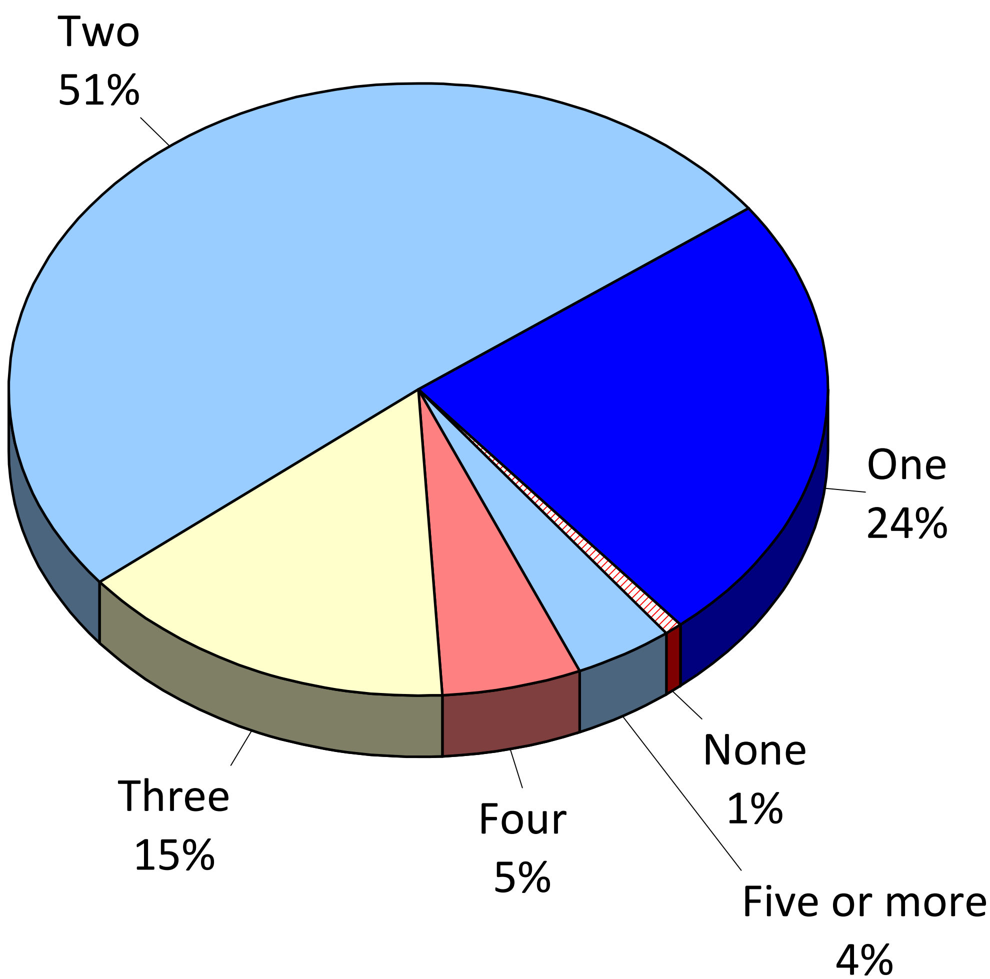
- **Importance of Issues Related to Transportation Improvements.** Of several possible issues related to long-range transportation improvements, those most important to respondents were: 1) having a transportation system that supports quality of life, 2) a safe and connected multi-modal network, and 3) preserves/enhances the environment and the community.

2

Charts & Graphs

Q1. How many operating vehicles do you have in your household?

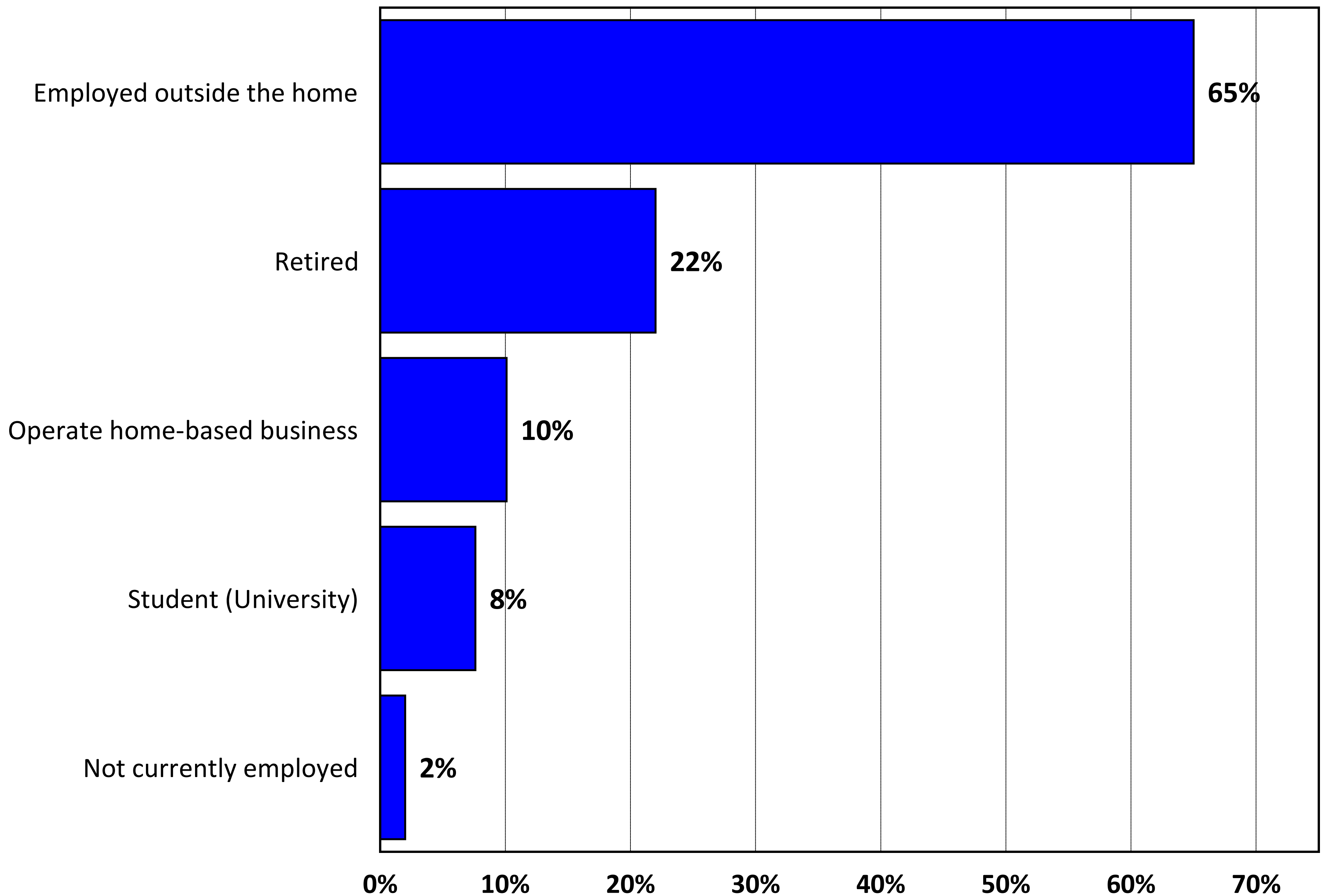
by percentage of respondents (excluding "not provided")



Source: ETC Institute Regional Travel Survey (2024)

Q2. What is your employment status?

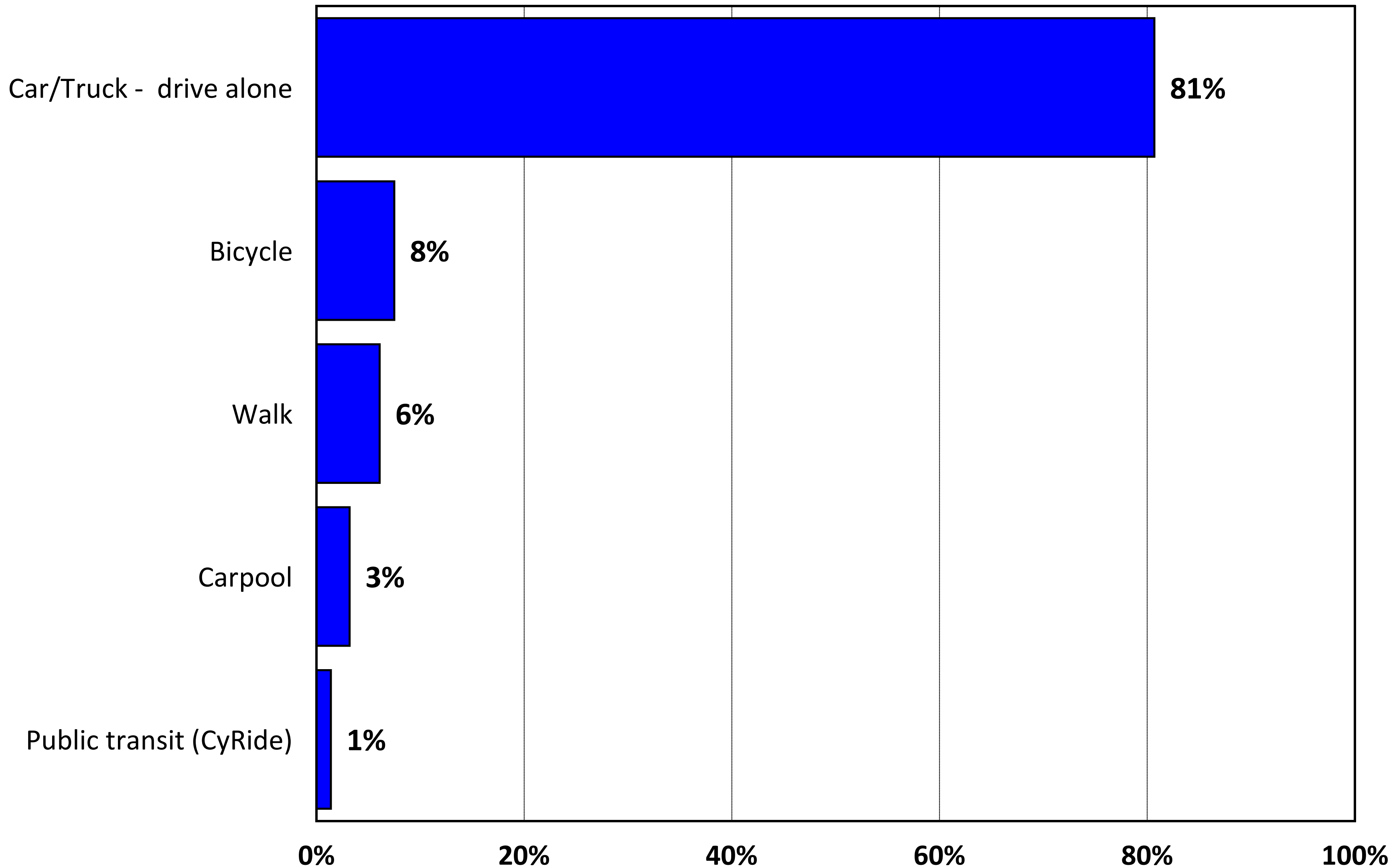
by percentage of respondents (excluding "not provided" - multiple selections could be made)



Source: ETC Institute Regional Travel Survey (2024)

Q2b. What method of transportation do you normally use to go to work or school?

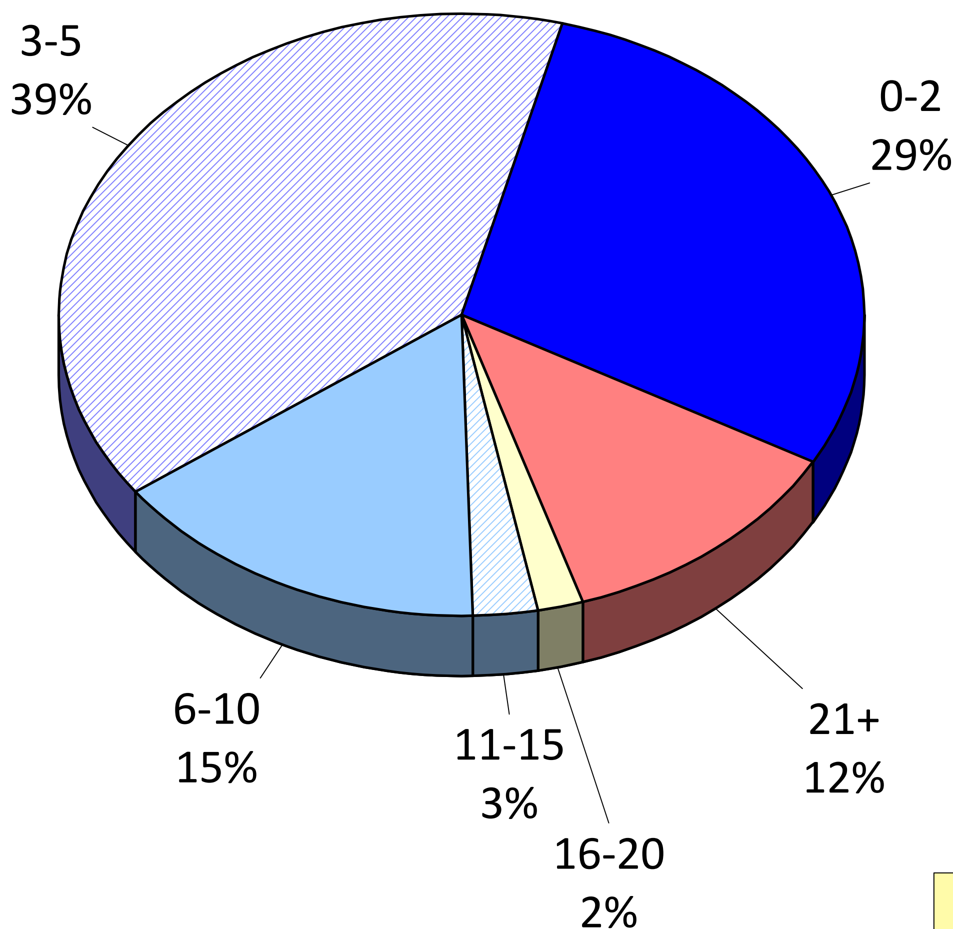
by percentage of respondents who indicated they work outside the home or go to school
(multiple selections could be made)



Source: ETC Institute Regional Travel Survey (2024)

Q2c. How many miles is your place of employment/school from your home?

by percentage of respondents (excluding "not provided")

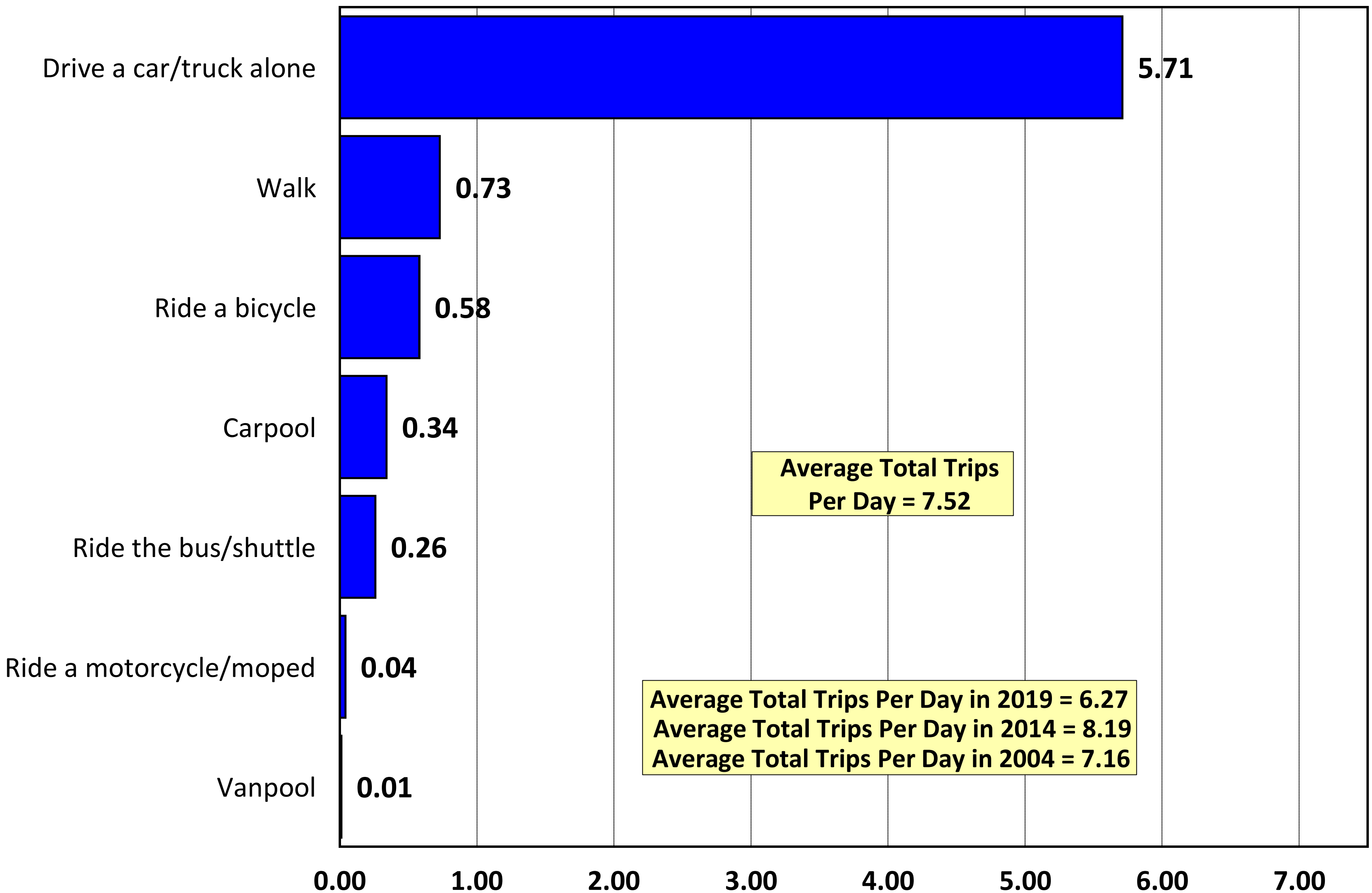


Mean number of miles from home to school or place of employment = **8.49 miles**

Source: ETC Institute Regional Travel Survey (2024)

Q3. On a typical weekday, how many one-way trips do you normally make using the following types of transportation?

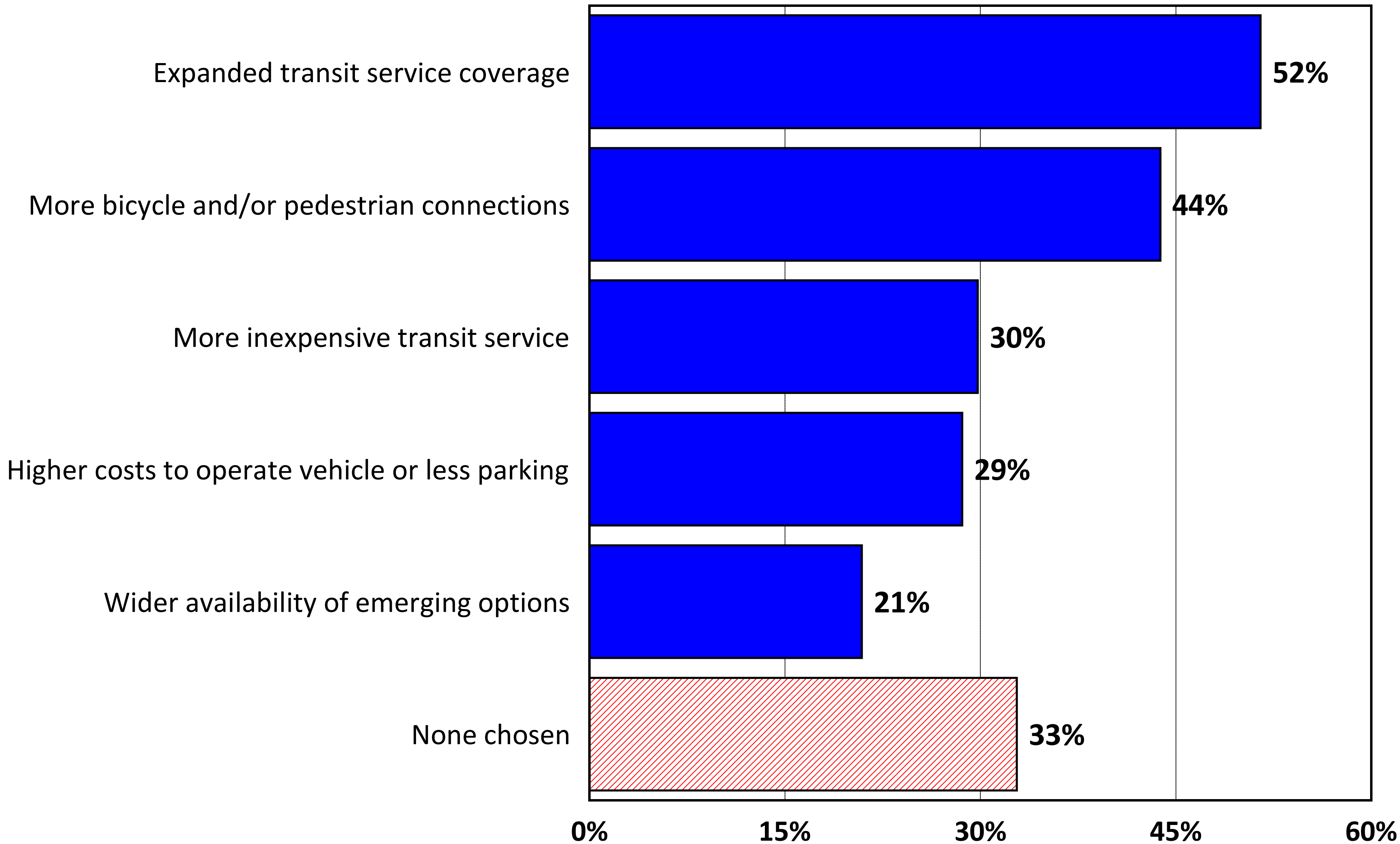
by average number of trips made per transit type (multiple selections could be made)



Source: ETC Institute Regional Travel Survey (2024)

Q4. Which THREE of the following would encourage you to use a mode of transportation other than driving a personal vehicle to complete your daily trips?

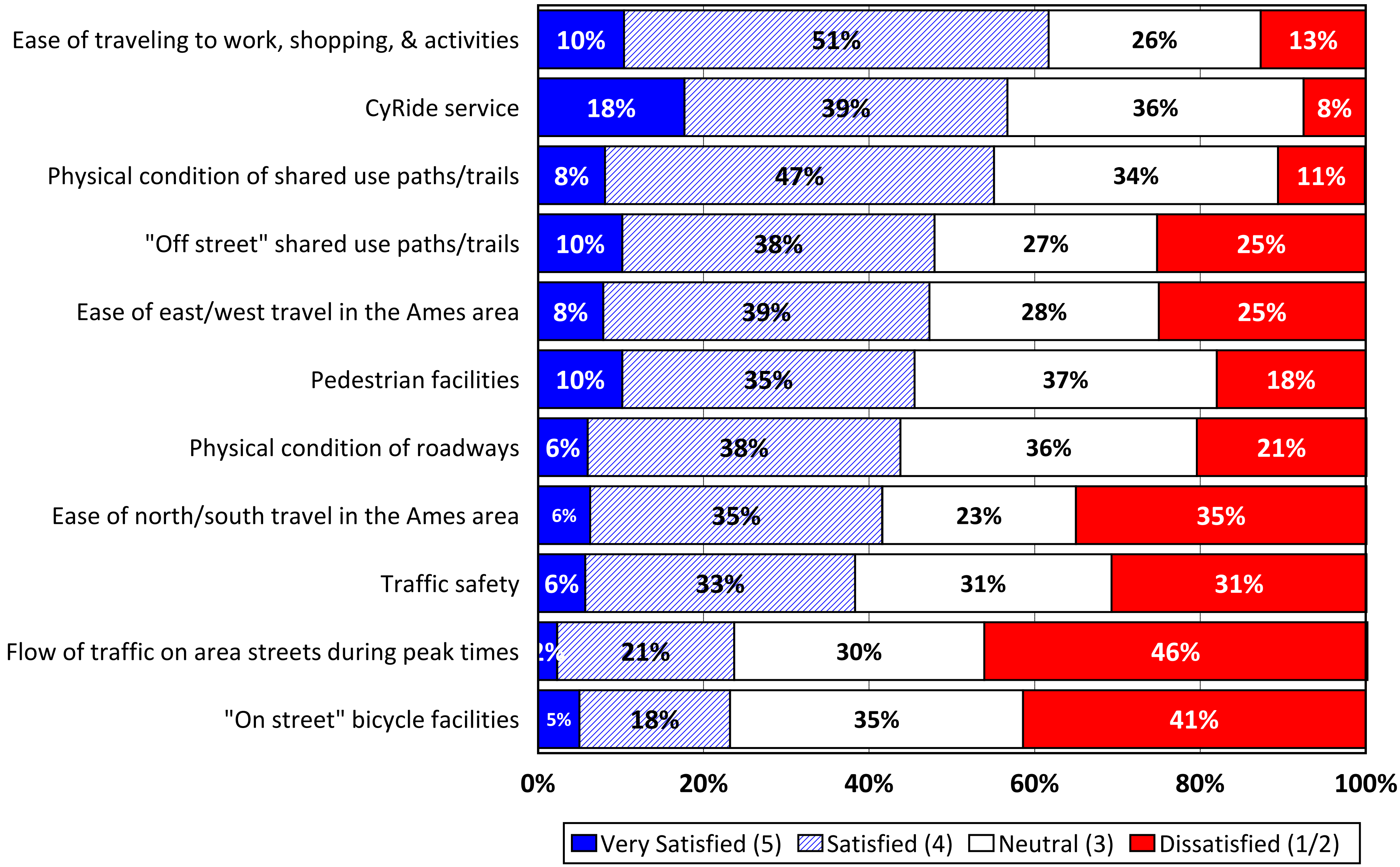
by percentage of respondents (multiple selections could be made)



Source: ETC Institute Regional Travel Survey (2024)

Q5. Satisfaction With Perceptions of Current Transportation Issues

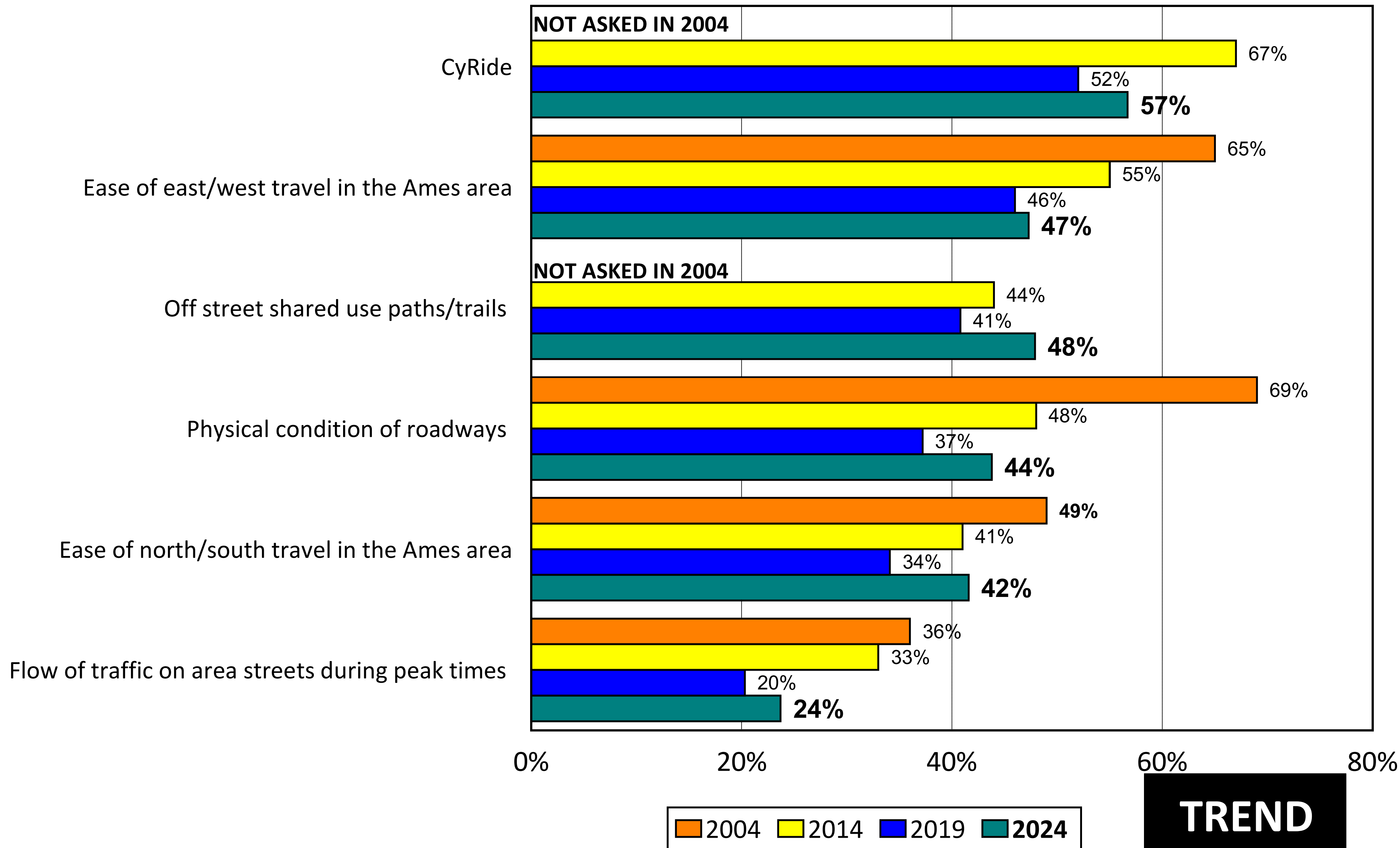
by percentage of respondents (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q5. Satisfaction With Perceptions of Current Transportation Issues

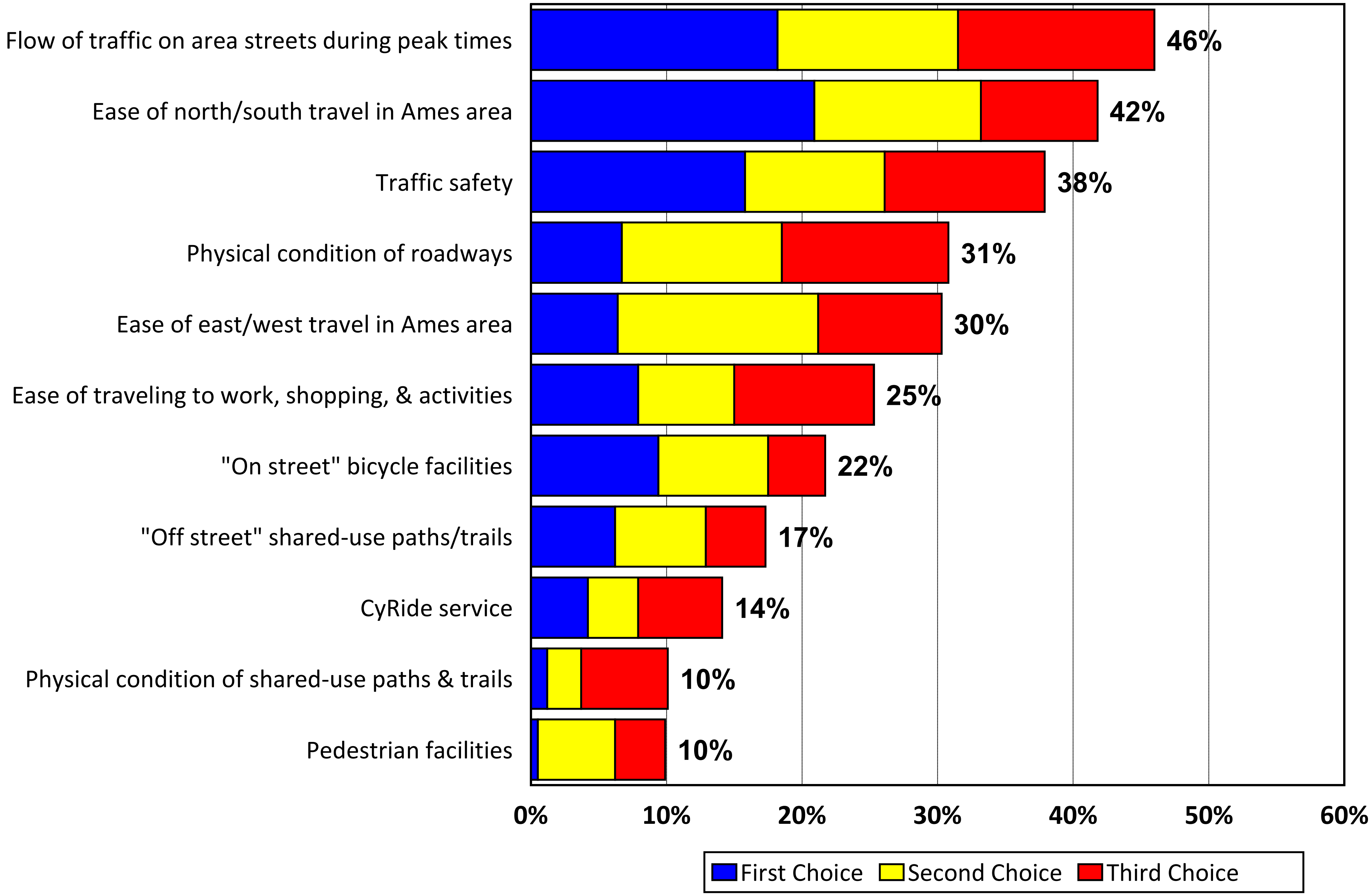
by percentage of respondents who rated the item as a 4 or 5 on a 5-point scale (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q6. Most Important Transportation Issues

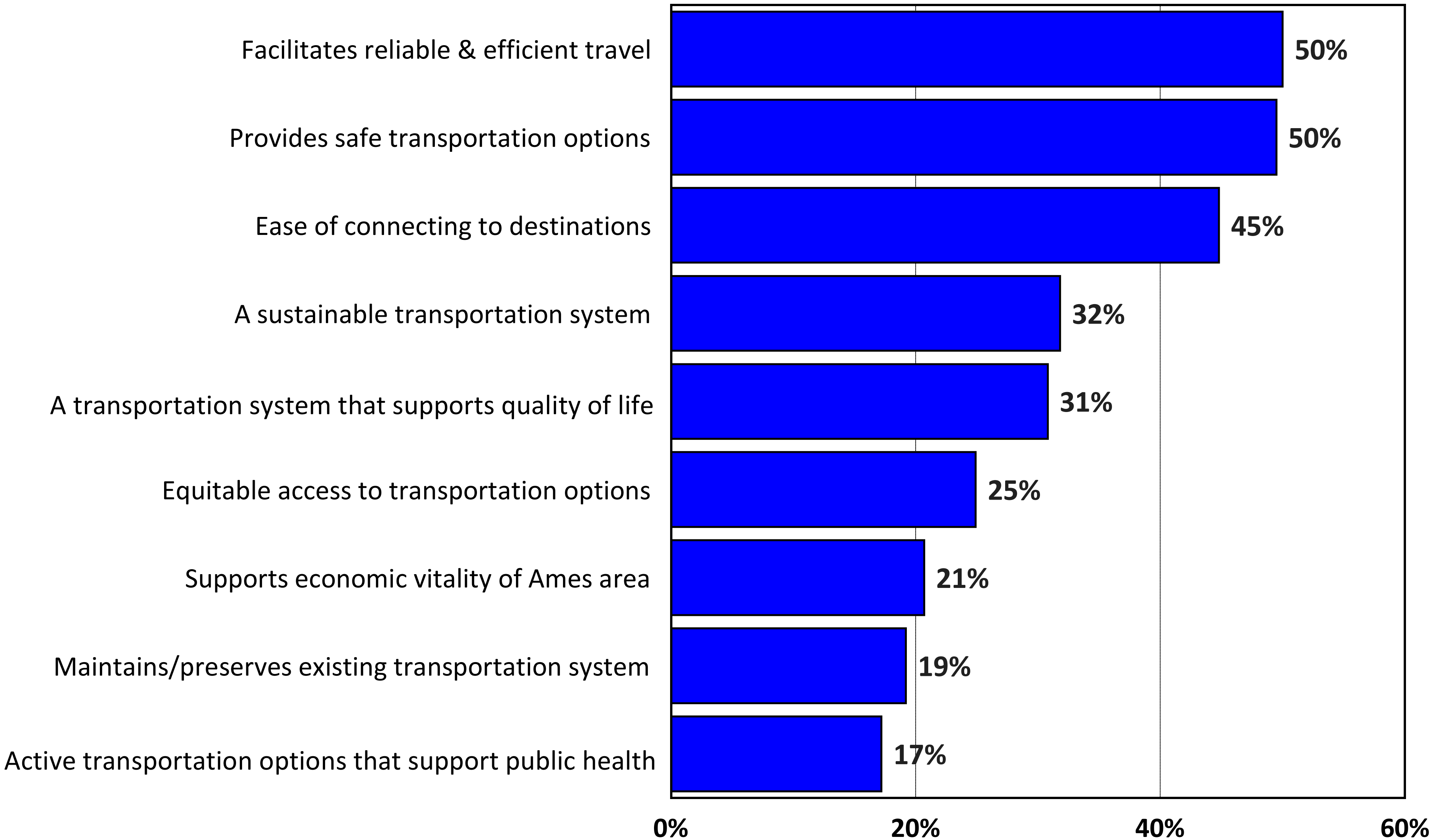
by percentage of respondents who selected the item as one of their top three choices



Source: ETC Institute Regional Travel Survey (2024)

Q7. Most Important Characteristics of the Ames Area Transportation System for the Future

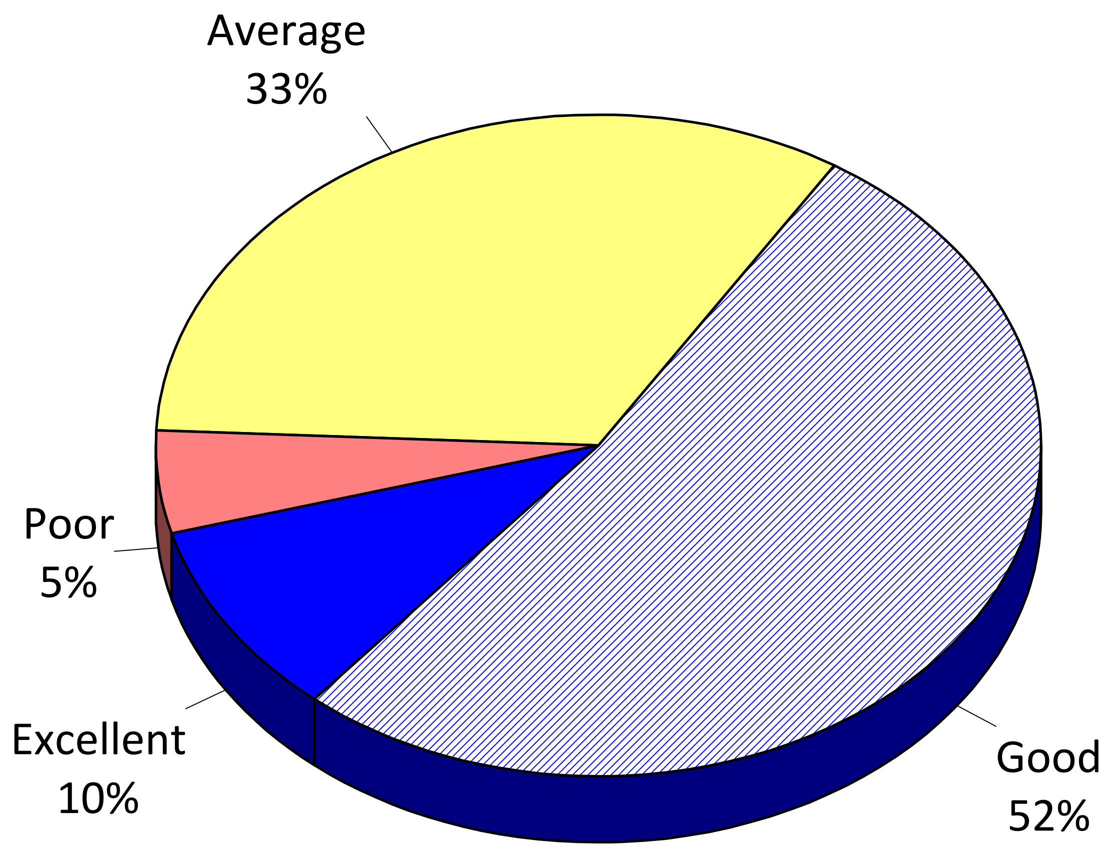
by percentage of respondents (multiple selections could be made)



Source: ETC Institute Regional Travel Survey (2024)

Q8. Overall, would you rate the transportation system in the Ames Area as excellent, good, average, or poor?

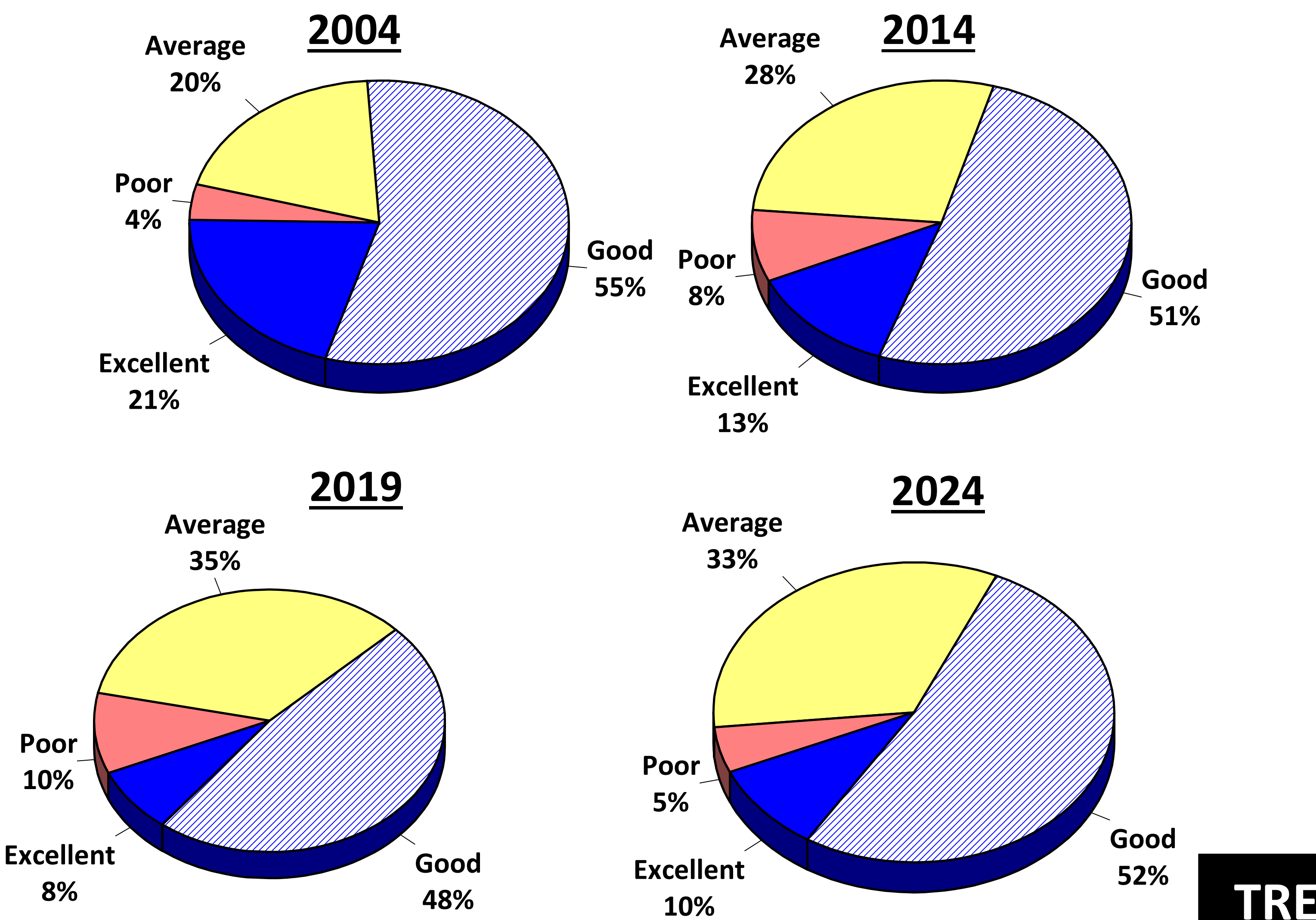
by percentage of respondents (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q8. Overall, would you rate the transportation system in the Ames area as excellent, good, average, or poor?

by percentage of respondents (excluding "don't know")

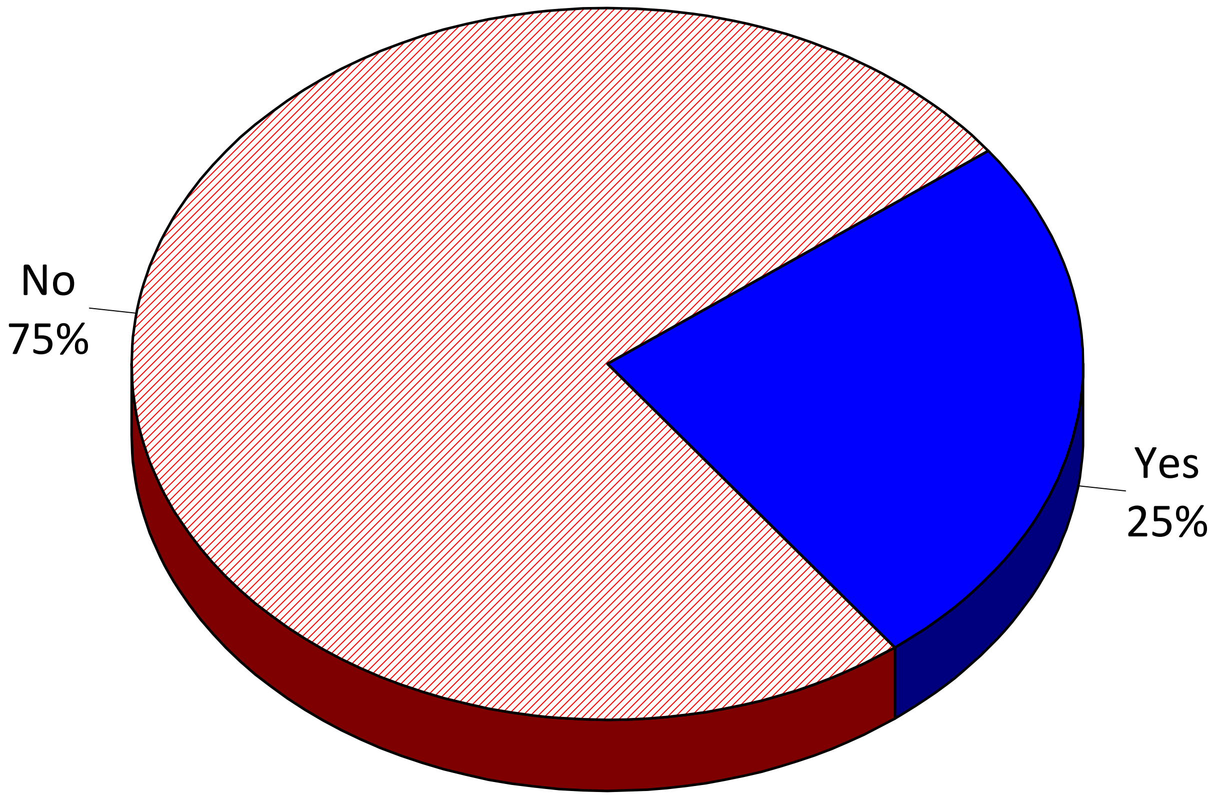


TREND

Source: ETC Institute Regional Travel Survey (2024)

Q9. Have you used public transit (CyRide) in the past 12 months?

