IOWA IN MOTION

planning ahead 2040

STATE TRANSPORTATION PLAN

Iowa Department of Transportation

IOWA IN MOTION planning ahead 2040

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1. Looking ahead to 2040

Decades ago, it was difficult to imagine how Iowa's transportation system would change over time. We, as Iowans, can look back over our history and see the important role transportation has played in the development of our state. We must now look to the future to determine the type of investments needed for our transportation system to serve our needs through 2040.

1.1 What is the Plan

According to 23 CFR § 450.214(a), "The State shall develop a long-range statewide transportation plan, with a minimum 20-year forecast period at the time of adoption, that provides for the development and implementation of the multimodal transportation system for the State." The state transportation plan (Plan) is a document that will address this requirement and serve as a transportation investment guide between now and 2040. Iowa's most recent plan was developed by the Iowa Department of Transportation and adopted in 1997 through a planning process called Iowa in Motion. Much of Iowa in Motion has been implemented and this Plan, "Iowa in Motion – Planning Ahead," will build on the success of its predecessor.

The Plan projects the demand for transportation infrastructure and services to 2040 based on consideration of social and economic changes likely to occur during this time. Iowa's economy and the need to meet the challenges of the future will continue to place pressure on the transportation system. With this in mind, the Plan will provide direction for each transportation mode, and will support a renewed emphasis on efficient investment and prudent, responsible management of our existing transportation system. In recent years, the Iowa DOT has branded this philosophy as stewardship.

As Iowa changes and the transportation system evolves, one constant will be that the safe and efficient movement of Iowans and our products is essential for stable growth in Iowa's economy. Iowa's extensive multimodal and multijurisdictional transportation system is a critical component of economic development and job creation throughout the state.

1.2 What does the Plan include

While the information below does not summarize every aspect of the Plan, some of the key components of the document include**:**

- **Trends:** An analysis of population, economic, passenger and freight trends, and what these trends mean for Iowa's transportation system.
- **System condition:** An overview of each mode within the transportation system.
- **Guiding principle and goals:** A description of the goals – **safety**, **efficiency** and **quality of life** – that will guide future investment.
- **Investment actions:** A collection of investments needed to accomplish these goals.
- **Costs and revenues:** An analysis of annual costs and revenues for each transportation mode.
- **Implementation strategies:** A discussion related to addressing the funding shortfall, programming future investments, and continuous performance monitoring.

1.3 How was the Plan developed

Development of the Plan involved input from a wide variety of resources. While it is impossible to capture every one of the resources in an exhaustive list, the inputs identified below played a critical role in shaping this document.

Public input

According to 23 CFR § 450.214(k), "the State shall, to the maximum extent practicable, utilize the public involvement process described under 450.210(a)." The Iowa DOT's current public participation process identifies several steps to be used in developing the state long-range transportation plan, and, to the maximum extent practicable, adheres to the process described in 23 CFR § 450.210(a). Each of the following steps was used at some point in the development of the Plan.

1. Use appropriate mailing (including email) lists to notify the public.
2. Use advisory committees.
3. Hold regional public information/listening meetings, when appropriate.
4. Use the Iowa Transportation Commission meetings.
5. Encourage letters and written comments.
6. Distribute draft plans and documents for review.
7. Review the state public participation process.

A 45-day public comment period and corresponding methods for providing comment on the draft plan were advertised in a package of five news releases. Social media, including Facebook and Twitter, were also utilized to enhance the effectiveness of these news releases. Public input was collected through a variety of means, but primarily through a series of public meetings and an online survey. The following statistics summarize the level of public input achieved during the comment period.

- Webpage visitors: 930 (749 unique)
- Survey responses: 264
- Total public meeting attendance: 57
- Written comments received: 20 (includes 6 submittals received prior to the comment period)

Iowa Transportation Commission (Commission)

The seven transportation commissioners set policy for the department and are appointed by the governor, with no more than four from one political party. Membership on the Commission is also gender-balanced. Commissioners are confirmed by the Iowa Senate and serve on a staggered basis for four-year terms. Eight of the 12 Commission meetings are held in Ames, with the other four being tours in various locations around the state with stakeholder input. The meetings are open to the public and follow a set agenda.

The commissioners were engaged and updated on numerous occasions in the years leading up to the adoption of the Plan. Most recently, Iowa DOT staff presented the Commission with draft chapters as they were completed. The Commission, which holds the authority to approve and adopt the Plan, reviewed the material and offered input.

Departmental efforts

Individuals representing a diverse cross section of the Iowa DOT were involved in the development of the Plan. These individuals included staff from the offices of Systems Planning, Aviation, Public Transit, Rail Transportation, Bridges and Structures, Contracts, Design, Local Systems, Location and Environment, Maintenance, Policy and Legislative Services, Program Management, Public Affairs, Right of Way, Traffic and Safety, and Transportation Data. Also involved were planners representing each one of the state's six transportation districts.