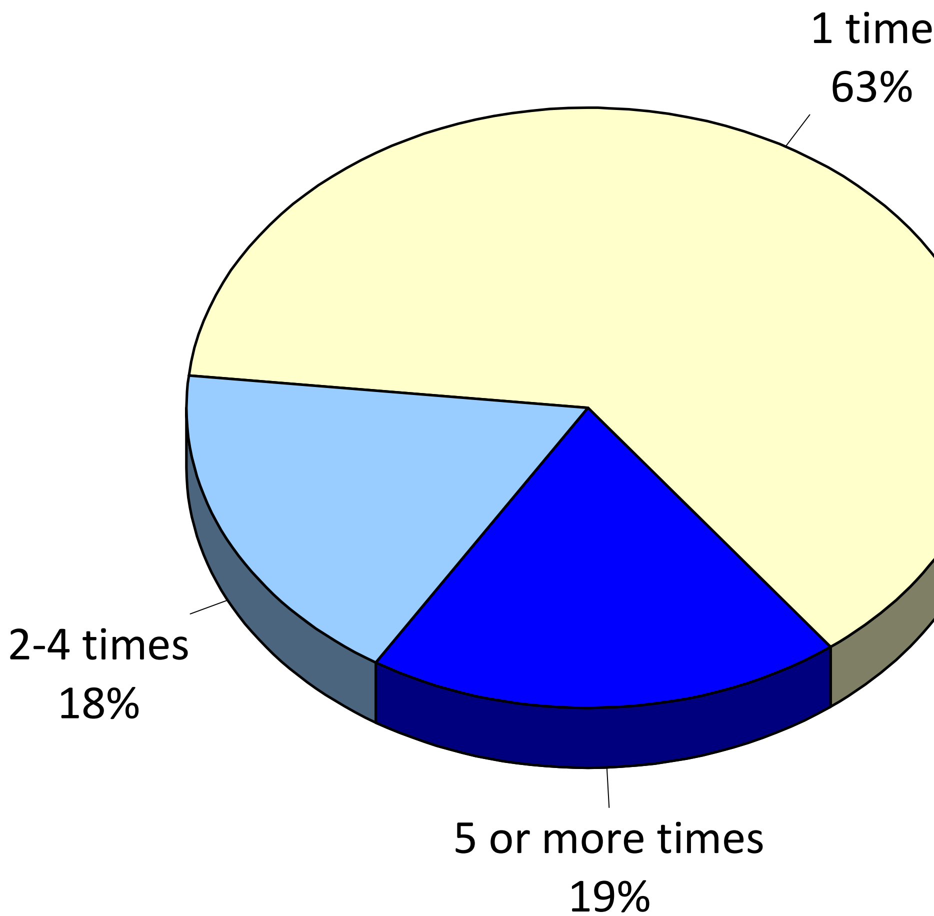
by percentage of respondents



Source: ETC Institute Regional Travel Survey (2024)

Q9a. How often do you use CyRide during a typical week?

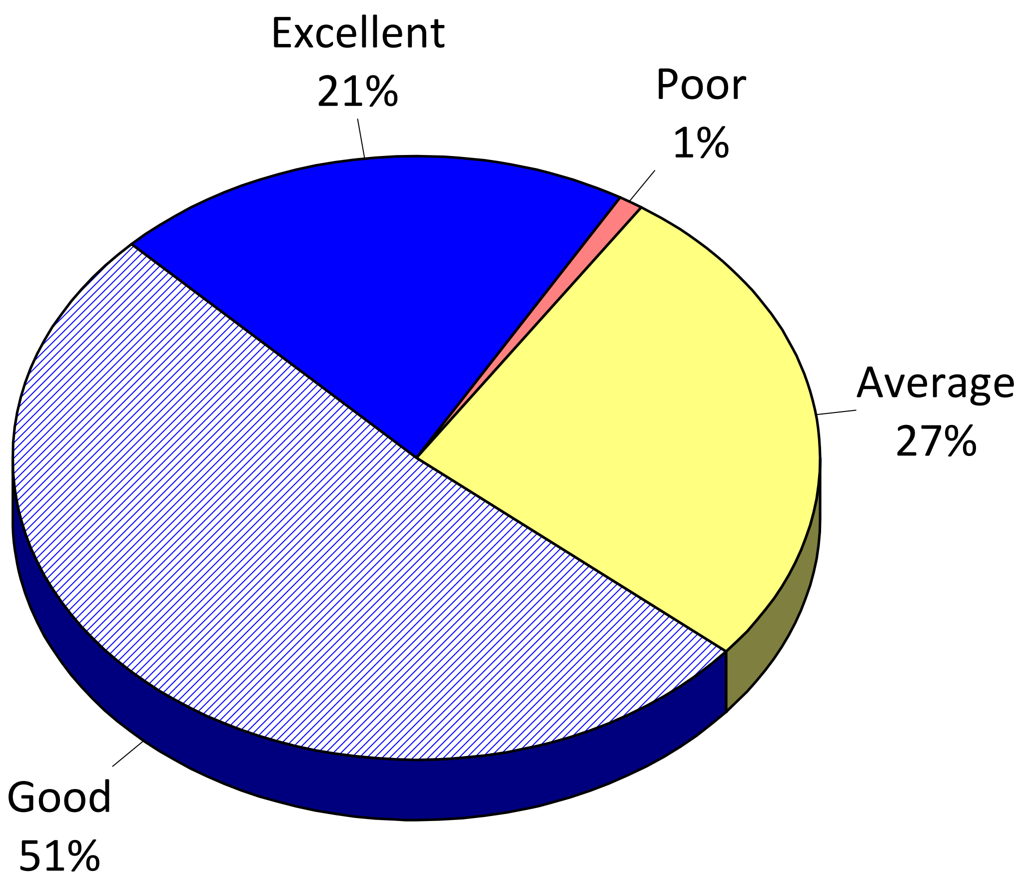
by percentage of respondents who have used CyRide in the past 12 months (excluding "not provided")



Source: ETC Institute Regional Travel Survey (2024)

Q9b. How would you rate the availability of public transit in Ames?

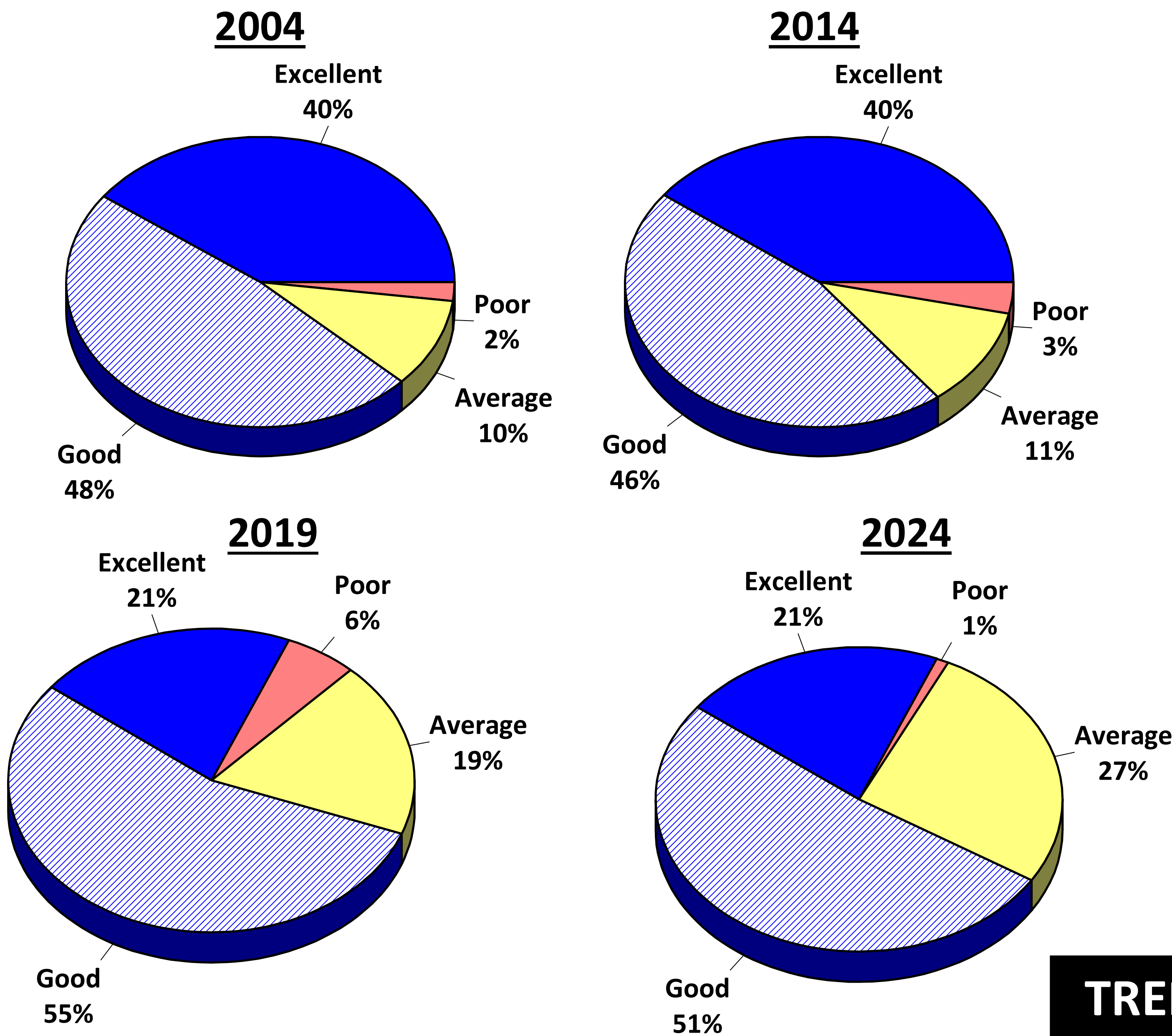
by percentage of respondents who have used CyRide in the past 12 months (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q9b. How would you rate the availability of public transit in Ames?

by percentage of respondents who have used CyRide in the past 12 months (excluding "don't know")

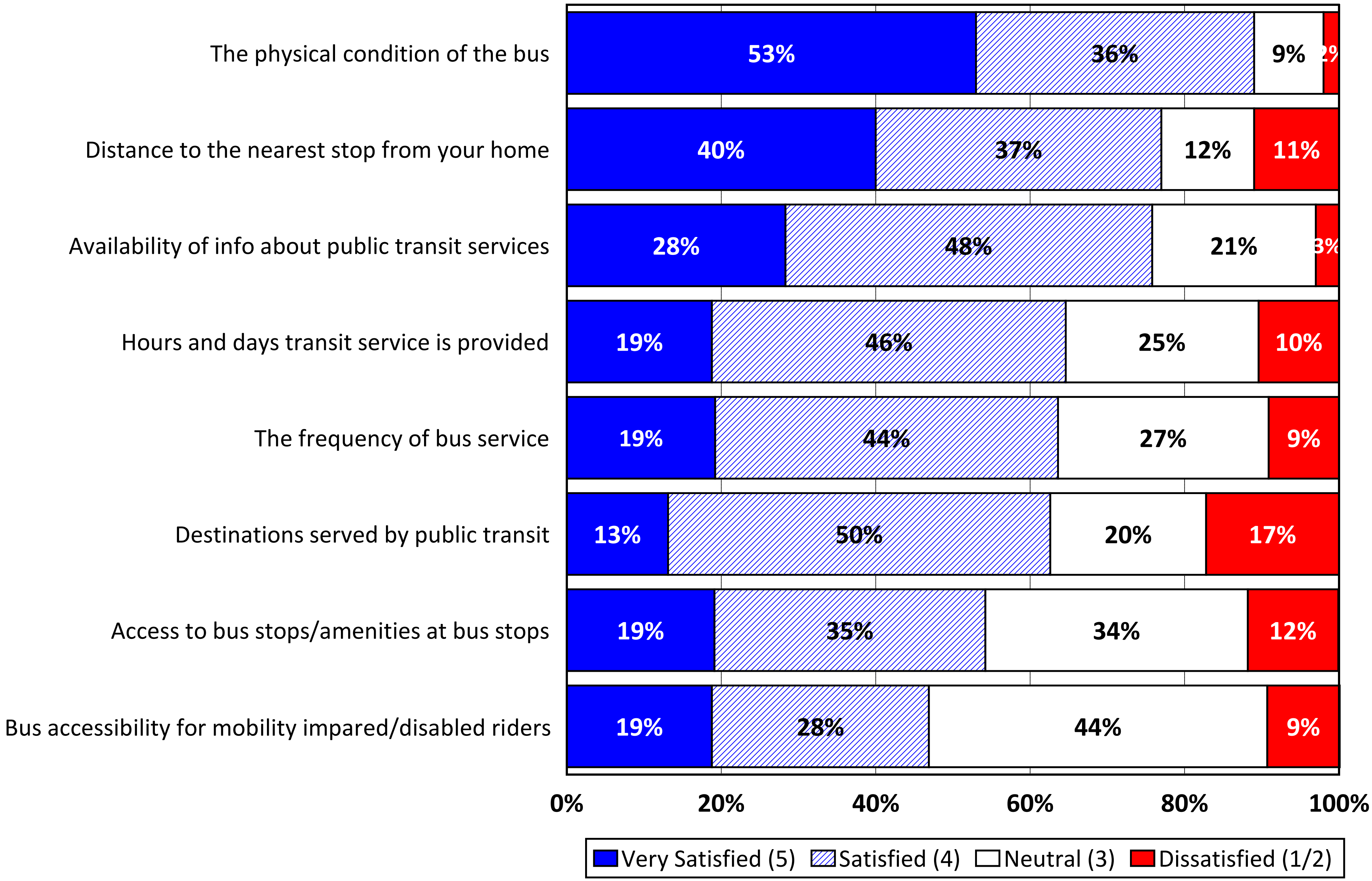


TREND

Source: ETC Institute Regional Travel Survey (2024)

Q9c. Satisfaction With Transit Availability in the Ames Area

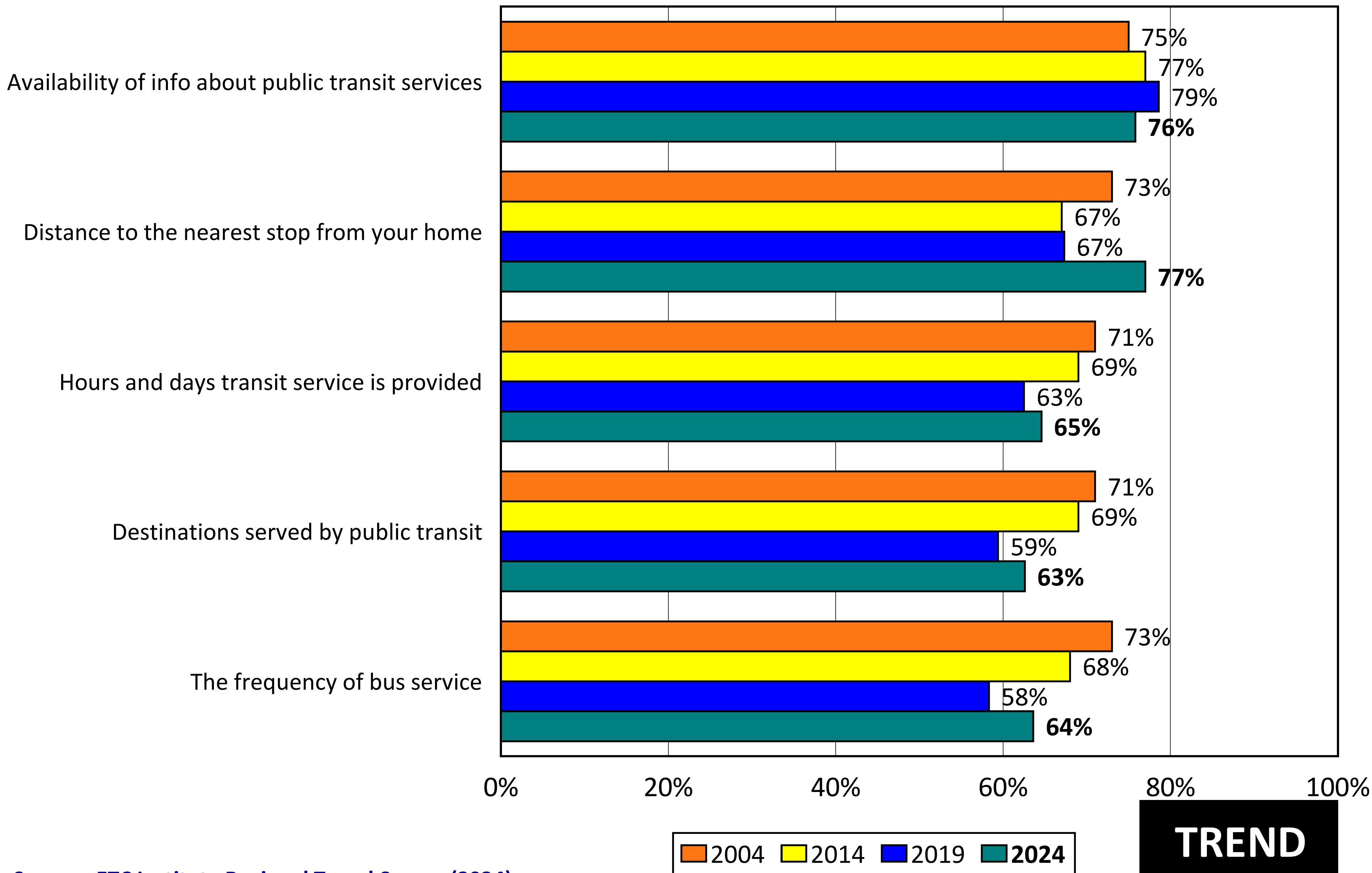
by percentage of respondents who have used CyRide in the past 12 months (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q9c. Satisfaction With Transit Availability in the Ames Area

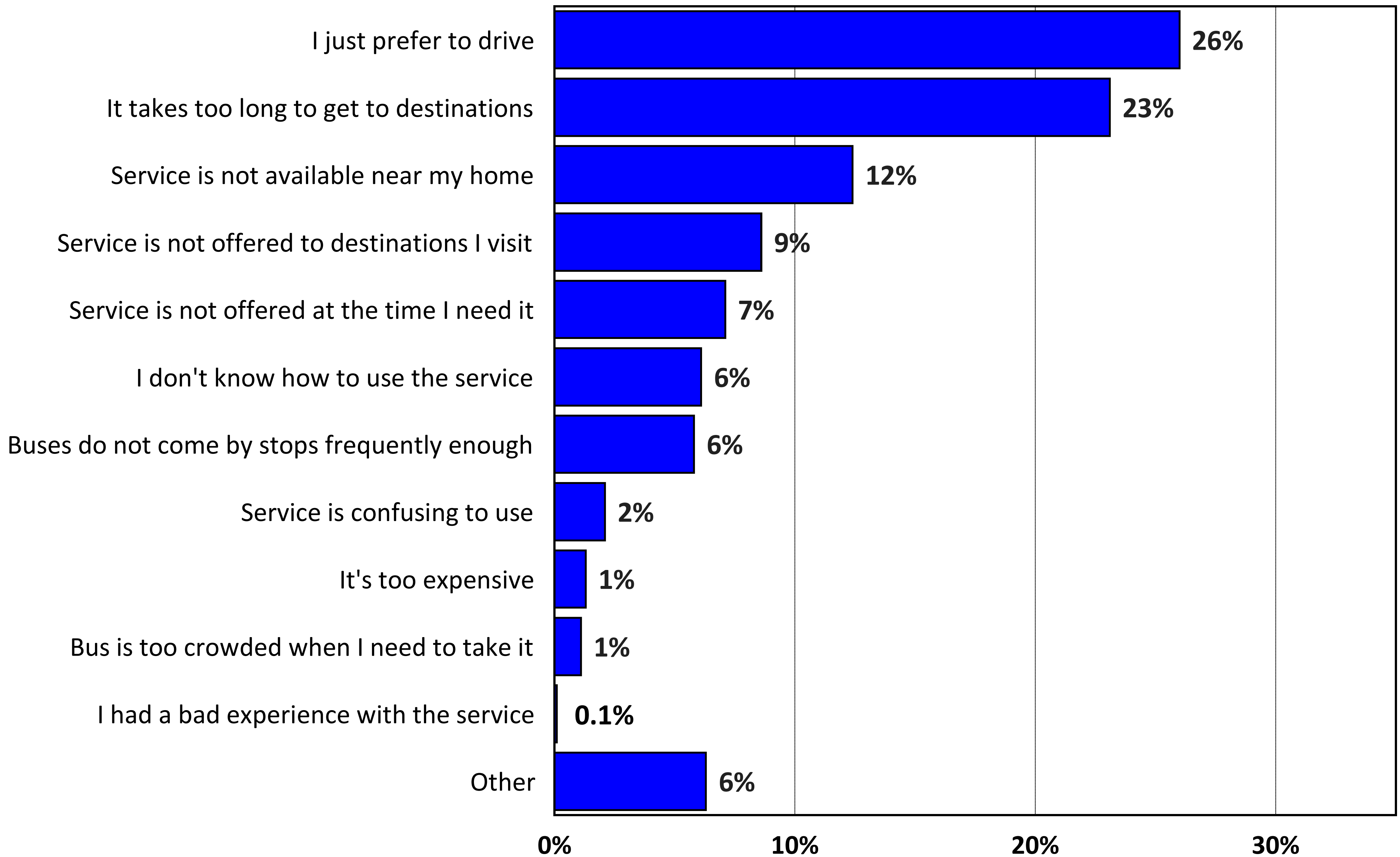
by percentage of respondents who rated the item as a 4 or 5 on a 5-point scale (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q10. Which of the following are reasons that you do not use public transit more often?

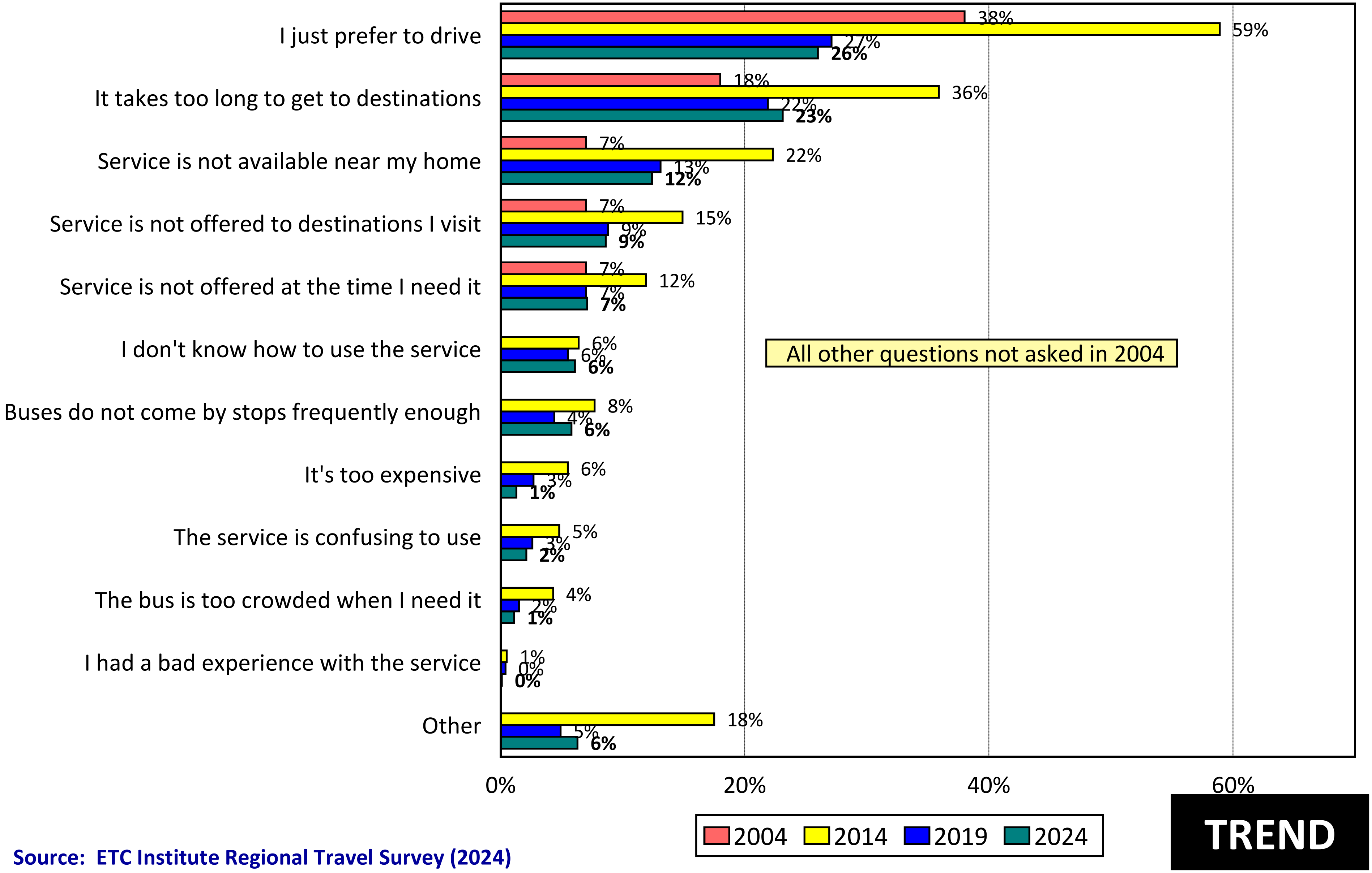
by percentage of respondents (multiple selections could be made)



Source: ETC Institute Regional Travel Survey (2024)

Q10. Which of the following are reasons that you do not use public transit more often?

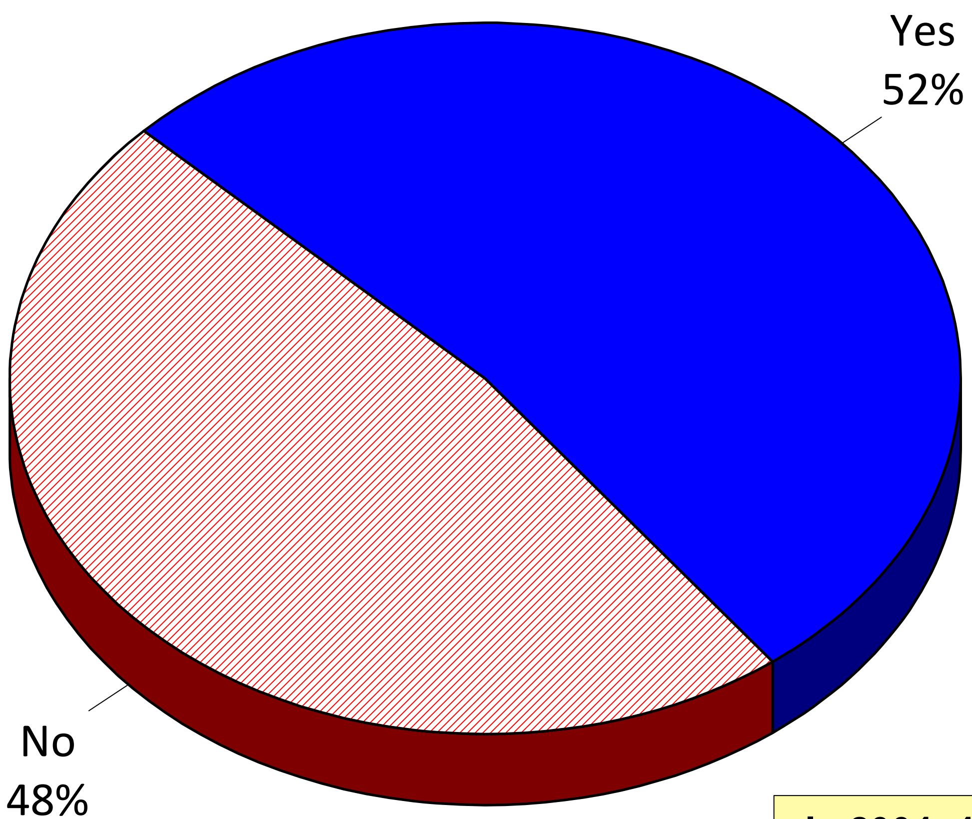
by percentage of respondents (multiple selections could be made)



Source: ETC Institute Regional Travel Survey (2024)

Q11. Have you ridden a bicycle in the Ames area during the past year?

by percentage of respondents (excluding "not provided")

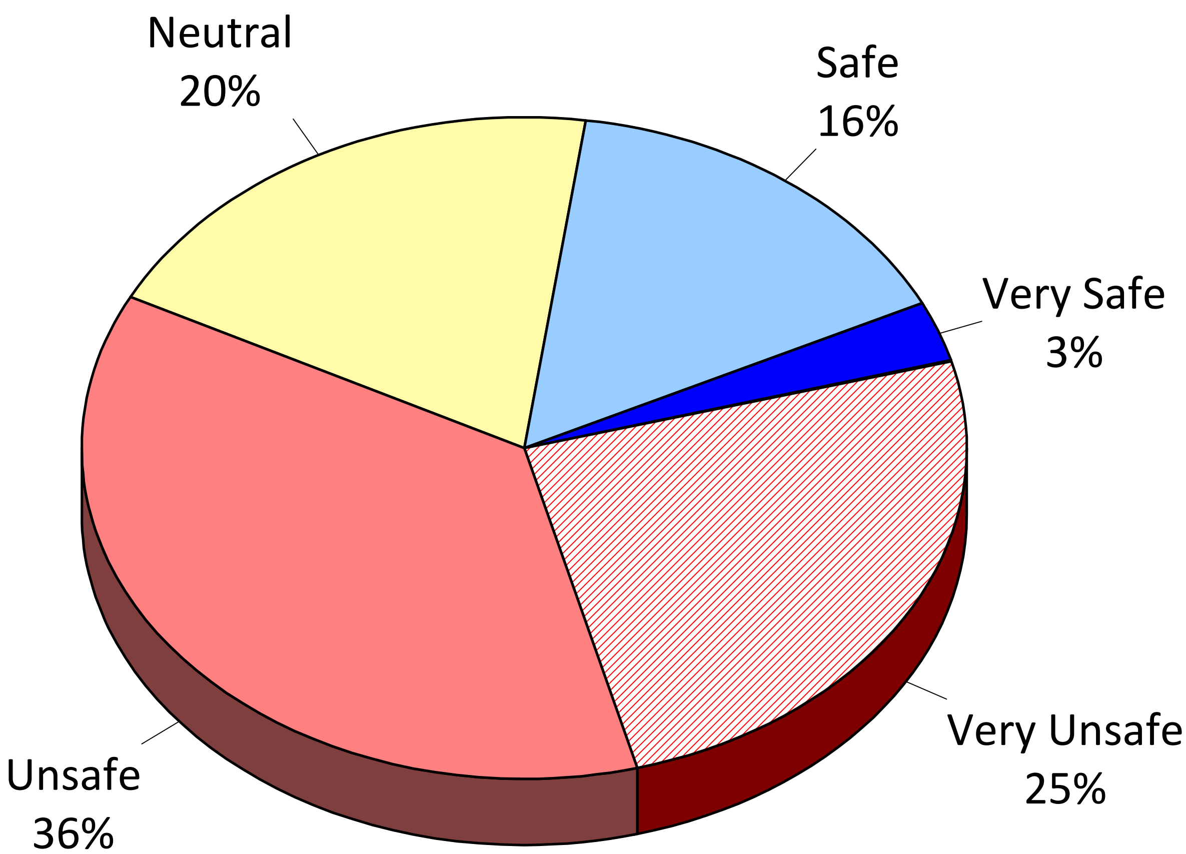


In 2004, 48% had ridden a bike in the past year. In 2014, it was 53%. In 2019, 47%.

Source: ETC Institute Regional Travel Survey (2024)

Q11a. How safe do you feel bicycling on major streets without bike lanes?

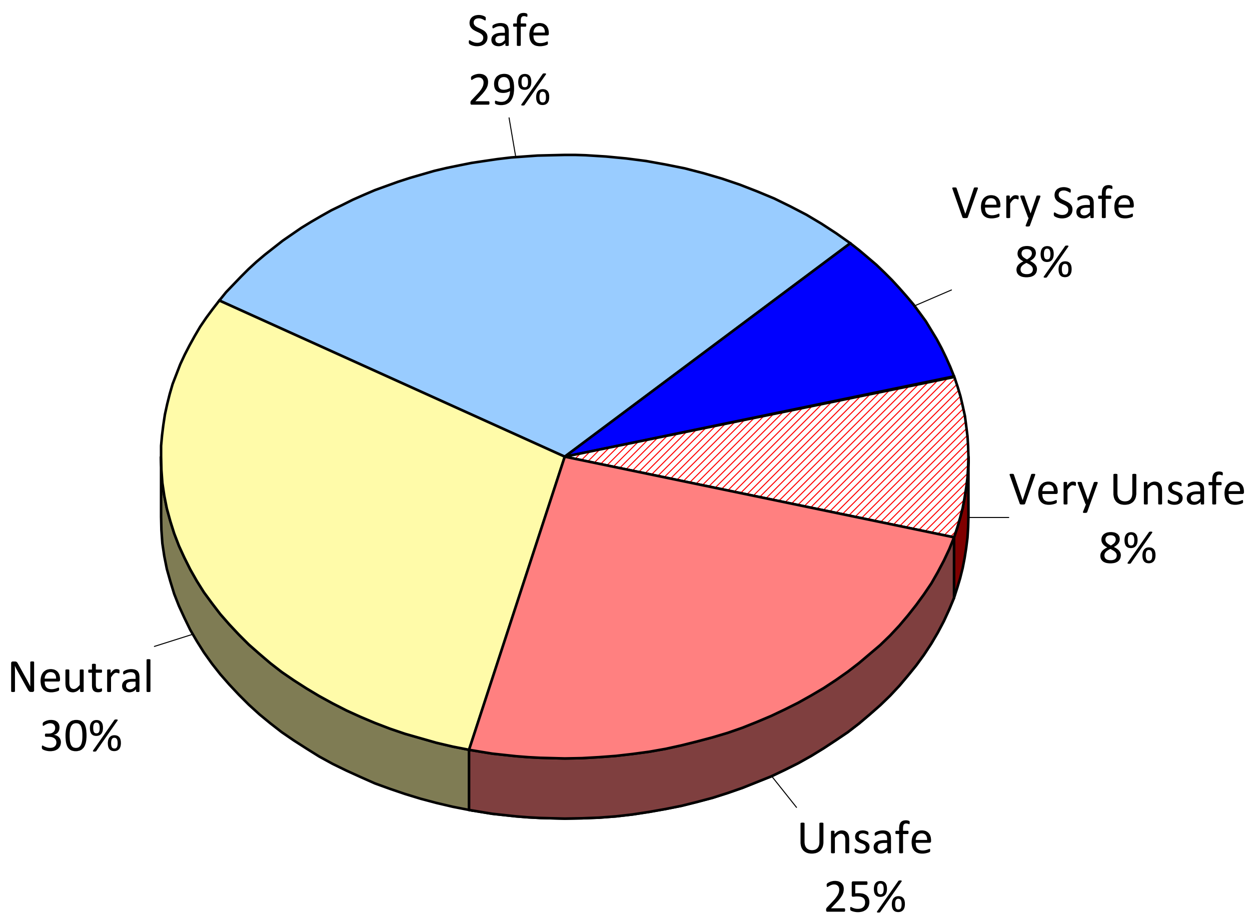
by percentage of respondents who have ridden a bicycle in the Ames area during the past year (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q11b. How safe do you feel bicycling on streets with an on-street bike lane?

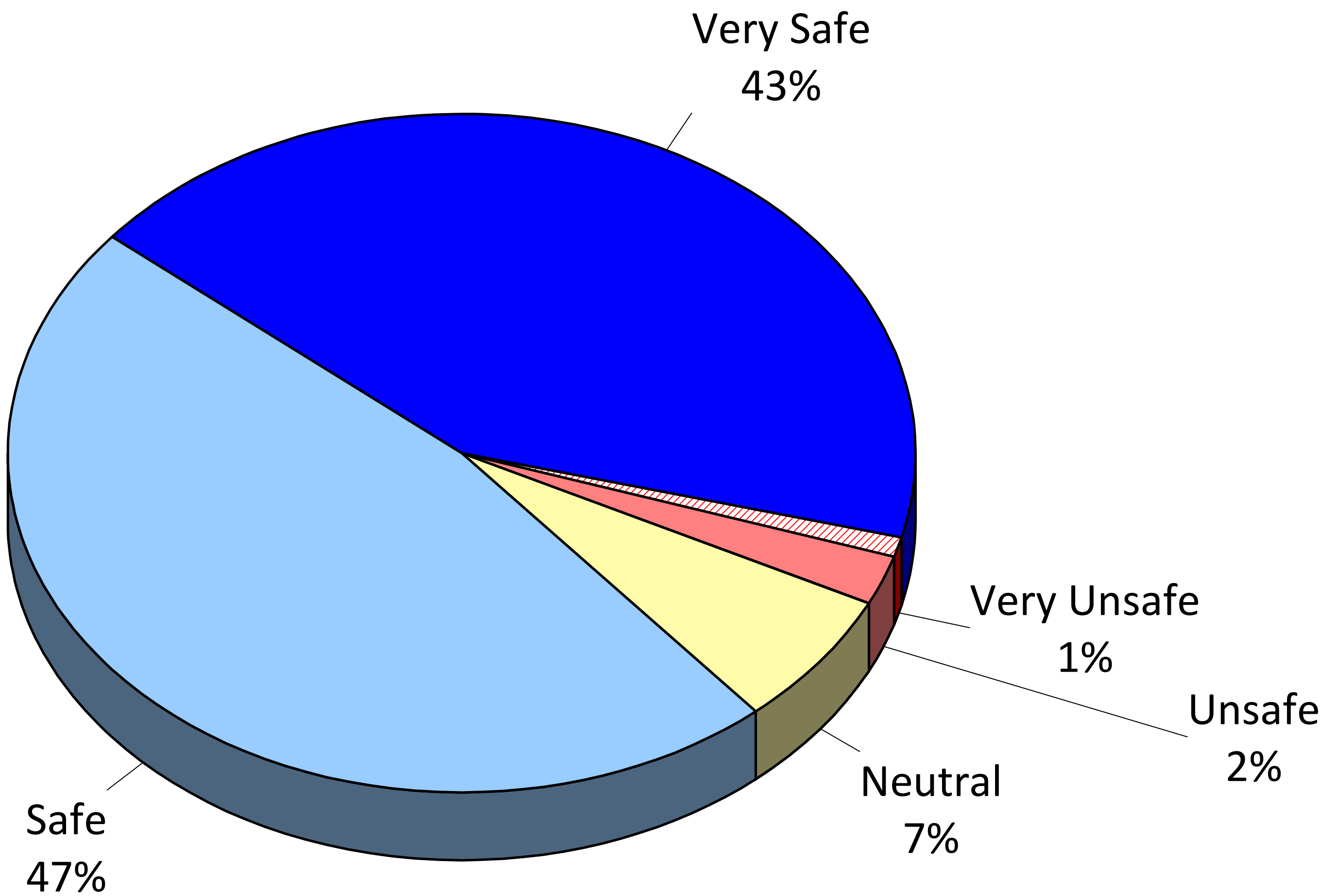
by percentage of respondents who have ridden a bicycle in the Ames area during the past year (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q11c. How safe do you feel bicycling on a shared-use path or trail?

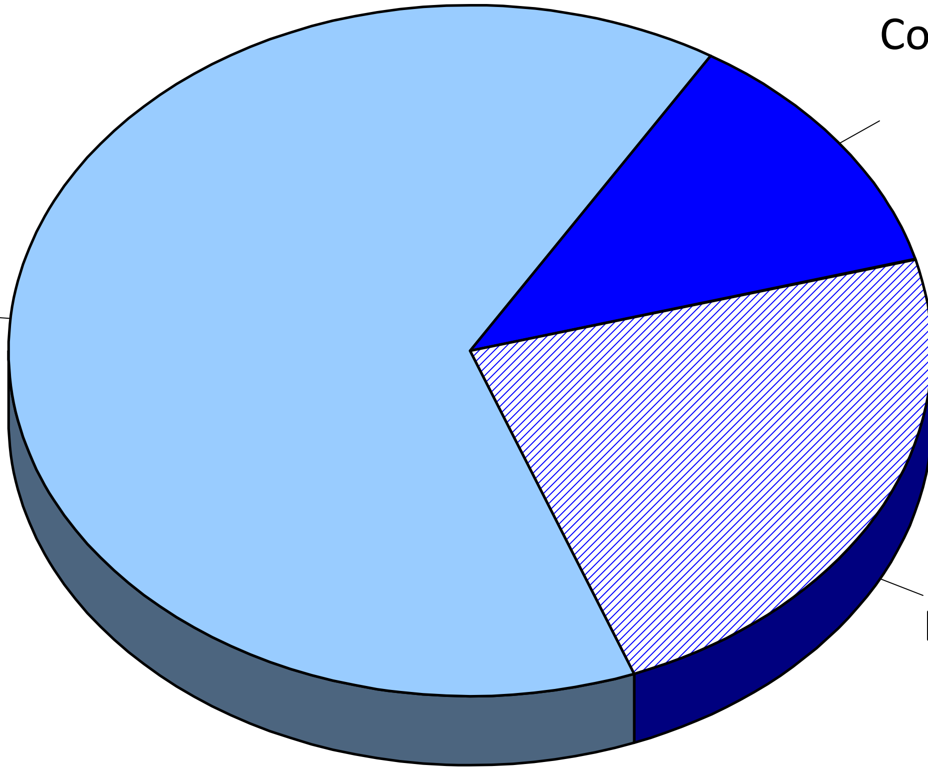
by percentage of respondents who have ridden a bicycle in the Ames area during the past year (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q11d. What is the primary reason why you ride your bike?

by percentage of respondents who have ridden a bicycle in the Ames area during the past year (excluding "not provided")

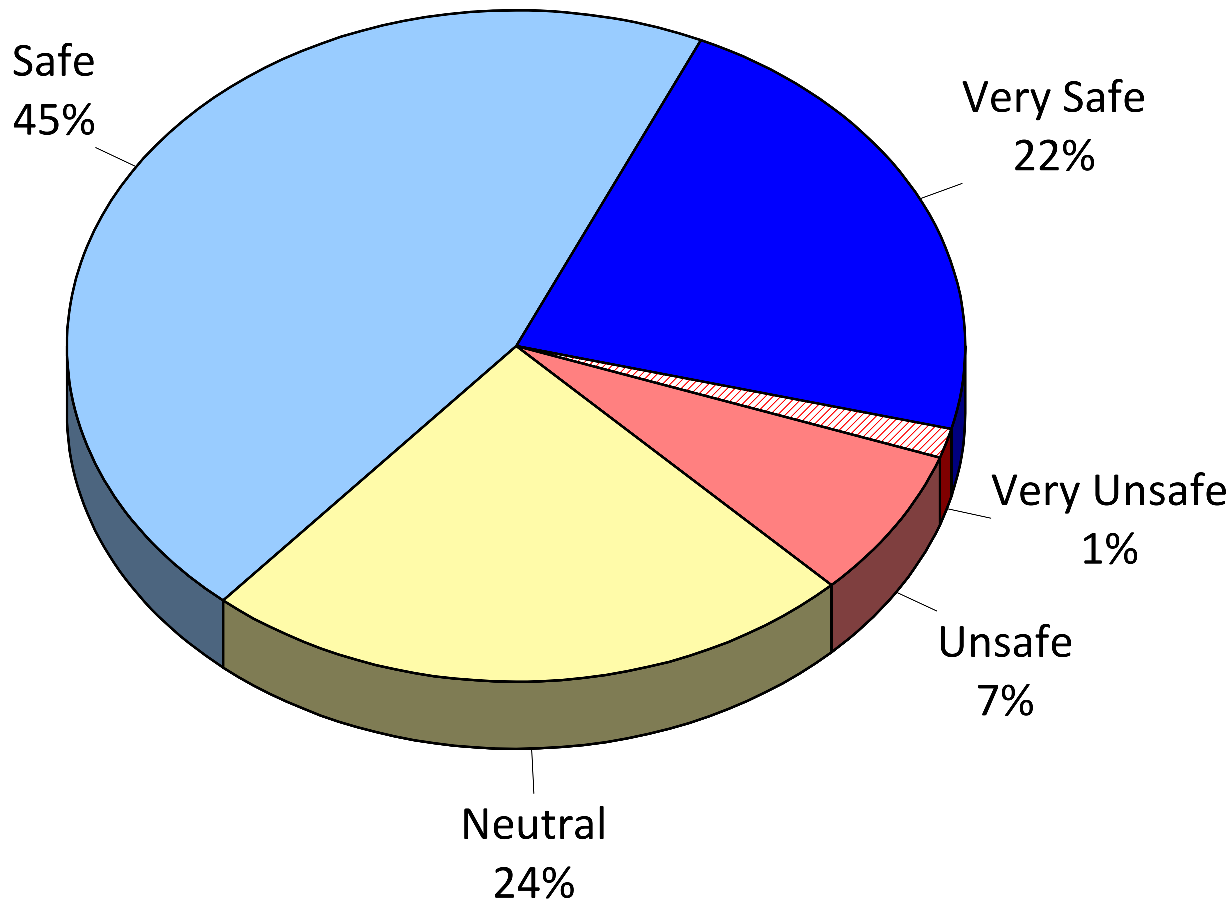


In 2019, 64% rode for recreation, 10% rode to commute, and 26% rode for both purposes.

Source: ETC Institute Regional Travel Survey (2024)

Q12. How safe do you feel, walking or using a wheelchair on sidewalks along major streets?

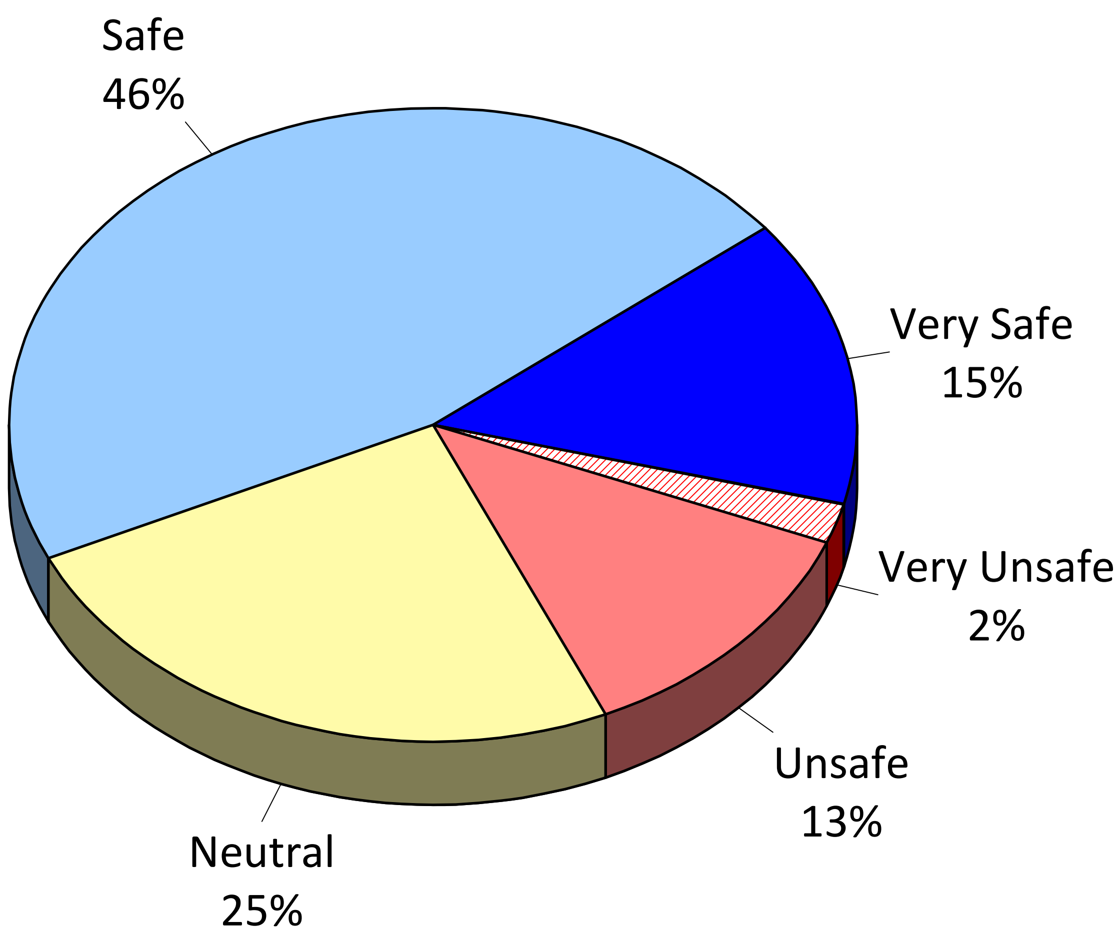
by percentage of respondents (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q13. How safe do you feel using pedestrian crossings on major streets?

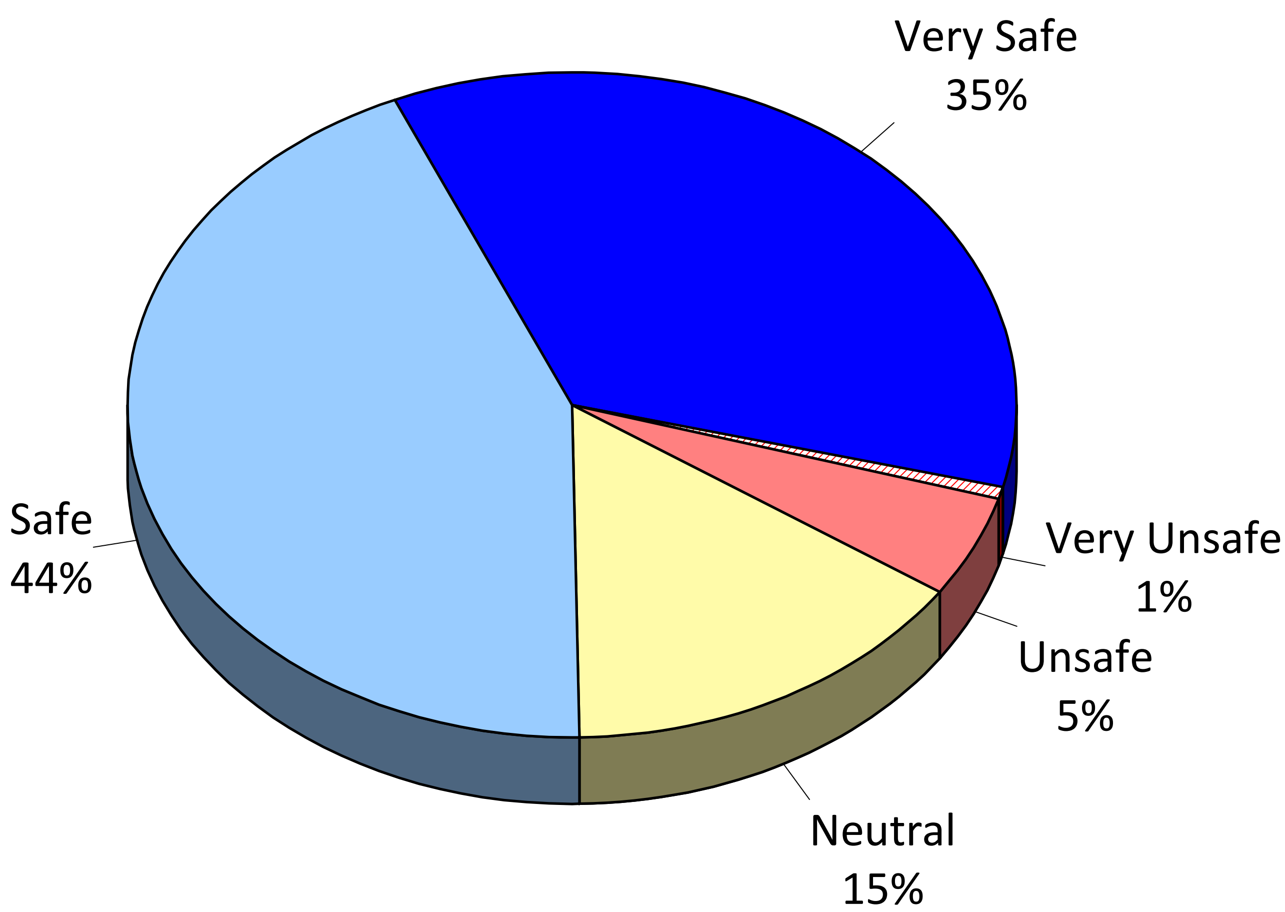
by percentage of respondents (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q14. How safe do you feel walking or using a wheelchair on a shared-use path or trail or sidewalk in the area where you live?

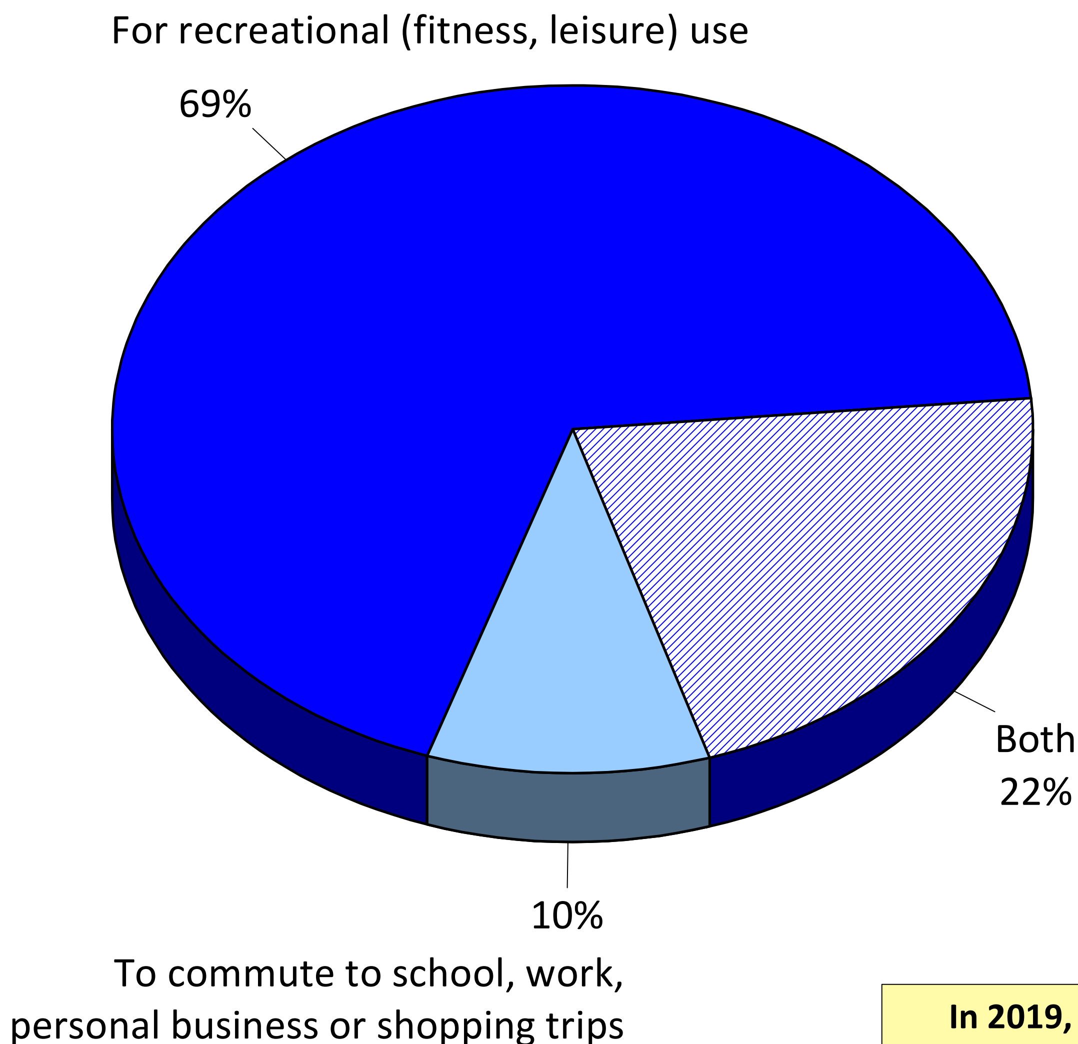
by percentage of respondents (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q15. What is the primary reason for your pedestrian travel?

by percentage of respondents (excluding "not provided")

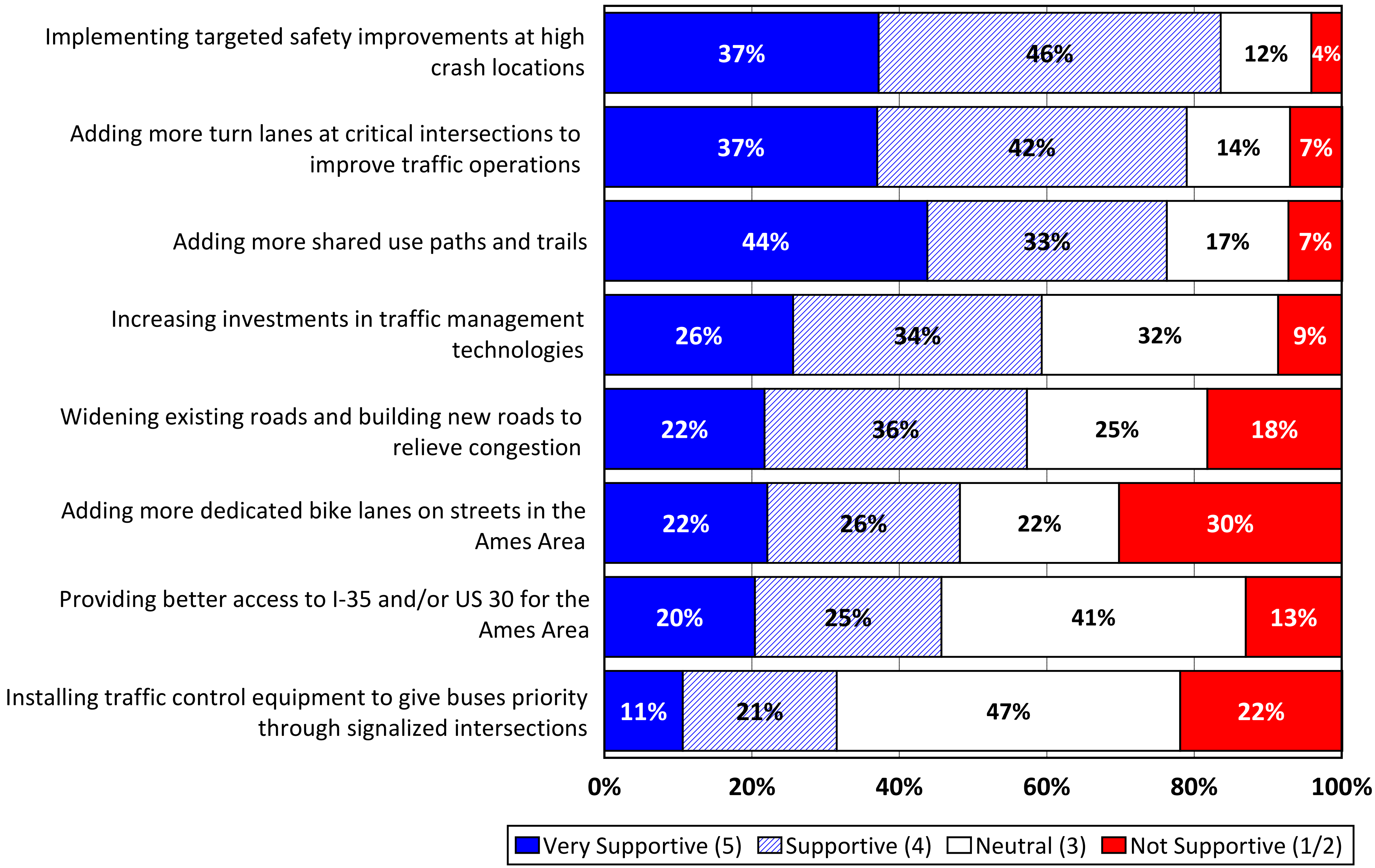


In 2019, 68% walked for recreation, 11% walked to commute, and 21% walked for both purposes.

Source: ETC Institute Regional Travel Survey (2024)

Q16. Support for the Following System Enhancements

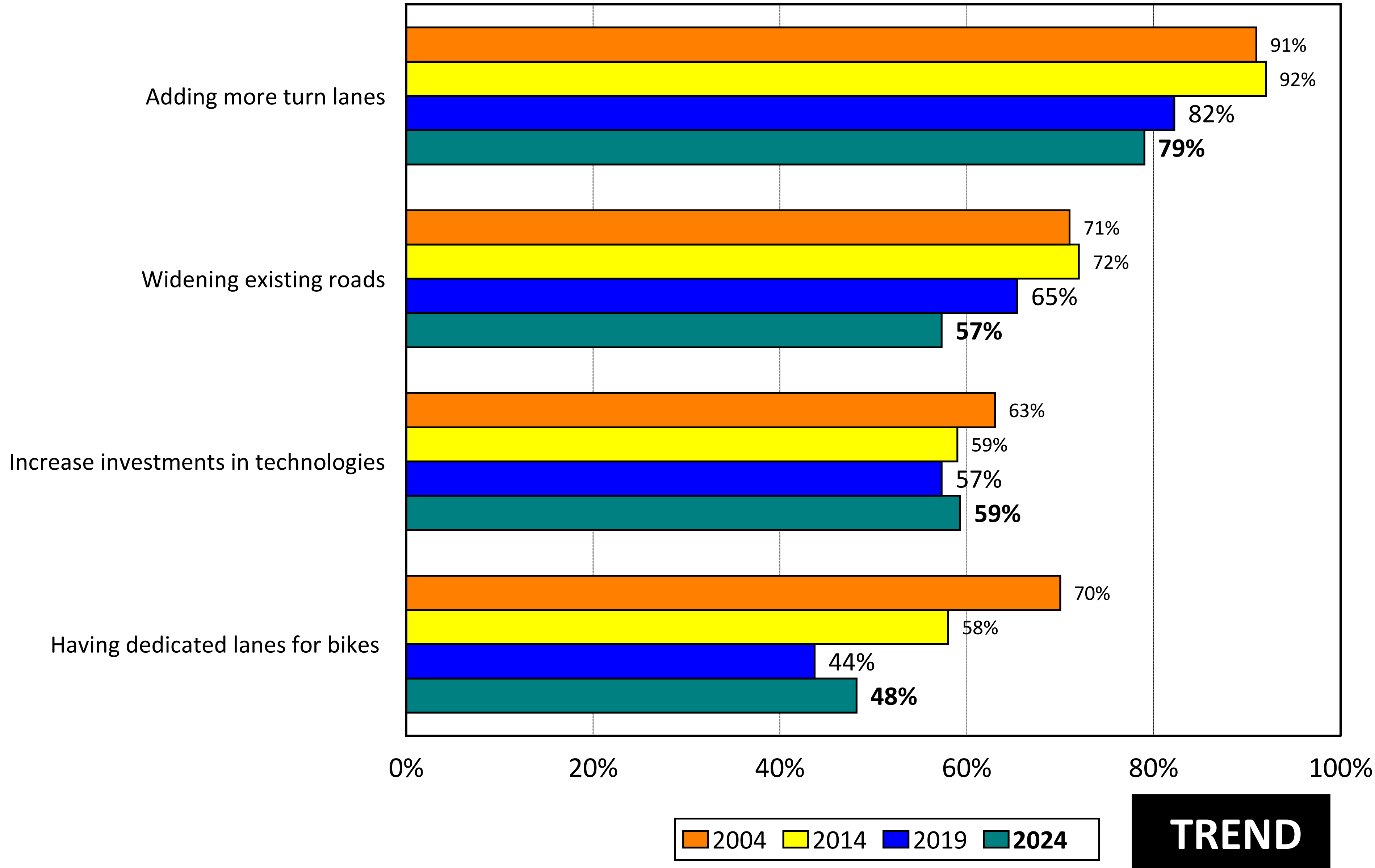
by percentage of respondents (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q16. Support for the Following System Enhancements

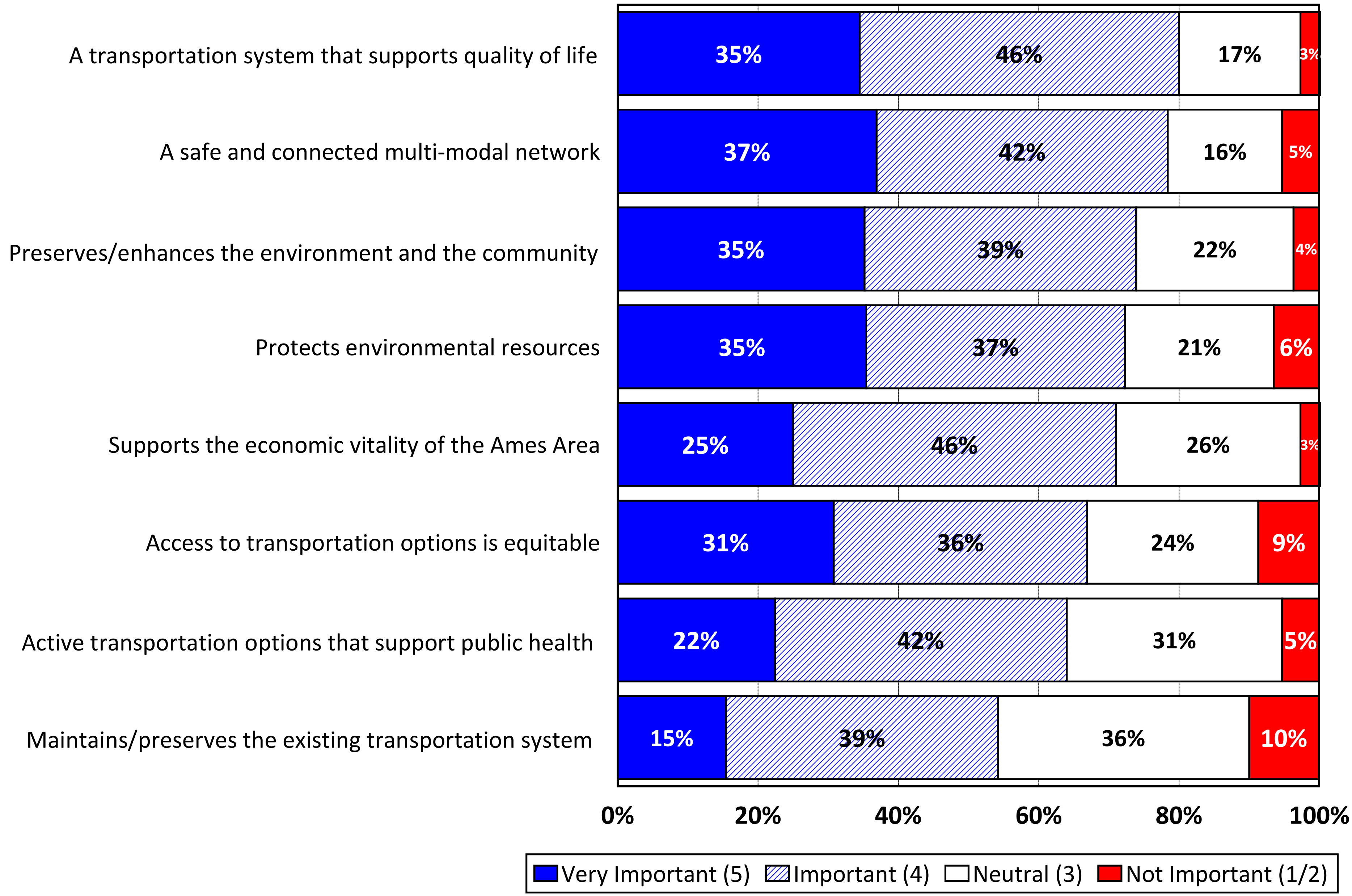
by percentage of respondents who were "very supportive" or "supportive" (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q17. Importance of the Following Long-Range Goals

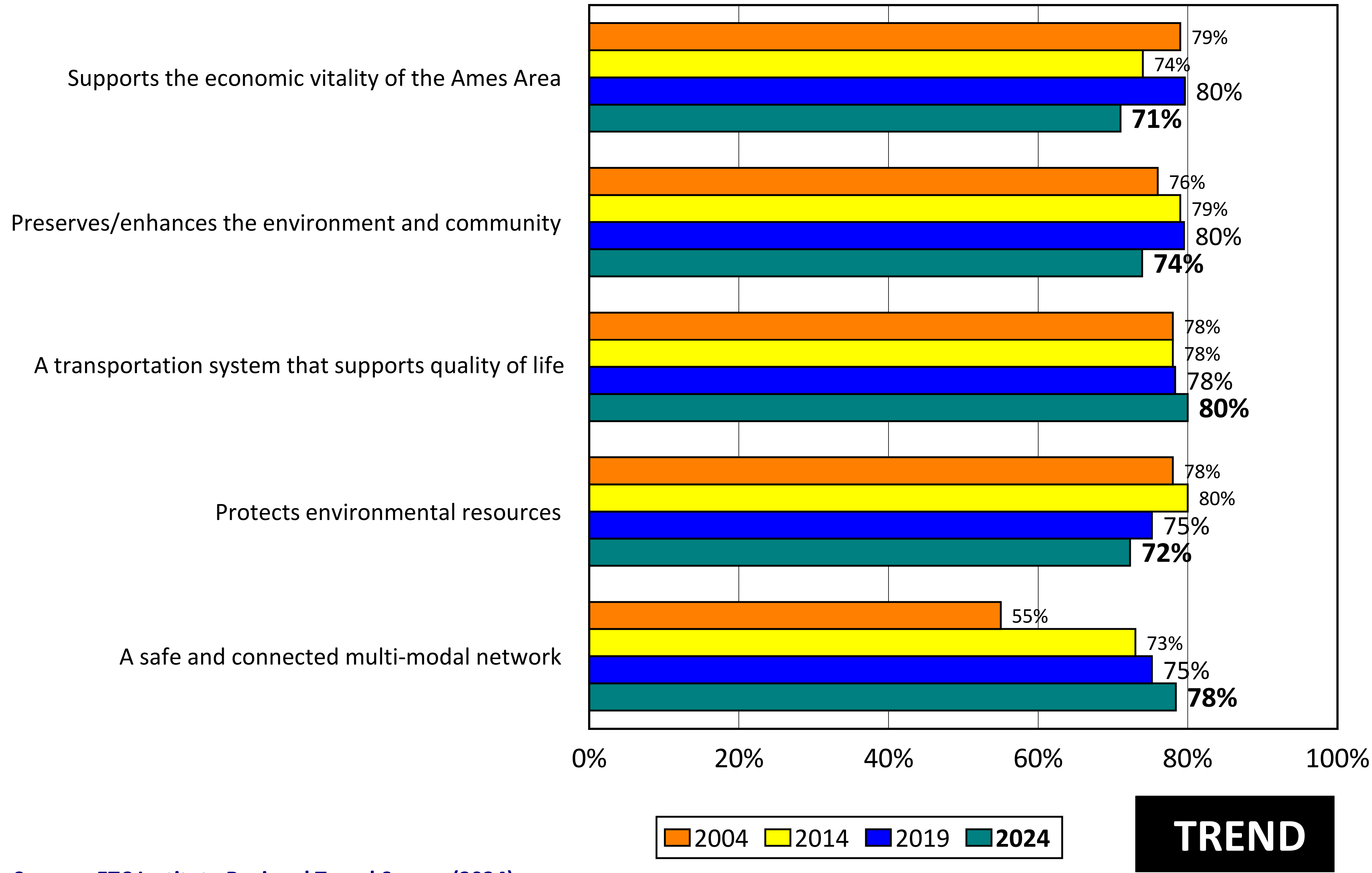
by percentage of respondents (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q17. Importance of the Following Long-Range Goals

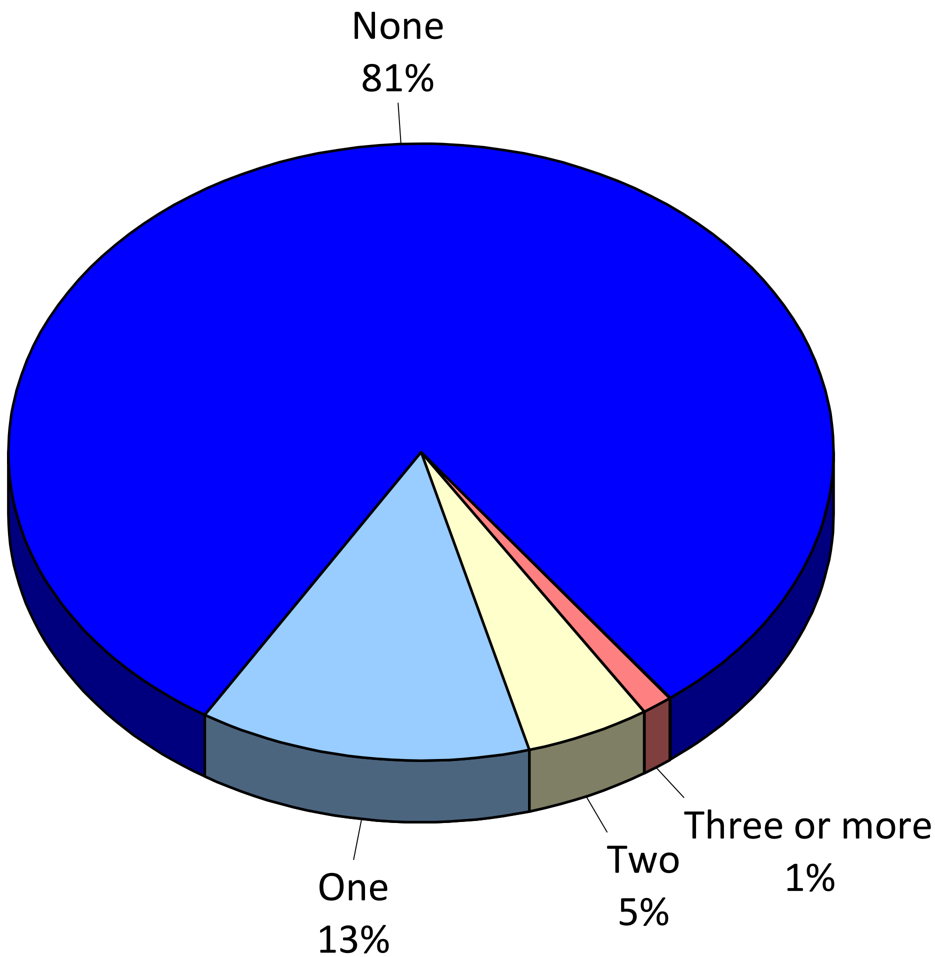
by percentage of respondents who rated the item as a 4 or 5 on a 5-point scale (excluding "don't know")



Source: ETC Institute Regional Travel Survey (2024)

Q18. How many persons in your household are dependent on public transit or rides from friends/relatives because they do not have a car or do not drive?

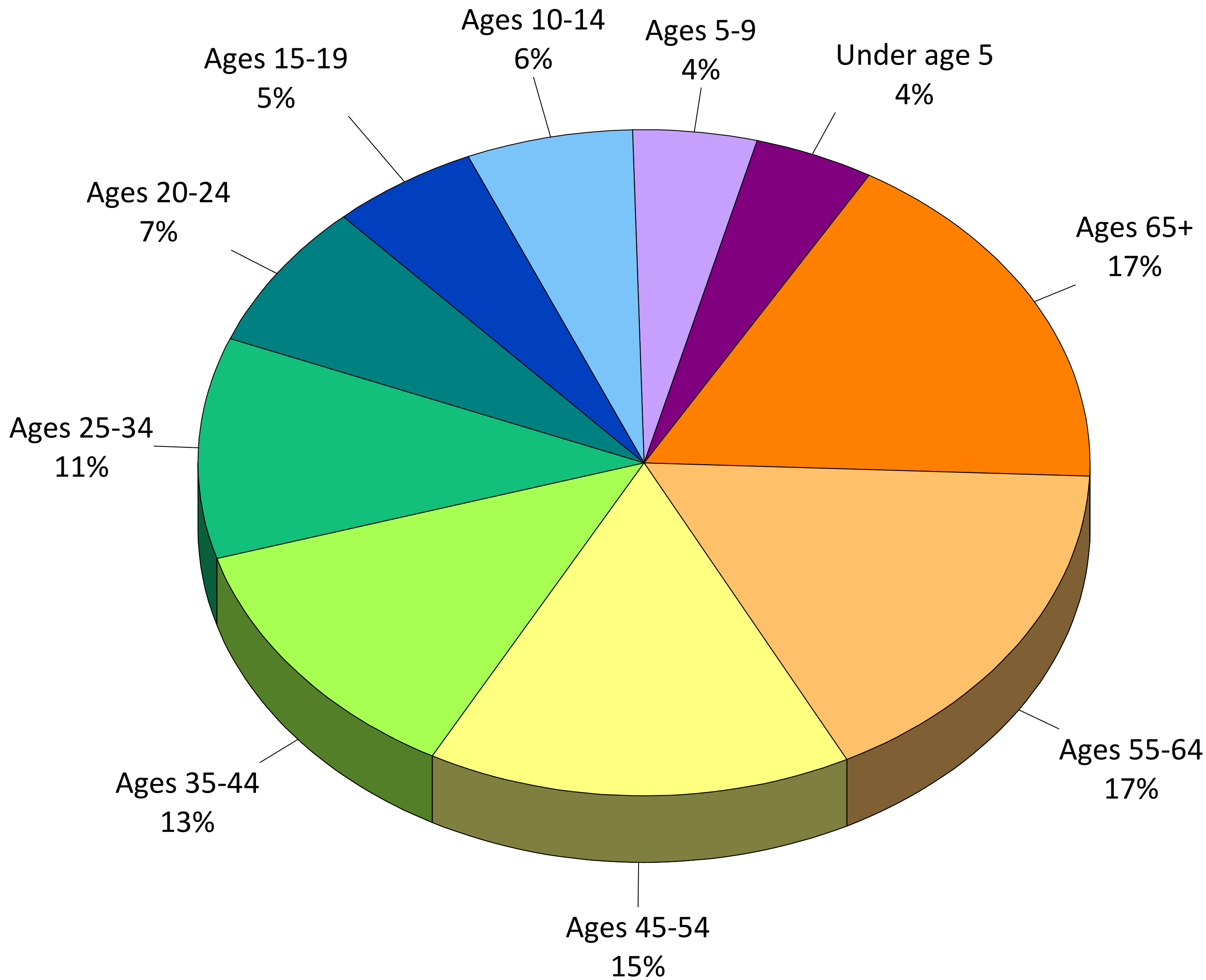
by percentage of respondents



Source: ETC Institute Regional Travel Survey (2024)

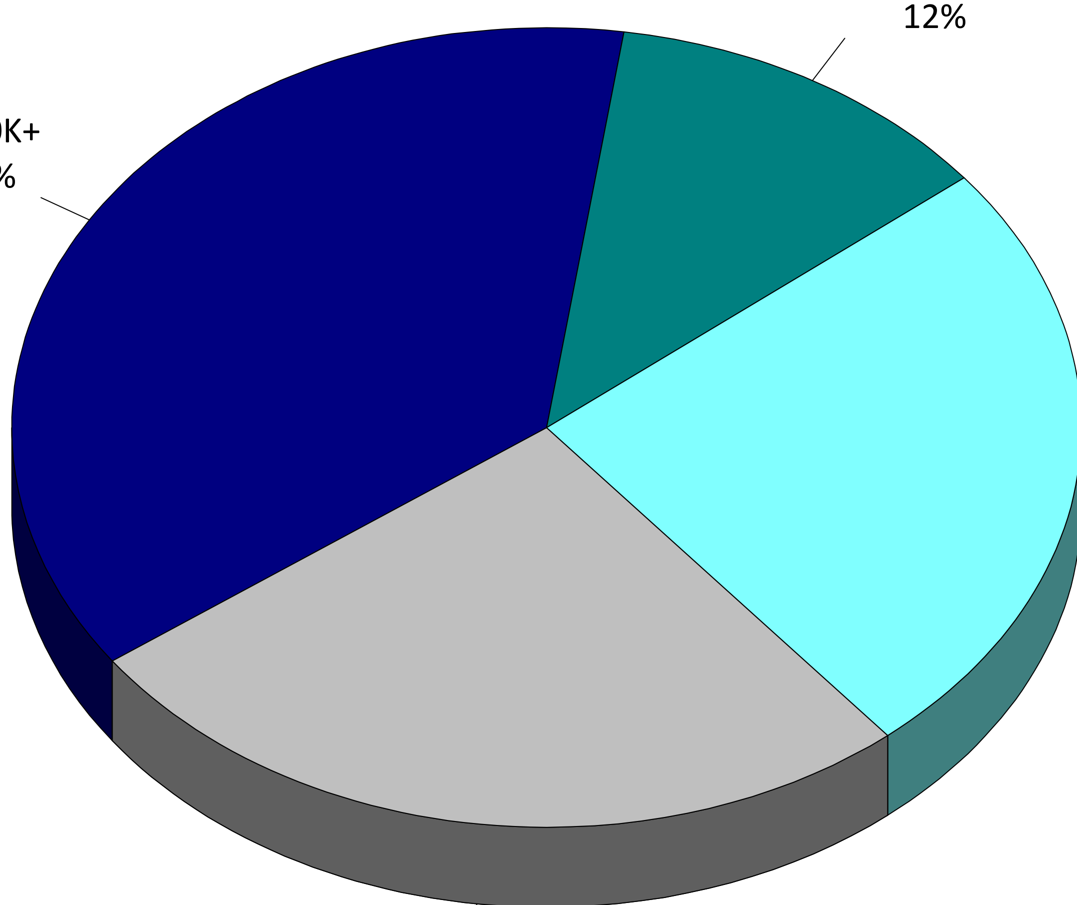
Q19. Including yourself, how many people in your household are...

by percentage of persons in household



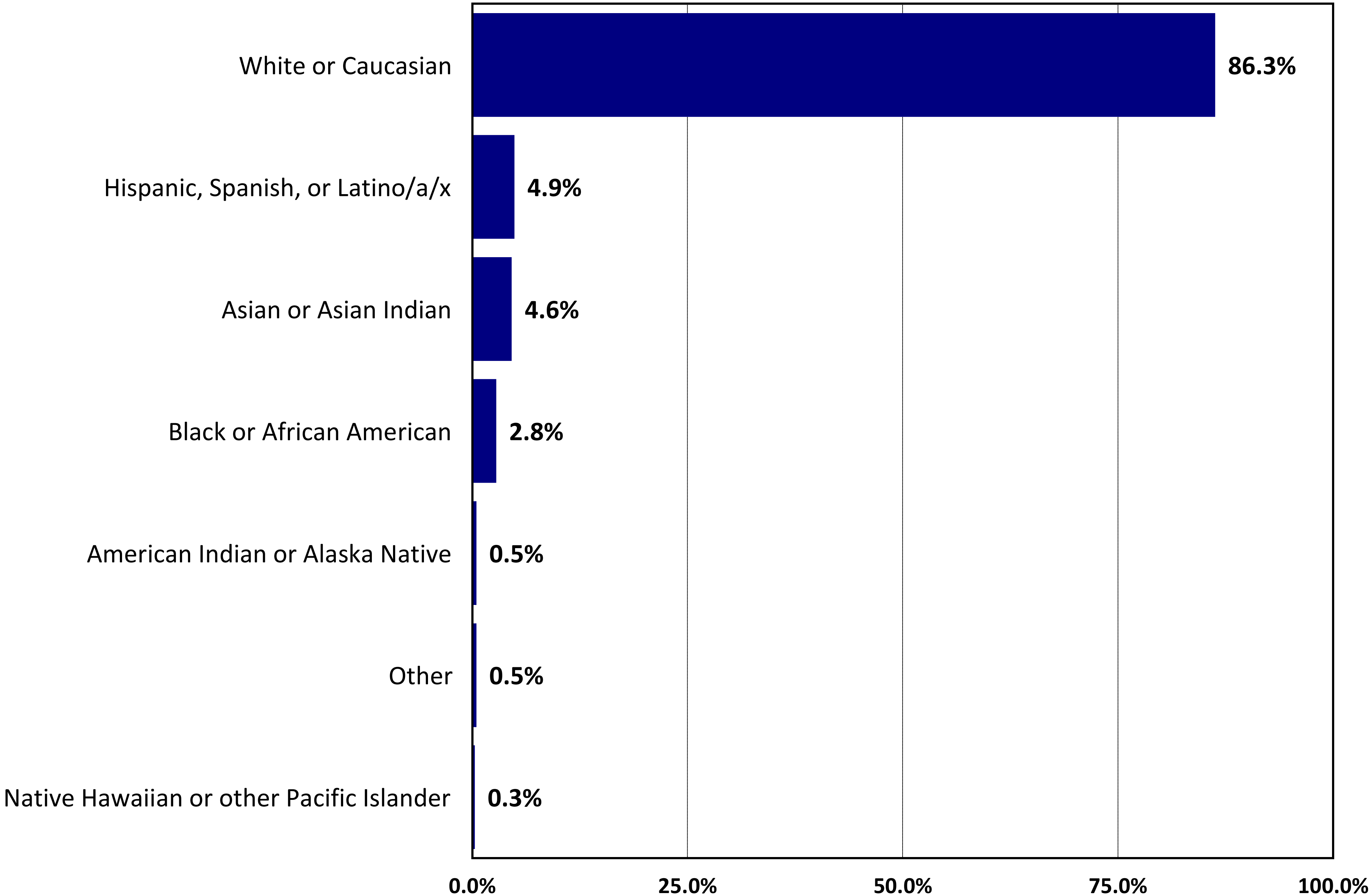
Q20. Would you say your total household income is...

by percentage of respondents (excluding “not provided")



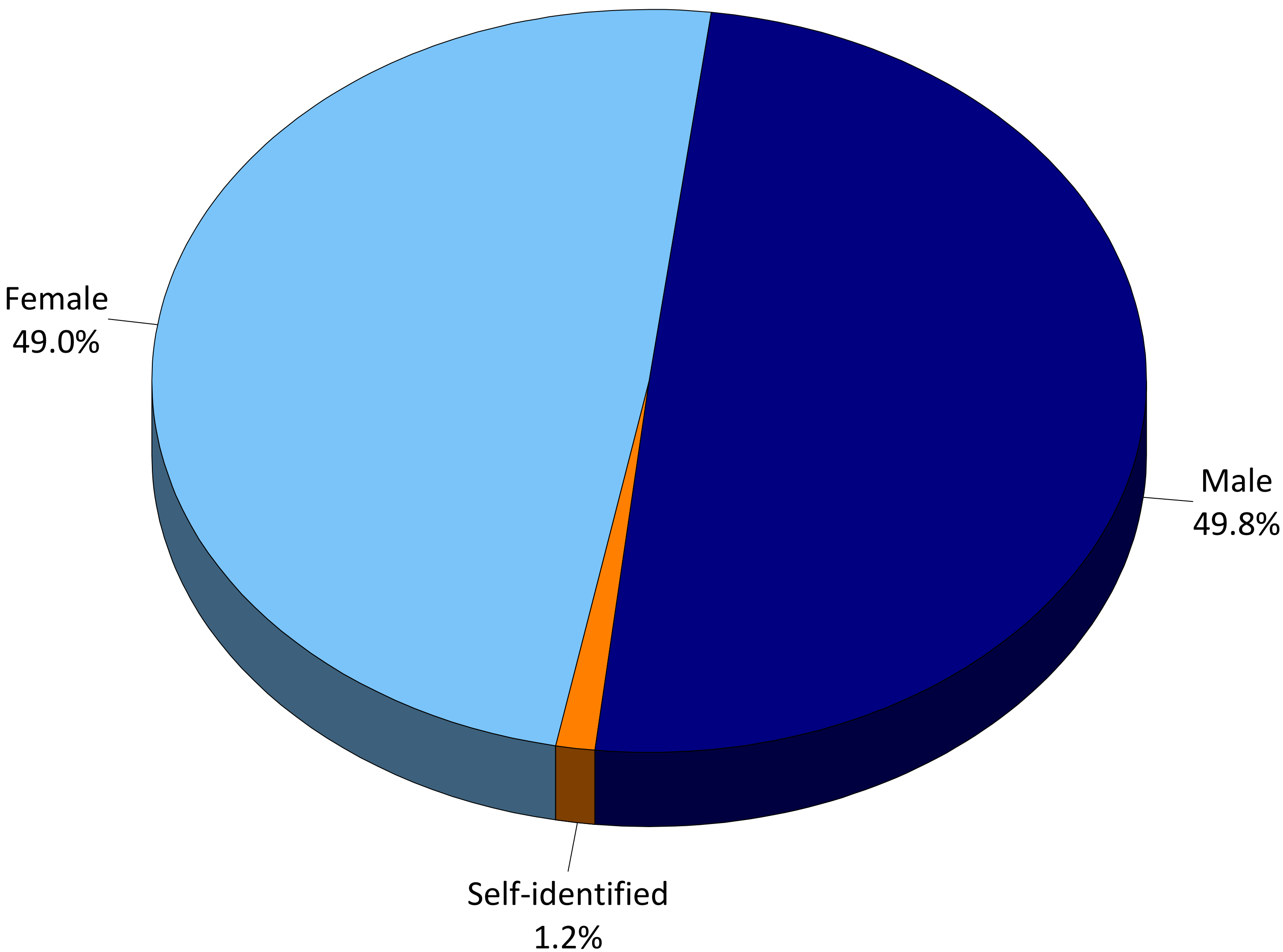
Q21. Which of the following best describes your race/ethnicity?

by percentage of respondents (excluding "prefer not to say")



Q22. Your gender:

by percentage of respondents (excluding "not provided")



3 Tabular Data

Q1. How many operating vehicles (cars, trucks, motorcycles/mopeds, vans) do you have in your household?

Q1. How many operating vehicles do you have in your household	Number	Percent
0	3	0.7 %
1	97	23.9 %
2	205	50.5 %
3	61	15.0 %
4	22	5.4 %
5+	16	3.9 %
Not provided	2	0.5 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")

Q1. How many operating vehicles (cars, trucks, motorcycles/mopeds, vans) do you have in your household? (without "not provided")

Q1. How many operating vehicles do you have in your household	Number	Percent
0	3	0.7 %
1	97	24.0 %
2	205	50.7 %
3	61	15.1 %
4	22	5.4 %
5+	16	4.0 %
Total	404	100.0 %

Q2. What is your employment status?

Q2. What is your employment status	Number	Percent
Employed outside the home	264	65.0 %
Student (K-12)	1	0.2 %
Student (University)	31	7.6 %
Operate home-based business	41	10.1 %
Not currently employed	8	2.0 %
Retired	90	22.2 %
Total	435	

Q2a. In which City do you work/go to school?

Q2a. In which City do you work/go to school	Number	Percent
Ames	223	79.6 %
Des Moines	8	2.9 %
Ames/Des Moines	6	2.1 %
Nevada	5	1.8 %
Boone	4	1.4 %
Johnston	3	1.1 %
Urbandale	2	0.7 %
Iowa State University	2	0.7 %
Gilbert	2	0.7 %
Ankeny	2	0.7 %
Huxley	2	0.7 %
Slater	2	0.7 %
Webster City	2	0.7 %
Woodward	1	0.4 %
Hubbard	1	0.4 %
Des Moines/Ames	1	0.4 %
Marshalltown	1	0.4 %
Carroll	1	0.4 %
Ames, Ankeny	1	0.4 %
Ames/Nevada	1	0.4 %
Polk City	1	0.4 %
Story	1	0.4 %
Ames/Waterloo	1	0.4 %
Ames/Storm Lake	1	0.4 %
Dallas Center	1	0.4 %
Ames/Iowa City	1	0.4 %
Ames, Boone, Des Moines, Sioux Falls	1	0.4 %
Luther	1	0.4 %
West Des Moines	1	0.4 %
Grimes	1	0.4 %
Total	280	100.0 %

Q2b. What method of transportation do you normally use to go to work/school?

Q2b. What method of transportation do you normally use to go to work/school	Number	Percent
Car/truck-drive alone	226	80.7 %
Carpool	9	3.2 %
Walk	17	6.1 %
Bicycle	21	7.5 %
Public transit (CyRide)	4	1.4 %
Other	3	1.1 %
Total	280	100.0 %

Q2c. How many miles is your place of employment/school from your home?

Q2c. How many miles is your place of employment/school from your home	Number	Percent
0-2	81	28.9 %
3-5	108	38.6 %
6-10	43	15.4 %
11-15	7	2.5 %
16-20	5	1.8 %
21-25	1	0.4 %
26-30	8	2.9 %
31+	25	8.9 %
Not provided	2	0.7 %
Total	280	100.0 %

(WITHOUT "NOT PROVIDED")
Q2c. How many miles is your place of employment/school from your home? (without "not provided")

Q2c. How many miles is your place of employment/school from your home	Number	Percent
0-2	81	29.1 %
3-5	108	38.8 %
6-10	43	15.5 %
11-15	7	2.5 %
16-20	5	1.8 %
21-25	1	0.4 %
26-30	8	2.9 %
31+	25	9.0 %
Total	278	100.0 %

Q3-1. On a typical weekday, how many one-way trips do you normally make driving a car or truck alone?

Q3-1. Drive a car/truck alone	Number	Percent
0-5	284	70.0 %
6-10	64	15.8 %
11-15	18	4.4 %
16-20	22	5.4 %
21+	10	2.5 %
Not provided	8	2.0 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")
Q3-1. On a typical weekday, how many one-way trips do you normally make driving a car or truck alone? (without "not provided")

Q3-1. Drive a car/truck alone	Number	Percent
0-5	284	71.4 %
6-10	64	16.1 %
11-15	18	4.5 %
16-20	22	5.5 %
21+	10	2.5 %
Total	398	100.0 %

Q3-2. On a typical weekday, how many one-way trips do you normally make carpooling?

Q3-2. Carpool	Number	Percent
0	352	86.7 %
1	11	2.7 %
2	24	5.9 %
3+	11	2.7 %
Not provided	8	2.0 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")
Q3-2. On a typical weekday, how many one-way trips do you normally make carpooling? (without "not provided")

Q3-2. Carpool	Number	Percent
0	352	88.4 %
1	11	2.8 %
2	24	6.0 %
3+	11	2.8 %
Total	398	100.0 %

Q3-3. On a typical weekday, how many one-way trips do you normally make vanpooling?

Q3-3. Vanpool	Number	Percent
0	397	97.8 %
2	1	0.2 %
Not provided	8	2.0 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")
Q3-3. On a typical weekday, how many one-way trips do you normally make vanpooling? (without "not provided")

Q3-3. Vanpool	Number	Percent
0	397	99.7 %
2	1	0.3 %
Total	398	100.0 %

Q3-4. On a typical weekday, how many one-way trips do you normally make riding bus/shuttle?

Q3-4. Ride the bus/shuttle	Number	Percent
0	372	91.6 %
1	3	0.7 %
2	12	3.0 %
3+	11	2.7 %
Not provided	8	2.0 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")

Q3-4. On a typical weekday, how many one-way trips do you normally make riding bus/shuttle? (without "not provided")

Q3-4. Ride the bus/shuttle	Number	Percent
0	372	93.5 %
1	3	0.8 %
2	12	3.0 %
3+	11	2.8 %
Total	398	100.0 %

Q3-5. On a typical weekday, how many one-way trips do you normally make riding a motorcycle/moped?

Q3-5. Ride a motorcycle/moped	Number	Percent
0	392	96.6 %
1	1	0.2 %
2	3	0.7 %
3+	2	0.5 %
Not provided	8	2.0 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")

Q3-5. On a typical weekday, how many one-way trips do you normally make riding a motorcycle/moped? (without "not provided")

Q3-5. Ride a motorcycle/moped	Number	Percent
0	392	98.5 %
1	1	0.3 %
2	3	0.8 %
3+	2	0.5 %
Total	398	100.0 %

Q3-6. On a typical weekday, how many one-way trips do you normally make walking (to a destination)?

Q3-6. Walk (to a destination)	Number	Percent
0	308	75.9 %
1	25	6.2 %
2	40	9.9 %
3	3	0.7 %
4+	22	5.4 %
Not provided	8	2.0 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")
Q3-6. On a typical weekday, how many one-way trips do you normally make walking (to a destination)? (without "not provided")

Q3-6. Walk (to a destination)	Number	Percent
0	308	77.4 %
1	25	6.3 %
2	40	10.1 %
3	3	0.8 %
4+	22	5.5 %
Total	398	100.0 %

Q3-7. On a typical weekday, how many one-way trips do you normally make riding a bicycle?

Q3-7. Ride a bicycle	Number	Percent
0	334	82.3 %
1	22	5.4 %
2	21	5.2 %
3+	21	5.2 %
Not provided	8	2.0 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")
Q3-7. On a typical weekday, how many one-way trips do you normally make riding a bicycle? (without "not provided")

Q3-7. Ride a bicycle	Number	Percent
0	334	83.9 %
1	22	5.5 %
2	21	5.3 %
3+	21	5.3 %
Total	398	100.0 %

Q4. Which THREE of the following would encourage you to use a mode of transportation other than driving a personal vehicle to complete your daily trips?

Q4. Top choice	Number	Percent
Expanded transit service coverage	115	28.3 %
More inexpensive transit service	21	5.2 %
More bicycle and/or pedestrian connections (trails, bike lanes) to employment & commercial destinations	98	24.1 %
Wider availability of emerging transportation options like bike sharing, ridesharing (Uber, Lyft), & electric scooters	16	3.9 %
Less vehicle parking availability, more bicycle parking availability, and/or higher vehicle operating costs like gas prices	23	5.7 %
None chosen	133	32.8 %
Total	406	100.0 %

Q4. Which THREE of the following would encourage you to use a mode of transportation other than driving a personal vehicle to complete your daily trips?

Q4. 2nd choice	Number	Percent
Expanded transit service coverage	62	15.3 %
More inexpensive transit service	59	14.5 %
More bicycle and/or pedestrian connections (trails, bike lanes) to employment & commercial destinations	42	10.3 %
Wider availability of emerging transportation options like bike sharing, ridesharing (Uber, Lyft), & electric scooters	29	7.1 %
Less vehicle parking availability, more bicycle parking availability, and/or higher vehicle operating costs like gas prices	52	12.8 %
None chosen	162	39.9 %
Total	406	100.0 %

Q4. Which THREE of the following would encourage you to use a mode of transportation other than driving a personal vehicle to complete your daily trips?

Q4. 3rd choice	Number	Percent
Expanded transit service coverage	32	7.9 %
More inexpensive transit service	41	10.1 %
More bicycle and/or pedestrian connections (trails, bike lanes) to employment & commercial destinations	38	9.4 %
Wider availability of emerging transportation options like bike sharing, ridesharing (Uber, Lyft), & electric scooters	40	9.9 %
Less vehicle parking availability, more bicycle parking availability, and/or higher vehicle operating costs like gas prices	41	10.1 %
None chosen	214	52.7 %
Total	406	100.0 %

(SUM OF TOP 3 CHOICES)

Q4. Which THREE of the following would encourage you to use a mode of transportation other than driving a personal vehicle to complete your daily trips? (top 3)

Q4. Top choice	Number	Percent
Expanded transit service coverage	209	51.5 %
More inexpensive transit service	121	29.8 %
More bicycle and/or pedestrian connections (trails, bike lanes) to employment & commercial destinations	178	43.8 %
Wider availability of emerging transportation options like bike sharing, ridesharing (Uber, Lyft), & electric scooters	85	20.9 %
Less vehicle parking availability, more bicycle parking availability, and/or higher vehicle operating costs like gas prices	116	28.6 %
None chosen	133	32.8 %
Total	842	

Q5. Perceptions of Current Transportation Issues. Please rate your satisfaction with the following.

(N=406)

	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied	Don't know
Q5-1. Ease of north/ south travel in Ames area	6.2%	34.2%	22.7%	26.8%	7.1%	3.0%
Q5-2. Ease of east/ west travel in Ames area	7.6%	38.2%	26.8%	19.7%	4.4%	3.2%
Q5-3. Ease of traveling to work, shopping, & recreational activities in Ames Area	10.1%	49.8%	24.9%	10.6%	1.7%	3.0%
Q5-4. CyRide (public transit in Ames) service	11.1%	24.4%	22.4%	3.7%	1.0%	37.4%
Q5-5. "On-street" bicycle facilities (e.g., bike lanes, sharrows, cycle tracks)	3.7%	13.5%	26.4%	22.7%	8.1%	25.6%
Q5-6. "Off street" shared-use paths/trails	8.4%	31.0%	22.2%	16.3%	4.4%	17.7%
Q5-7. Pedestrian facilities	8.1%	28.1%	29.1%	12.8%	1.5%	20.4%
Q5-8. Traffic safety, including automobile, bicycle, & pedestrian safety	5.4%	31.0%	29.6%	24.9%	4.4%	4.7%
Q5-9. Flow of traffic on area streets during peak times ("rush hours")	2.2%	20.9%	29.6%	30.0%	15.3%	2.0%
Q5-10. Physical condition of roadways	5.9%	37.2%	35.2%	17.2%	3.0%	1.5%
Q5-11. Physical condition of shared-use paths & trails	6.7%	38.4%	28.1%	7.4%	1.2%	18.2%

(WITHOUT "DON'T KNOW")

Q5. Perceptions of Current Transportation Issues. Please rate your satisfaction with the following. (without "don't know")

(N=406)

	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
Q5-1. Ease of north/ south travel in Ames area	6.3%	35.3%	23.4%	27.7%	7.4%
Q5-2. Ease of east/ west travel in Ames area	7.9%	39.4%	27.7%	20.4%	4.6%
Q5-3. Ease of traveling to work, shopping, & recreational activities in Ames Area	10.4%	51.3%	25.6%	10.9%	1.8%
Q5-4. CyRide (public transit in Ames) service	17.7%	39.0%	35.8%	5.9%	1.6%
Q5-5. "On-street" bicycle facilities (e.g., bike lanes, sharrows, cycle tracks)	5.0%	18.2%	35.4%	30.5%	10.9%
Q5-6. "Off street" shared-use paths/ trails	10.2%	37.7%	26.9%	19.8%	5.4%
Q5-7. Pedestrian facilities	10.2%	35.3%	36.5%	16.1%	1.9%
Q5-8. Traffic safety, including automobile, bicycle, & pedestrian safety	5.7%	32.6%	31.0%	26.1%	4.7%
Q5-9. Flow of traffic on area streets during peak times ("rush hours")	2.3%	21.4%	30.2%	30.7%	15.6%
Q5-10. Physical condition of roadways	6.0%	37.8%	35.8%	17.5%	3.0%
Q5-11. Physical condition of shared-use paths & trails	8.1%	47.0%	34.3%	9.0%	1.5%

Q6. Which THREE of the items in Question 5 do you think are the most important Transportation issues?

Q6. Top choice	Number	Percent
Ease of north/south travel in Ames area	85	20.9 %
Ease of east/west travel in Ames area	26	6.4 %
Ease of traveling to work, shopping, & recreational activities in Ames area	32	7.9 %
CyRide (public transit in Ames) service	17	4.2 %
"On street" bicycle facilities (e.g. bike lanes, sharrows, cycle tracks)	38	9.4 %
"Off street" shared-use paths/trails	25	6.2 %
Pedestrian facilities	2	0.5 %
Traffic safety, including automobiles, bicycle, & pedestrian safety	64	15.8 %
Flow of traffic on area streets during peak times ("rush hours")	74	18.2 %
Physical condition of roadways	27	6.7 %
Physical condition of shared-use paths & trails	5	1.2 %
None chosen	11	2.7 %
Total	406	100.0 %

Q6. Which THREE of the items in Question 5 do you think are the most important Transportation issues?

Q6. 2nd choice	Number	Percent
Ease of north/south travel in Ames area	50	12.3 %
Ease of east/west travel in Ames area	60	14.8 %
Ease of traveling to work, shopping, & recreational activities in Ames area	29	7.1 %
CyRide (public transit in Ames) service	15	3.7 %
"On street" bicycle facilities (e.g. bike lanes, sharrows, cycle tracks)	33	8.1 %
"Off street" shared-use paths/trails	27	6.7 %
Pedestrian facilities	23	5.7 %
Traffic safety, including automobiles, bicycle, & pedestrian safety	42	10.3 %
Flow of traffic on area streets during peak times ("rush hours")	54	13.3 %
Physical condition of roadways	48	11.8 %
Physical condition of shared-use paths & trails	10	2.5 %
None chosen	15	3.7 %
Total	406	100.0 %

Q6. Which THREE of the items in Question 5 do you think are the most important Transportation issues?

Q6. 3rd choice	Number	Percent
Ease of north/south travel in Ames area	35	8.6 %
Ease of east/west travel in Ames area	37	9.1 %
Ease of traveling to work, shopping, & recreational activities in Ames area	42	10.3 %
CyRide (public transit in Ames) service	25	6.2 %
"On street" bicycle facilities (e.g. bike lanes, sharrows, cycle tracks)	17	4.2 %
"Off street" shared-use paths/trails	18	4.4 %
Pedestrian facilities	15	3.7 %
Traffic safety, including automobiles, bicycle, & pedestrian safety	48	11.8 %
Flow of traffic on area streets during peak times ("rush hours")	59	14.5 %
Physical condition of roadways	50	12.3 %
Physical condition of shared-use paths & trails	26	6.4 %
None chosen	34	8.4 %
Total	406	100.0 %

(SUM OF TOP 3 CHOICES)

Q6. Which THREE of the items in Question 5 do you think are the most important Transportation issues? (top 3)

Q6. Top choice	Number	Percent
Ease of north/south travel in Ames area	170	41.9 %
Ease of east/west travel in Ames area	123	30.3 %
Ease of traveling to work, shopping, & recreational activities in Ames area	103	25.4 %
CyRide (public transit in Ames) service	57	14.0 %
"On street" bicycle facilities (e.g. bike lanes, sharrows, cycle tracks)	88	21.7 %
"Off street" shared-use paths/trails	70	17.2 %
Pedestrian facilities	40	9.9 %
Traffic safety, including automobiles, bicycle, & pedestrian safety	154	37.9 %
Flow of traffic on area streets during peak times ("rush hours")	187	46.1 %
Physical condition of roadways	125	30.8 %
Physical condition of shared-use paths & trails	41	10.1 %
None chosen	11	2.7 %
Total	1169	

Q7. Which THREE of the following characteristics of the Ames Area transportation system do you think are most important for the future?

Q7. Top choice	Number	Percent
Provides safe transportation options	117	28.8 %
Facilitates reliable & efficient travel	65	16.0 %
Ease of connecting to destinations	60	14.8 %
Supports economic vitality of Ames area	24	5.9 %
Maintains & preserves existing transportation system	24	5.9 %
A sustainable transportation system	28	6.9 %
A transportation system that supports quality of life	35	8.6 %
Active transportation options that support public health	15	3.7 %
Equitable access to transportation options	30	7.4 %
None chosen	8	2.0 %
Total	406	100.0 %

Q7. Which THREE of the following characteristics of the Ames Area transportation system do you think are most important for the future?

Q7. 2nd choice	Number	Percent
Provides safe transportation options	37	9.1 %
Facilitates reliable & efficient travel	89	21.9 %
Ease of connecting to destinations	66	16.3 %
Supports economic vitality of Ames area	28	6.9 %
Maintains & preserves existing transportation system	21	5.2 %
A sustainable transportation system	57	14.0 %
A transportation system that supports quality of life	41	10.1 %
Active transportation options that support public health	27	6.7 %
Equitable access to transportation options	25	6.2 %
None chosen	15	3.7 %
Total	406	100.0 %

Q7. Which THREE of the following characteristics of the Ames Area transportation system do you think are most important for the future?

Q7. 3rd choice	Number	Percent
Provides safe transportation options	47	11.6 %
Facilitates reliable & efficient travel	49	12.1 %
Ease of connecting to destinations	56	13.8 %
Supports economic vitality of Ames area	32	7.9 %
Maintains & preserves existing transportation system	33	8.1 %
A sustainable transportation system	44	10.8 %
A transportation system that supports quality of life	49	12.1 %
Active transportation options that support public health	28	6.9 %
Equitable access to transportation options	46	11.3 %
None chosen	22	5.4 %
Total	406	100.0 %

(SUM OF TOP 3 CHOICES)

Q7. Which THREE of the following characteristics of the Ames Area transportation system do you think are most important for the future? (top 3)

Q7. Top choice	Number	Percent
Provides safe transportation options	201	49.5 %
Facilitates reliable & efficient travel	203	50.0 %
Ease of connecting to destinations	182	44.8 %
Supports economic vitality of Ames area	84	20.7 %
Maintains & preserves existing transportation system	78	19.2 %
A sustainable transportation system	129	31.8 %
A transportation system that supports quality of life	125	30.8 %
Active transportation options that support public health	70	17.2 %
Equitable access to transportation options	101	24.9 %
None chosen	8	2.0 %
Total	1181	

Q8. Overall, would you rate the transportation system in the Ames Area as excellent, good, average, or poor?

Q8. How would you rate transportation system in Ames Area	Number	Percent
Excellent	38	9.4 %
Good	203	50.0 %
Average	129	31.8 %
Poor	19	4.7 %
Don't know	17	4.2 %
Total	406	100.0 %

(WITHOUT "DON'T KNOW")

Q8. Overall, would you rate the transportation system in the Ames Area as excellent, good, average, or poor? (without "don't know")

Q8. How would you rate transportation system in Ames Area	Number	Percent
Excellent	38	9.8 %
Good	203	52.2 %
Average	129	33.2 %
Poor	19	4.9 %
Total	389	100.0 %

Q9. Have you used public transit (CyRide) in the past 12 months?

Q9. Have you used public transit (CyRide) in past 12 months	Number	Percent
Yes	101	24.9 %
No	305	75.1 %
Total	406	100.0 %

Q9a. How often do you use CyRide during a typical week?

Q9a. How often do you use CyRide during a typical week	Number	Percent
1 time per week	53	52.5 %
2-4 times per week	15	14.9 %
5+ times per week	16	15.8 %
Not provided	17	16.8 %
Total	101	100.0 %

(WITHOUT "NOT PROVIDED")
Q9a. How often do you use CyRide during a typical week? (without "not provided")

Q9a. How often do you use CyRide during a typical week	Number	Percent
1 time per week	53	63.1 %
2-4 times per week	15	17.9 %
5+ times per week	16	19.0 %
Total	84	100.0 %

Q9b. How would you rate the availability of public transit in Ames?

Q9b. How would you rate availability of public transit in Ames	Number	Percent
Excellent	21	20.8 %
Good	52	51.5 %
Average	27	26.7 %
Poor	1	1.0 %
Total	101	100.0 %

Q9c. Transit Availability in the Ames Area. Please rate your satisfaction with the following.

(N=101)

	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied	Don't know
Q9c-1. Availability of information about public transit services	27.7%	46.5%	20.8%	3.0%	0.0%	2.0%
Q9c-2. Destinations served by public transit	12.9%	48.5%	19.8%	14.9%	2.0%	2.0%
Q9c-3. Distance to nearest public transit stop from your home	39.6%	36.6%	11.9%	9.9%	1.0%	1.0%
Q9c-4. Frequency of bus service	18.8%	43.6%	26.7%	7.9%	1.0%	2.0%
Q9c-5. Hours & days transit service is provided	17.8%	43.6%	23.8%	8.9%	1.0%	5.0%
Q9c-6. Physical condition of bus	52.5%	35.6%	8.9%	2.0%	0.0%	1.0%
Q9c-7. Access to bus stops/amenities at bus stops	17.8%	32.7%	31.7%	6.9%	4.0%	6.9%
Q9c-8. Bus accessibility for mobility impaired/ disabled riders	11.9%	17.8%	27.7%	5.0%	1.0%	36.6%

(WITHOUT "DON'T KNOW")

Q9c. Transit Availability in the Ames Area. Please rate your satisfaction with the following. (without "don't know")

(N=101)

	Very satisfied	Satisfied	Neutral	Dissatisfied	Very dissatisfied
Q9c-1. Availability of information about public transit services	28.3%	47.5%	21.2%	3.0%	0.0%
Q9c-2. Destinations served by public transit	13.1%	49.5%	20.2%	15.2%	2.0%
Q9c-3. Distance to nearest public transit stop from your home	40.0%	37.0%	12.0%	10.0%	1.0%
Q9c-4. Frequency of bus service	19.2%	44.4%	27.3%	8.1%	1.0%
Q9c-5. Hours & days transit service is provided	18.8%	45.8%	25.0%	9.4%	1.0%
Q9c-6. Physical condition of bus	53.0%	36.0%	9.0%	2.0%	0.0%
Q9c-7. Access to bus stops/amenities at bus stops	19.1%	35.1%	34.0%	7.4%	4.3%
Q9c-8. Bus accessibility for mobility impaired/ disabled riders	18.8%	28.1%	43.8%	7.8%	1.6%

Q10. Which of the following are reasons that you do not use public transit (CyRide) more often?

Q10. Reasons why you do not use public transit (CyRide) more often	Number	Percent
Service is not available near my home	105	12.4 %
Service is not offered to destinations I visit frequently	73	8.6 %
I don't know how to use the service (need information about routes/fees/schedules)	52	6.1 %
I had a bad experience with the service (treated poorly, arrived late, did not feel safe)	1	0.1 %
It takes too long to get to destinations compared to travel by car	196	23.1 %
Service is confusing to use	18	2.1 %
Service is not offered at the time I need it	60	7.1 %
It's too expensive	11	1.3 %
Buses do not come by stops frequently enough	49	5.8 %
Bus is too crowded when I need to take it	9	1.1 %
I just prefer to drive	220	26.0 %
Other	53	6.3 %
Total	847	100.0 %

Q11. Have you ridden a bicycle in the Ames area during the past year?

Q11. Have you ridden a bicycle in Ames area during past year	Number	Percent
Yes	213	52.5 %
No	193	47.5 %
Total	406	100.0 %

Q11a. How safe do you feel bicycling on major streets without bike lanes?

Q11a. How safe do you feel bicycling on major streets without bike lanes	Number	Percent
Very safe	6	2.8 %
Safe	32	15.0 %
Neutral/neither safe nor unsafe	40	18.8 %
Unsafe	74	34.7 %
Very unsafe	51	23.9 %
Don't know	10	4.7 %
Total	213	100.0 %

(WITHOUT "DON'T KNOW")

Q11a. How safe do you feel bicycling on major streets without bike lanes? (without "don't know")

Q11a. How safe do you feel bicycling on major streets without bike lanes	Number	Percent
Very safe	6	3.0 %
Safe	32	15.8 %
Neutral/neither safe nor unsafe	40	19.7 %
Unsafe	74	36.5 %
Very unsafe	51	25.1 %
Total	203	100.0 %

Q11b. How safe do you feel bicycling on streets with an on-street bike lane?

Q11b. How safe do you feel bicycling on streets with an on-street bike lane	Number	Percent
Very safe	17	8.0 %
Safe	59	27.7 %
Neutral/neither safe nor unsafe	61	28.6 %
Unsafe	50	23.5 %
Very unsafe	17	8.0 %
Don't know	9	4.2 %
Total	213	100.0 %

(WITHOUT "DON'T KNOW")

Q11b. How safe do you feel bicycling on streets with an on-street bike lane? (without "don't know")

Q11b. How safe do you feel bicycling on streets with an on-street bike lane	Number	Percent
Very safe	17	8.3 %
Safe	59	28.9 %
Neutral/neither safe nor unsafe	61	29.9 %
Unsafe	50	24.5 %
Very unsafe	17	8.3 %
Total	204	100.0 %

Q11c. How safe do you feel bicycling on a shared-use path or trail?

Q11c. How safe do you feel bicycling on a shared-use path or trail	Number	Percent
Very safe	91	42.7 %
Safe	100	46.9 %
Neutral/neither safe nor unsafe	14	6.6 %
Unsafe	5	2.3 %
Very unsafe	2	0.9 %
Don't know	1	0.5 %
Total	213	100.0 %

(WITHOUT "DON'T KNOW")

Q11c. How safe do you feel bicycling on a shared-use path or trail? (without "don't know")

Q11c. How safe do you feel bicycling on a shared-use path or trail	Number	Percent
Very safe	91	42.9 %
Safe	100	47.2 %
Neutral/neither safe nor unsafe	14	6.6 %
Unsafe	5	2.4 %
Very unsafe	2	0.9 %
Total	212	100.0 %

Q11d. What is the primary reason why you ride your bike?

Q11d. Primary reason why you ride your bike	Number	Percent
To commute to school, work, personal business, or shopping trips	26	12.2 %
For recreational (fitness, leisure) use	137	64.3 %
Both	50	23.5 %
Total	213	100.0 %

Q12. How safe do you feel walking or using a wheelchair on sidewalks along major streets?

Q12. How safe do you feel walking or using a wheelchair on sidewalks along major streets	Number	Percent
Very safe	79	19.5 %
Safe	161	39.7 %
Neutral/neither safe nor unsafe	84	20.7 %
Unsafe	26	6.4 %
Very unsafe	5	1.2 %
Don't know	51	12.6 %
Total	406	100.0 %

(WITHOUT "DON'T KNOW")

Q12. How safe do you feel, walking or using a wheelchair on sidewalks along major streets? (without "don't know")

Q12. How safe do you feel walking or using a wheelchair on sidewalks along major streets	Number	Percent
Very unsafe	5	1.4 %
Unsafe	26	7.3 %
Neutral/neither safe nor unsafe	84	23.7 %
Safe	161	45.4 %
Very safe	79	22.3 %
Total	355	100.0 %

Q13. How safe do you feel using pedestrian crossings on major streets?

Q13. How safe do you feel using pedestrian crossings on major streets	Number	Percent
Very safe	57	14.0 %
Safe	181	44.6 %
Neutral/neither safe nor unsafe	97	23.9 %
Unsafe	49	12.1 %
Very unsafe	8	2.0 %
Don't know	14	3.4 %
Total	406	100.0 %

(WITHOUT "DON'T KNOW")

Q13. How safe do you feel using pedestrian crossings on major streets? (without "don't know")

Q13. How safe do you feel using pedestrian crossings on major streets	Number	Percent
Very safe	57	14.5 %
Safe	181	46.2 %
Neutral/neither safe nor unsafe	97	24.7 %
Unsafe	49	12.5 %
Very unsafe	8	2.0 %
Total	392	100.0 %

Q14. How safe do you feel walking or using a wheelchair on a shared-use path or trail or sidewalk in the area where you live?

Q14. How safe do you feel walking or using a wheelchair on a shared-use path or trail or sidewalk in the area where you live	Number	Percent
Very safe	120	29.6 %
Safe	149	36.7 %
Neutral/neither safe nor unsafe	52	12.8 %
Unsafe	17	4.2 %
Very unsafe	2	0.5 %
Don't know	66	16.3 %
Total	406	100.0 %

(WITHOUT "DON'T KNOW")

Q14. How safe do you feel walking or using a wheelchair on a shared-use path or trail or sidewalk in the area where you live? (without "don't know")

Q14. How safe do you feel walking or using a wheelchair on a shared-use path or trail or sidewalk in the area where you live	Number	Percent
Very safe	120	35.3 %
Safe	149	43.8 %
Neutral/neither safe nor unsafe	52	15.3 %
Unsafe	17	5.0 %
Very unsafe	2	0.6 %
Total	340	100.0 %

Q15. What is the primary reason for your pedestrian travel?

Q15. Primary reason for your pedestrian travel	Number	Percent
To commute to school, work, personal business, or shopping trips	38	9.4 %
For recreational (fitness, leisure) use	269	66.3 %
Both	85	20.9 %
Not provided	14	3.4 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")
Q15. What is the primary reason for your pedestrian travel? (without "not provided")

Q15. Primary reason for your pedestrian travel	Number	Percent
To commute to school, work, personal business, or shopping trips	38	9.7 %
For recreational (fitness, leisure) use	269	68.6 %
Both	85	21.7 %
Total	392	100.0 %

<u>Q16. For each of the following system enhancements, please indicate whether you would be Very Supportive, Supportive, Neutral, Not Supportive, or Not at all Supportive. Please recognize that there is an increased cost to some of these elements.</u>

(N=406)

	Very supportive	Supportive	Neutral	Not supportive	Not at all supportive	Don't know
Q16-1. Adding more dedicated bike lanes on streets in Ames Area	21.4%	25.4%	20.9%	14.0%	15.3%	3.0%
Q16-2. Adding more shared-use paths & trails in Ames Area	41.9%	31.0%	15.8%	3.7%	3.2%	4.4%
Q16-3. Increasing investments in traffic management technologies such as real-time traveler information & advanced traffic signal systems	24.1%	31.8%	30.3%	5.9%	2.2%	5.7%
Q16-4. Widening existing roads & building new roads to relieve congestion	21.2%	34.7%	23.9%	8.9%	8.9%	2.5%
Q16-5. Adding more turn lanes at critical intersections to improve traffic operations	36.5%	41.4%	13.8%	3.7%	3.2%	1.5%
Q16-6. Installing traffic control equipment to give buses priority through signalized intersections	9.9%	19.5%	43.3%	14.0%	6.4%	6.9%
Q16-7. Implementing targeted safety improvements at high crash locations	35.7%	44.6%	11.8%	3.0%	1.0%	3.9%
Q16-8. Providing better access to I-35 and/or US 30 for Ames Area	19.7%	24.4%	39.9%	9.6%	3.0%	3.4%

(WITHOUT "DON'T KNOW")

Q16. For each of the following system enhancements, please indicate whether you would be Very Supportive, Supportive, Neutral, Not Supportive, or Not at all Supportive. Please recognize that there is an increased cost to some of these elements. (without "don't know")

(N=406)

	Very supportive	Supportive	Neutral	Not supportive	Not at all supportive
Q16-1. Adding more dedicated bike lanes on streets in Ames Area	22.1%	26.1%	21.6%	14.5%	15.7%
Q16-2. Adding more shared-use paths & trails in Ames Area	43.8%	32.5%	16.5%	3.9%	3.4%
Q16-3. Increasing investments in traffic management technologies such as real-time traveler information & advanced traffic signal systems	25.6%	33.7%	32.1%	6.3%	2.3%
Q16-4. Widening existing roads & building new roads to relieve congestion	21.7%	35.6%	24.5%	9.1%	9.1%
Q16-5. Adding more turn lanes at critical intersections to improve traffic operations	37.0%	42.0%	14.0%	3.8%	3.3%
Q16-6. Installing traffic control equipment to give buses priority through signalized intersections	10.6%	20.9%	46.6%	15.1%	6.9%

(WITHOUT "DON’T KNOW")

Q16. For each of the following system enhancements, please indicate whether you would be Very Supportive, Supportive, Neutral, Not Supportive, or Not at all Supportive. Please recognize that there is an increased cost to some of these elements. (without "don't know")

	Very supportive	Supportive	Neutral	Not supportive	Not at all supportive
Q16-7. Implementing targeted safety improvements at high crash locations	37.2%	46.4%	12.3%	3.1%	1.0%
Q16-8. Providing better access to I-35 and/or US 30 for Ames Area	20.4%	25.3%	41.3%	9.9%	3.1%

Q17. Understanding the long-range goals and vision of Ames area residents is vital to the Plan. Help us by telling us how important each of the following statements are to you. Please rate each goal area by choosing a number between 5 and 1, where 5 means it is "Very Important" and 1 means "Not at all Important."

(N=406)

	Very important	Important	Neutral	Not important	Not at all important	Not provided
Q17-1. A safe & connected multi-modal network, including bikes, pedestrians, transit & autos	36.2%	40.6%	16.0%	2.7%	2.5%	2.0%
Q17-2. A transportation system that supports quality of life	34.0%	44.8%	17.0%	1.0%	1.7%	1.5%
Q17-3. Preserves & enhances the environment & the community	34.7%	38.2%	22.2%	2.2%	1.5%	1.2%
Q17-4. Supports the economic vitality of Ames Area	24.6%	45.3%	25.9%	2.5%	0.2%	1.5%
Q17-5. Maintains & preserves the existing transportation system	15.3%	38.4%	35.5%	6.7%	3.2%	1.0%
Q17-6. Active transportation options that support public health	22.2%	41.1%	30.3%	2.5%	2.7%	1.2%
Q17-7. Protects environmental resources	35.0%	36.5%	20.9%	3.2%	3.2%	1.2%
Q17-8. Access to transportation options is equitable	30.5%	35.7%	24.1%	4.4%	4.2%	1.0%

(WITHOUT "NOT PROVIDED")

Q17. Understanding the long-range goals and vision of Ames area residents is vital to the Plan. Help us by telling us how important each of the following statements are to you. Please rate each goal area by choosing a number between 5 and 1, where 5 means it is "Very Important" and 1 means "Not at all Important." (without "not provided")

(N=406)

	Very important	Important	Neutral	Not important	Not at all important
Q17-1. A safe & connected multi-modal network, including bikes, pedestrians, transit & autos	36.9%	41.5%	16.3%	2.8%	2.5%
Q17-2. A transportation system that supports quality of life	34.5%	45.5%	17.3%	1.0%	1.8%
Q17-3. Preserves & enhances the environment & the community	35.2%	38.7%	22.4%	2.2%	1.5%
Q17-4. Supports the economic vitality of Ames Area	25.0%	46.0%	26.3%	2.5%	0.3%
Q17-5. Maintains & preserves the existing transportation system	15.4%	38.8%	35.8%	6.7%	3.2%
Q17-6. Active transportation options that support public health	22.4%	41.6%	30.7%	2.5%	2.7%
Q17-7. Protects environmental resources	35.4%	36.9%	21.2%	3.2%	3.2%
Q17-8. Access to transportation options is equitable	30.8%	36.1%	24.4%	4.5%	4.2%

Q18. How many persons in your household, ages 16 and older, are dependent on public transit or rides from friends/relatives because they do not have a car or do not drive?

Q18. How many persons in your household 16 & older are dependent on public transit or rides from friends/relatives	Number	Percent
0	329	81.0 %
1	52	12.8 %
2	20	4.9 %
3	5	1.2 %
Total	406	100.0 %

Q19. Including yourself, how many persons in your household are...

	Mean	Sum
number	2.4	961
Under age 5	0.1	42
5-9 years	0.1	42
10-14 years	0.1	57
15-19 years	0.1	52
20-24 years	0.2	70
25-34 years	0.3	101
35-44 years	0.3	122
45-54 years	0.4	146
55-64 years	0.4	163
65+ years	0.4	166

Q20. Would you say your total household income is...

Q20. Your total household income	Number	Percent
Under $30K	44	10.8 %
$30K to $59,999	90	22.2 %
$60K to $99,999	95	23.4 %
$100K+	135	33.3 %
Not provided	42	10.3 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")

Q20. Would you say your total household income is... (without "not provided")

Q20. Your total household income	Number	Percent
Under $30K	44	12.1 %
$30K to $59,999	90	24.7 %
$60K to $99,999	95	26.1 %
$100K+	135	37.1 %
Total	364	100.0 %

Q21. Which of the following best describes your race/ethnicity?

Q21. Your race/ethnicity	Number	Percent
Asian or Asian Indian	18	4.4 %
Black or African American	11	2.7 %
American Indian or Alaska Native	2	0.5 %
White or Caucasian	335	82.3 %
Native Hawaiian or other Pacific Islander	1	0.2 %
Hispanic, Spanish, or Latino/a/x	19	4.7 %
Prefer not to say	19	4.7 %
Other	2	0.5 %
Total	407	100.0 %

(WITHOUT "PREFER NOT TO SAY")

Q21. Which of the following best describes your race/ethnicity? (without "prefer not to say")

Q21. Your race/ethnicity	Number	Percent
White or Caucasian	335	86.3 %
Hispanic, Spanish, or Latino/a/x	19	4.9 %
Asian or Asian Indian	18	4.6 %
Black or African American	11	2.8 %
American Indian or Alaska Native	2	0.5 %
Other	2	0.5 %
Native Hawaiian or other Pacific Islander	1	0.3 %
Total	388	100.0 %

Q21-8. Self-describe your race/ethnicity:

Q21-8. Self-describe your race/ethnicity	Number	Percent
More than one	1	50.0 %
Mixed	1	50.0 %
Total	2	100.0 %

Q22. Your gender:

Q22. Your gender	Number	Percent
Male	201	49.5 %
Female	198	48.8 %
Self-identified	5	1.2 %
Not provided	2	0.5 %
Total	406	100.0 %

(WITHOUT "NOT PROVIDED")

Q22. Your gender: (without "not provided")

Q22. Your gender	Number	Percent
Male	201	49.8 %
Female	198	49.0 %
Self-identified	5	1.2 %
Total	404	100.0 %

Q22-3. Self-describe your gender:

Q22-3. Self-describe your gender	Number	Percent
Non binary	3	60.0 %
Fluid	1	20.0 %
Agender	1	20.0 %
Total	5	100.0 %

4 Open-Ended Comments

Open-Ended Question Responses

Q10—"Other": Which of the following are reasons that you do not use public transit (CyRide) more often?

- app is poor
- Biking
- BUSES ARE ALWAYS BLOCKING VEHICLE TRAFFIC. OVERALL THEY ANNOY ME
- BUSINESS USE
- cannot take pets
- carrying packages
- Convenience
- do not carry cash
- Doesn't get close enough to where I work when weather is bad. Otherwise, I don't mind a walk.
- Elderly parent unable to physically tolerate the wait/physical demands of riding public transportation. On occasion needs ability to return home immediately. Not all bus stops are wheelchair accessible. Distance from bus stop to destination is not friendly for mobility challenged family members.
- Hauling things
- Have kids.
- Have to take a child to daycare
- HERTA for disabled was terrible.
- I BIKE
- I don't like crossing Strange Road on foot
- I have never given it a thought.
- I have to carry a lot.
- I just prefer to bike. Sometimes buses need more bike rack spots.
- I NEED TO ESTABLISH THE HABIT OF CHOOSING CYRIDE
- I often have large items or many bags
- I quit riding CyRide when my library stop was overrun with unhoused people.
- I RIDE A BICYCLE OR MY DELIVERY VAN
- I travel with my dogs
- I want to bike the places I would bus to
- I'll get motion sickness on buses
- Impractical to transport groceries or other items, timing and destinations would be impossible for transporting kids to sport events

- It takes too long to get to destinations compared to travel by bike including wait time and travel time
- Like to walk
- Make stops faster
- MULTI TASKING EASIER BY CAR
- multiple errands
- need flexible schedule for errands
- NEED IT FOR ON DEMAND TRAVEL
- not a habit
- not free for faculty
- NOT NEEDED
- Nowhere to go
- Often easier to bike
- Often hauling garden tools or buying items
- physical limits
- prefer to bike or walk
- prefer to walk
- problem is walkability when you get off the bus
- retirement community has transportation
- Sharing the same air with others.
- staff at IS have to pay to ride the bus
- Transporting large or heavy items
- use bicycle
- Walk from home to bus stop is long
- Weekend frequency is bad.
- When I need a ride
- Young children

5 Survey Instrument

October 2024

RE: Ames Area Regional Transportation Survey

Dear Resident:

On behalf of local governments in Story County and Boone County, I want to encourage you to take a few minutes to complete this important survey. Your input will be used by community leaders to set transportation priorities for our region.

The Ames Area Metropolitan Planning Organization (AAMPO) is an organization of local governments that is responsible for regional transportation planning. We are currently updating the region's transportation plan, Ames Connect 2050, and the results of this survey will help us identify which transportation improvements are needed most.

Since only a limited number of households in the region were selected at random to receive this survey, your participation will ensure residents in your area are well represented. A postage-paid return envelope addressed to ETC Institute has been provided for your convenience. We have selected ETC Institute as our partner for this project. They will compile the survey results, which will be critical for the transportation plan's development.

If you have any questions, don't hesitate to reach out to me by email at kyle.thompson@cityofames.org or by phone at 515-239-5169. More information about the AAMPO and this transportation plan can also be found online at aampo.org.

Thank you for your support of this important effort.

Sincerely,

Kyle Thompson
Transportation Planner

Ames Area Metropolitan Planning Organization • 515 Clark Avenue • Ames, IA 50010

2024 Regional Travel Survey

One of the first considerations for planning the future of a region is the need for adequate transportation. Because of the time it takes to implement, and the investment required, long-range transportation planning is vital to successfully shaping the future of any region. We would like your help today in shaping the future of the Ames Region. Thank you for taking the time to complete the survey. When you are finished, please return your completed survey in the postage-paid envelope addressed to ETC Institute, 725 W. Frontier Circle, Olathe, KS 66061. If you prefer, you can complete the survey online at *aamposurvey.org*.

---

1. How many operating vehicles (cars, trucks, motorcycles/mopeds, vans) do you have in your household?

______ vehicle(s)

2. What is your employment status? *[Check all that apply.]*

____(1) Employed outside the home *[Answer Q2a-2c.]*
____(2) Student (K-12) *[Answer Q2a-2c.]*
____(3) Student (University) *[Answer Q2a-2c.]*
____(4) Operate home-based business *[Skip to Q3.]*
____(5) Not currently employed *[Skip to Q3.]*
____(6) Retired *[Skip to Q3.]*

2a. In which city do you work/go to school? ____

2b. What method of transportation do you normally use to go to work/school?

____(1) Car/Truck - drive alone
____(2) Carpool
____(3) Vanpool
____(4) Walk
____(5) Taxi/Ride hail (Uber, Lyft, etc.)
____(6) Bicycle
____(7) Public transit (CyRide)
____(8) Motorcycle/Moped
____(9) Other: ____

2c. How many miles is your place of employment/school from your home? ______ miles

3. On a typical weekday, how many one-way trips do you normally make using the following types of transportation? Please count all trips completed, including return trips to your home. If you make multiple stops on your way, please count each destination you visit as a separate trip. For example, if you stop at a gas station on the way to work, this would count as two trips.

1. Drive a car/truck alone ______ trips
2. Carpool ______ trips
3. Vanpool ______ trips
4. Ride the bus/shuttle ______ trips
5. Ride a motorcycle/moped ______ trips
6. Walk (to a destination) ______ trips
7. Ride a bicycle ______ trips

4. Which THREE of the following would encourage you to use a mode of transportation other than driving a personal vehicle to complete your daily trips? *[Write in your answers below using the numbers.]*

(**1**) Expanded transit service coverage
(**2**) More inexpensive transit service
(**3**) More bicycle and/or pedestrian connections (trails, bike lanes) to employment and commercial destinations
(**4**) Wider availability of emerging transportation options like bike sharing, ridesharing (Uber, Lyft), and electric scooters
(**5**) Less vehicle parking availability, more bicycle parking availability, and/or higher vehicle operating costs like gas prices

1st: ____ 2nd: ____ 3rd: ____ NONE

5.	Perceptions of Current Transportation Issues Please rate your satisfaction with the following.	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied	Don't Know
01.	Ease of north/south travel in the Ames area	5	4	3	2	1	9
02.	Ease of east/west travel in the Ames area	5	4	3	2	1	9
03.	Ease of traveling to work, shopping, and recreational activities in the Ames Area	5	4	3	2	1	9
04.	CyRide (public transit in Ames) service	5	4	3	2	1	9
05.	"On-street" bicycle facilities (e.g., bike lanes, sharrows, cycle tracks)	5	4	3	2	1	9
06.	"Off street" shared-use paths/trails	5	4	3	2	1	9
07.	Pedestrian facilities	5	4	3	2	1	9
08.	Traffic safety, including automobile, bicycle, and pedestrian safety	5	4	3	2	1	9
09.	Flow of traffic on area streets during peak times ("rush hours")	5	4	3	2	1	9
10.	Physical condition of roadways	5	4	3	2	1	9
11.	Physical condition of shared use paths and trails	5	4	3	2	1	9

6. Which THREE of the items in Question 5 do you think are the most important Transportation issues? *[Write in your answers below using the numbers from the list in Question 5.]*

1st: ____ 2nd: ____ 3rd: ____

7. Which THREE of the following characteristics of the Ames Area transportation system do you think are most important for the future? *[Write in your answers below using the numbers.]*

(**1**) Provides safe transportation options
(**2**) Facilitates reliable and efficient travel
(**3**) Ease of connecting to destinations
(**4**) Supports the economic vitality of the Ames Area
(**5**) Maintains and preserves the existing transportation system
(**6**) A sustainable transportation system
(**7**) A transportation system that supports quality of life
(**8**) Active transportation options that support public health
(**9**) Equitable access to transportation options

1st: ____ 2nd: ____ 3rd: ____

8. Overall, would you rate the transportation system in the Ames Area as Excellent, Good, Average, or Poor?

____(4) Excellent ____(3) Good ____(2) Average ____(1) Poor ____(9) Don't know

9. Have you used public transit (CyRide) in the past 12 months?

____(1) Yes *[Answer Q9a-c.]* ____(2) No *[Skip to Q10.]*

9a. How often do you use CyRide during a typical week?

____(1) 1 time per week ____(2) 2-4 times per week ____(3) 5 or more times per week

9b. How would you rate the availability of public transit in Ames?

____(4) Excellent ____(3) Good ____(2) Average ____(1) Poor ____(9) Don't know

9c.	Transit Availability in the Ames Area Please rate your satisfaction with the following.	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied	Don't Know
1.	Availability of information about public transit services	5	4	3	2	1	9
2.	Destinations served by public transit	5	4	3	2	1	9
3.	Distance to the nearest public transit stop from your home	5	4	3	2	1	9
4.	Frequency of bus service	5	4	3	2	1	9
5.	Hours and days transit service is provided	5	4	3	2	1	9
6.	Physical condition of the bus	5	4	3	2	1	9
7.	Access to bus stops/amenities at bus stops	5	4	3	2	1	9
8.	Bus accessibility for mobility impaired/disabled riders	5	4	3	2	1	9

10. Which of the following are reasons that you do not use public transit (CyRide) more often? *[Check all that apply.]*

____(01) Service is not available near my home
____(02) Service is not offered to destinations I visit frequently
____(03) I don't know how to use the service (need information about routes/fees/schedules)
____(04) I had a bad experience with the service (treated poorly, arrived late, did not feel safe)
____(05) It takes too long to get to destinations compared to travel by car
____(06) The service is confusing to use
____(07) Service is not offered at the time I need it
____(08) It's too expensive
____(09) Buses do not come by stops frequently enough
____(10) The bus is too crowded when I need to take it
____(11) I just prefer to drive
____(12) Other: ________________________________

Bicycling in the Ames Area

11. Have you ridden a bicycle in the Ames area during the past year?

____(1) Yes *[Answer Q11a-d.]* ____(2) No *[Skip to Q12.]*

11a. How safe do you feel bicycling on major streets without bike lanes?

____(5) Very safe
____(4) Safe
____(3) Neutral/neither safe nor unsafe
____(2) Unsafe
____(1) Very unsafe
____(9) Don't know

11b. How safe do you feel bicycling on streets with an on-street bike lane?

____(5) Very safe
____(4) Safe
____(3) Neutral/neither safe nor unsafe
____(2) Unsafe
____(1) Very unsafe
____(9) Don't know

11c. How safe do you feel bicycling on a shared-use path or trail?

____(5) Very safe
____(4) Safe
____(3) Neutral/neither safe nor unsafe
____(2) Unsafe
____(1) Very unsafe
____(9) Don't know

11d. What is the primary reason why you ride your bike?

____(1) To commute to school, work, personal business, or shopping trips
____(2) For recreational (fitness, leisure) use
____(3) Both

12. How safe do you feel walking or using a wheelchair on sidewalks along major streets?

____(5) Very safe
____(4) Safe
____(3) Neutral/Neither safe nor unsafe
____(2) Unsafe
____(1) Very unsafe
____(9) Don't know

13. How safe do you feel using pedestrian crossings on major streets?

____(5) Very safe
____(4) Safe
____(3) Neutral/Neither safe nor unsafe
____(2) Unsafe
____(1) Very unsafe
____(9) Don't know

14. How safe do you feel walking or using a wheelchair on a shared-use path or trail or sidewalk in the area where you live?

____(5) Very safe
____(4) Safe
____(3) Neutral/Neither safe nor unsafe
____(2) Unsafe
____(1) Very unsafe
____(9) Don't know

15. What is the primary reason for your pedestrian travel?

____(1) To commute to school, work, personal business or shopping trips
____(2) For recreational (fitness, leisure) use
____(3) Both

16. For each of the following system enhancements, please indicate whether you would be Very Supportive, Supportive, Neutral, Not Supportive, or Not at all Supportive. Please recognize that there is an increased cost to some of these elements.

	System Enhancements Please rate your support for the following.	Very Supportive	Supportive	Neutral	Not Supportive	Not at all Supportive	Don't Know
1.	Adding more dedicated bike lanes on streets in the Ames Area	5	4	3	2	1	9
2.	Adding more shared use paths and trails in the Ames Area	5	4	3	2	1	9
3.	Increasing investments in traffic management technologies such as real-time traveler information and advanced traffic signal systems	5	4	3	2	1	9
4.	Widening existing roads and building new roads to relieve congestion	5	4	3	2	1	9
5.	Adding more turn lanes at critical intersections to improve traffic operations	5	4	3	2	1	9
6.	Installing traffic control equipment to give buses priority through signalized intersections	5	4	3	2	1	9
7.	Implementing targeted safety improvements at high crash locations	5	4	3	2	1	9
8.	Providing better access to I-35 and/or US 30 for the Ames Area	5	4	3	2	1	9

17. Understanding the long-range goals and vision of Ames area residents is vital to the Plan. Help us by telling us how important each of the following statements are to you. Please rate each goal area by choosing a number between 5 and 1, where 5 means it is "Very Important" and 1 means "Not at all Important."

	Importance of Various Issues to Transportation Improvements	Very Important	Important	Neutral	Not important	Not at all Important
1.	A safe and connected multi-modal network, including bikes, pedestrians, transit and autos	5	4	3	2	1
2.	A transportation system that supports quality of life	5	4	3	2	1
3.	Preserves and enhances the environment and the community	5	4	3	2	1
4.	Supports the economic vitality of the Ames Area	5	4	3	2	1
5.	Maintains and preserves the existing transportation system	5	4	3	2	1
6.	Active transportation options that support public health	5	4	3	2	1
7.	Protects environmental resources	5	4	3	2	1
8.	Access to transportation options is equitable	5	4	3	2	1

To ensure our survey is representative of the community, please provide the following information.

18. How many persons in your household, ages 16 and older, are dependent on public transit or rides from friends/relatives because they do not have a car or do not drive?

______ persons

19. Including yourself, how many persons in your household are...

Under age 5: ____ 15 - 19 years: ____ 35 - 44 years: ____ 65+ years: ____
5 - 9 years: ____ 20 - 24 years: ____ 45 - 54 years: ____
10 - 14 years: ____ 25 - 34 years: ____ 55 - 64 years: ____

20. Would you say your total Household income is...

____(1) Under $30,000 ____(2) $30,000 to $59,999 ____(3) $60,000 to $99,999 ____(4) $100,000 plus

21. Which of the following best describes your race/ethnicity? *[Check all that apply.]*

____(01) Asian or Asian Indian
____(02) Black or African American
____(03) American Indian or Alaska Native
____(04) White or Caucasian
____(05) Native Hawaiian or other Pacific Islander
____(06) Hispanic, Spanish, or Latino/a/x
____(88) Prefer not to say
____(99) Other: ____

22. Your gender: ____(1) Male ____(2) Female ____(3) Self-identified: ____________

23. Would you be willing to participate in future surveys sponsored by the Ames Area MPO?

____(1) Yes *[Answer Q23a.]* ____(2) No

23a. Please provide your contact information.

Mobile Phone Number: ____

Email Address: ____

This concludes the survey. Thank you for your time!

Please Return Your Completed Survey in the Enclosed Postage Paid Envelope Addressed to:
ETC Institute, 725 W. Frontier Circle, Olathe, KS 66061

Your responses will remain completely confidential. The information printed to the right will ONLY be used to help identify which areas of the City are having problems with city services. If your address is not correct, please provide the correct information. Thank you.

APPENDIX F
Travel Demand Model Documentation

2023-2050 Travel Demand Model Update and Validation Report

Ames Area Metropolitan Planning Organization

Table of Contents

List of Figures

List of Tables

Introduction

This document provides a summary of the 2023 base Ames Area Metropolitan Organization (AAMPO) Iowa Standardized Model Structure 2.0 (ISMS 2.0) Travel Demand Model (TDM). A TDM is an important tool for transportation planning that estimates and distributes the area's trips across its transportation network. The modeling process attempts to replicate existing traffic levels and forecast future traffic volumes based on anticipated population and employment growth. One of the primary purposes of the TDM is to support the development of the Metropolitan Transportation Plan (MTP). The model can be used to identify potential future deficiencies in the road network and used to estimate the impacts of various scenarios such as adding new roads, changing the capacity of existing roads, or removing roads from the network.

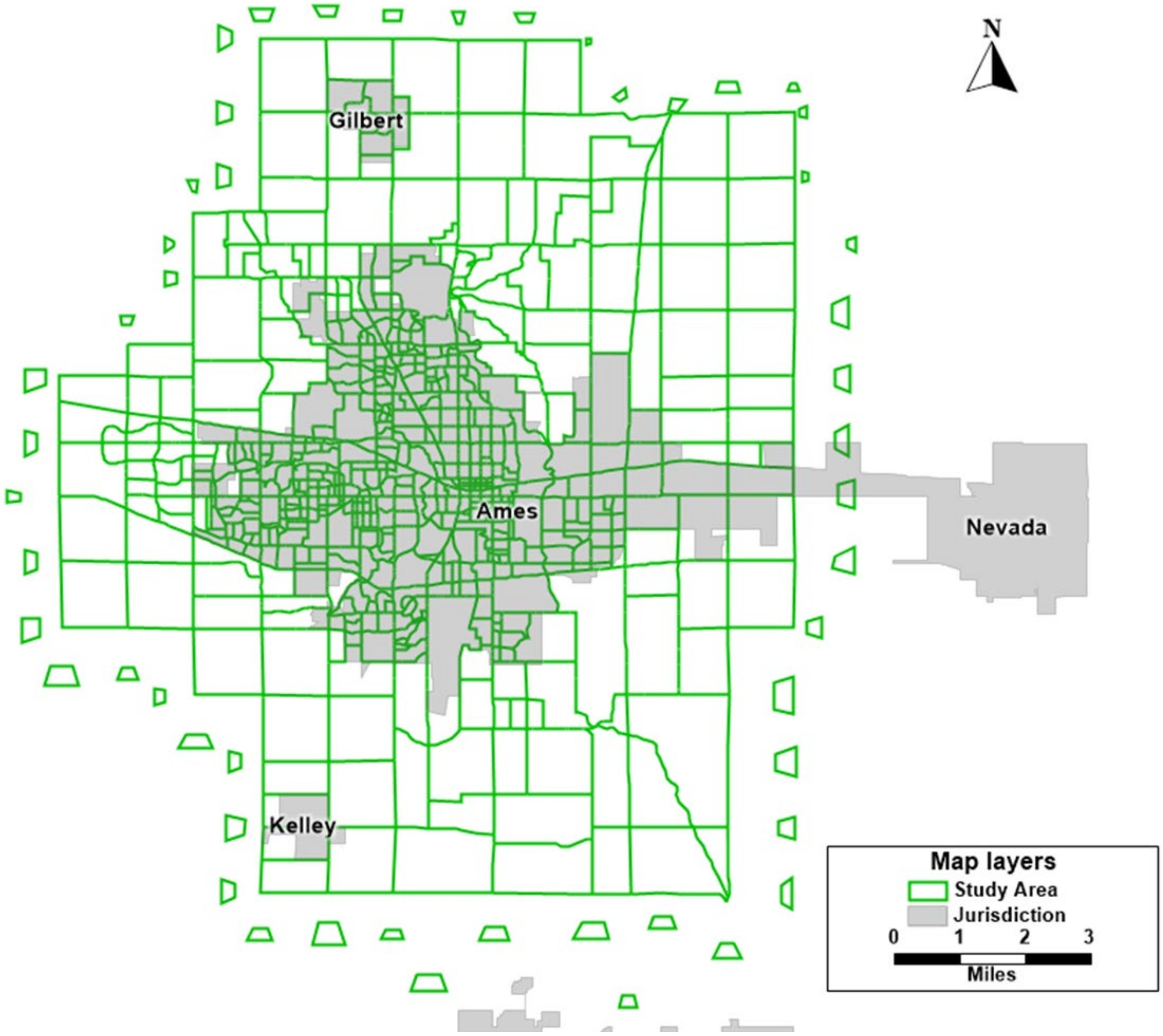
ISMS 2.0 is the current version of the Iowa standard model structure. The ISMS process is in use by every metropolitan planning organization (MPO) in Iowa, as well as all MPOs that border Iowa. ISMS 2.0 has numerous updates to the first version of ISMS (ISMS 1.0), which are discussed in the ISMS 2.0 Manual. More details on default inputs and specific modeling procedures used in the ISMS 2.0 process can be found in the ISMS 2.0 Manual. This TDM update and validation report can be used as an addendum to the ISMS 2.0 Manual. Inputs that differ from ISMS 2.0 defaults are discussed as well as validation statistics specific to this model.

Model Updates

The AAMPO TDM was updated to a new base year of 2023 using the Iowa Standardized Model Structure (ISMS). The major categories of inputs to the TDM are the transportation network and the parcel-based land use data, which includes households and non-residential land use activity. Next, projections of future year land use and future road network information are placed in the model to predict traffic conditions in the future. The AAMPO TDM is built to forecast traffic conditions to a 2050 horizon year. Interim year forecast land use data for 2035 was also prepared and external station data inputs are interpolated between 2023 and 2050, so the 2035 interim forecast years can also be run.

A map of the model area is shown in **Figure 1**.

Figure 1 - Study Area



Network Updates

The base year road network was updated from the previous 2015 base year to match 2023 year roadway alignments and attributes. The Iowa DOT Systems Planning Bureau provided an updated base year road network that included alignment and attribute changes since the previous base model road network. Attributes were reviewed for accuracy, and intersection control data were copied from the previous base model network and manually updated. A summary of the model network inputs can be found in the ISMS Manual.

When the model is run, the input network is copied over to the scenario output folder. The ISMS master network approach is used so that all existing, committed, and planned or other "illustrative" scenario network projects are included in one master input network. Attributes are coded that allow certain projects to be "turned on" or "turned off", depending on the scenario being run. Attributes are updated if they have future year attributes and meet certain criteria in the projlut.bin input file. **Appendix 1** summarizes the future road projects in the projects bin file.

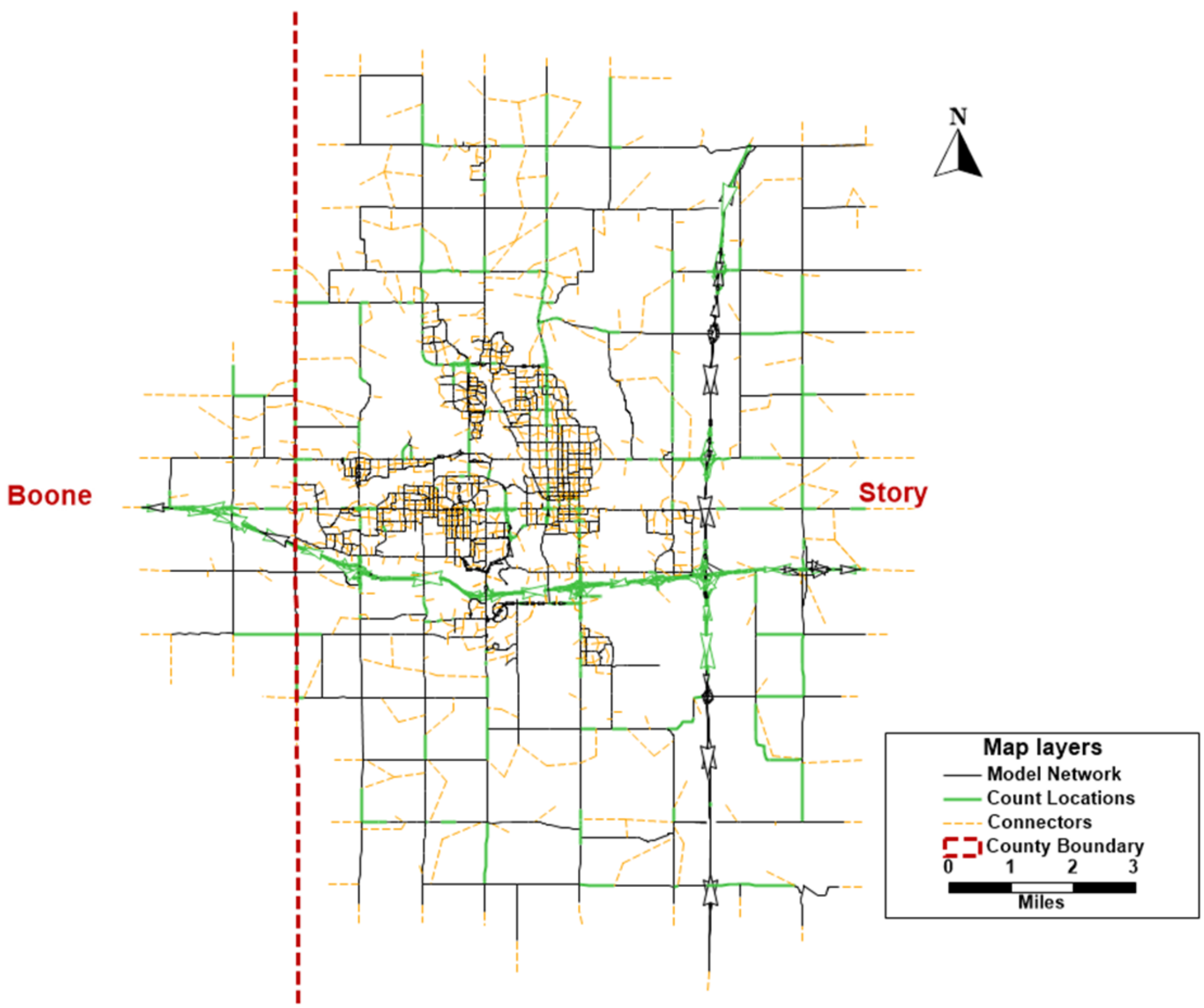
Attributes will be updated on the scenario network if the project number has a year less than or equal to the year listed in the column representing the network set that is being run (Committed, Planned, or Illustrative).

The output road network has several new fields added to it during the model runtime. The ISMS 2.0 Manual can be referenced for descriptions of the fields.

Traffic Counts

The traffic counts were provided through the 2023 counts conducted by the Iowa DOT. The count locations were determined by the Interstate Strip Counts and the City Count Maps. The traffic count locations are shown in **Figure 2**.

Figure 2 - Validation Count Locations



Parcel Data Updates

The ISMS uses land use parcel data inputs to determine the quantity of trips. The AAMPO TDM parcel data was updated to a new base year by obtaining data from assessors for the two counties in the model area (Story and Boone) and processing the data per the ISMS 2.0 Manual guidelines. The household and non-residential land use activity was compared with the previous model to check for reasonable amounts of growth. A sample of jurisdictions and a sum of housing units for the entire model area is shown in **Table 1.**

Table 1 - Housing Unit Growth in the Sample of Jurisdictions

Jurisdiction	Housing Units (2015)	Housing Units (2023)	% Growth
Entire Model	27,506	31,544	15%
Ames	25,931	29,116	12%
Gilbert	429	454	6%
Kelly*	--	140	--

Kelly was outside the model boundary in 2015.

Similar comparisons by jurisdiction were done for non-residential land use activity. Large differences in the values were investigated and discussed with the Model Project Team (MPT). A comparison of the amount field sums for a sample of land uses is shown in **Table 2**. The ISMS 2.0 Manual can be referenced for details about the Land Use Names (LUNAME) and the unit that is used in amount (AMT) field. The 2015 parcel data did not have assessor building square footage data available. Building footprint data was used to try to approximate the building square footage. For the 2023 update, the assessor building square footage information was used. This led to volatile growth percentages for some land uses, which should not be the case for future model updates where assessor building square footage information is available.

Table 2 - Amount Growth for a Sample of Land Uses

LUNAME	AMT (2015)	AMT (2023)	Growth
AUC	308	186	-40%
BNK	158	170	8%
CEM	63	83	32%
CSC	941	1,240	32%
ELEM	3,201	3,299	3%
FF	77	176	129%
GO	2,509	2,546	1%
GOV	653	653	0%
HOSP	865	520	-40%
HOT	892	524	-41%
IPK	669	1,263	89%
JRHS	1,334	1,436	8%
LIB	100	100	0%
NSC	968	1,238	28%
OHC	206	677	229%
PO	13	14	8%
PS	45	53	18%
REC	73	150	105%
RF	814	2,834	248%
RSC	447	443	-1%
SDR	231	287	24%
SFC	611	530	-13%
SNF	85	52	-39%
SRHS	1,705	1,955	15%
SS	77	297	286%
WAR	1,143	1,819	59%

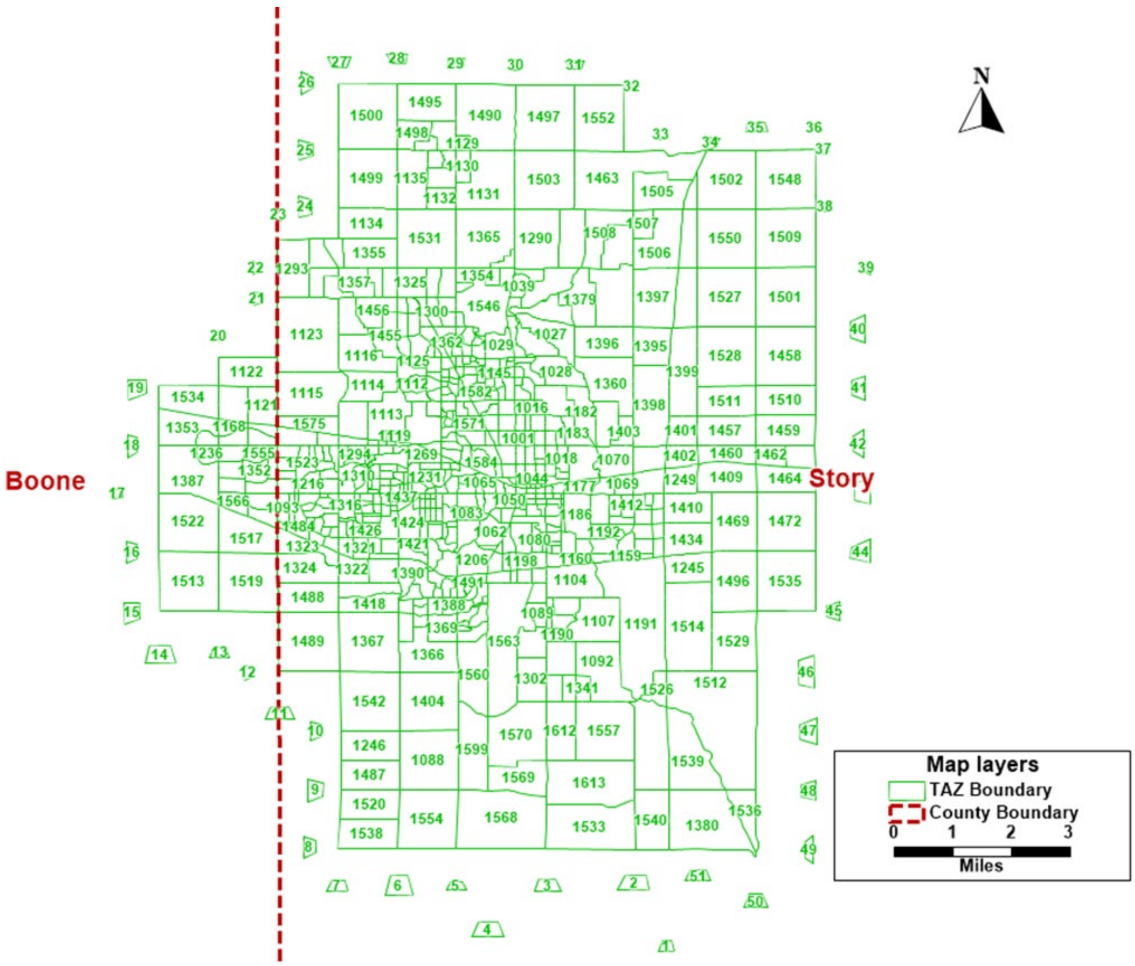
Traffic Analysis Zones (TAZ) Updates

The model area is divided up into a number of Transportation Analysis Zones (TAZs). TAZs are geographical areas that represent groups of homes and employment locations with somewhat similar trip making behavior. The TAZ is used as the unit in which the model generates and distributes trips. The AAMPO TDM has 653 TAZs, which are shown in **Figure 3**. 602 are internal zones and 51 are external station zones.

Parcel land use data is aggregated to the TAZs during a model run, which includes both households and non-residential by land use categories. The ISMS 2.0 Manual Appendix G provides a summary of land uses and the unit of measure represented by the AMT field.

Households are next disaggregated at the TAZ level by household size and income level percentages from Census Transportation Planning Products (CTPP) data. Trip production rates are then applied to the disaggregated households. Trip attraction rates are separately applied to the land use amounts for each TAZ. The TAZ structure and data were built from the previous model as a starting point. Several TAZs were subdivided where new roads were added to the model or where future road projects were anticipated.

Figure 3 – Ames Area MPO TAZs



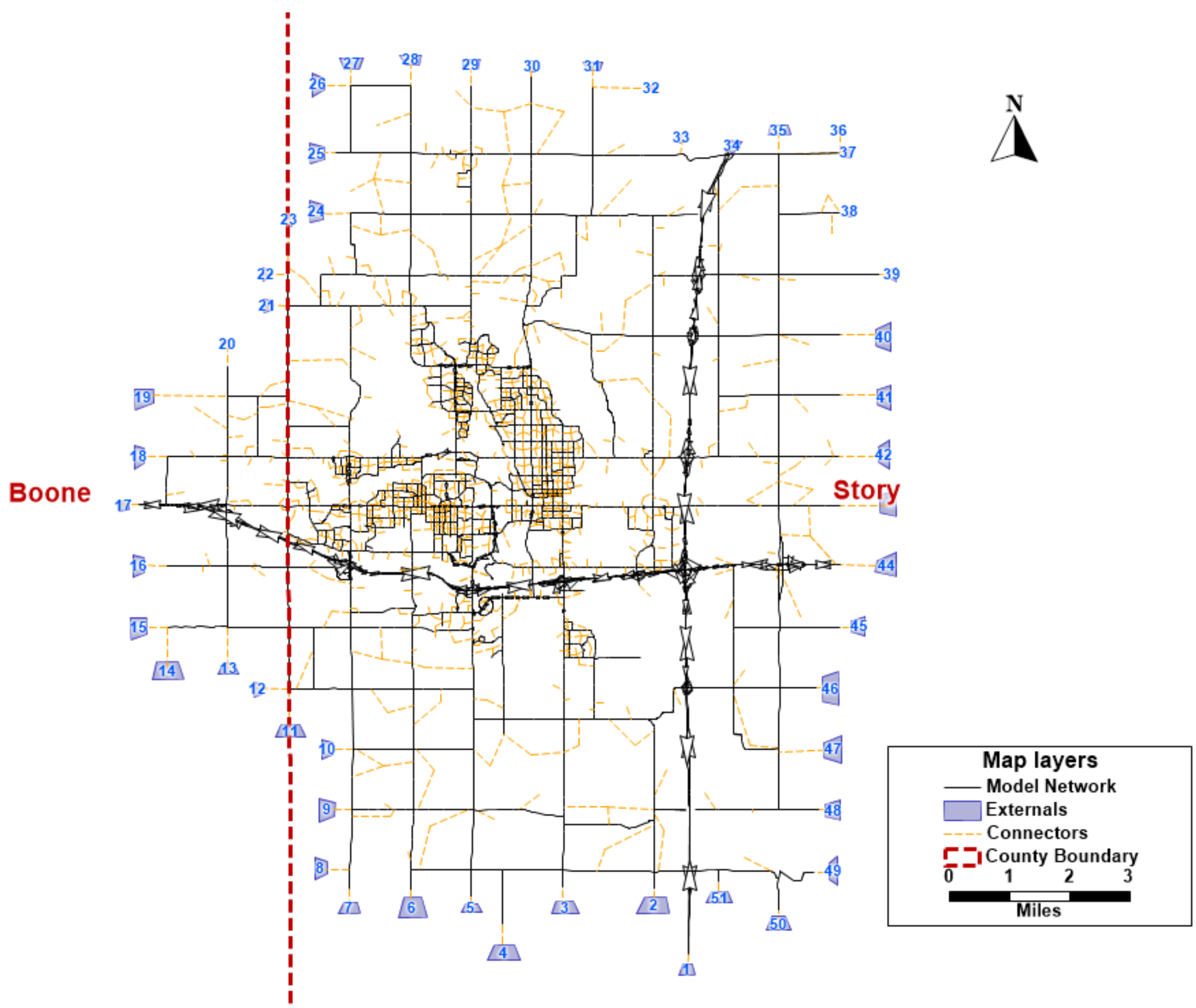
External Analysis Updates

The AAMPO TDM has 51 external stations shown in **Figure 4**. Trips both to and from external stations are External-External (E-E) trips. The trips that have one end at an external station and do not have the other trip end at another external station are External-Internal or Internal-External (E-I/I-E) trips.

Traffic counts at the external stations and a statewide model (iTRAM) sub-area for both the existing year and future year were prepared by the Iowa DOT. The external station forecast volumes were also prepared by the Iowa DOT and reviewed by the MPT. The Traffic_Forecasts.bin provided by the Iowa specifies how trips from iTRAM should be disaggregated to ISMS trip purposes. These values were adjusted during model calibration and reviewed with the MPT. The inputs are shown in **Appendix 2**.

During the execution of the model, external inputs are split into E-I/I-E and E-E trips. The E-E trips are adjusted with an iterative proportional fitting procedure to balance trips by direction. The E-I/I-E trips are added to the internal trips prior to balancing.

Figure 4 - External Station Locations

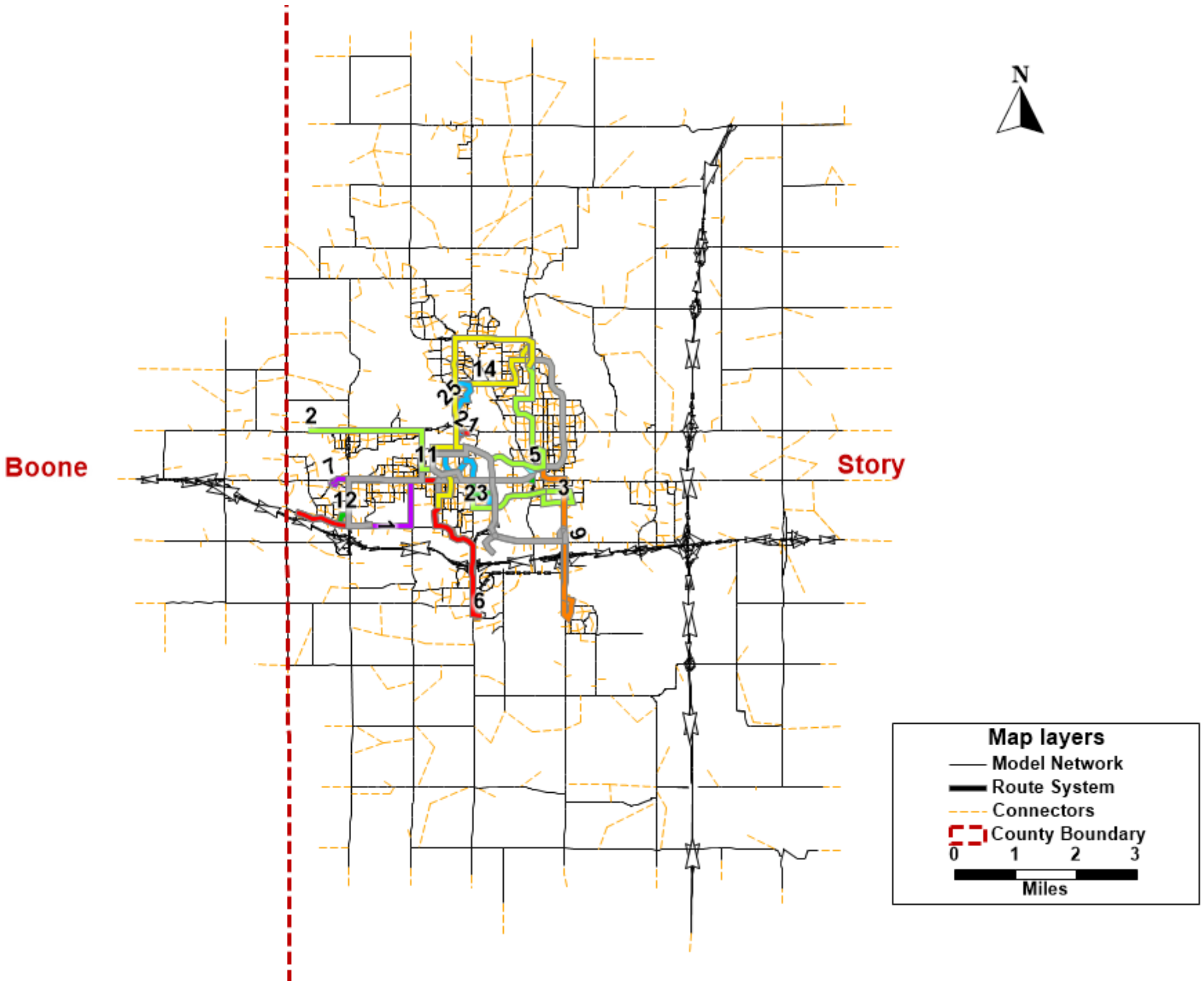


Transit Routes and Stops

Transit route alignments were updated using information provided by CyRide. Often, routes vary by times of the day or days of the week. Whenever there was a variation, the new alignment was modeled as a new route. The attribute for route number is consistent among all variations so that results can be easily grouped. Headways and fares were updated with information provided by CyRide for all time periods. Transit stop locations were added for each route based on locations shown on Google Maps.

During the model processing, transit routes are copied to output folders for both weekday and weekend time periods and the headways by time period are used to prepare a modeled headway and calculate transit skims that are used in mode choice. The transit routes and stops in the AAMPO model are shown in **Figure 5**.

Figure 5 - Transit Routes and Stops



`

Trip Rates

Trip production rates had been prepared for ISMS trip purposes from a 2017 National Household Travel Survey Add-on (NHTS Add-on) for the Des Moines area for the prior model update. Trip productions from the NHTS Add-on were used again for this model update. Trip production rates are shown in **Appendix 3**.

The prior model trip attraction rates were also from the NHTS Add-on. Yet, sample sizes for many land uses and time periods were extremely low or zero, which required significant inferring of trip rates. Thus, Replica data was leveraged to estimate trip attraction rates by classifying the trips produced by the Replica Fall 2023 model synthetic population into ISMS trip purposes and dividing by land use amount values from the parcel data.

For land uses with larger sample sizes, the NHTS Add-on trip attraction rates were used. For other land uses, Replica data was used after careful review for reasonableness. The final trip attraction rates and the source of data used are shown in **Appendix 4**.

Employment Density

Employment density inputs are used to convert land use amount values to an estimated employment value. Each land use has a different density of employment per square mile.

The AAMPO TDM employment density inputs were initially estimated using employment densities borrowed from the Waterloo-Cedar Falls metropolitan area by geocoding employment to parcel data. The employment density values were altered to calibrate to employment totals by jurisdiction.

Table 3 - Employment Densities by Land Use

LUC	LUNAME	Employment Density
25	SNF	2.633
26	HOT	1.658
30	MFG	0.991
31	IPK	0.991
32	WAR	0.991
35	EXT	0.461
36	LF	0.278
40	CAIR	0.634
41	GAIR	0.610
45	TERM	1.050
50	SFC	1.658
51	NSC	1.658
52	CSC	1.658
53	RSC	1.658
55	AUC	1.658
56	SS	1.658
57	FF	1.658

LUC	LUNAME	Employment Density
58	SDR	1.658
59	ORC	1.658
60	GO	2.182
61	GOV	2.182
62	HRO	2.182
63	LIB	0.571
64	PO	1.658
65	BNK	1.658
66	FS	0.571
68	RF	0.571
69	OPS	0.571
70	HOSP	2.633
71	OHC	2.633
73	REC	0.571
74	CUL	0.571
75	CCEN	0.571
76	PA	0.571
77	MIL	2.247
78	JAIL	0.571
79	TOUR	0.571
80	PS	0.571
81	ELEM	0.168
82	JRHS	0.105
83	SRHS	0.122
84	COLL	0.316
89	ORS	0.571
90	GC	0.167
91	CAS	2.633
92	STAD	2.633
93	APRK	0.084
303	FPUB	0.571
304	FSPI	2.633
305	FOFF	2.182
306	FCOM	1.658
308	FIND	0.991
309	FCO	2.051

Time of Day

Time of day factors are applied to trip rate values by land use and disaggregated household category to generate trips for each time period in the ISMS. Directional factors are applied during trip distribution. The Des Moines 2017 NHTS Add-on was used to estimate directional factors for the previous AAMPO ISMS model. The same values were used for the ISMS 2.0 model update.

Table 4 - Directional Factors

	Weekday				Weekend			
Trip Purpose	AM	MD	PM	OP	AM	MD	PM	OP
HBWL	0.97	0.55	0.07	0.38	1.00	0.55	0.15	0.23
HBWM	0.99	0.54	0.07	0.42	0.88	0.54	0.15	0.42
HBWH	1.00	0.51	0.07	0.27	1.00	0.51	0.15	0.33
HBSC	0.99	0.29	0.03	0.11	1.00	0.29	0.03	0.11
HBSH	0.83	0.48	0.40	0.27	0.77	0.47	0.38	0.26
HBO	0.81	0.61	0.48	0.38	0.84	0.62	0.58	0.30
NHB	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
HOSP	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
APRT	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
RREC	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
HOT	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
SU	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
COMBO	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Auto Occupancy

Auto occupancies were borrowed from the 2017 Des Moines NHTS Add-on. Minor revisions were made to match total observed VMT. **Table 5** shows the final input auto occupancy values compared to NCHRP 716 where available. Most revisions occurred on weekend values, which had lower sample sizes in the NHTS Add-on and had more volatile initial values.

Table 5 - Auto Occupancy Values

PURPOSE	WDWE	am	pm	op	md	NCHRP 716
HBWL	wd	1.07	1.07	1.07	1.07	1.10
HBWL	we	1.16	1.16	1.16	1.16	
HBWM	wd	1.07	1.07	1.07	1.07	
HBWM	we	1.16	1.16	1.16	1.16	
HBWH	wd	1.07	1.07	1.07	1.07	
HBWH	we	1.16	1.16	1.16	1.16	
HBSC	wd	1.521	1.521	1.521	1.521	N/A
HBSC	we	1.521	1.521	1.521	1.521	
HBSH	wd	1.459	1.459	1.459	1.459	1.75
HBSH	we	1.726	1.726	1.726	1.726	
HBO	wd	1.65	1.65	1.65	1.65	
HBO	we	1.726	1.726	1.726	1.726	
NHB	wd	1.545	1.545	1.545	1.545	1.66
NHB	we	1.95	1.95	1.95	1.95	
UNIV	wd	1.2	1.2	1.2	1.2	N/A
UNIV	we	1.5	1.5	1.5	1.5	
HOSP	wd	1.14	1.14	1.14	1.14	
HOSP	we	1.14	1.14	1.14	1.14	
APRT	wd	1.4	1.4	1.4	1.4	
APRT	we	1.6	1.6	1.6	1.6	
RREC	wd	1.425	1.425	1.425	1.425	
RREC	we	1.726	1.726	1.726	1.726	
HOT	wd	1.286	1.286	1.286	1.286	
HOT	we	1.726	1.726	1.726	1.726	
SU	wd	1	1	1	1	
SU	we	1	1	1	1	
COMBO	wd	1	1	1	1	
COMBO	we	1	1	1	1	

Calibration and Validation

The model development goal is to create a realistic picture of travel patterns in the study area. As such, models should be calibrated to reflect current travel conditions. Travel is unique in each community. Therefore, results need to be reviewed in detail and adjustments made to inputs or parameters to match local conditions. Each adjustment needs to be done without unreasonably modifying inputs to unrealistic values, which might constrain the model in future scenario years.

Validation refers to the statistical and non-statistical reasonableness checks used to assess the accuracy of the model. The best practice is to perform validation checks on each major step of the model process. This helps to ensure that data and model structure errors are limited or omitted throughout the process, and that the model will be flexible enough to respond to transportation and land use scenarios to be effectively used as a forecasting tool. The main validation checks and calibration adjustments are discussed below.

Trip Generation Validation Checks and Calibration Adjustments

Each trip has a beginning and an end, and it is necessary for the trip producing trips ends to be equal to the number trip attracting ends. The initial (unbalanced) productions and attractions in the model are never completely equal due to different data sources and trip rate sources, the ratios of productions and attractions by trip purpose should be reasonably close prior to balancing. If they are not, then it could be because of an input data error (either land use input data or trip rates) or a model processing error.

The Travel Model Improvement Program (TMIP) *Travel Model Validation and Reasonableness Checking Manual*, 2nd Edition recommends a preferred ratio of between 0.90 – 1.10 for unbalanced productions and attractions before trip balancing. The unbalanced trip ratios by trip purpose for the AAMPO TDM are shown in **Table 6** below. Overall, productions and attractions are very close to balanced for each trip purpose, which suggests that there are not any obvious errors in the socioeconomic data or trip rates.

Table 6 - Unbalanced Production and Attraction Ratios

	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	HOSP	APRT	RREC	HOT	SU	COMBO	Total
Weekday Ratio	1.06	1.05	1.03	0.97	0.92	1.05	1.00	1.22	1.36	0.99	1.11	1.04	1.01	1.01
Weekend Ratio	0.97	1.01	0.78	1.09	0.81	1.06	0.99	0.95	0.61	0.99	1.08	1.07	1.02	0.96
Weighted Average	1.00	1.02	0.92	0.94	0.98	1.01	1.00	0.87	0.99	1.06	1.04	1.01	1.00	0.99

The final balanced trips per household are shown in **Table 7** and compared to Table 5.2 from The Travel Model Improvement Program (TMIP) *Travel Model Validation and Reasonableness Checking Manua*l (Second Edition).

*Table 7 - Balanced Trips Per Household**

Source	Trips per Household
Model (Weekday)	14.80
Model (Weekend)	8.18
Model (Weighted Average)	12.91
TMIP**	10.84

**Trucks not included*
***Travel Model Validation and Reasonableness Checking Manual - Second Edition*

Trip Distribution Validation Checks and Calibration Adjustments

The trip distribution step takes the balanced trips and for each TAZ allocates them to other TAZs based on network travel times and friction factors. This is done using the gravity model within TransCAD.

Replica data was processed into one minute and one mile groups based on the Fall 2023 weekday model for trips starting or ending in the model area. StreetLight data was downloaded for 2022 Location Based Service (LBS) data for the model region, including external stations as passthrough zones. An origin-destination matrix was created using StreetLight data and applied to an average weekday shortest path matrix to calculate one minute and one mile time groups.

Adjustments were made to the model to better replicate both travel distances and travel times, including adjusting density values and terminal times, and adjusting trip purpose friction factors.

The initial friction factor curves were borrowed from the ISMS 1.0 version of the model. Slight adjustments were made to better match StreetLight trip length frequency distribution curves for available trip purposes and to improve the ratio of count VMT to model volume VMT. The model frequency distribution curves closely align with StreetLight data for both miles and minutes.

Replica data provides another dataset that can be used for comparison, however Replica data represents modeled data rather than observed data. The trip length frequency distribution curves from Replica match the model and StreetLight data closely in terms of miles, but less closely in terms of minutes. The modeled versus StreetLight and Replica trip length frequency distribution curves are shown in **Figure 6, Figure 7** and **Figure 8**. Only the trip purposes that include both StreetLight and Replica data are shown.

Figure 6 - Home-Based Work Trip Length Distribution Curves (Miles and Minutes)

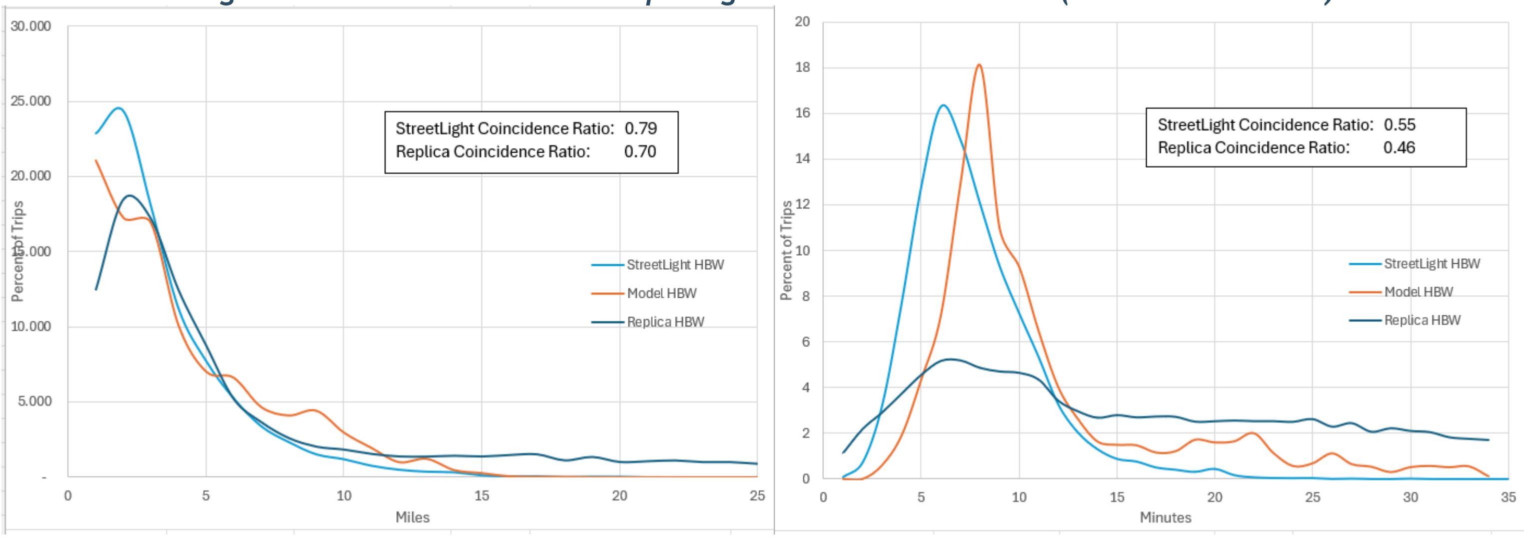
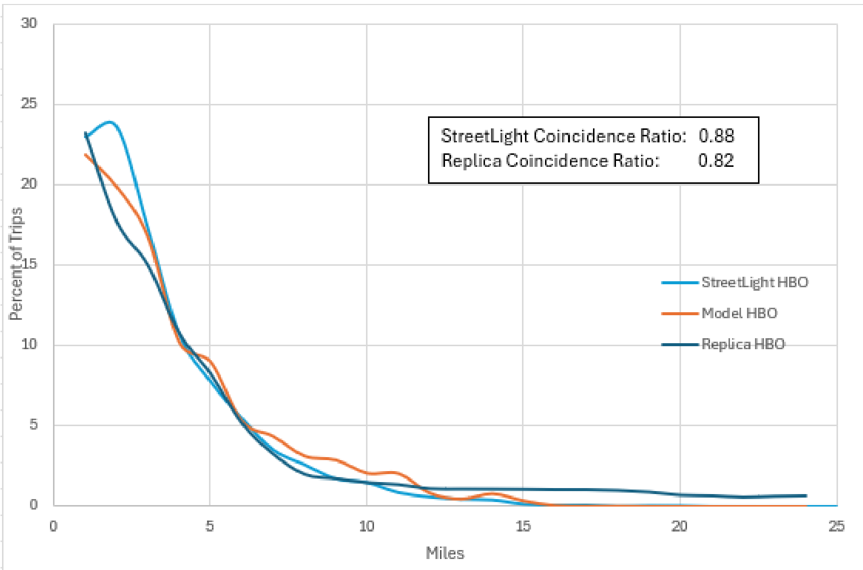


Figure 7 - Home-Based Other Trip Length Distribution Curves (Miles and Minutes)



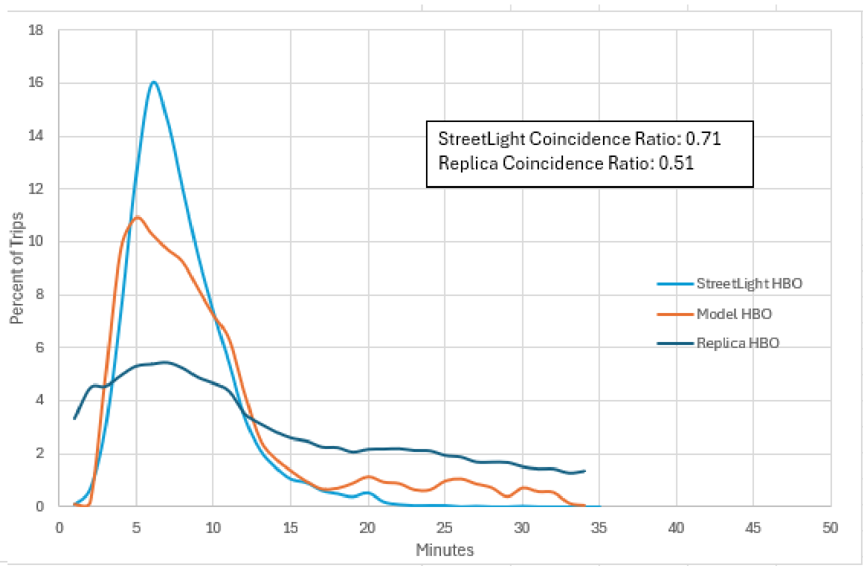
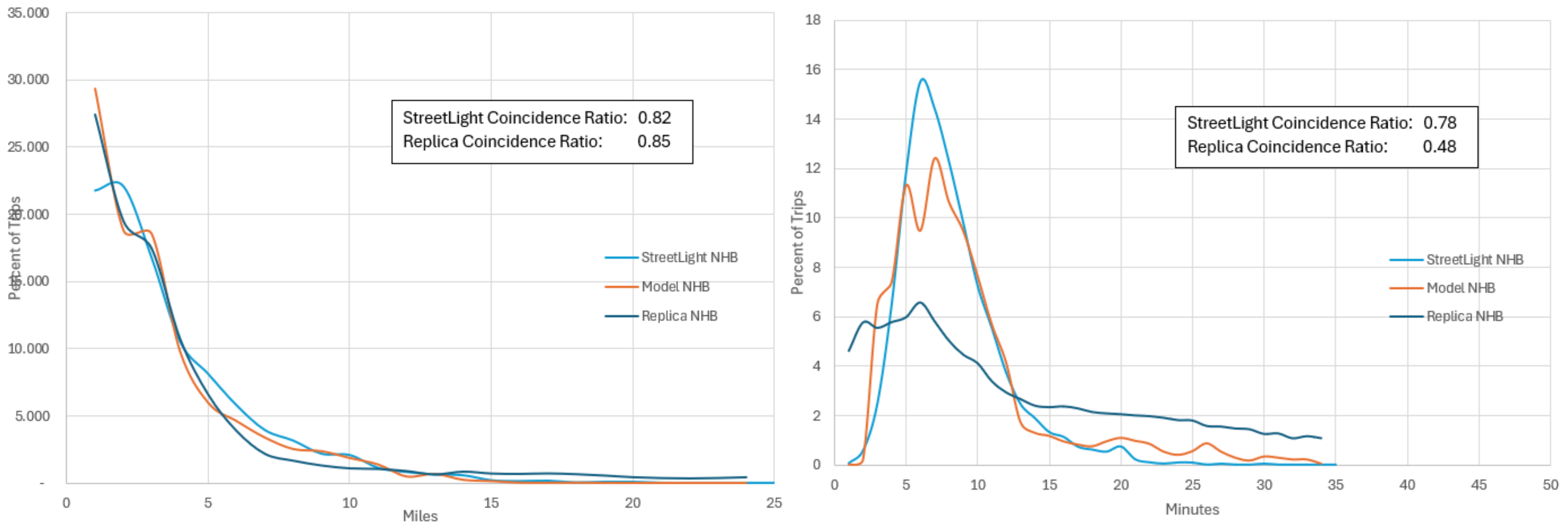


Figure 8 - Non-Home Based Trip Length Distribution Curves (Miles and Minutes)



A summary of the coincidence ratios, which measures the fit of two trip length frequency distribution curves is shown in **Table 8** and **Table 9** for miles and minutes, respectively. The five special trip purposes and truck trip purpose ratios were not calculated. A ratio over 0.70 is considered a good fit. The model trip length frequency distribution curves consistently match the StreetLight-derived distribution curves well. The model and Replica-derived trip length frequency distribution curves are also a very close match, particularly in terms of miles.

Table 8 - Trip Mile Frequency Distribution Curve Coincidence Ratios

Trip Purpose	StreetLight Coincidence Ratio	Replica Coincidence Ratio
HBW (all income levels)	0.79	0.70
HBSC	N/A	0.73
HBSH	N/A	0.71
HBO	0.88	0.82
NHB	0.82	0.85

Table 9 - Trip Minute Frequency Distribution Curve Coincidence Ratios

Trip Purpose	StreetLight Coincidence Ratio	Replica Coincidence Ratio
HBW (all income levels)	0.55	0.46
HBSC	N/A	0.45
HBSH	N/A	0.56
HBO	0.71	0.51
NHB	0.78	0.48

A comparison of average travel times was made with StreetLight data. The average travel times and average travel distances are shown in **Table 10** and **Table 11**. Modeled travel distances and durations are slightly longer than StreetLight data for all passenger trip purposes.

Table 10 - Average Travel Distance (Miles)

	Model	StreetLight
HBW	4.18	3.38
HBO	3.89	2.48
NHB	3.38	2.75

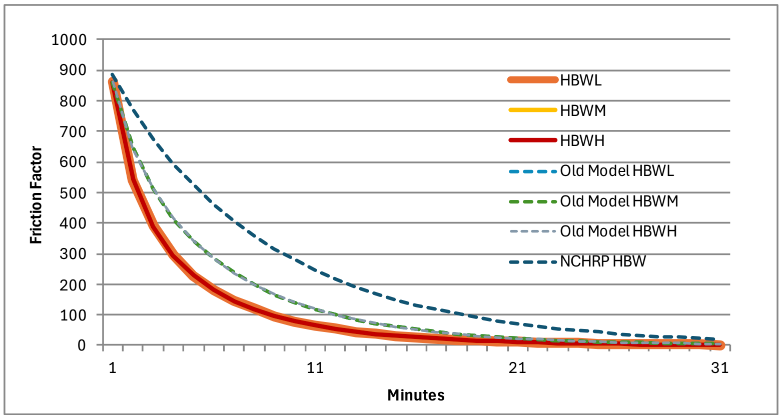
Table 11 - Average Travel Time (Minutes)

	Model	StreetLight
HBW	11.13	6.69
HBO	9.69	6.83
NHB	9.11	7.11

Friction factor curves show the desirability of making trips of certain distances. The x-axis represents minutes of travel time, and the y-axis represents the friction factor, which is the utility or likelihood of making a certain distance trip. Friction factors vary by trip purpose as people will typically travel farther for a work trip than other trip purposes. The flatter a curve, the more desirable longer trips are relative to a steeper curve and thus the model would produce longer average trip lengths.

Figure 9–Figure 13 below show the friction factor curves used for each trip purpose. National Cooperative Highway Research Program Report 716 (NCHRP 716) provides typical friction factor values for HBW, HBO, and NHB trip purposes that can be used for comparison. Most friction factor curves were kept the same as the ISMS 1.0 curves and provided a good match with StreetLight and Replica trips. HBW trip purposes are the main exception. The HBW friction factor curves were made steeper to favor shorter trips to provide a better fit with the StreetLight data used for validation.

Figure 9 - HBW (All Income Levels) and HBSC Friction Factor Curves



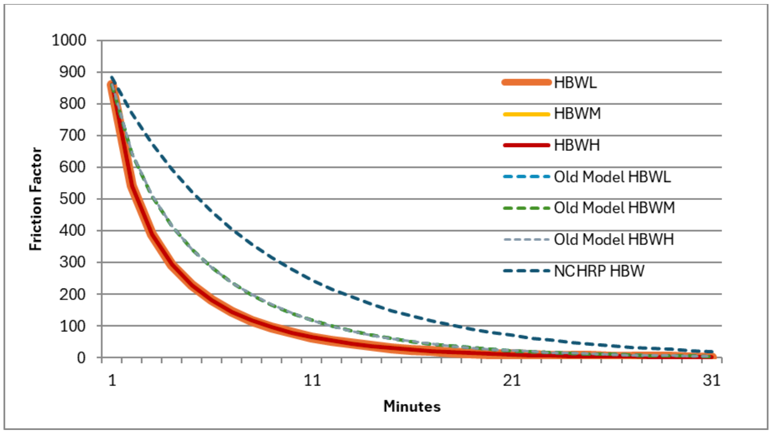


Figure 10 - Home-based Shopping and Other Trip Purpose Friction Factor Curves

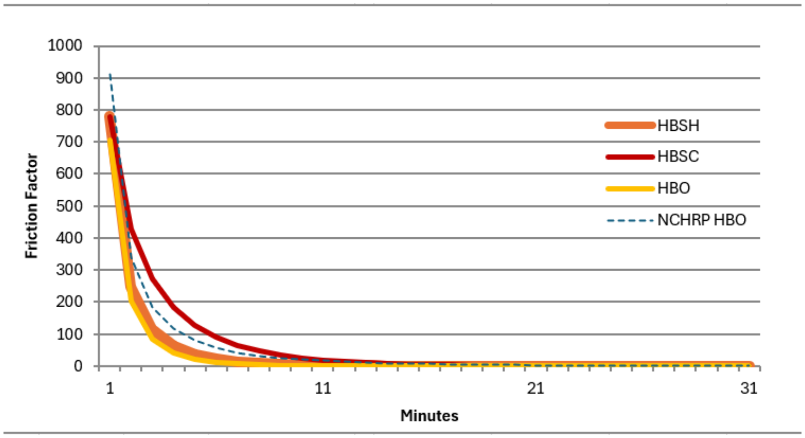


Figure 11 - NHB Friction Factor Curve

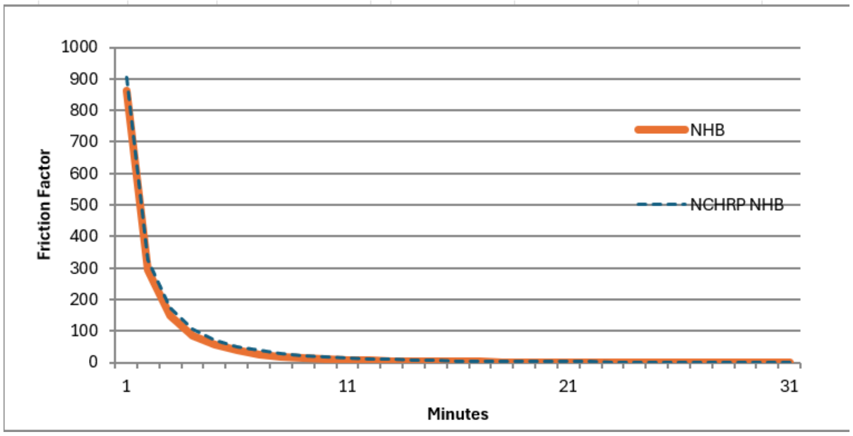


Figure 12 - Special Trip Purpose Friction Factor Curves

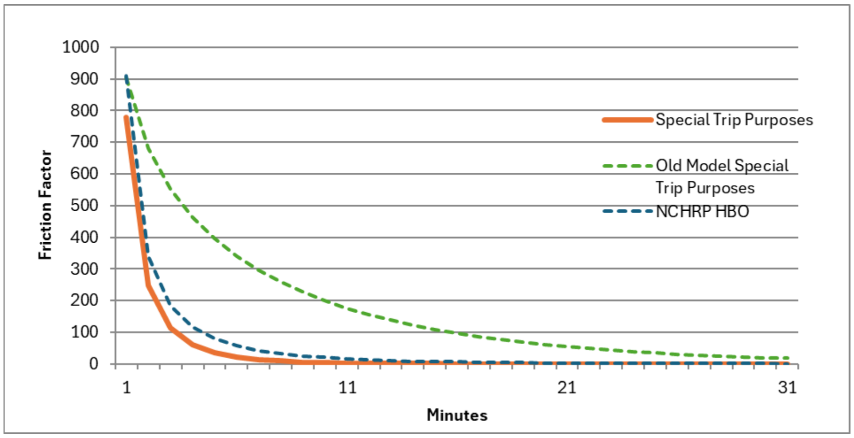
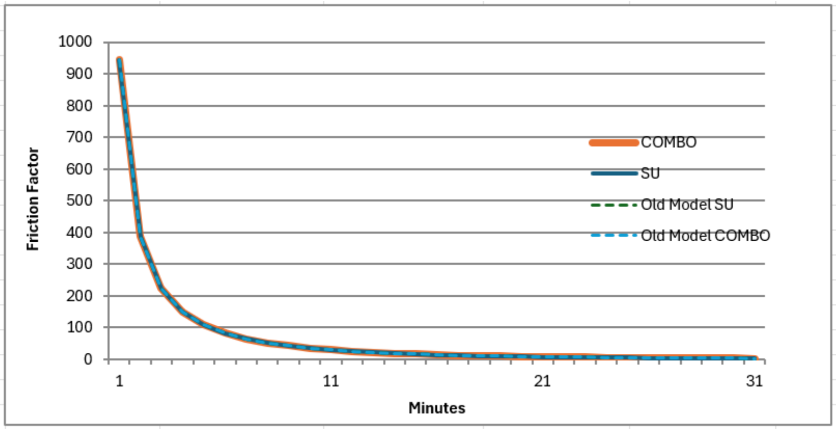


Figure 13 - Truck Friction Factor Curves



During the trip distribution gravity model, K-Factors can be added to reduce or enhance origin and destination pairs that the gravity model does not represent accurately. K-Factors are often referred to as a “socioeconomic” factor to adjust travel propensity between origin-destination pairs that are not otherwise accounted for in the trip distribution model. In some situations, K factors may be warranted but ideally are not required (or desired) in a trip distribution model.

The AAMPO TDM does not have any K-Factors. That said, the input K-Factor matrix does use K-Factor values of 0 to ensure that the gravity model does not distribute trips between external zones, which are determined outside the model.

Mode Choice Validation Checks and Calibration Adjustments

After all trips are distributed, they are split into trips by different modes of transportation. First, trips are split into motorized and non-motorized (walk and bike) trips. Then, the AAMPO TDM uses the ISMS Mode Choice option to split the motorized trips into auto versus transit trips. The ISMS 2.0 Manual provides more details on the model processing steps.

The target number of non-motorized weekday trips by trip purpose were estimated from the Replica data and were compared with model-estimated weekday non-motorized trips by purpose. A comparison is shown in **Table 12**. **Table 13** shows the final percentage of trips by trip purpose that are assumed to be non-motorized for all trips between TAZs that are within the distance thresholds shown. Weekend percentages were assumed to be the same as weekday percentages. These values are used to skim trips between zones within these distance thresholds.

Table 12 – Replica versus Model-Estimated Non-motorized Trips by Purpose

	Replica Weekday	Model Weekday
HBWL	1,226	1,106
HBWM	1,244	1,224
HBWH	1,120	815
HBSC	3,582	5,673
HBSH	7,524	0
HBO	11,079	11,672
NHB	19,798	16,861
Special Trip Purposes*	-	215
Sum	45,573	37,351

Table 13 - Non-Motorized.Bin File Containing Percentages by Purpose and Distance

	Weekday		Weekend	
Purpose	0-0.5 Miles	0.5-1 Miles	0-0.5 Miles	0.5-1 Miles
HBWL	65%	30%	65%	30%
HBWM	65%	30%	65%	30%
HBWH	65%	30%	65%	30%
HBSC	85%	30%	85%	30%
HBSH	50%	20%	50%	20%
HBO	50%	20%	50%	20%
NHB	50%	20%	50%	15%
UNIV	85%	50%	85%	50%
HOSP	50%	20%	50%	20%
APRT	0%	0%	0%	0%
RREC	50%	20%	50%	20%
HOT	50%	20%	50%	20%
SU	0%	0%	0%	0%
COMBO	0%	0%	0%	0%

The resulting weekday and weekend trips by mode (for all regional trips) are shown in the tables below and do not include intrazonal trips.

Table 14 - Percent Person Trips by Mode - Weekday

	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	Total
Nonmotorized	5.8%	3.3%	3.2%	8.7%	4.9%	6.8%	8.1%	7.9%
Transit	7.7%	0.6%	0.7%	0.0%	0.0%	0.6%	1.3%	2.6%
Persons in Auto	86.5%	96.0%	96.1%	91.3%	95.1%	92.6%	90.6%	89.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 15 - Percent Person Trips by Mode - Weekend

	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	Total
Nonmotorized	4.6%	2.7%	1.2%	5.5%	4.0%	6.4%	7.7%	7.6%
Transit	2.0%	0.2%	0.1%	0.0%	0.0%	0.3%	0.3%	1.8%
Persons in Auto	93.4%	97.1%	98.7%	94.5%	96.0%	93.3%	92.0%	90.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

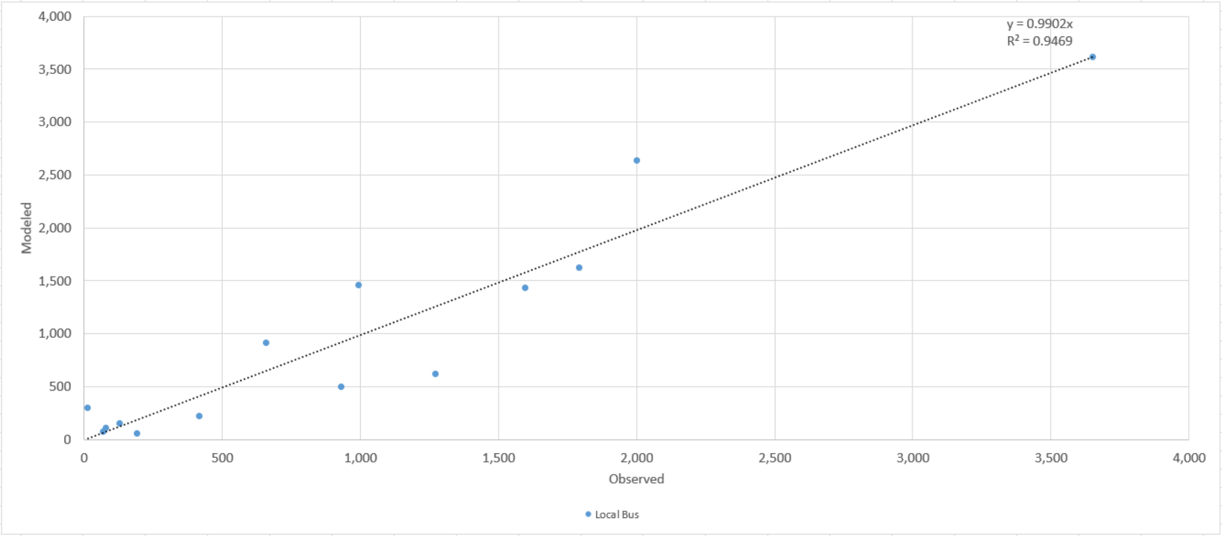
Monthly transit ridership data was provided by CyRide for the year 2023. Ridership for the month of March was divided by the number of weekdays and weekends to estimate weekday and weekend ridership numbers.

The model-estimated ridership by route compared with observed ridership data is shown in **Table 16**. **Figure 14** shows a scatterplot and linear trendline of observed versus modeled ridership. While ridership by route results vary for each route, the model estimates the correct magnitude of transit trips and the trendline slope of 0.99 suggests that the model does not consistently over or underestimate ridership.

Table 16 - Observed versus Modeled Ridership by Route

2023 Ridership by Route Average Weekday		
Route	Average Daily Ridership	Modeled Daily Ridership
Red	2,004	2,632
Green	662	903
Blue	1,601	1,424
Yellow	81	100
Brown	997	1,452
Purple	133	148
Plum	421	211
Cherry	935	494
Lilac	193	52
Peach	73	67
Cardinal	1,276	610
Orange	3,655	3,611
Gold	1,797	1,618
Moonlight Express	15	295
Sum	13,844	13,616

Figure 14 - Observed Versus Modeled Ridership by Route



Traffic Assignment Validation Checks and Calibration Adjustments

The goal of a TDM is to replicate travel patterns as accurately as possible throughout each step of the model, without placing too many unreasonable constraints on its operation. Ultimately, the model-predicted volumes should have a strong correlation with observed traffic count data but not be over-calibrated and limit the sensitivity of the model to input changes.

In the traffic assignment step the model attempts to minimize a trip's cost (in ISMS, this is travel time) between its origin and destination. Travel time is a function of speed and distance traveled.

Localized adjustments to centroid connectors were made during calibration to better represent how traffic flows in and out of neighborhoods.

A comparison of model-estimated Vehicle Miles Traveled (VMT) to counted VMT for locations with traffic counts shows that all functionally classified road categories are largely within the validation goals provided by FHWA in 1990 **(Table 17)**. All facility types are within the FHWA guidelines. The collector roads had a higher VMT error which can be caused because models typically estimate lower volume roads less accurately, and a portion of the error may also be a function of the estimated count data.

Table 17 - Model-Estimated VMT by Functional Class Compared to Observed VMT

	Number of Counts	Vehicle Miles Traveled (VMT)		Error		Validation Goal*
Functional Class		**Estimated**	**Observed**	**Difference**	**Percent**	
Interstate	19	286,733	284,985	1,748	0.6%	**+/-7%**
Principal Arterial	63	133,577	132,252	1,324	1.0%	**+/-10%**
Minor Arterial	42	29,048	32,358	-3,310	-10.2%	**+/-15%**
Collector	57	28,320	24,941	3,379	13.5%	**+/-20%**
Local	33	2,603	2,445	158	6.5%	
Ramps	42	47,158	44,102	3,056	6.9%	
Total	**256**	**477,679**	**474,536**	**3,142**	**0.7%**	

*FHWA-1990 goals

Percent Root Mean Squared Error (%RMSE) is a standard model validation check that measures the average error between the model-estimated and counted volumes. The lower the value, the less the difference there is between the model-estimated volumes and the counts. **Table 18** and **Table** 19 show the %RMSE stratified in two different ways: by volume groups and by functional class. The %RMSE in the AAMPO TDM is within the preferable validation target for most volume groups and well within the acceptable validation target for all volume groups. By functional class the model meets the ISMS Preferred criteria for all categories.

Table 18 - Percent Root Mean Squared Error by Volume Groups

Volume Range	Number of Counts	% RMSE	Validation Goal*	
			Acceptable	Preferable
0 - 5,000	147	**50.59%**	100%	45%
5,000 - 10,000	70	**26.43%**	45%	35%
10,000 - 15,000	22	**12.47%**	35%	27%
15,000 - 20,000	20	**7.84%**	35%	27%
20,000 – 30,000	3	**16.88%**	35%	27%
30,000 – 40,000	1	**0.89%**	35%	27%
40,000 – 50,000	1	**1.27%**	35%	27%
50,000 – 60,000	0	**0%**	35%	27%
60,000 – 70,000	0	**0%**	35%	27%

*Florida Standard Urban Transportation Modeling Systems (FSUTMS)

Table 19 - Percent Root Mean Squared Error by Functional Class

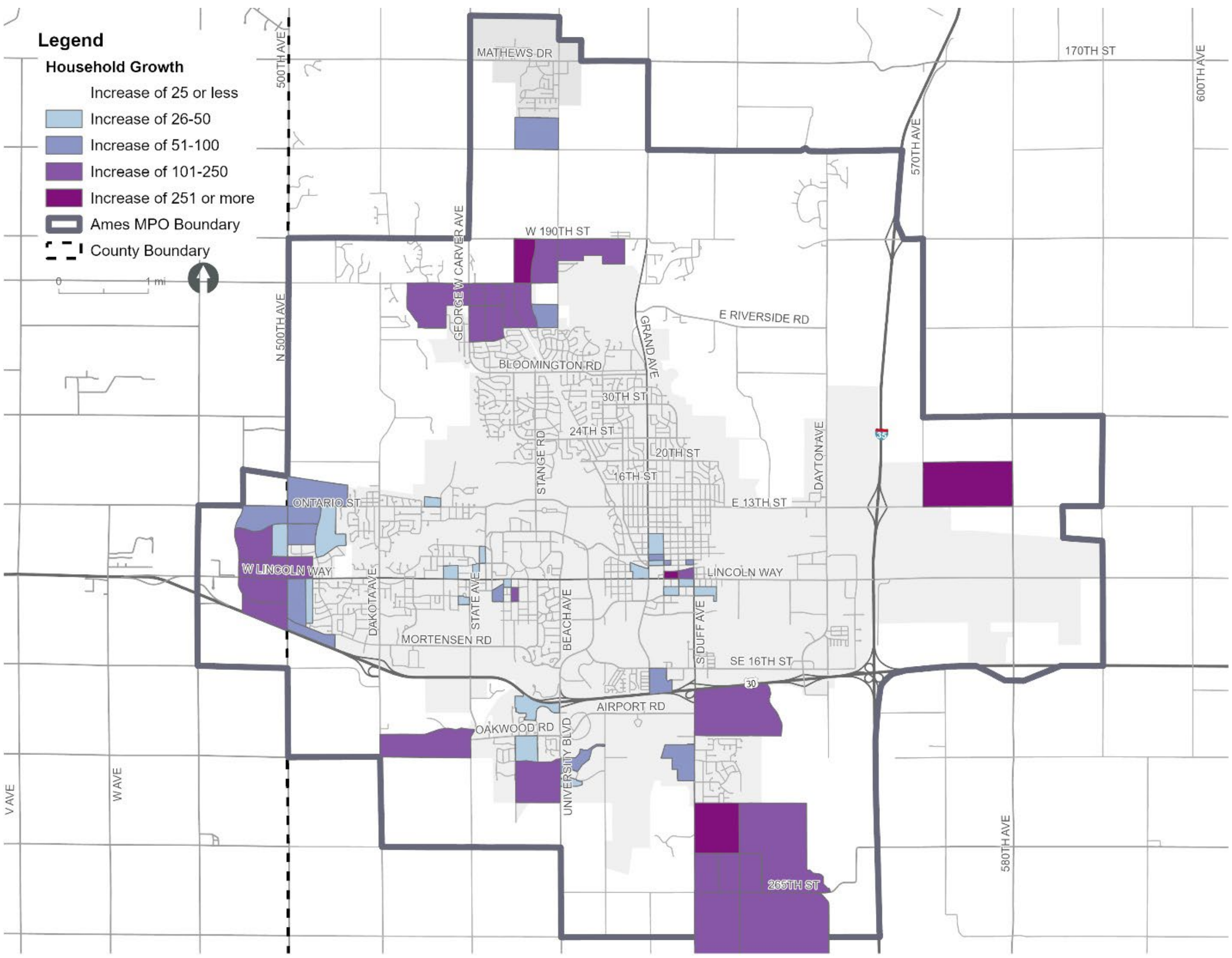
Link Type	Number of Counts	% RMSE	ISMS Acceptable	ISMS Preferred
Interstate	19	4.5%	30%	25%
Principal Arterial	63	20.4%	35%	30%
Minor Arterial	44	25.8%	45%	40%
Collector	44	46.2%	65%	50%
Local	36	81.9%	N/A	N/A
Ramp	2	0.2%	N/A	N/A
Total	**250**	**23.9%**	**35%**	**30%**

Future Year

While good base year model validation statistics are important, the main goal of the model is to forecast trips. Thus, the growth and future level-of-service can be reviewed for reasonableness to ensure the model is sensitive enough to be used as a forecasting tool.

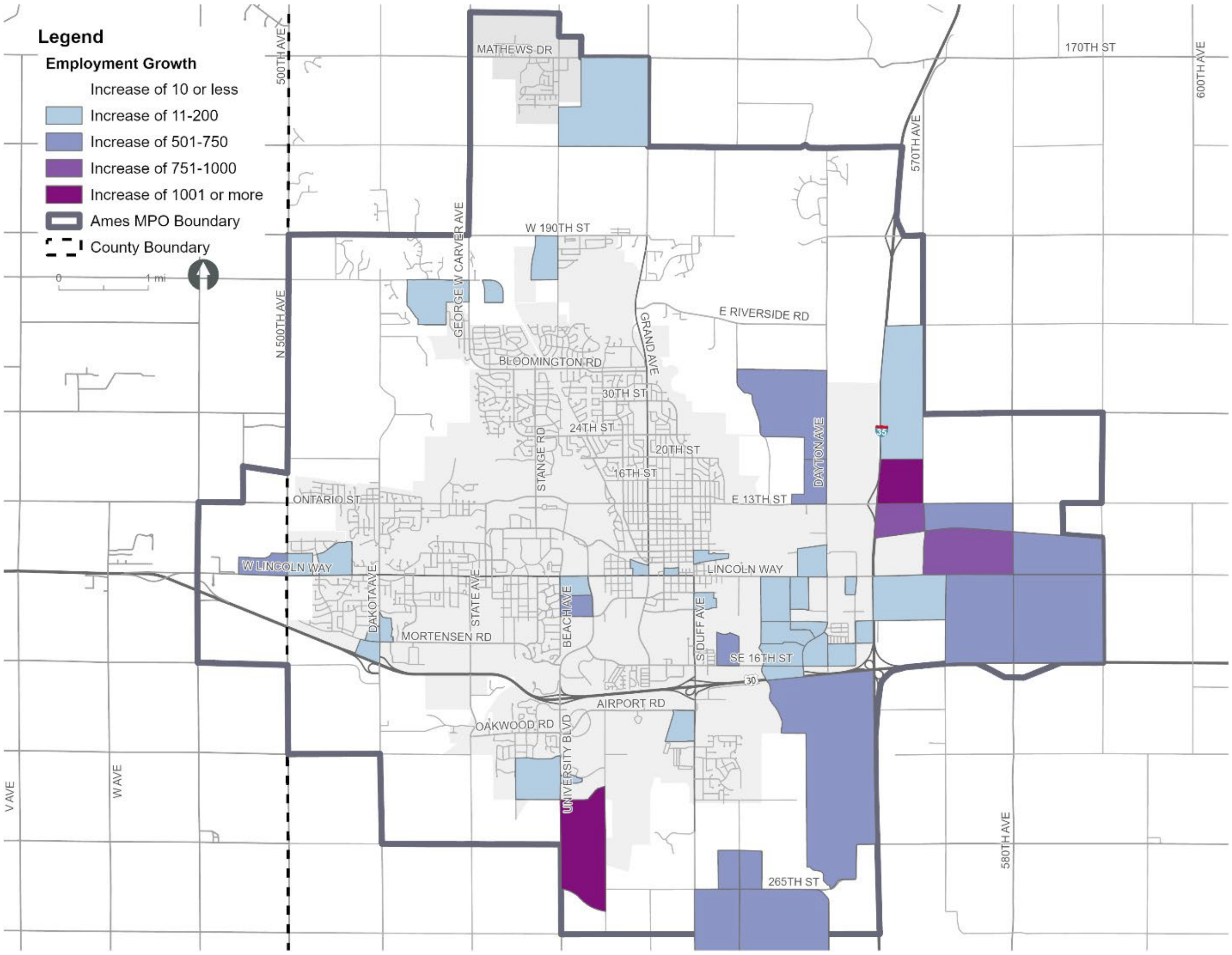
Forecast growth control totals were determined by MPO staff for 2035 and 2050. The MPO then allocated the growth to the TAZs where they expect growth to occur. This data was then migrated to the input parcel file for each of the two forecast years. **Figure 15** and **Figure 16** show the growth by TAZ in the AAMPO for households and employment. Some growth is expected to occur near the city center, but the majority of growth is on the periphery of the urbanized area.

Figure 15 - Forecast Household Growth



Employment growth shows a somewhat similar pattern as household growth but with higher amounts of growth in city centers rather than on the urban fringes.

Figure 16 - Forecast Employment Growth



External station growth was forecast to 2050 by the Iowa DOT for each external station. The forecast values were reviewed by the MPT. In 2035, the interim year forecasted growth at the external stations is interpolated between the base year and 2050.

Figure 17 and show the model-predicted AM and PM peak period level-of-service for the model base year. Level-of-Service F represents congested roadways, while Level-of-Service D and E represent roadways that are congested, but not fully congested.

There are no roads that are fully congested, operating at a LOS of D or above in the AM or PM peak hours in the base year.

Figure 17 – 2023 AM Level-of-Service

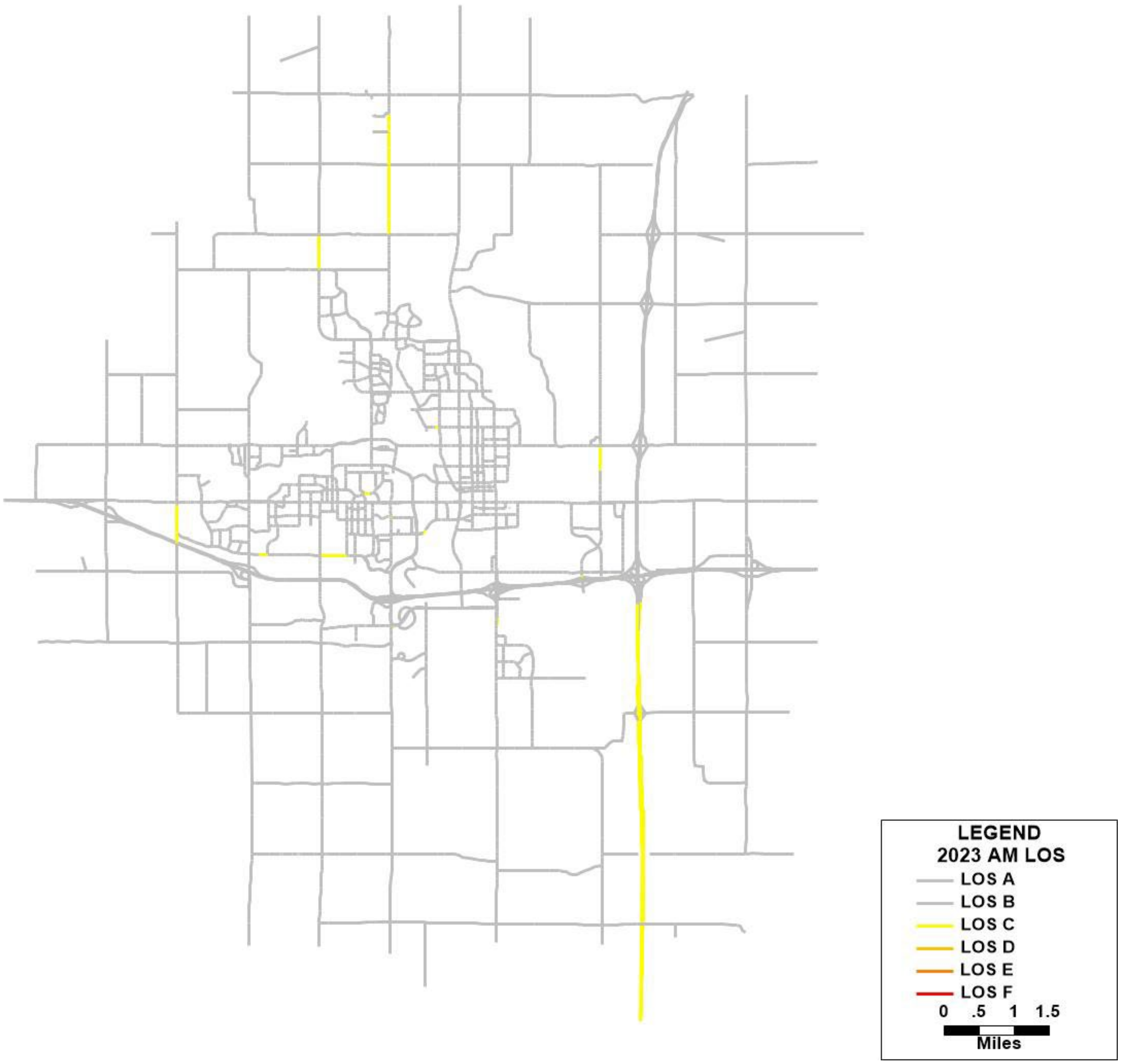
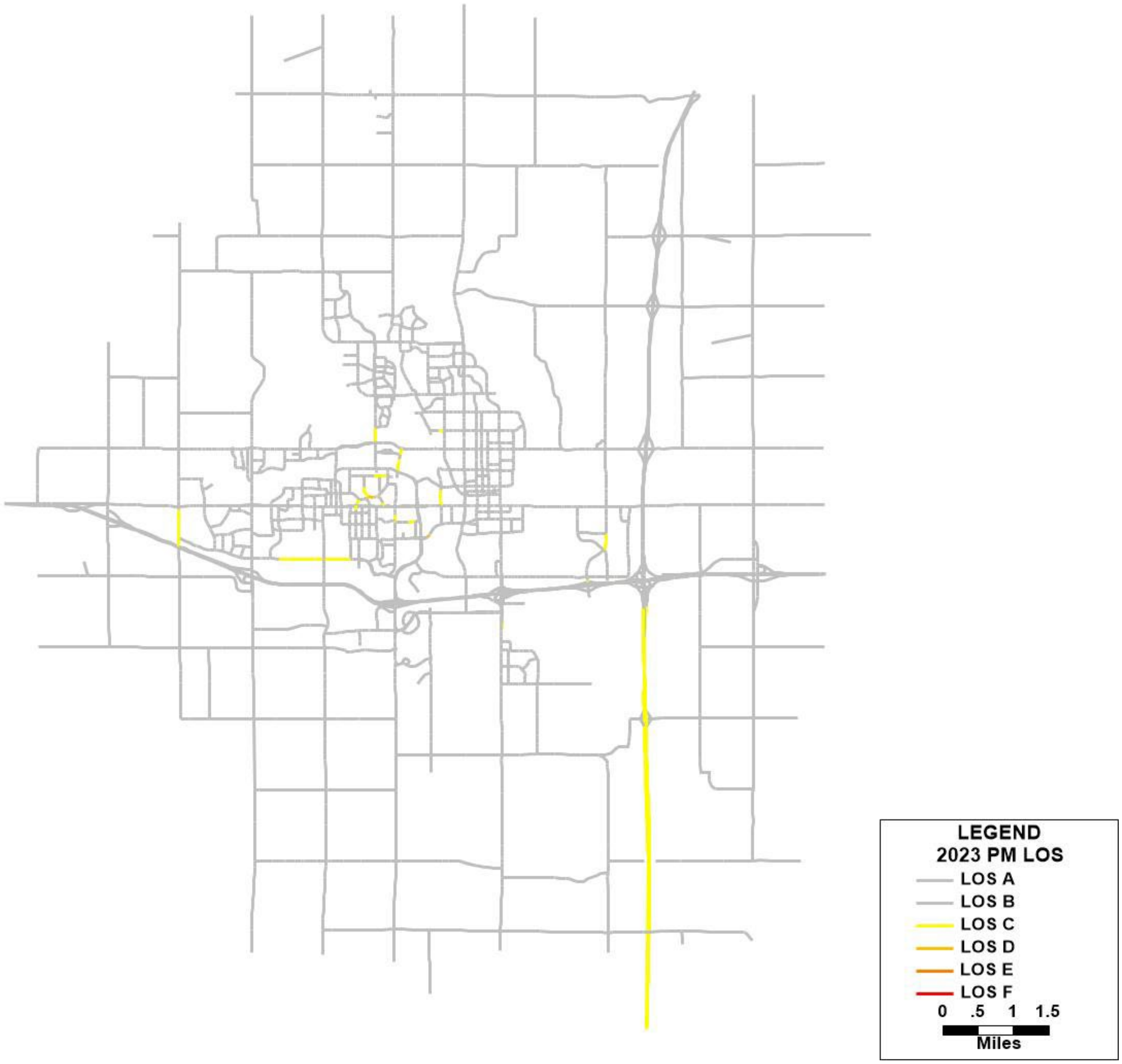


Figure 18 – 2023 PM Level-of-Service



The 2050 AM and PM peak time period level-of-service maps are shown in **Figure 19** and **Figure 20**. Both figures represent the anticipated 2050 trip generation and include both committed and planned road projects.

Significantly more congestion is shown in 2050. In both the AM and PM peak times there are segments with an LOS of E and F, meaning those segments are expected to operate at capacity during the peak time periods. These segments operating with LOS F are located on Y Ave and 530th Ave. Interstate 35 is operating with a LOS of D, creating potential disruptions in free flow.

Figure 19 – 2050 AM Level-of-Service

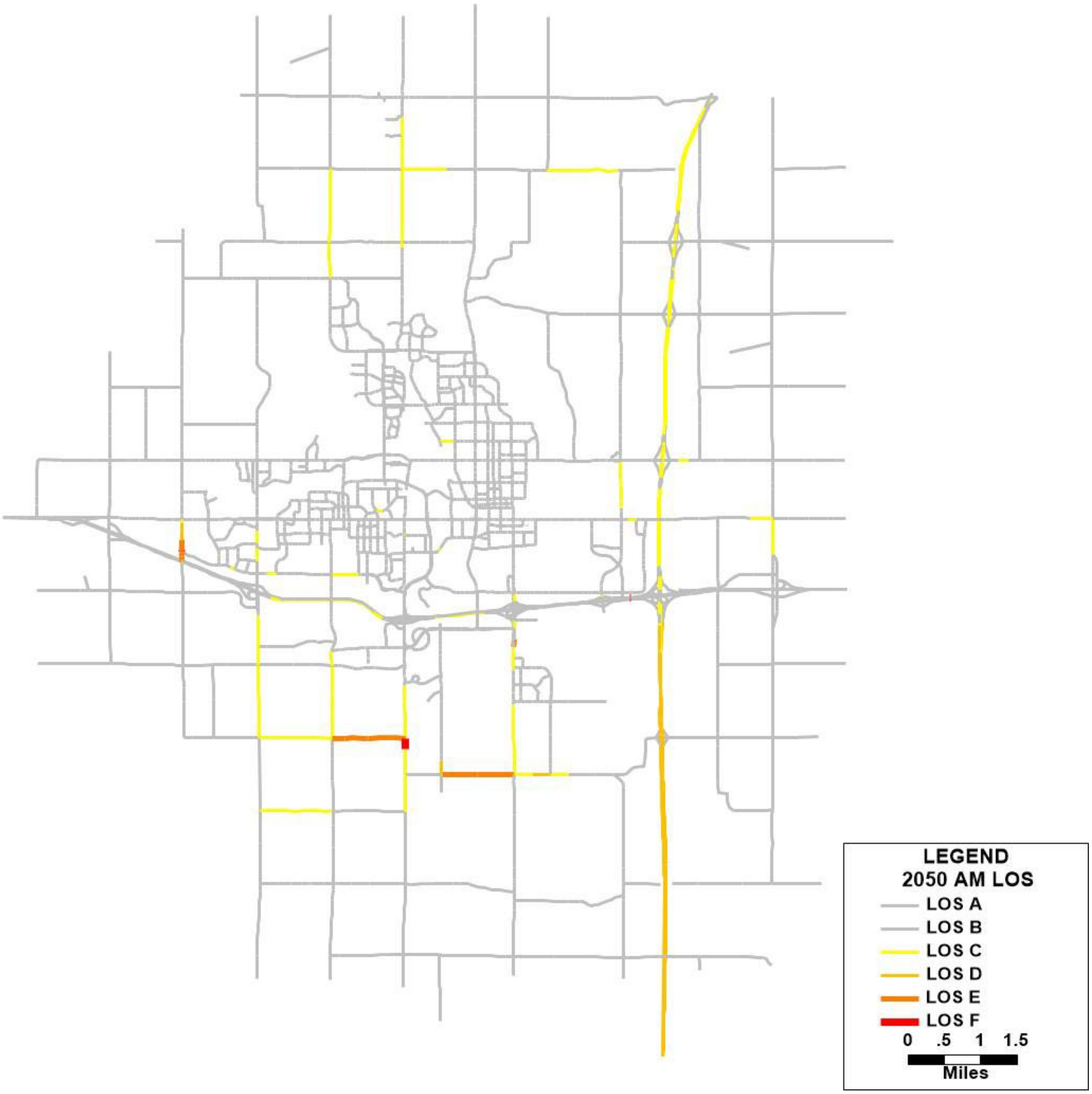
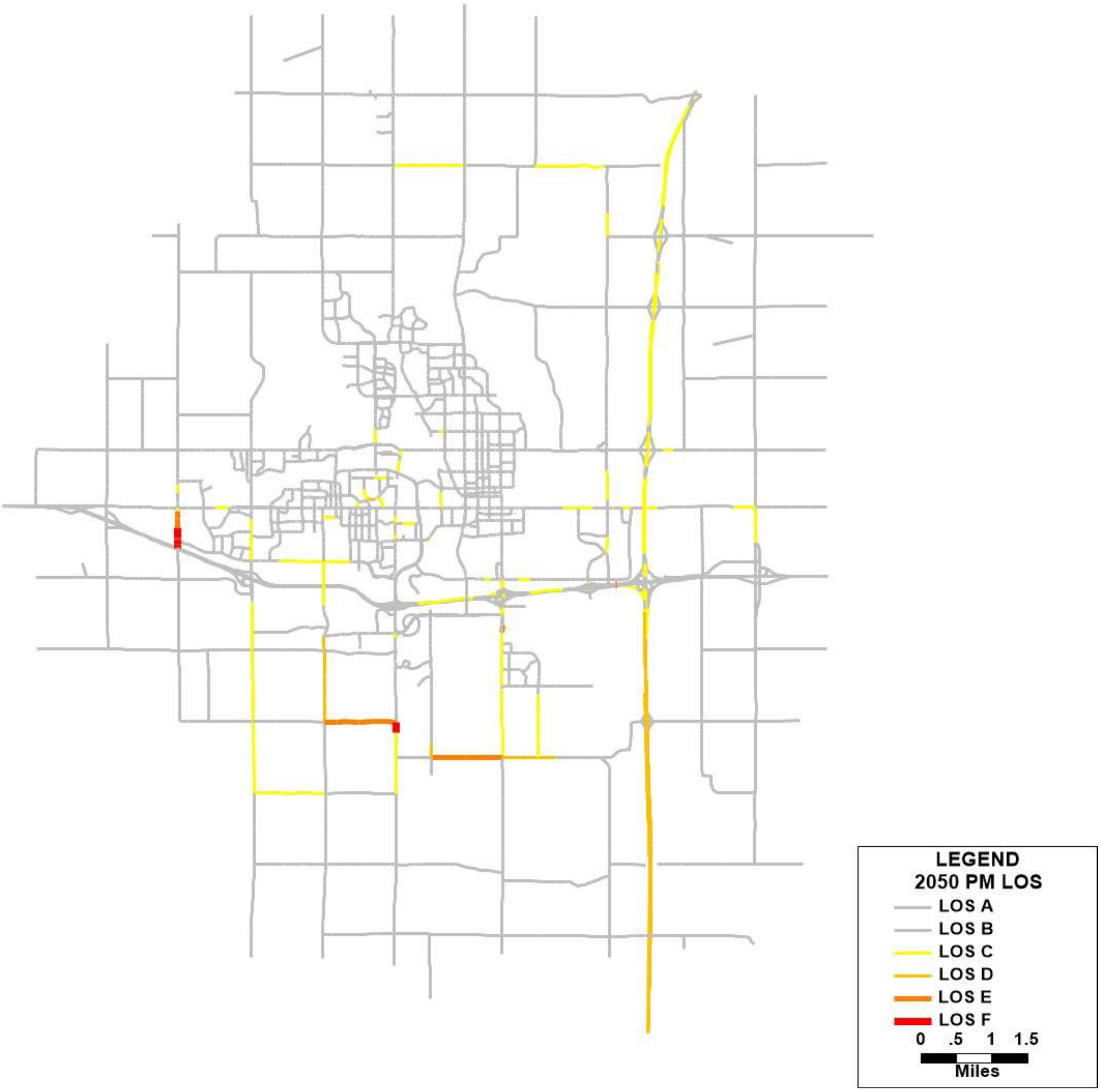


Figure 20 – 2050 PM Level-of-Service



A summary of growth is shown in **Table 20** for interim and horizon forecast years. A 2035 scenario with only Committed Road projects is shown, as well as Planned Road network scenarios for 2035 and 2050. Households and trips grow by similar amounts. VMT grows at a faster pace than trips since much of the housing unit growth is in suburban areas where trips must travel farther to reach trip attraction locations.

VHT grows at a similar pace as VMT. Average trip speeds increase slightly, because new growth is on the periphery of the model where there are higher speed roads, outweighing new congestion in the future year models.

Including planned road projects instead of just committed road projects in the 2050 scenario shows that the planned road projects do relieve some congestion by increasing average trip speeds and reducing average trip time.

Trips per household remains relatively consistent across all scenario years. Trip rates are the same, but external trip differences occur.

Table 20 - Growth Summary

	2023	2035 Committed		2050 Committed		2050 Planned	
	Value	Value	Growth	Value	Growth	Value	Growth
Households	40,047	44,628	11%	49,097	25%	49,097	25%
Balanced Trips	516,975	566,679	10%	633,706	23%	633,706	23%
VMT	1,746,063	2,004,486	15%	2,348,896	34%	2,345,924	34%
VHT	40,547	46,061	14%	53,623	32%	53,287	31%
Trips per Household	12.91	12.70	-1%	12.88	-0%	12.88	0%
Average Trip Length (miles)	3.38	3.54	5%	3.71	10%	3.71	10%
Average Trip Speed (mph)	43.06	43.54	1%	43.80	2%	44.02	2%
Average Trip Time	4.71	4.88	4%	5.09	8%	5.05	7%

Conclusions and Next Steps

The major edits, updates, and adjustments that were made to the AAMPO TDM were discussed in this documentation. The ISMS Manual 2.0 can be referenced for more details about modeling procedures and data sources. The calibration process and validation results were also discussed in detail. The validation results indicate that the AAMPO TDM is an accurate and useable forecasting tool by Iowa DOT and FHWA standards.

Appendices

Appendix 1 - Future Projects

Table 20- Future Projects Table

Project Number	Description	Committed	Planned	Illustrative
117	24th St (Stange Rd - Hayes Ave) Road diet to 3 lanes	2023	2023	2023
118	Highway 30 - 580th Ave Interchange addition	2024	2024	2024
127	HWY 30 Frontage New connection	2024	2024	2024
113	16th St from University Blvd to Apple Place – Widen to 4 Lanes	2025	2025	2025
115	Stange Crescent Reduction to 2 lanes, new AWSC	2025	2025	2025
116	Airport Rd from Sam's Club to S Duff Ave Traffic Signal, intersection lane changes	2025	2025	2025
51	US-30 widening to 6 lanes	-	2035	-
52	US 30 & Duff Ave Interchange reconfiguration, DDI	-	2035	-
75	Grand Ave & 16th St Intersection improvements	-	2035	-
339	Bloomington Road from George Washington Carver Reduction to 2 lanes	-	2040	-
345	Mortensen Parkway from Welch Avenue to University - 3 way cross section	-	2040	-
23	Stange Rd extension to George Washington Carver Ave	2050	2050	-
229	Duff Ave from 265th St - Airport Rd Urbanize to 4-lane divided section	-	2050	-
238	260th St at I-35 New Interchange	-	2050	-
346	N Dakota Ave from Lincoln Way to Ontario Street - 3 way cross section	-	2050	-
79	Stange & 13th Addition of turn lanes	-	2050	-
202	190th St from GW Carver - US 69 Addition of turn lanes	-	-	2050
205	Bloomington Rd from Ascension Church Drive – Hoover addition of a Center turn lane	2028	-	2028
206	Grand Ave from Bloomington Rd - 190th St Addition of turn lanes	-	-	2050
207	W Riverside Rd from US 69 / Grand Ave - Stagecoach Urbanize to 3-lane section with traffic growth	-	-	2050
208	E Riverside Rd from Stagecoach Road - Dayton Ave Urbanize to 3-lane section with traffic growth	-	-	2050

Project Number	Description	Committed	Planned	Illustrative
209	Dayton Ave from USDA - Riverside Rd Addition of turn lanes	-	-	2050
210	Riverside Rd from Dayton Ave - 570th Ave New connection	-	-	2050
211	Lincoln Way from X Ave - Y Ave Urbanize to 3-lane section with traffic growth	-	-	2050
212	S 500th Ave from Mortenson Rd - Lincoln Way Urbanize to 2-lane / 3-lane with traffic growth	-	-	2050
213	Y Ave from Lincoln Way - Ontario St Urbanize to 3-lane section with traffic growth	-	-	2050
214	Ontario St from Y Ave / 500th Ave - Idaho Ave Urbanize to 3-lane section with traffic growth	-	-	2050
215	Lincoln Way from Y Ave - Thackery Dr Urbanize to 3-lane section with traffic growth	-	-	2050
217	Duff Ave from UPRR - 16th Street 4-3 conversion	-	-	2050
219	S 3rd St from Current east terminus – Future new connection	-	-	2050
220	New Backage Road from Lincoln Way - S 5th Street new connection	-	-	2050
221	S 5th St from Current east terminus - Future new connection	-	-	2050
222	Dayton Ave from Lincoln Way - 13th St Urbanize to 4-lane divided	-	-	2050
224	13th St from I-35 - 570th Ave Urbanize to 4-lane divided section	-	-	2050
225	13th St from 570th St - 580th Ave Urbanize to 3-lane section	-	-	2050
226	Lincoln Way from I-35 - 580th Ave Urbanize to 3-lane section	-	-	2050
227	Sand Hill Trail from US 30 North Frontage – Lincoln Way, New Industrial Collector as development occurs	-	-	2050
228	580th St from US 30 - 13th St Urbanize to 3-lane	-	-	2050
230	530th Ave from Collaboration Pl - 260th St Urbanize to 3-lane section	-	-	2050
231	265th St from 260th St / 530th Ave - Duff Ave Pave to 3-lane section	-	-	2050
232	265th St from Duff Ave - 550th Ave Urbanize to 3-lane section	-	-	2050
233	550th Ave from Ken Maril Rd - 265th St New connection	-	-	2050
234	265th St from 550th Ave - 260th St Urbanize to 3-lane section	-	-	2050
235	260th St from 265th St - Sand Hill Trail Pave as 2-lane section	-	-	2050
236	260th St from Sand Hill Trail - 580th Ave Pave as 2-lane section	-	-	2050
237	Riverside Rd at I-35 New Interchange	-	-	2050
311	Lincoln way from X Ave to Y Ave Widen to 3 Lanes	-	-	2050
323	Freel Drive from Lincoln Way to SE 9th Street Add Turn Lanes	-	-	2050
324	E 13th Street from I-35 Ramp Terminal to 570th A Add Turn Lanes	-	-	2050

Project Number	Description	Committed	Planned	Illustrative
329	Duff Avenue from 265th Street to Kitty Hawk Drive - Widen to 5 Lanes	-	-	2050
344	13th Street from Hyland Avenue to Aquatic Center - 3 way cross section	-	-	2050
347	Duff Avenue from S 5th Street to Lincoln Way - Addition of a median	-	-	2050
348	Duff Avenue from Ioway Creek to S 16th Street - Addition of a median	-	-	2050
349	Dayton Avenue from Browning Street to Lincoln Way - widen to 3 lanes	-	-	2050
24	E Lincoln Way (Duff to Skunk) - Road diet to 3 lanes	2027	-	2027
224	13th St from I-35 - 570th Ave - Urbanize to 4-lane divided section	-	2035	-
225	13th St from 570th St - 580th Ave Urbanize to 3-lane section	-	2035	-
226	Lincoln Way from I-35 - 580th Ave Urbanize to 3-lane section	-	2035	-
229	Duff Ave from 265th St - Airport Rd Urbanize to 4-lane divided section	-	2035	-
234	265th St from 550th Ave - 260th St Urbanize to 3-lane section	-	2035	-
235	260th St from 265th St - Sand Hill Trail Pave as 2-lane section	-	2035	-
236	260th St from Sand Hill Trail - 580th Ave Pave as 2-lane section.	-	2035	-
24	E Lincoln Way (Duff to Skunk) Road diet to 3 lanes	2027	-	-
2001	Highway 30 - 3 lanes from Duff to I-35 Addition of a 3rd lane	2023	2023	2023

Appendix 2 - External Station Inputs

Table 21 - External Station Inputs

TAZ	2023	2050	Productions							Attractions						
	AADT	AADT	HBSCP	HBSHP	HBOP	UNIVP	HOSPP	RRECP	HOTP	HBSCA	HBSHA	HBOA	UNIVA	HOSPA	RRECA	HOTA
1	48,300	65,346	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
2	50	57	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
3	7,000	8,890	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
4	60	68	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
5	70	79	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
6	40	45	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
7	4,340	4,926	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
8	30	34	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
9	90	102	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
10	710	806	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
11	30	34	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
12	110	125	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
13	670	760	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
14	50	57	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
15	35	40	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
16	40	45	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
17	18,400	23,368	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
18	90	102	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
19	250	284	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
20	50	57	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
21	60	68	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
22	1,810	2,054	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
23	1,560	1,771	40%	30%	20%	30%	1%	2%	1%	40%	40%	52%	0%	1%	3%	3%
24	70	79	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
25	1,340	1,521	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
26	30	34	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%

TAZ	2023	2050	Productions							Attractions						
	AADT	AADT	HBSCP	HBSHP	HBOP	UNIVP	HOSPP	RRECP	HOTP	HBSCA	HBSHA	HBOA	UNIVA	HOSPA	RRECA	HOTA
27	25	28	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
28	45	51	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
29	50	57	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
30	4,980	6,325	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
31	80	91	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
32	30	34	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
33	60	68	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
34	31,600	44,398	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
35	70	79	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
36	30	34	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
37	35	40	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
38	5	6	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
39	1,730	1,964	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
40	70	79	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
41	35	40	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
42	150	170	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
43	4,400	4,994	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
44	16,900	23,375	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
45	60	68	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
46	120	136	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
47	35	40	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
48	70	79	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
49	80	91	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
50	820	931	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%
51	35	40	1%	40%	30%	20%	30%	1%	2%	1%	40%	52%	0%	1%	3%	3%

Appendix 3 - Trip Production Rates

Table 22 - Trip Production Rates

Trip Purpose	Household Size	Income Level	Weekday				Weekend				
			AM	Mid-Day	PM	Off Peak	AM	Mid-Day	PM	Off Peak	AADT
HBWL	1	1	1.324	0.302	0.347	0.210	0.245	0.034	0.055	0.064	0.069
HBWL	1	2									
HBWL	1	3									
HBWL	2	1	2.719	0.611	0.703	0.425	0.497	0.074	0.119	0.140	0.150
HBWL	2	2									
HBWL	2	3									
HBWL	3	1	4.400	0.909	1.046	0.632	0.739	0.164	0.265	0.312	0.333
HBWL	3	2									
HBWL	3	3									
HBWL	4	1	5.226	1.121	1.289	0.780	0.911	0.172	0.278	0.327	0.350
HBWL	4	2									
HBWL	4	3									
HBWM	1	1									
HBWM	1	2	1.634	0.408	0.469	0.284	0.332	0.021	0.035	0.041	0.044
HBWM	1	3									
HBWM	2	1									
HBWM	2	2	2.651	0.636	0.732	0.443	0.517	0.049	0.080	0.094	0.100
HBWM	2	3									
HBWM	3	1									
HBWM	3	2	3.377	0.798	0.918	0.555	0.649	0.070	0.113	0.133	0.142
HBWM	3	3									
HBWM	4	1									
HBWM	4	2	4.182	1.018	1.171	0.708	0.827	0.070	0.113	0.133	0.142
HBWM	4	3									
HBWH	1	1									
HBWH	1	2									

Trip Purpose	Household Size	Income Level	Weekday				Weekend				
			AM	Mid-Day	PM	Off Peak	AM	Mid-Day	PM	Off Peak	AADT
HBWH	1	3	1.664	0.408	0.469	0.284	0.332	0.026	0.042	0.050	0.053
HBWH	2	1									
HBWH	2	2									
HBWH	2	3	2.529	0.645	0.741	0.448	0.524	0.026	0.042	0.050	0.053
HBWH	3	1									
HBWH	3	2									
HBWH	3	3	3.091	0.798	0.918	0.555	0.649	0.026	0.042	0.050	0.053
HBWH	4	1									
HBWH	4	2									
HBWH	4	3	3.896	1.018	1.171	0.708	0.827	0.026	0.042	0.050	0.053
HBSC	1	1	0.030	0.008	0.008	0.001	0.004	0.002	0.001	0.001	0.006
HBSC	1	2	0.030	0.008	0.008	0.001	0.004	0.002	0.001	0.001	0.006
HBSC	1	3	0.030	0.008	0.008	0.001	0.004	0.002	0.001	0.001	0.006
HBSC	2	1	0.259	0.092	0.091	0.007	0.049	0.003	0.002	0.002	0.012
HBSC	2	2	0.259	0.092	0.091	0.007	0.049	0.003	0.002	0.002	0.012
HBSC	2	3	0.259	0.092	0.091	0.007	0.049	0.003	0.002	0.002	0.012
HBSC	3	1	2.018	0.757	0.755	0.057	0.406	0.007	0.005	0.005	0.027
HBSC	3	2	2.018	0.757	0.755	0.057	0.406	0.007	0.005	0.005	0.027
HBSC	3	3	2.018	0.757	0.755	0.057	0.406	0.007	0.005	0.005	0.027
HBSC	4	1	2.638	0.993	0.990	0.075	0.532	0.008	0.005	0.006	0.031
HBSC	4	2	2.638	0.993	0.990	0.075	0.532	0.008	0.005	0.006	0.031
HBSC	4	3	2.638	0.993	0.990	0.075	0.532	0.008	0.005	0.006	0.031
HBSH	1	1	2.186	0.056	0.331	0.384	0.538	0.077	0.179	0.187	0.433
HBSH	1	2	2.231	0.058	0.342	0.398	0.557	0.077	0.179	0.187	0.433
HBSH	1	3	2.467	0.068	0.402	0.467	0.654	0.077	0.179	0.187	0.433
HBSH	2	1	3.961	0.104	0.616	0.716	1.003	0.133	0.312	0.325	0.753
HBSH	2	2	3.961	0.104	0.616	0.716	1.003	0.133	0.312	0.325	0.753
HBSH	2	3	4.247	0.116	0.689	0.799	1.120	0.133	0.312	0.325	0.753
HBSH	3	1	4.518	0.116	0.689	0.799	1.120	0.157	0.367	0.383	0.887

Trip Purpose	Household Size	Income Level	Weekday				Weekend				
			AM	Mid-Day	PM	Off Peak	AM	Mid-Day	PM	Off Peak	AADT
HBSH	3	2	4.937	0.128	0.757	0.878	1.231	0.170	0.398	0.415	0.961
HBSH	3	3	5.086	0.128	0.757	0.878	1.231	0.183	0.428	0.447	1.035
HBSH	4	1	5.086	0.128	0.757	0.878	1.231	0.183	0.428	0.447	1.035
HBSH	4	2	5.385	0.132	0.782	0.907	1.271	0.201	0.469	0.490	1.133
HBSH	4	3	6.597	0.132	0.782	0.907	1.271	0.307	0.717	0.749	1.733
HBO	1	1	2.102	0.113	0.351	0.438	0.369	0.056	0.172	0.255	0.349
HBO	1	2	2.990	0.187	0.585	0.729	0.614	0.059	0.181	0.268	0.367
HBO	1	3	4.450	0.250	0.780	0.971	0.819	0.110	0.337	0.500	0.684
HBO	2	1	4.409	0.278	0.870	1.084	0.914	0.085	0.261	0.388	0.531
HBO	2	2	4.409	0.278	0.870	1.084	0.914	0.085	0.261	0.388	0.531
HBO	2	3	6.026	0.343	1.072	1.336	1.126	0.144	0.444	0.659	0.902
HBO	3	1	6.344	0.371	1.160	1.445	1.218	0.144	0.444	0.659	0.902
HBO	3	2	7.380	0.437	1.364	1.700	1.433	0.164	0.505	0.750	1.026
HBO	3	3	8.676	0.499	1.559	1.943	1.638	0.204	0.627	0.931	1.274
HBO	4	1	10.029	0.556	1.736	2.163	1.823	0.252	0.774	1.151	1.574
HBO	4	2	10.744	0.556	1.736	2.163	1.823	0.300	0.922	1.370	1.874
HBO	4	3	11.826	0.624	1.949	2.429	2.047	0.321	0.986	1.465	2.005
NHB	1	1	3.428	0.221	0.570	0.453	1.351	0.043	0.209	0.202	0.379
NHB	1	2	3.960	0.249	0.642	0.510	1.522	0.053	0.260	0.251	0.472
NHB	1	3	4.588	0.275	0.711	0.564	1.685	0.070	0.339	0.328	0.616
NHB	2	1	5.722	0.359	0.926	0.735	2.195	0.078	0.378	0.365	0.686
NHB	2	2	5.892	0.373	0.964	0.765	2.284	0.078	0.378	0.365	0.686
NHB	2	3	5.958	0.377	0.974	0.773	2.308	0.079	0.383	0.370	0.695
NHB	3	1	6.311	0.394	1.017	0.807	2.411	0.087	0.422	0.408	0.765
NHB	3	2	7.468	0.466	1.205	0.956	2.855	0.102	0.498	0.482	0.904
NHB	3	3	8.226	0.505	1.304	1.035	3.090	0.118	0.575	0.556	1.043
NHB	4	1	8.380	0.505	1.304	1.035	3.090	0.126	0.614	0.593	1.113
NHB	4	2	9.216	0.560	1.446	1.147	3.425	0.136	0.662	0.639	1.200
NHB	4	3	11.129	0.644	1.662	1.319	3.939	0.184	0.895	0.864	1.623

Trip Purpose	Household Size	Income Level	Weekday				Weekend				
			AM	Mid-Day	PM	Off Peak	AM	Mid-Day	PM	Off Peak	AADT
UNIV	1	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	1	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	1	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	2	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	2	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	2	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	3	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	3	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	3	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	4	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	4	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
UNIV	4	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HOSP	1	1	0.226	0.014	0.044	0.054	0.046	0.005	0.014	0.021	0.028
HOSP	1	2	0.226	0.014	0.044	0.054	0.046	0.005	0.014	0.021	0.028
HOSP	1	3	0.226	0.014	0.044	0.054	0.046	0.005	0.014	0.021	0.028
HOSP	2	1	0.253	0.016	0.051	0.064	0.054	0.005	0.014	0.021	0.028
HOSP	2	2	0.253	0.016	0.051	0.064	0.054	0.005	0.014	0.021	0.028
HOSP	2	3	0.253	0.016	0.051	0.064	0.054	0.005	0.014	0.021	0.028
HOSP	3	1	0.359	0.022	0.070	0.086	0.073	0.007	0.022	0.033	0.045
HOSP	3	2	0.359	0.022	0.070	0.086	0.073	0.007	0.022	0.033	0.045
HOSP	3	3	0.359	0.022	0.070	0.086	0.073	0.007	0.022	0.033	0.045
HOSP	4	1	0.403	0.025	0.078	0.097	0.082	0.008	0.025	0.037	0.051
HOSP	4	2	0.403	0.025	0.078	0.097	0.082	0.008	0.025	0.037	0.051
HOSP	4	3	0.403	0.025	0.078	0.097	0.082	0.008	0.025	0.037	0.051
APRT	1	1	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	1	2	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	1	3	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	2	1	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	2	2	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003

Trip Purpose	Household Size	Income Level	Weekday				Weekend				
			AM	Mid-Day	PM	Off Peak	AM	Mid-Day	PM	Off Peak	AADT
APRT	2	3	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	3	1	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	3	2	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	3	3	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	4	1	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	4	2	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003
APRT	4	3	0.018	0.002	0.003	0.004	0.004	0.000	0.001	0.001	0.003

Appendix 4 - Trip Attraction Rates

Table 23 - Trip Attraction Rates

LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
10	RES	wdam	0.008	0.013	0.005	0	0.004	0.082	0.024	0	0	0	0	0	0.008	0.003	0.148	NHTS
10	RES	wdmd	0.006	0.01	0.004	0	0.028	0.269	0.137	0	0	0	0	0	0.016	0.006	0.474	NHTS
10	RES	wdop	0.011	0.018	0.007	0	0.025	0.203	0.054	0	0	0	0	0	0.025	0.01	0.351	NHTS
10	RES	wdpm	0.027	0.042	0.016	0	0.013	0.248	0.064	0	0	0	0	0	0.016	0.006	0.432	NHTS
10	RES	weam	0.002	0.002	0	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.088	NHTS
10	RES	wemd	0.011	0.008	0.002	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.77	NHTS
10	RES	weop	0.008	0.006	0.001	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	NHTS
10	RES	wepm	0.008	0.006	0.001	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	NHTS
11	SFD	wdam	0.004	0.018	0.017	0	0.004	0.115	0.041	0	0	0	0	0	0.008	0.003	0.208	NHTS
11	SFD	wdmd	0.002	0.01	0.009	0	0.027	0.231	0.095	0	0	0	0	0	0.016	0.006	0.396	NHTS
11	SFD	wdop	0.004	0.02	0.018	0	0.012	0.126	0.015	0	0	0	0	0	0.025	0.01	0.229	NHTS
11	SFD	wdpm	0.007	0.03	0.028	0	0.027	0.331	0.128	0	0	0	0	0	0.016	0.006	0.572	NHTS
11	SFD	weam	0.001	0.002	0.001	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.088	NHTS
11	SFD	wemd	0.005	0.01	0.005	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.77	NHTS
11	SFD	weop	0.004	0.008	0.004	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	NHTS
11	SFD	wepm	0.004	0.008	0.004	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	NHTS
19	MHP	wdam	0.015	0.007	0	0	0.007	0.088	0.027	0	0	0	0	0	0.008	0.003	0.156	NHTS
19	MHP	wdmd	0.019	0.009	0	0	0.025	0.238	0.101	0	0	0	0	0	0.016	0.006	0.413	NHTS
19	MHP	wdop	0.016	0.008	0	0	0.025	0.232	0.1	0	0	0	0	0	0.025	0.01	0.416	NHTS
19	MHP	wdpm	0.062	0.03	0	0	0.013	0.245	0.05	0	0	0	0	0	0.016	0.006	0.422	NHTS
19	MHP	weam	0.003	0.001	0	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.087	NHTS
19	MHP	wemd	0.016	0.004	0	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.769	NHTS
19	MHP	weop	0.012	0.003	0	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	NHTS
19	MHP	wepm	0.013	0.003	0	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	NHTS
20	SFA	wdam	0.002	0.015	0.006	0	0	0.038	0	0	0	0	0	0	0.008	0.003	0.072	NHTS
20	SFA	wdmd	0	0	0	0	0.033	0.369	0.251	0	0	0	0	0	0.016	0.006	0.675	NHTS
20	SFA	wdop	0.005	0.034	0.012	0	0.036	0.223	0	0	0	0	0	0	0.025	0.01	0.345	NHTS

LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
20	SFA	wdpm	0.009	0.06	0.022	0	0	0.174	0.027	0	0	0	0	0	0.016	0.006	0.314	NHTS
20	SFA	weam	0.001	0.003	0.001	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.088	NHTS
20	SFA	wemd	0.004	0.013	0.003	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.77	NHTS
20	SFA	weop	0.003	0.01	0.002	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	NHTS
20	SFA	wepm	0.003	0.01	0.002	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	NHTS
21	APT	wdam	0.009	0.012	0.002	0	0.007	0.088	0.027	0	0	0	0	0	0.008	0.003	0.156	NHTS
21	APT	wdmd	0.011	0.015	0.002	0	0.025	0.238	0.101	0	0	0	0	0	0.016	0.006	0.413	NHTS
21	APT	wdop	0.009	0.013	0.002	0	0.025	0.232	0.1	0	0	0	0	0	0.025	0.01	0.416	NHTS
21	APT	wdpm	0.036	0.05	0.007	0	0.013	0.245	0.05	0	0	0	0	0	0.016	0.006	0.421	NHTS
21	APT	weam	0.002	0.002	0	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.087	NHTS
21	APT	wemd	0.012	0.008	0.001	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.77	NHTS
21	APT	weop	0.009	0.006	0	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	NHTS
21	APT	wepm	0.009	0.006	0	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	NHTS
22	DOR	wdam	0.015	0.007	0	0	0.007	0.088	0.027	0	0	0	0	0	0.008	0.003	0.156	Replica
22	DOR	wdmd	0.019	0.009	0	0	0.025	0.238	0.101	0	0	0	0	0	0.016	0.006	0.413	Replica
22	DOR	wdop	0.016	0.008	0	0	0.025	0.232	0.1	0	0	0	0	0	0.025	0.01	0.416	Replica
22	DOR	wdpm	0.062	0.03	0	0	0.013	0.245	0.05	0	0	0	0	0	0.016	0.006	0.422	Replica
22	DOR	weam	0.003	0.001	0	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.087	Replica
22	DOR	wemd	0.016	0.004	0	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.769	Replica
22	DOR	weop	0.012	0.003	0	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	Replica
22	DOR	wepm	0.013	0.003	0	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	Replica
23	STUD	wdam	0.015	0.007	0	0	0.007	0.088	0.027	0	0	0	0	0	0.008	0.003	0.156	Replica
23	STUD	wdmd	0.019	0.009	0	0	0.025	0.238	0.101	0	0	0	0	0	0.016	0.006	0.413	Replica
23	STUD	wdop	0.016	0.008	0	0	0.025	0.232	0.1	0	0	0	0	0	0.025	0.01	0.416	Replica
23	STUD	wdpm	0.062	0.03	0	0	0.013	0.245	0.05	0	0	0	0	0	0.016	0.006	0.422	Replica
23	STUD	weam	0.003	0.001	0	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.087	Replica
23	STUD	wemd	0.016	0.004	0	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.769	Replica
23	STUD	weop	0.012	0.003	0	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	Replica
23	STUD	wepm	0.013	0.003	0	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	Replica
24	RET	wdam	0	0.022	0	0	0.007	0.088	0.027	0	0	0	0	0	0.008	0.003	0.156	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
24	RET	wdmd	0	0.028	0	0	0.025	0.238	0.101	0	0	0	0	0	0.016	0.006	0.413	NHTS
24	RET	wdop	0	0.024	0	0	0.025	0.232	0.1	0	0	0	0	0	0.025	0.01	0.416	NHTS
24	RET	wdpm	0	0.092	0	0	0.013	0.245	0.05	0	0	0	0	0	0.016	0.006	0.422	NHTS
24	RET	weam	0	0.004	0	0	0.006	0.07	0.008	0	0	0	0	0	0	0	0.087	NHTS
24	RET	wemd	0	0.02	0	0	0.056	0.588	0.105	0	0	0	0	0	0.001	0	0.77	NHTS
24	RET	weop	0	0.015	0	0	0.016	0.238	0.031	0	0	0	0	0	0.002	0.005	0.306	NHTS
24	RET	wepm	0	0.015	0	0	0.017	0.347	0.084	0	0	0	0	0	0.001	0	0.465	NHTS
25	SNF	wdam	0.263	1.668	1.961	0	0	2.64	1.544	0	0	0	0	0	0.013	0	8.088	NHTS
25	SNF	wdmd	0.263	0.615	1.083	0	0	1.545	3.961	0	0	0	0	0	0.013	0	7.479	NHTS
25	SNF	wdop	0.176	0.527	0.439	0	0	1.674	0.961	0	0	0	0	0	0.025	0	3.801	NHTS
25	SNF	wdpm	0.146	0.263	0.556	0	0	0.579	1.427	0	0	0	0	0	0	0	2.972	NHTS
25	SNF	weam	0.088	0.41	0.034	0	0	0.287	0.056	0	0	0	0	0	0	0	0.874	NHTS
25	SNF	wemd	0.234	0.328	0.023	0	0	0.689	0.26	0	0	0	0	0	0	0	1.534	NHTS
25	SNF	weop	0.117	0.213	0.013	0	0	0.431	0.074	0	0	0	0	0	0	0	0.848	NHTS
25	SNF	wepm	0.088	0.082	0.005	0	0	0.301	0.085	0	0	0	0	0	0	0	0.561	NHTS
26	HOT	wdam	0.253	0.344	0.31	0.007	0	0	0	0	0	0	0	0.82	0.041	0.004	1.784	Replica
26	HOT	wdmd	0.177	0.287	0.177	0.007	0.047	0	0	0	0	0	0	1.31	0.133	0.012	2.149	Replica
26	HOT	wdop	0.067	0.115	0.072	0	0.047	0	0	0	0	0	0	1.15	0.068	0.004	1.531	Replica
26	HOT	wdpm	0.081	0.091	0.067	0.027	0.087	0	0	0	0	0	0	0.92	0.049	0	1.327	Replica
26	HOT	weam	0.091	0.078	0.003	0	0.001	0	0	0	0	0	0	0.38	0.047	0.004	0.605	Replica
26	HOT	wemd	0.148	0.078	0.003	0.001	0.005	0	0	0	0	0	0	0.87	0.129	0.002	1.242	Replica
26	HOT	weop	0.038	0.037	0.001	0.001	0.009	0	0	0	0	0	0	0.86	0.081	0.002	1.029	Replica
26	HOT	wepm	0.038	0.021	0	0	0.008	0	0	0	0	0	0	0.51	0.085	0	0.667	Replica
27	GQ	wdam	0.21	0.491	0.678	0.034	0	0.874	0.605	0	0	0	0	0	0	0	2.891	NHTS
27	GQ	wdmd	0.21	0.421	0.584	0.368	0.262	1.388	1.674	0	0	0	0	0	0	0	4.907	NHTS
27	GQ	wdop	0.117	0.514	0.28	0.034	0.72	2.365	0.372	0	0	0	0	0	0	0	4.401	NHTS
27	GQ	wdpm	0.07	0.257	0.094	0.402	0.425	1.131	0.395	0	0	0	0	0	0.01	0	2.784	NHTS
27	GQ	weam	0.07	0.079	0.009	0.004	0.003	0.149	0.042	0	0	0	0	0	0	0	0.355	NHTS
27	GQ	wemd	0.07	0.079	0.003	0.015	0.052	0.711	0.148	0	0	0	0	0	0	0	1.077	NHTS
27	GQ	weop	0.047	0.118	0.007	0.004	0.115	0.642	0.071	0	0	0	0	0	0	0	1.002	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
27	GQ	wepm	0.07	0.079	0.003	0.019	0.072	0.332	0.039	0	0	0	0	0	0	0	0.613	NHTS
28	FRAT	wdam	0	0.002	0.001	0.002	0	0.051	0.01	0	0	0	0	0	0	0	0.066	Replica
28	FRAT	wdmd	0.003	0.005	0.003	0.013	0.024	0.151	0.075	0	0	0	0	0	0	0	0.275	Replica
28	FRAT	wdop	0.015	0.007	0	0	0.031	0.154	0.038	0	0	0	0	0	0	0	0.244	Replica
28	FRAT	wdpm	0.007	0.001	0.002	0.021	0.023	0.088	0.031	0	0	0	0	0	0	0	0.173	Replica
28	FRAT	weam	0	0.001	0	0	0	0.006	0.001	0	0	0	0	0	0	0	0.008	Replica
28	FRAT	wemd	0.001	0.001	0	0.002	0.004	0.046	0.007	0	0	0	0	0	0	0	0.061	Replica
28	FRAT	weop	0.008	0.002	0	0	0.004	0.043	0.005	0	0	0	0	0	0	0	0.062	Replica
28	FRAT	wepm	0.001	0.001	0	0.001	0.004	0.017	0.002	0	0	0	0	0	0	0	0.026	Replica
30	MFG	wdam	0	0.676	0	0	0	0.187	0.112	0	0	0	0	0	0.021	0.009	1.005	NHTS
30	MFG	wdmd	0	0.468	0	0	0	0.4	0.484	0	0	0	0	0	0.023	0.01	1.385	NHTS
30	MFG	wdop	0	0.495	0	0	0	0.251	0.252	0	0	0	0	0	0.02	0.009	1.027	NHTS
30	MFG	wdpm	0	0.664	0	0	0	0.314	0.304	0	0	0	0	0	0.023	0.01	1.315	NHTS
30	MFG	weam	0	0.054	0	0	0	0.053	0.006	0	0	0	0	0	0.001	0.01	0.124	NHTS
30	MFG	wemd	0	0.069	0	0	0	0.418	0.041	0	0	0	0	0	0.005	0.01	0.543	NHTS
30	MFG	weop	0	0.179	0	0	0	0.148	0.012	0	0	0	0	0	0.002	0.02	0.362	NHTS
30	MFG	wepm	0	0.103	0	0	0	0.138	0.025	0	0	0	0	0	0.005	0.01	0.281	NHTS
31	IPK	wdam	0.057	0.39	0.55	0	0.069	0.362	0.518	0	0	0	0	0	0.023	0.002	1.972	NHTS
31	IPK	wdmd	0.018	0.152	0.242	0.014	0.116	0.379	1.243	0	0	0	0	0	0.059	0.011	2.234	NHTS
31	IPK	wdop	0.018	0.097	0.15	0	0.125	0.318	0.288	0	0	0	0	0	0.007	0.003	1.006	NHTS
31	IPK	wdpm	0.004	0.055	0.071	0.006	0.141	0.183	0.426	0	0	0	0	0	0.03	0.001	0.917	NHTS
31	IPK	weam	0.012	0.071	0.007	0	0.005	0.055	0.023	0	0	0	0	0	0.009	0.001	0.183	NHTS
31	IPK	wemd	0.012	0.049	0.004	0	0.014	0.104	0.057	0	0	0	0	0	0.024	0.014	0.277	NHTS
31	IPK	weop	0.014	0.021	0.002	0	0.013	0.072	0.025	0	0	0	0	0	0.004	0	0.151	NHTS
31	IPK	wepm	0.006	0.008	0.001	0	0.016	0.048	0.019	0	0	0	0	0	0.006	0.004	0.107	NHTS
32	WAR	wdam	0.077	0.348	0.491	0.03	0.141	0.457	0.443	0	0	0	0	0	0.072	0.001	2.059	NHTS
32	WAR	wdmd	0.048	0.18	0.205	0.026	0.281	0.521	1.23	0	0	0	0	0	0.143	0.016	2.652	NHTS
32	WAR	wdop	0.029	0.146	0.124	0.006	0.279	0.545	0.374	0	0	0	0	0	0.017	0	1.52	NHTS
32	WAR	wdpm	0.026	0.072	0.09	0.041	0.357	0.251	0.566	0	0	0	0	0	0.076	0.001	1.48	NHTS
32	WAR	weam	0.025	0.063	0.006	0.001	0.009	0.061	0.029	0	0	0	0	0	0.023	0.001	0.218	NHTS

LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
32	WAR	wemd	0.025	0.048	0.005	0.003	0.041	0.187	0.079	0	0	0	0	0	0.047	0.002	0.435	NHTS
32	WAR	weop	0.012	0.029	0.003	0	0.032	0.122	0.031	0	0	0	0	0	0.003	0	0.233	NHTS
32	WAR	wepm	0.011	0.013	0.002	0.002	0.046	0.085	0.039	0	0	0	0	0	0.012	0	0.21	NHTS
34	STOR	wdam	0	0	0	0	0	0.036	0.031	0	0	0	0	0	0	0	0.067	Replica
34	STOR	wdmd	0	0	0	0	0	0.055	0.05	0	0	0	0	0	0	0	0.105	Replica
34	STOR	wdop	0	0	0	0	0	0.013	0.006	0	0	0	0	0	0	0	0.018	Replica
34	STOR	wdpm	0	0	0	0	0	0.046	0.04	0	0	0	0	0	0	0	0.086	Replica
34	STOR	weam	0	0	0	0	0	0.015	0.006	0	0	0	0	0	0	0.005	0.026	Replica
34	STOR	wemd	0	0	0	0	0	0.12	0.039	0	0	0	0	0	0	0.005	0.164	Replica
34	STOR	weop	0	0	0	0	0	0.042	0.012	0	0	0	0	0	0	0	0.054	Replica
34	STOR	wepm	0	0	0	0	0	0.039	0.024	0	0	0	0	0	0	0.005	0.068	Replica
35	EXT	wdam	0.009	0.097	0.075	0	0.018	0.068	0.066	0	0	0	0	0	0.217	0.004	0.552	Replica
35	EXT	wdmd	0.009	0.044	0.035	0	0.055	0.019	0.205	0	0	0	0	0	0.362	0.004	0.733	Replica
35	EXT	wdop	0.004	0.026	0.018	0	0.037	0.039	0.061	0	0	0	0	0	0.094	0	0.279	Replica
35	EXT	wdpm	0	0.018	0.013	0	0.049	0.019	0.096	0	0	0	0	0	0.059	0	0.254	Replica
35	EXT	weam	0	0.015	0.001	0	0.002	0.007	0.002	0	0	0	0	0	0.004	0	0.03	Replica
35	EXT	wemd	0	0.003	0	0	0.004	0.011	0.01	0	0	0	0	0	0.01	0	0.037	Replica
35	EXT	weop	0	0.015	0	0	0.005	0.007	0.005	0	0	0	0	0	0.014	0	0.044	Replica
35	EXT	wepm	0	0.003	0	0	0.007	0.004	0.004	0	0	0	0	0	0	0	0.018	Replica
36	LF	wdam	0.025	0.102	0.102	0	0	0.168	0.456	0	0	0	0	0	0.339	0	1.191	NHTS
36	LF	wdmd	0.025	0.025	0.025	0	0	0.671	0.683	0	0	0	0	0	1.05	0	2.481	NHTS
36	LF	wdop	0	0.025	0	0	0	0.168	0.506	0	0	0	0	0	0.142	0	0.842	NHTS
36	LF	wdpm	0	0	0.025	0	0	0.112	0.278	0	0	0	0	0	0.339	0	0.755	NHTS
36	LF	weam	0	0.014	0.003	0	0	0.05	0.029	0	0	0	0	0	0.057	0	0.153	NHTS
36	LF	wemd	0	0	0	0	0	0.137	0.078	0	0	0	0	0	0.192	0	0.407	NHTS
36	LF	weop	0	0	0.002	0	0	0.037	0.036	0	0	0	0	0	0.023	0	0.098	NHTS
36	LF	wepm	0	0.029	0.001	0	0	0.05	0.007	0	0	0	0	0	0	0	0.086	NHTS
41	GAIR	wdam	0.028	0.071	0.039	0	0	0.009	0.043	0	0	0	0	0	0.017	0.002	0.208	Replica
41	GAIR	wdmd	0.008	0.02	0.031	0	0	0	0.121	0	0	0	0	0	0.046	0.018	0.243	Replica
41	GAIR	wdop	0	0.02	0.016	0	0	0.017	0.031	0	0	0	0	0	0.005	0	0.089	Replica

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
41	GAIR	wdpm	0.008	0.016	0.008	0	0	0.009	0.031	0	0	0	0	0	0.002	0	0.073	Replica
41	GAIR	weam	0.008	0.011	0.001	0	0	0.006	0.004	0	0	0	0	0	0.004	0	0.033	Replica
41	GAIR	wemd	0.004	0.02	0.001	0	0	0.012	0.011	0	0	0	0	0	0.007	0.005	0.059	Replica
41	GAIR	weop	0.004	0	0	0	0	0.002	0.003	0	0	0	0	0	0.005	0.021	0.035	Replica
41	GAIR	wepm	0.004	0.004	0.001	0	0	0.006	0.003	0	0	0	0	0	0.011	0	0.028	Replica
42	ROW	wdam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
42	ROW	wdmd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
42	ROW	wdop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
42	ROW	wdpm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
42	ROW	weam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
42	ROW	wemd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
42	ROW	weop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
42	ROW	wepm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
43	UTL	wdam	0.052	0	0.155	0	0	0.454	0.154	0	0	0	0	0	0.022	0	0.836	NHTS
43	UTL	wdmd	0.052	0	0.052	0.148	0.361	1.588	0.872	0	0	0	0	0	0.044	0	3.117	NHTS
43	UTL	wdop	0.155	0.309	0.052	0	0.794	2.155	0.359	0	0	0	0	0	0.022	0	3.846	NHTS
43	UTL	wdpm	0.052	0.103	0.103	0.591	0.577	1.701	0.411	0	0	0	0	0	0.044	0.021	3.604	NHTS
43	UTL	weam	0	0.087	0.002	0	0	0.051	0.02	0	0	0	0	0	0	0	0.159	NHTS
43	UTL	wemd	0.052	0.116	0.002	0.025	0.051	0.506	0.046	0	0	0	0	0	0.046	0	0.842	NHTS
43	UTL	weop	0.103	0.058	0.002	0	0.13	0.582	0.039	0	0	0	0	0	0	0	0.914	NHTS
43	UTL	wepm	0	0.058	0	0.025	0.13	0.506	0.013	0	0	0	0	0	0.046	0	0.777	NHTS
44	PARK	wdam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
44	PARK	wdmd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
44	PARK	wdop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
44	PARK	wdpm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
44	PARK	weam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
44	PARK	wemd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
44	PARK	weop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
44	PARK	wepm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
45	TERM	wdam	0.015	0.015	0.015	0	0	0	0	0	0	0	0	0	0.002	0	0.047	Replica

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
45	TERM	wdmd	0.015	0.015	0.015	0	0	0	0	0	0	0	0	0	0.004	0.001	0.049	Replica
45	TERM	wdop	0.015	0.015	0.015	0	0	0	0	0	0	0	0	0	0.008	0.001	0.053	Replica
45	TERM	wdpm	0.015	0.015	0.015	0	0	0	0	0	0	0	0	0	0.004	0.001	0.049	Replica
45	TERM	weam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
45	TERM	wemd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
45	TERM	weop	0	0	0	0	0	0	0	0	0	0	0	0	0.001	0	0.001	Replica
45	TERM	wepm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
50	SFC	wdam	0.291	0.706	0.644	0.009	2.151	3.217	1.949	0	0	0	0	0	0.027	0	8.994	NHTS
50	SFC	wdmd	0.266	0.428	0.291	0.24	4.059	7.606	8.454	0	0	0	0	0	0.077	0	21.421	NHTS
50	SFC	wdop	0.223	0.353	0.13	0	4.953	8.342	5.877	0	0	0	0	0	0.016	0	19.893	NHTS
50	SFC	wdpm	0.13	0.217	0.149	0.355	6.696	6.829	7.881	0	0	0	0	0	0.021	0.003	22.28	NHTS
50	SFC	weam	0.136	0.167	0.01	0	0.258	0.574	0.175	0	0	0	0	0	0.011	0	1.331	NHTS
50	SFC	wemd	0.167	0.153	0.007	0.018	0.781	3.383	0.974	0	0	0	0	0	0.08	0	5.562	NHTS
50	SFC	weop	0.136	0.076	0.003	0.001	0.813	2.678	0.68	0	0	0	0	0	0.022	0	4.409	NHTS
50	SFC	wepm	0.037	0.08	0.004	0.019	1.022	2.17	0.854	0	0	0	0	0	0.014	0	4.199	NHTS
51	NSC	wdam	0.069	0.128	0.13	0	0.871	0.418	0.854	0	0	0	0	0	0.008	0.002	2.479	NHTS
51	NSC	wdmd	0.1	0.184	0.187	0	4.044	1.433	5.791	0	0	0	0	0	0.019	0.005	11.763	NHTS
51	NSC	wdop	0.123	0.227	0.23	0	2.321	0.892	2.027	0	0	0	0	0	0.034	0.009	5.862	NHTS
51	NSC	wdpm	0.121	0.224	0.228	0	3.403	1.189	3.597	0	0	0	0	0	0.019	0.005	8.786	NHTS
51	NSC	weam	0.131	0.112	0.058	0	2.447	0.286	1.318	0	0	0	0	0	0	0.001	4.354	NHTS
51	NSC	wemd	0.372	0.318	0.165	0	11.18	1.211	7.84	0	0	0	0	0	0.001	0.001	21.087	NHTS
51	NSC	weop	0.299	0.255	0.132	0	3.624	0.592	3.383	0	0	0	0	0	0.003	0.002	8.29	NHTS
51	NSC	wepm	0.2	0.171	0.089	0	3.587	0.493	3.152	0	0	0	0	0	0.001	0.001	7.694	NHTS
52	CSC	wdam	0.068	0.156	0.193	0	0.029	0.07	0.859	0	0	0	0	0	0.003	0.001	1.378	NHTS
52	CSC	wdmd	0.018	0.042	0.052	0	2.525	0.166	4.921	0	0	0	0	0	0.015	0.004	7.743	NHTS
52	CSC	wdop	0.064	0.148	0.183	0	4.99	0.167	1.114	0	0	0	0	0	0.029	0.007	6.703	NHTS
52	CSC	wdpm	0.114	0.261	0.323	0	2.791	0.192	2.519	0	0	0	0	0	0.015	0.004	6.218	NHTS
52	CSC	weam	0.14	0.149	0.094	0	0.885	0.297	0.135	0	0	0	0	0	0	0.001	1.702	NHTS
52	CSC	wemd	0.269	0.287	0.181	0	9.04	2.216	9.958	0	0	0	0	0	0.001	0.001	21.953	NHTS
52	CSC	weop	0.298	0.317	0.2	0	1.833	0.734	1.284	0	0	0	0	0	0.003	0.002	4.669	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
52	CSC	wepm	0.227	0.242	0.152	0	4.916	0.93	1.702	0	0	0	0	0	0.001	0.001	8.17	NHTS
53	RSC	wdam	0.017	0.07	0.002	0	0.299	0.21	0.201	0	0	0	0	0	0.028	0	0.826	NHTS
53	RSC	wdmd	0.028	0.113	0.023	0	5.82	2.743	7.467	0	0	0	0	0	0.061	0	16.254	NHTS
53	RSC	wdop	0.017	0.017	0.006	0	4.494	2.271	4.116	0	0	0	0	0	0.036	0	10.956	NHTS
53	RSC	wdpm	0.017	0.017	0.023	0.008	6.989	2.656	6.412	0	0	0	0	0	0.007	0	16.128	NHTS
53	RSC	weam	0.023	0.025	0.001	0	0.449	0.252	0.231	0	0	0	0	0	0.013	0	0.994	NHTS
53	RSC	wemd	0.023	0.022	0.001	0.001	1.181	1.143	1.187	0	0	0	0	0	0.048	0	3.606	NHTS
53	RSC	weop	0.023	0.003	0	0	0.654	0.935	0.564	0	0	0	0	0	0.005	0	2.184	NHTS
53	RSC	wepm	0.006	0.01	0.001	0	1.138	1.052	0.773	0	0	0	0	0	0.025	0	3.004	NHTS
55	AUC	wdam	0.121	0.229	0.337	0.328	2.129	0.148	1.192	0	0	0	0	0	0.058	0	4.542	NHTS
55	AUC	wdmd	0.121	0.175	0.081	0.251	2.28	0.089	3.456	0	0	0	0	0	0.151	0	6.604	NHTS
55	AUC	wdop	0.081	0.027	0.081	0.039	2.205	0.474	0.951	0	0	0	0	0	0.006	0.006	3.868	NHTS
55	AUC	wdpm	0.04	0.081	0.04	0.058	2.054	0.118	1.742	0	0	0	0	0	0.041	0	4.174	NHTS
55	AUC	weam	0.067	0.068	0.002	0.019	0.207	0.046	0.079	0	0	0	0	0	0.012	0	0.501	NHTS
55	AUC	wemd	0.081	0.03	0.004	0.009	0.426	0.079	0.273	0	0	0	0	0	0.036	0	0.938	NHTS
55	AUC	weop	0.014	0.008	0.003	0	0.288	0.073	0.145	0	0	0	0	0	0	0.033	0.563	NHTS
55	AUC	wepm	0.014	0.008	0.001	0.002	0.298	0.02	0.157	0	0	0	0	0	0.012	0	0.51	NHTS
56	SS	wdam	0.288	0.466	0.441	0.012	6.063	1.007	2.32	0	0	0	0	0	0.233	0.01	10.841	NHTS
56	SS	wdmd	0.178	0.17	0.22	0.049	11.521	2.685	10.486	0	0	0	0	0	0.503	0.007	25.818	NHTS
56	SS	wdop	0.102	0.187	0.102	0	11.189	3.188	6.158	0	0	0	0	0	0.098	0.007	21.031	NHTS
56	SS	wdpm	0.093	0.11	0.127	0	15.995	2.293	10.005	0	0	0	0	0	0.157	0.01	28.79	NHTS
56	SS	weam	0.127	0.138	0.006	0	0.724	0.125	0.255	0	0	0	0	0	0.079	0.007	1.461	NHTS
56	SS	wemd	0.187	0.076	0.006	0	2.336	1.143	1.107	0	0	0	0	0	0.162	0	5.017	NHTS
56	SS	weop	0.042	0.052	0.003	0	1.734	0.965	0.759	0	0	0	0	0	0.151	0	3.704	NHTS
56	SS	wepm	0.034	0.038	0.002	0	2.352	0.823	1.001	0	0	0	0	0	0.098	0	4.348	NHTS
57	FF	wdam	0.078	0.091	0.014	0	2.534	1.05	2.826	0	0	0	0	0	0.003	0.001	6.597	NHTS
57	FF	wdmd	0.251	0.294	0.046	0	28.942	6.88	29.879	0	0	0	0	0	0.01	0.003	66.306	NHTS
57	FF	wdop	0.075	0.088	0.014	0	29.519	4.169	15.109	0	0	0	0	0	0.028	0.007	49.01	NHTS
57	FF	wdpm	0.332	0.389	0.061	0	16.455	4.864	11.701	0	0	0	0	0	0.01	0.003	33.814	NHTS
57	FF	weam	0.003	0.001	0	0	1.125	0.172	7.718	0	0	0	0	0	0	0	9.019	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
57	FF	wemd	0.109	0.059	0.005	0	48.865	2.11	42.858	0	0	0	0	0	0.001	0	94.005	NHTS
57	FF	weop	0.053	0.029	0.002	0	23.689	0.809	9.081	0	0	0	0	0	0.002	0.001	33.664	NHTS
57	FF	wepm	0.068	0.037	0.003	0	30.745	1.155	17.525	0	0	0	0	0	0.001	0	49.533	NHTS
58	SDR	wdam	0.121	0.41	0.166	0	0.73	1.115	0.951	0	0	0	0	0	0.004	0.001	3.497	NHTS
58	SDR	wdmd	0.081	0.276	0.112	0	4.346	2.815	8.592	0	0	0	0	0	0.016	0.004	16.243	NHTS
58	SDR	wdop	0.137	0.468	0.189	0	5.687	2.566	3.204	0	0	0	0	0	0.053	0.014	12.318	NHTS
58	SDR	wdpm	0.109	0.372	0.15	0	4.829	2.609	5.631	0	0	0	0	0	0.016	0.004	13.72	NHTS
58	SDR	weam	0.037	0.058	0.012	0	6.256	0.731	0.418	0	0	0	0	0	0	0	7.512	NHTS
58	SDR	wemd	0.124	0.194	0.04	0	21.083	4.11	22.77	0	0	0	0	0	0.001	0	48.323	NHTS
58	SDR	weop	0.105	0.166	0.034	0	17.994	2.534	6.793	0	0	0	0	0	0.004	0.01	27.64	NHTS
58	SDR	wepm	0.046	0.072	0.015	0	7.851	1.537	8.568	0	0	0	0	0	0.001	0	18.091	NHTS
59	ORC	wdam	0.189	0.452	0.043	0	0.035	0.248	0.163	0	0	0	0	0	0.147	0.007	1.284	NHTS
59	ORC	wdmd	0.162	0.21	0.02	0.01	0.065	0.301	0.409	0	0	0	0	0	0.327	0.006	1.51	NHTS
59	ORC	wdop	0.071	0.277	0.31	0	0.756	1.618	1.028	0	0	0	0	0	0.044	0	4.103	NHTS
59	ORC	wdpm	0.044	0.159	0.172	0.073	0.883	0.676	1.407	0	0	0	0	0	0.128	0	3.541	NHTS
59	ORC	weam	0.078	0.127	0.012	0	0.03	0.18	0.069	0	0	0	0	0	0.026	0.003	0.523	NHTS
59	ORC	wemd	0.101	0.13	0.009	0.003	0.102	0.492	0.197	0	0	0	0	0	0.063	0.001	1.098	NHTS
59	ORC	weop	0.044	0.066	0.004	0	0.098	0.338	0.095	0	0	0	0	0	0.012	0	0.657	NHTS
59	ORC	wepm	0.027	0.028	0.002	0.004	0.115	0.174	0.111	0	0	0	0	0	0.021	0	0.482	NHTS
60	GO	wdam	0.124	0.422	0.582	0.274	0.365	1.274	0.772	0	0	0	0	0	0.037	0.001	3.851	NHTS
60	GO	wdmd	0.102	0.229	0.295	0.25	0.682	1.841	2.501	0	0	0	0	0	0.08	0.001	5.982	NHTS
60	GO	wdop	0.103	0.159	0.194	0.041	0.678	1.677	0.938	0	0	0	0	0	0.012	0	3.802	NHTS
60	GO	wdpm	0.064	0.117	0.107	0.102	0.806	0.871	1.146	0	0	0	0	0	0.017	0	3.23	NHTS
60	GO	weam	0.048	0.077	0.008	0.012	0.033	0.189	0.054	0	0	0	0	0	0.017	0.002	0.44	NHTS
60	GO	wemd	0.065	0.061	0.006	0.014	0.098	0.61	0.197	0	0	0	0	0	0.018	0	1.068	NHTS
60	GO	weop	0.048	0.038	0.002	0.003	0.09	0.438	0.108	0	0	0	0	0	0.01	0	0.737	NHTS
60	GO	wepm	0.034	0.027	0.002	0.007	0.099	0.257	0.104	0	0	0	0	0	0.007	0	0.535	NHTS
61	GOV	wdam	0.045	1.768	0.789	0	0	1.236	0.169	0	0	0	0	0	0.002	0	4.008	NHTS
61	GOV	wdmd	0	0	0	0	0	0.98	1.328	0	0	0	0	0	0.003	0.001	2.312	NHTS
61	GOV	wdop	0	0	0	0	0	1.411	1.912	0	0	0	0	0	0.007	0.001	3.332	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
61	GOV	wdpm	0.031	1.225	0.547	0	0	2.018	1.691	0	0	0	0	0	0.003	0.001	5.516	NHTS
61	GOV	weam	0.01	0.176	0.04	0	0	1.452	0.201	0	0	0	0	0	0	0	1.879	NHTS
61	GOV	wemd	0.003	0.057	0.013	0	0	2.804	2.844	0	0	0	0	0	0	0	5.722	NHTS
61	GOV	weop	0	0	0	0	0	0.471	0.283	0	0	0	0	0	0.001	0	0.755	NHTS
61	GOV	wepm	0.005	0.083	0.019	0	0	1.041	0.848	0	0	0	0	0	0	0	1.995	NHTS
63	LIB	wdam	0.304	0.899	0.621	0	0.018	1.376	0.275	0	0	0	0	0	0.002	0	3.495	NHTS
63	LIB	wdmd	0.161	0.478	0.33	0	0.215	2.394	3.304	0	0	0	0	0	0.002	0	6.884	NHTS
63	LIB	wdop	0.172	0.508	0.351	0	0.081	1.35	1.241	0	0	0	0	0	0.007	0.001	3.71	NHTS
63	LIB	wdpm	0.17	0.502	0.347	0	0.494	4.685	7.589	0	0	0	0	0	0.002	0	13.789	NHTS
63	LIB	weam	0.051	0.056	0.02	0	0	1.554	0.088	0	0	0	0	0	0	0	1.767	NHTS
63	LIB	wemd	0.027	0.03	0.01	0	0	2.703	1.055	0	0	0	0	0	0	0	3.825	NHTS
63	LIB	weop	0.029	0.031	0.011	0	0	1.524	0.396	0	0	0	0	0	0.001	0	1.992	NHTS
63	LIB	wepm	0.028	0.031	0.011	0	0	5.29	2.423	0	0	0	0	0	0	0	7.783	NHTS
64	PO	wdam	0.062	0.156	0.062	0	0	0.46	2.226	0	0	0	0	0	0.003	0	2.969	NHTS
64	PO	wdmd	0.044	0.113	0.044	0	0	1.459	6.311	0	0	0	0	0	0.001	0	7.972	NHTS
64	PO	wdop	0.154	0.392	0.154	0	0	0.613	0	0	0	0	0	0	0.007	0.001	1.321	NHTS
64	PO	wdpm	0.092	0.235	0.092	0	0	0.89	2.134	0	0	0	0	0	0.001	0	3.445	NHTS
64	PO	weam	0.053	0.062	0.013	0	0	1.554	0.046	0	0	0	0	0	0	0	1.727	NHTS
64	PO	wemd	0.028	0.033	0.007	0	0	2.703	0.553	0	0	0	0	0	0	0	3.324	NHTS
64	PO	weop	0.03	0.035	0.007	0	0	1.524	0.208	0	0	0	0	0	0.001	0	1.804	NHTS
64	PO	wepm	0.03	0.035	0.007	0	0	5.29	1.271	0	0	0	0	0	0	0	6.632	NHTS
65	BNK	wdam	0.279	0.321	0.069	0	0.002	0.828	0.253	0	0	0	0	0	0.078	0	1.83	Replica
65	BNK	wdmd	0.132	0.271	0.038	0	0.002	0.821	0.646	0	0	0	0	0	0.189	0	2.1	Replica
65	BNK	wdop	0.088	0.197	0.022	0	0.002	0.777	0.27	0	0	0	0	0	0.013	0	1.37	Replica
65	BNK	wdpm	0.029	0.09	0.013	0	0.019	0.346	0.199	0	0	0	0	0	0.033	0	0.729	Replica
65	BNK	weam	0.029	0.14	0.022	0	0.002	0.641	0.127	0	0	0	0	0	0.039	0	1	Replica
65	BNK	wemd	0.103	0.156	0.019	0.002	0.01	1.274	0.428	0	0	0	0	0	0.065	0	2.058	Replica
65	BNK	weop	0.029	0.082	0.006	0	0.012	0.921	0.201	0	0	0	0	0	0.007	0	1.259	Replica
65	BNK	wepm	0.029	0.041	0.006	0.007	0.01	0.403	0.166	0	0	0	0	0	0.033	0	0.695	Replica
66	FS	wdam	0	0.338	0.338	0	0	1.116	0.253	0	0	0	0	0	0	0	2.046	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
66	FS	wdmd	0	0.085	0.085	0	0	0.558	1.263	0	0	0	0	0	0	0	1.99	NHTS
66	FS	wdop	0	0	0.085	0	0	0.744	0.168	0	0	0	0	0	0	0	0.997	NHTS
66	FS	wdpm	0	0	0	0	0	0.558	0.084	0	0	0	0	0	0	0	0.642	NHTS
66	FS	weam	0	0.095	0.01	0	0	0.166	0.011	0	0	0	0	0	0	0	0.281	NHTS
66	FS	wemd	0	0.047	0	0	0	0.332	0.086	0	0	0	0	0	0	0	0.465	NHTS
66	FS	weop	0.085	0	0	0	0.012	0.083	0.022	0	0	0	0	0	0	0	0.201	NHTS
66	FS	wepm	0	0	0	0	0	0.083	0.011	0	0	0	0	0	0	0	0.094	NHTS
67	CEM	wdam	0	0.061	0	0	0	0.067	0.121	0	0	0	0	0	0.013	0	0.261	Replica
67	CEM	wdmd	0	0	0	0	0	0.466	0.181	0	0	0	0	0	0.039	0.037	0.723	Replica
67	CEM	wdop	0	0	0.03	0	0	0.133	0.09	0	0	0	0	0	0	0	0.254	Replica
67	CEM	wdpm	0	0	0	0	0	0.4	0.09	0	0	0	0	0	0	0	0.49	Replica
67	CEM	weam	0	0	0.001	0	0	0.059	0.012	0	0	0	0	0	0	0	0.072	Replica
67	CEM	wemd	0	0.017	0	0	0	0.238	0.019	0	0	0	0	0	0	0	0.274	Replica
67	CEM	weop	0	0	0	0	0	0.089	0.023	0	0	0	0	0	0	0	0.112	Replica
67	CEM	wepm	0	0	0	0	0	0.059	0	0	0	0	0	0	0	0	0.059	Replica
68	RF	wdam	0.054	0.193	0.245	0.224	0.087	0.588	0.275	0	0	0	0	0	0.008	0.001	1.674	NHTS
68	RF	wdmd	0.087	0.097	0.121	0.19	0.292	1.322	0.946	0	0	0	0	0	0.016	0	3.07	NHTS
68	RF	wdop	0.243	0.044	0.07	0.014	0.523	1.524	0.344	0	0	0	0	0	0.003	0	2.764	NHTS
68	RF	wdpm	0.072	0.033	0.036	0.231	0.474	0.643	0.393	0	0	0	0	0	0.003	0	1.885	NHTS
68	RF	weam	0.021	0.039	0.003	0.001	0.007	0.113	0.02	0	0	0	0	0	0.002	0	0.207	NHTS
68	RF	wemd	0.05	0.028	0.002	0.021	0.042	0.465	0.09	0	0	0	0	0	0.004	0	0.702	NHTS
68	RF	weop	0.133	0.012	0.001	0	0.071	0.401	0.04	0	0	0	0	0	0.004	0	0.663	NHTS
68	RF	wepm	0.04	0.01	0.001	0.019	0.054	0.185	0.036	0	0	0	0	0	0.003	0	0.347	NHTS
69	OPS	wdam	0.098	0.024	0.073	0	0.205	0	0.194	0	0	0	0	0	0	0.1	0.695	NHTS
69	OPS	wdmd	0	0.024	0.024	0	0.171	0	0.292	0	0	0	0	0	0.021	0.01	0.542	NHTS
69	OPS	wdop	0	0.024	0.024	0	0.342	0.054	0.121	0	0	0	0	0	0	0	0.566	NHTS
69	OPS	wdpm	0	0	0	0	0.273	0	0.316	0	0	0	0	0	0	0.02	0.609	NHTS
69	OPS	weam	0	0.014	0	0	0.01	0	0.016	0	0	0	0	0	0	0.02	0.06	NHTS
69	OPS	wemd	0	0	0.001	0	0.024	0.012	0.012	0	0	0	0	0	0	0.03	0.079	NHTS
69	OPS	weop	0	0	0	0	0.021	0	0	0	0	0	0	0	0	0	0.021	NHTS

LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
69	OPS	wepm	0	0	0	0	0.034	0	0.003	0	0	0	0	0	0	0	0.037	NHTS
70	HOSP	wdam	0	0	0	0	0	0	0	0	2.76	0	0	0	0.009	0.001	2.771	Replica
70	HOSP	wdmd	0	0	0	0	0	0	0	0	0	0	0	0	0.009	0.001	3.011	Replica
70	HOSP	wdop	0	0	0	0	0	0	0	0	3.45	0	0	0	0.024	0.003	3.477	Replica
70	HOSP	wdpm	0	0	0	0	0	0	0	0	0	0	0	0	0.009	0.001	3.011	Replica
70	HOSP	weam	0	0	0	0	0	0	0	0	0.86	0	0	0	0	0	0.861	Replica
70	HOSP	wemd	0	0	0	0	0	0	0	0	4.07	0	0	0	0.001	0	4.07	Replica
70	HOSP	weop	0	0	0	0	0	0	0	0	1.41	0	0	0	0.002	0	1.411	Replica
70	HOSP	wepm	0	0	0	0	0	0	0	0	1.49	0	0	0	0.001	0	1.488	Replica
71	OHC	wdam	0.845	0.861	0.299	0.435	0	1.771	0.664	0	0	0	0	0	0.003	0	4.878	NHTS
71	OHC	wdmd	0.355	0.362	0.126	0	0	2.941	3.885	0	0	0	0	0	0.005	0.001	7.674	NHTS
71	OHC	wdop	0.025	0.025	0.009	0	0	1.827	0.653	0	0	0	0	0	0.013	0.002	2.554	NHTS
71	OHC	wdpm	0.754	0.768	0.266	0	0	3.074	1.688	0	0	0	0	0	0.005	0.001	6.555	NHTS
71	OHC	weam	0.063	0.03	0.005	0	0.074	0.792	0.097	0	0	0	0	0	0	0	1.061	NHTS
71	OHC	wemd	0.238	0.112	0.02	0	0.28	3.009	0.367	0	0	0	0	0	0	0	4.026	NHTS
71	OHC	weop	0.013	0.006	0.001	0	0.015	0.158	0.019	0	0	0	0	0	0.001	0	0.212	NHTS
71	OHC	wepm	0.013	0.006	0.001	0	0.015	0.158	0.019	0	0	0	0	0	0	0	0.211	NHTS
73	REC	wdam	0	0.047	0.002	0	0	0.074	0.004	0	0	0	0	0	0.007	0	0.134	NHTS
73	REC	wdmd	0	0.009	0.001	0	0	0.188	0.042	0	0	0	0	0	0	0	0.241	NHTS
73	REC	wdop	0	0	0.001	0	0	0.311	0.044	0	0	0	0	0	0	0	0.356	NHTS
73	REC	wdpm	0.05	0.009	0	0	0	0.221	0.023	0	0	0	0	0	0	0	0.303	NHTS
73	REC	weam	0	0	0.001	0	0.002	0.082	0.006	0	0	0	0	0	0	0	0.092	NHTS
73	REC	wemd	0	0.009	0	0	0	0.18	0.034	0	0	0	0	0	0	0	0.223	NHTS
73	REC	weop	0	0	0	0	0	0.327	0.015	0	0	0	0	0	0	0	0.342	NHTS
73	REC	wepm	0	0.009	0.001	0	0	0.204	0.021	0	0	0	0	0	0	0	0.236	NHTS
74	CUL	wdam	0.134	0.134	0.104	0.746	0	1.014	0.637	0	0	0	0	0	0.006	0	2.775	NHTS
74	CUL	wdmd	0.089	0.03	0.045	0.597	0	2.356	2.132	0	0	0	0	0	0.013	0	5.261	NHTS
74	CUL	wdop	0.104	0.06	0.06	0.085	0	1.113	0.785	0	0	0	0	0	0	0	2.206	NHTS
74	CUL	wdpm	0.06	0.104	0.06	0.043	0.021	1.047	0.607	0	0	0	0	0	0	0	1.941	NHTS
74	CUL	weam	0.015	0.033	0	0.024	0	0.248	0.04	0	0	0	0	0	0.02	0	0.379	NHTS

LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
74	CUL	wemd	0.06	0.025	0.001	0.04	0	0.752	0.157	0	0	0	0	0	0.026	0	1.06	NHTS
74	CUL	weop	0.045	0.008	0.001	0.002	0	0.43	0.059	0	0	0	0	0	0	0	0.545	NHTS
74	CUL	wepm	0.03	0.017	0.001	0.002	0	0.263	0.047	0	0	0	0	0	0	0	0.36	NHTS
75	CCEN	wdam	0.145	0.042	0	0.417	0.611	0	0	0	0	0	0.802	0	0.009	0	2.025	NHTS
75	CCEN	wdmd	0.042	0.042	0.042	0.447	1.28	0	0	0	0	0	2.824	0	0.018	0	4.693	NHTS
75	CCEN	wdop	0.083	0	0.021	0.119	0.873	0	0	0	0	0	0.948	0	0	0	2.043	NHTS
75	CCEN	wdpm	0	0	0	0.06	1.309	0	0	0	0	0	0.902	0	0	0	2.27	NHTS
75	CCEN	weam	0	0	0	0.02	0.076	0	0	0	0	0	0.608	0	0	0	0.703	NHTS
75	CCEN	wemd	0	0.012	0.001	0.023	0.265	0	0	0	0	0	2.65	0	0	0	2.95	NHTS
75	CCEN	weop	0.021	0.012	0	0.003	0.166	0	0	0	0	0	1.102	0	0	0	1.303	NHTS
75	CCEN	wepm	0.062	0	0	0	0.233	0	0	0	0	0	0.959	0	0	0	1.254	NHTS
76	PA	wdam	0.051	0.076	0.025	0	0	0.614	0.025	0	0	0	0	0	0.011	0.01	0.812	Replica
76	PA	wdmd	0	0	0	0.109	0.036	1.227	0.505	0	0	0	0	0	0.076	0.01	1.963	Replica
76	PA	wdop	0.025	0.051	0.025	0	0.071	1.116	0.252	0	0	0	0	0	0	0	1.541	Replica
76	PA	wdpm	0	0.025	0	0.036	0	1.339	0.454	0	0	0	0	0	0.011	0	1.866	Replica
76	PA	weam	0.025	0	0	0	0	0.124	0.01	0	0	0	0	0	0	0	0.16	Replica
76	PA	wemd	0	0	0	0	0.011	0.734	0.113	0	0	0	0	0	0.023	0	0.88	Replica
76	PA	weop	0	0.014	0	0	0.011	0.46	0.064	0	0	0	0	0	0	0	0.549	Replica
76	PA	wepm	0	0.014	0	0	0.007	0.672	0.042	0	0	0	0	0	0	0	0.735	Replica
77	MIL	wdam	0.098	0.098	0	0	1.646	0	0.293	0	0	0	0	0	0	0	2.134	NHTS
77	MIL	wdmd	0.098	0.49	0	0	1.783	0	2.047	0	0	0	0	0	0	0	4.417	NHTS
77	MIL	wdop	0	0.196	0.098	0	2.331	0	0.585	0	0	0	0	0	0	0	3.21	NHTS
77	MIL	wdpm	0	0.294	0.098	0	1.783	0	0.78	0	0	0	0	0	0.084	0	3.038	NHTS
77	MIL	weam	0	0	0	0	0.233	0	0.037	0	0	0	0	0	0.087	0	0.357	NHTS
77	MIL	wemd	0	0.165	0	0	0.398	0.096	0.174	0	0	0	0	0	0	0	0.832	NHTS
77	MIL	weop	0	0	0	0	0.343	0	0.075	0	0	0	0	0	0	0	0.417	NHTS

LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
77	MIL	wepm	0	0.055	0	0	0.315	0	0.087	0	0	0	0	0	0	0	0.457	NHTS
79	TOUR	wdam	0.504	0.567	0.441	6.138	2.38	0	0	0	0	0	1.712	0	0	0	11.742	Replica
79	TOUR	wdmd	0.945	0.126	0.126	4.423	2.116	0	0	0	0	0	5.137	0	0.027	0	12.899	Replica
79	TOUR	wdop	0.315	0.378	0.126	0.993	2.38	0	0	0	0	0	2.182	0	0	0	6.374	Replica
79	TOUR	wdpm	0.819	0.378	0.063	0.903	2.204	0	0	0	0	0	2.541	0	0	0	6.907	Replica
79	TOUR	weam	0.126	0.176	0.005	0.319	0.044	0	0	0	0	0	1.18	0	0	0	1.851	Replica
79	TOUR	wemd	0.315	0.071	0.003	0.24	0.379	0	0	0	0	0	8.637	0	0	0	9.644	Replica
79	TOUR	weop	0.126	0	0.005	0.09	0.344	0	0	0	0	0	3.167	0	0	0	3.732	Replica
79	TOUR	wepm	0.315	0.212	0.005	0.03	0.379	0	0	0	0	0	2.505	0	0.14	0	3.585	Replica
80	PS	wdam	0.047	0.712	1.044	0	0	1.148	0.945	0	0	0	0	0	0	0	3.896	Replica
80	PS	wdmd	0.285	0.142	0.475	0	0	1.566	1.936	0	0	0	0	0	0	0	4.404	Replica
80	PS	wdop	0	0.19	0.475	0	0	0.835	0.472	0	0	0	0	0	0	0	1.972	Replica
80	PS	wdpm	0	0.095	0.095	0	0	0.626	0.472	0	0	0	0	0	0.02	0	1.309	Replica
80	PS	weam	0.047	0.08	0.021	0	0	0.279	0.03	0	0	0	0	0	0	0	0.457	Replica
80	PS	wemd	0.095	0.08	0.008	0	0	0.489	0.102	0	0	0	0	0	0.021	0	0.795	Replica
80	PS	weop	0	0.027	0.008	0	0	0.349	0.018	0	0	0	0	0	0	0	0.401	Replica
80	PS	wepm	0.047	0	0.002	0	0	0.186	0.03	0	0	0	0	0	0	0	0.266	Replica
81	ELEM	wdam	0.019	0.042	0.078	3.064	0	0.248	0.122	0	0	0	0	0	0.005	0	3.579	NHTS
81	ELEM	wdmd	0.007	0.017	0.028	0.001	0	0.387	0.44	0	0	0	0	0	0.001	0	0.881	NHTS
81	ELEM	wdop	0.005	0.014	0.024	0	0.001	0.163	0.115	0	0	0	0	0	0	0	0.322	NHTS
81	ELEM	wdpm	0.008	0.008	0.017	0.001	0	0.082	0.103	0	0	0	0	0	0.002	0	0.221	NHTS
81	ELEM	weam	0.006	0.006	0.001	0	0	0.029	0.01	0	0	0	0	0	0	0	0.053	NHTS
81	ELEM	wemd	0.008	0.006	0.001	0	0	0.095	0.035	0	0	0	0	0	0.005	0	0.149	NHTS
81	ELEM	weop	0.002	0.006	0.001	0	0	0.034	0.012	0	0	0	0	0	0	0	0.055	NHTS
81	ELEM	wepm	0.001	0.002	0	0	0	0.019	0.011	0	0	0	0	0	0	0	0.033	NHTS
82	JRHS	wdam	0.019	0.031	0.044	3.03	0.005	0.28	0.05	0	0	0	0	0	0.005	0	3.464	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
82	JRHS	wdmd	0.009	0.014	0.012	0	0.002	0.414	0.161	0	0	0	0	0	0.002	0	0.614	NHTS
82	JRHS	wdop	0.004	0.002	0.004	0	0.007	0.123	0.031	0	0	0	0	0	0	0	0.17	NHTS
82	JRHS	wdpm	0.002	0	0.007	0.005	0.007	0.1	0.038	0	0	0	0	0	0.001	0	0.159	NHTS
82	JRHS	weam	0.002	0.001	0	0	0	0.028	0.002	0	0	0	0	0	0	0	0.033	NHTS
82	JRHS	wemd	0.002	0.002	0	0	0	0.04	0.007	0	0	0	0	0	0	0	0.052	NHTS
82	JRHS	weop	0.002	0.001	0	0	0.002	0.018	0.002	0	0	0	0	0	0	0	0.024	NHTS
82	JRHS	wepm	0	0.001	0	0.001	0.001	0.011	0.002	0	0	0	0	0	0	0	0.016	NHTS
83	SRHS	wdam	0.06	0.068	0.061	1.818	0.002	0.433	0.213	0	0	0	0	0	0.006	0	2.661	NHTS
83	SRHS	wdmd	0.07	0.031	0.029	0.248	0.018	0.605	0.589	0	0	0	0	0	0.002	0.001	1.593	NHTS
83	SRHS	wdop	0.041	0.018	0.008	0.037	0.025	0.239	0.088	0	0	0	0	0	0	0	0.455	NHTS
83	SRHS	wdpm	0.06	0.005	0.024	0.037	0.011	0.189	0.14	0	0	0	0	0	0	0	0.465	NHTS
83	SRHS	weam	0.018	0.004	0.001	0.024	0	0.035	0.01	0	0	0	0	0	0.002	0	0.093	NHTS
83	SRHS	wemd	0.051	0.004	0	0.024	0.002	0.11	0.036	0	0	0	0	0	0.001	0	0.229	NHTS
83	SRHS	weop	0.009	0.001	0	0.003	0.002	0.046	0.009	0	0	0	0	0	0	0	0.07	NHTS
83	SRHS	wepm	0.026	0.003	0	0.001	0.002	0.028	0.009	0	0	0	0	0	0	0	0.069	NHTS
84	COLL	wdam	0.366	0.733	1.008	2.364	0.449	0	0	1.937	0	0	0	0	0.079	0.038	6.973	NHTS
84	COLL	wdmd	0.092	0.458	0.412	0.985	0.77	0	0	4.212	0	0	0	0	0.079	0	7.007	NHTS
84	COLL	wdop	0.046	0.412	0.275	0.657	0.128	0	0	1.582	0	0	0	0	0.02	0	3.119	NHTS
84	COLL	wdpm	0.137	0.137	0.275	0.066	0.705	0	0	1.635	0	0	0	0	0	0	2.956	NHTS
84	COLL	weam	0.183	0.154	0.018	0.123	0.064	0	0	1.035	0	0	0	0	0	0	1.578	NHTS
84	COLL	wemd	0.137	0.051	0.007	0.065	0.276	0	0	2.855	0	0	0	0	0.041	0	3.433	NHTS
84	COLL	weop	0.046	0.051	0.004	0.022	0.115	0	0	1.102	0	0	0	0	0.102	0	1.442	NHTS
84	COLL	wepm	0	0	0.002	0.022	0.282	0	0	1.085	0	0	0	0	0.041	0	1.432	NHTS
85	MUNS	wdam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
85	MUNS	wdmd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
85	MUNS	wdop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS

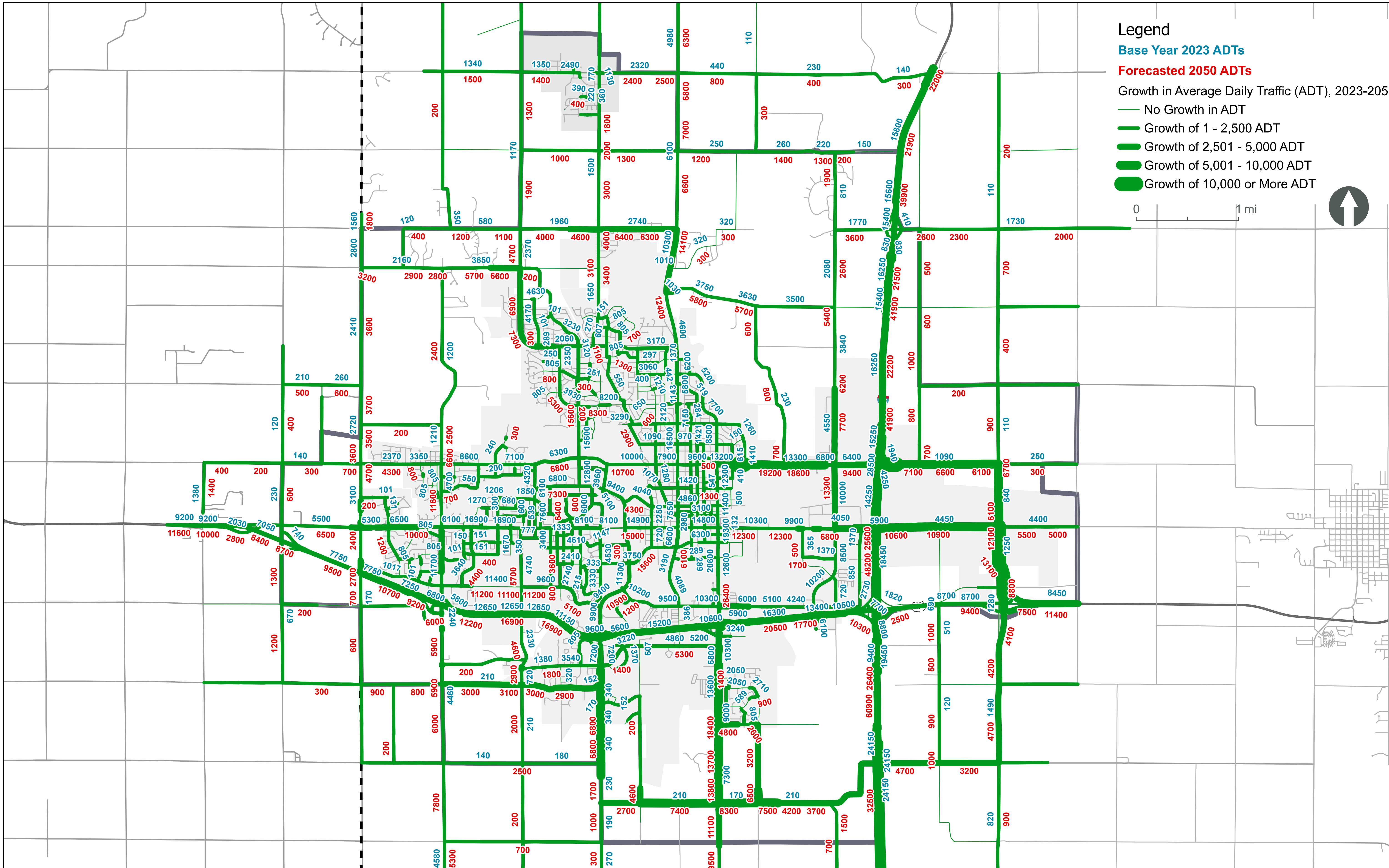
LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
85	MUNS	wdpm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
85	MUNS	weam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
85	MUNS	wemd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
85	MUNS	weop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
85	MUNS	wepm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
90	GC	wdam	0.075	0.181	0.261	0.513	0	0.544	0.356	0	0	0	0	0	0.006	0	1.935	NHTS
90	GC	wdmd	0.115	0.124	0.128	0.373	0	0.796	1.169	0	0	0	0	0	0.006	0	2.711	NHTS
90	GC	wdop	0.049	0.08	0.084	0.108	0	0.738	0.347	0	0	0	0	0	0.008	0	1.412	NHTS
90	GC	wdpm	0.071	0.062	0.057	0.025	0.006	0.816	0.422	0	0	0	0	0	0.004	0	1.463	NHTS
90	GC	weam	0.031	0.037	0.005	0.025	0	0.08	0.029	0	0	0	0	0	0.012	0	0.219	NHTS
90	GC	wemd	0.071	0.047	0.003	0.022	0	0.392	0.091	0	0	0	0	0	0.008	0	0.633	NHTS
90	GC	weop	0.022	0.022	0.001	0.008	0	0.182	0.03	0	0	0	0	0	0.006	0	0.271	NHTS
90	GC	wepm	0.031	0.017	0	0.004	0	0.201	0.032	0	0	0	0	0	0	0	0.286	NHTS
92	STAD	wdam	0.071	0.09	0.032	1.408	0	0	0	0	0	0	0.468	0	0.006	0	2.074	Replica
92	STAD	wdmd	0.218	0.084	0.051	0.948	0	0	0	0	0	0	1.65	0	0.039	0	2.99	Replica
92	STAD	wdop	0.135	0.077	0.032	0.221	0	0	0	0	0	0	0.566	0	0.008	0	1.039	Replica
92	STAD	wdpm	0.148	0.077	0.006	0.203	0	0	0	0	0	0	0.501	0	0.008	0	0.943	Replica
92	STAD	weam	0.026	0.022	0.001	0.052	0	0	0	0	0	0	0.534	0	0.011	0	0.646	Replica
92	STAD	wemd	0.186	0.022	0.001	0.077	0	0	0	0	0	0	3.192	0	0.029	0	3.507	Replica
92	STAD	weop	0.071	0.025	0	0.01	0	0	0	0	0	0	1.257	0	0	0	1.363	Replica
92	STAD	wepm	0.032	0.018	0.001	0.004	0	0	0	0	0	0	1.042	0	0.009	0	1.106	Replica
93	APRK	wdam	0.055	0.1	0.107	0.375	0.014	0.691	0.35	0	0	0	0	0	0.021	0.002	1.715	NHTS
93	APRK	wdmd	0.1	0.072	0.07	0.379	0.119	1.491	1.191	0	0	0	0	0	0.027	0.001	3.449	NHTS
93	APRK	wdop	0.239	0.067	0.052	0.071	0.227	1.612	0.553	0	0	0	0	0	0.006	0	2.828	NHTS
93	APRK	wdpm	0.072	0.05	0.027	0.147	0.216	0.888	0.481	0	0	0	0	0	0.01	0	1.891	NHTS
93	APRK	weam	0.032	0.015	0.002	0.02	0.001	0.202	0.025	0	0	0	0	0	0.003	0	0.301	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
93	APRK	wemd	0.045	0.022	0.002	0.032	0.026	0.616	0.129	0	0	0	0	0	0.037	0.002	0.91	NHTS
93	APRK	weop	0.13	0.014	0.001	0.005	0.038	0.446	0.057	0	0	0	0	0	0.029	0	0.718	NHTS
93	APRK	wepm	0.04	0.015	0.001	0.011	0.029	0.268	0.046	0	0	0	0	0	0.01	0	0.42	NHTS
94	PPRK	wdam	0.009	0.013	0.013	0	0	1.138	0.266	0	0	0	0	0	0.008	0.002	1.449	NHTS
94	PPRK	wdmd	0.009	0	0.004	0.019	0.037	1.514	1.379	0	0	0	0	0	0.047	0.004	3.013	NHTS
94	PPRK	wdop	0.004	0.013	0.009	0	0.061	1.196	0.602	0	0	0	0	0	0.008	0	1.893	NHTS
94	PPRK	wdpm	0.004	0.018	0.013	0.031	0.025	0.974	0.401	0	0	0	0	0	0.009	0	1.476	NHTS
94	PPRK	weam	0.004	0.005	0	0	0.002	0.282	0.042	0	0	0	0	0	0.02	0	0.354	NHTS
94	PPRK	wemd	0.013	0.005	0	0.001	0.005	0.733	0.194	0	0	0	0	0	0.018	0	0.969	NHTS
94	PPRK	weop	0	0.007	0	0	0.009	0.346	0.081	0	0	0	0	0	0.008	0	0.451	NHTS
94	PPRK	wepm	0.004	0	0	0	0.005	0.357	0.072	0	0	0	0	0	0.02	0	0.458	NHTS
95	IAG	wdam	0.092	0.177	0.256	1.87	0.205	0.657	0.825	0	0	0	0	0	0.045	0.008	4.134	Replica
95	IAG	wdmd	0.293	0.152	0.116	1.04	0.623	1.207	2.646	0	0	0	0	0	0.094	0	6.171	Replica
95	IAG	wdop	0.305	0.146	0.085	0.393	0.324	1.154	0.564	0	0	0	0	0	0.013	0	2.985	Replica
95	IAG	wdpm	0.171	0.092	0.098	0.288	0.29	0.59	0.868	0	0	0	0	0	0.032	0	2.428	Replica
95	IAG	weam	0.098	0.041	0.003	0.089	0.015	0.135	0.047	0	0	0	0	0	0.005	0	0.433	Replica
95	IAG	wemd	0.177	0.038	0.003	0.093	0.065	0.362	0.225	0	0	0	0	0	0.027	0	0.989	Replica
95	IAG	weop	0.213	0.055	0.004	0.018	0.033	0.326	0.056	0	0	0	0	0	0.014	0.005	0.724	Replica
95	IAG	wepm	0.055	0.051	0.001	0.018	0.035	0.171	0.05	0	0	0	0	0	0.003	0.005	0.388	Replica
96	AG	wdam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
96	AG	wdmd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
96	AG	wdop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
96	AG	wdpm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
96	AG	weam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
96	AG	wemd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
96	AG	weop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
96	AG	wepm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Replica
99	VAC	wdam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
99	VAC	wdmd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
99	VAC	wdop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS

LUC	LUNA ME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
99	VAC	wdpm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
99	VAC	weam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
99	VAC	wemd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
99	VAC	weop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
99	VAC	wepm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NHTS
303	FPUB	wemd	0.094	0.204	0.119	0	0	4.554	1.731	0	0	0	0	0	0	0	6.703	NHTS
303	FPUB	weop	0.021	0.046	0.027	1	0	0.859	0.328	0	0	0	0	0	0.002	0.005	2.287	NHTS
303	FPUB	wepm	0.04	0.088	0.051	0	0	1.67	0.58	0	0	0	0	0	0	0	2.429	NHTS
303	FPUB	weam	0.046	0.101	0.059	0	0	1.778	0.674	0	0	0	0	0	0	0	2.658	NHTS
303	FPUB	wdmd	0.049	0.189	0.172	0.015	0.054	1.806	1.293	0	0	0	0	0	0.007	0.002	3.586	NHTS
303	FPUB	wdop	0.053	0.205	0.187	0.016	0.026	1.067	0.628	0	0	0	0	0	0.022	0.006	2.211	NHTS
303	FPUB	wdpm	0.072	0.279	0.254	0.025	0.049	1.696	1.186	0	0	0	0	0	0.007	0.002	3.571	NHTS
303	FPUB	wdam	0.083	0.322	0.294	0.033	0.024	1.245	0.577	0	0	0	0	0	0.007	0.002	2.587	NHTS
304	FSPI	wemd	0.073	0.092	0.02	0	0.16	3.182	0.821	0	0	0	0	0	0	0	4.347	NHTS
304	FSPI	weop	0.078	0.098	0.022	1	0.058	2.263	0.5	0	0	0	0	0	0.001	0	4.021	NHTS
304	FSPI	wepm	0.034	0.042	0.009	0	0.02	1.887	0.314	0	0	0	0	0	0	0	2.306	NHTS
304	FSPI	weam	0.024	0.03	0.007	0	0.018	1.39	0.174	0	0	0	0	0	0	0	1.643	NHTS
304	FSPI	wdmd	0.045	0.175	0.16	0.022	0.023	1.278	1.61	0	0	0	0	0	0.003	0	3.316	NHTS
304	FSPI	wdop	0.048	0.185	0.169	0.011	0.02	1.439	0.609	0	0	0	0	0	0.007	0.001	2.489	NHTS
304	FSPI	wdpm	0.05	0.196	0.179	0.011	0.017	0.909	0.78	0	0	0	0	0	0.003	0	2.146	NHTS
304	FSPI	wdam	0.054	0.209	0.191	0.028	0.004	0.891	0.278	0	0	0	0	0	0.002	0	1.657	NHTS
305	FOFF	wemd	0.022	0.036	0.008	0	0	1.336	1.014	0	0	0	0	0	0	0	2.416	NHTS
305	FOFF	weop	0.002	0.003	0.001	1	0	0.228	0.113	0	0	0	0	0	0.001	0	1.347	NHTS
305	FOFF	wepm	0.037	0.061	0.014	0	0	0.948	0.574	0	0	0	0	0	0	0	1.633	NHTS
305	FOFF	weam	0.047	0.079	0.018	0	0	0.782	0.193	0	0	0	0	0	0	0	1.119	NHTS
305	FOFF	wdmd	0.041	0.161	0.147	0	0	0.761	1.479	0	0	0	0	0	0.004	0.001	2.593	NHTS
305	FOFF	wdop	0.025	0.099	0.09	0	0	0.744	0.606	0	0	0	0	0	0.008	0.001	1.573	NHTS
305	FOFF	wdpm	0.222	0.861	0.786	0	0	0.786	0.987	0	0	0	0	0	0.004	0.001	3.646	NHTS
305	FOFF	wdam	0.318	1.236	1.127	0	0	0.805	0.878	0	0	0	0	0	0.002	0	4.366	NHTS
306	FCOM	wemd	0.139	0.172	0.062	0	10.1	1.74	9.108	0	0	0	0	0	0.001	0.001	21.321	

LUC	LUNAME	Time Period	HBWL	HBWM	HBWH	HBSC	HBSH	HBO	NHB	UNIV	HOSP	APRT	RREC	HOT	SU	Combo	Sum	Data Source
306	FCOM	weop	0.094	0.116	0.042	1	3.24	0.691	2.18	0	0	0	0	0	0.002	0.003	7.368	
306	FCOM	wepm	0.073	0.09	0.033	0	4.991	0.783	3.065	0	0	0	0	0	0.001	0.001	9.037	
306	FCOM	weam	0.052	0.064	0.023	0	1.599	0.387	0.899	0	0	0	0	0	0	0.001	3.025	
306	FCOM	wdmd	0.045	0.175	0.159	0	4.959	1.547	6.119	0	0	0	0	0	0.012	0.003	13.018	
306	FCOM	wdop	0.079	0.305	0.278	0	2.957	1.029	1.737	0	0	0	0	0	0.081	0.033	6.499	
306	FCOM	wdpm	0.065	0.252	0.23	0	3.103	1.152	3.561	0	0	0	0	0	0.012	0.003	8.377	
306	FCOM	wdam	0.048	0.187	0.171	0	1.236	0.641	1.369	0	0	0	0	0	0.048	0.022	3.723	
308	FIND	wemd	0.008	0.032	0.004	0	0.039	0.202	0.083	0	0	0	0	0	0.004	0.01	0.38	
308	FIND	weop	0.02	0.082	0.009	1	0	0.077	0.025	0	0	0	0	0	0.004	0.02	1.237	
308	FIND	wepm	0.012	0.047	0.005	0	0.003	0.08	0.05	0	0	0	0	0	0.004	0.01	0.211	
308	FIND	weam	0.006	0.025	0.003	0	0.003	0.036	0.013	0	0	0	0	0	0.001	0.01	0.096	
308	FIND	wdmd	0.035	0.134	0.123	0	0.009	0.192	0.385	0	0	0	0	0	0.021	0.009	0.908	
308	FIND	wdop	0.04	0.155	0.141	0	0.003	0.094	0.152	0	0	0	0	0	0.038	0.016	0.638	
308	FIND	wdpm	0.056	0.217	0.198	0	0.005	0.154	0.264	0	0	0	0	0	0.021	0.009	0.925	
308	FIND	wdam	0.058	0.225	0.206	0	0.002	0.102	0.138	0	0	0	0	0	0.022	0.01	0.763	
309	FCO	wemd	0.051	0.07	0.022	0	2.525	1.437	3.038	0	0	0	0	0	0	0	7.143	
309	FCO	weop	0.025	0.031	0.011	1	0.81	0.344	0.63	0	0	0	0	0	0.001	0.001	2.852	
309	FCO	wepm	0.046	0.068	0.019	0	1.248	0.906	1.196	0	0	0	0	0	0	0	3.484	
309	FCO	weam	0.048	0.075	0.019	0	0.4	0.683	0.369	0	0	0	0	0	0	0	1.596	
309	FCO	wdmd	0.042	0.164	0.15	0	1.24	0.958	2.639	0	0	0	0	0	0.006	0.001	5.2	
309	FCO	wdop	0.039	0.151	0.137	0	0.739	0.815	0.889	0	0	0	0	0	0.026	0.009	2.805	
309	FCO	wdpm	0.183	0.709	0.647	0	0.776	0.878	1.63	0	0	0	0	0	0.006	0.001	4.829	
309	FCO	wdam	0.251	0.974	0.888	0	0.309	0.764	1	0	0	0	0	0	0.014	0.006	4.205	

APPENDIX F TRAVEL DEMAND MODEL DOCUMENTATION


Legend
Base Year 2023 ADTs
Forecasted 2050 ADTs
Growth in Average Daily Traffic (ADT), 2023-2050
No Growth in ADT
Growth of 1 - 2,500 ADT
Growth of 2,501 - 5,000 ADT
Growth of 5,001 - 10,000 ADT
Growth of 10,000 or More ADT
0
1 mi