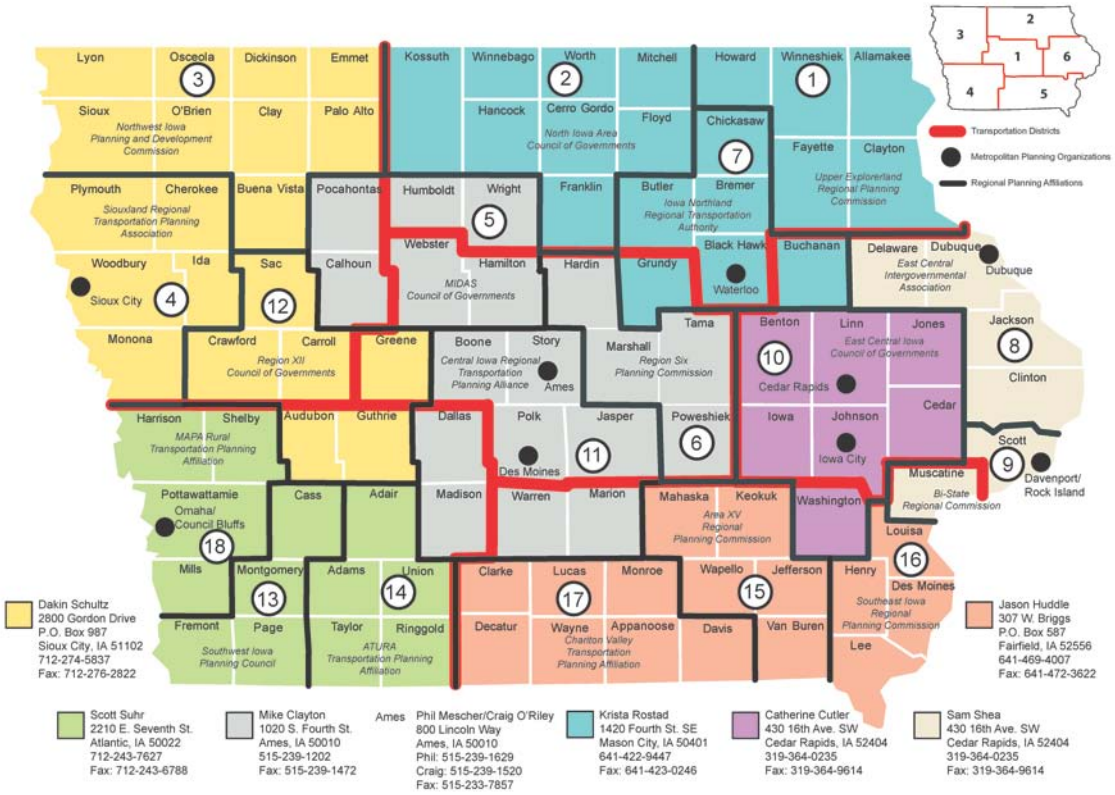
Various focus groups and advisory committees were established and consulted throughout the planning process, and a number of plans and studies developed by Iowa DOT staff (identified later in this section) were considered during the development of the Plan. Finally, significant amounts of informal staff dialogue also proved to be a valuable resource.

State planning agencies

According to 23 CFR § 450.214(f) and (g), "Within each metropolitan area of the State, the long-range statewide transportation plan shall be developed in cooperation with the affected MPOs. For nonmetropolitan areas, the long-range statewide transportation plan shall be developed in consultation with affected nonmetropolitan officials with responsibility for transportation using the State's consultation process(es) …"

The state's transportation planning agencies, which include metropolitan planning organizations (MPOs) and regional planning affiliations (RPAs), partnered with the Iowa DOT and were critical in the development of the Plan. MPOs conduct transportation planning and programming activities in the state's nine urban areas with populations greater than 50,000, which include Ames, Cedar Rapids, Council Bluffs, Davenport, Des Moines, Dubuque, Iowa City, Sioux City and Waterloo. Iowa's 18 RPAs conduct transportation planning and programming activities in the remaining nonmetropolitan areas of the state, covering all 99 counties. The locations of these agencies and the areas of responsibility for the Iowa DOT district planners are shown in Figure 1.1.

Figure 1.1: Iowa MPOs, RPAs and district planner areas of responsibility



Source: Iowa DOT

The MPOs and RPAs were engaged in a number of different ways in the years leading up to the adoption of the Plan. Input was gathered through routine meetings, subcommittee deliberations, questionnaire responses, policy board and technical committee meetings, and numerous interactions with staff. In addition, a selection of MPO and RPA long-range transportation plans (LRTPs) was referenced throughout the development of the Plan. Ultimately, the Iowa DOT hoped to use this MPO and RPA input to develop a plan that is more useful to these agencies in their transportation planning and programming activities.

Transportation 2020

At the March 8, 2011, Commission meeting, Governor Branstad announced his "Transportation 2020" initiative. As part of this initiative, the governor sought public input on the topic of highway transportation and funding needs. He was assisted in these efforts by a 12 person Transportation 2020 Citizen Advisory Commission. The input gathered as part of Transportation 2020 was incorporated into the Plan as appropriate.

Interagency and modal interest group consultation

According to 23 CFR § 450.214(i), “The long-range statewide transportation plan shall be developed, as appropriate, in consultation with State, Tribal, and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation. This consultation shall involve comparison of transportation plans to State and Tribal conservation plans or maps, if available, and comparison of transportation plans to inventories of natural or historic resources, if available. As part of this consultation, the Iowa DOT contacted the following agencies and tribal governments.

- Iowa Department for the Blind
- Iowa Department of Agriculture and Land Stewardship
- Iowa Department of Cultural Affairs
- Iowa Economic Development Authority
- Iowa Department of Education
- Iowa Department of Human Rights
- Iowa Department of Human Services
- Iowa Department of Natural Resources
- Iowa Department of Public Safety
- Iowa Department on Aging
- Iowa Homeland Security and Emergency Management

- Iowa Utilities Board
- Iowa Workforce Development
- Office of the State Archaeologist
- Federal Highway Administration, Iowa Division
- Federal Transit Administration, Region 7
- U.S. Army Corps of Engineers, Rock Island District
- U.S. Environmental Protection Agency, Region 7
- U.S. Fish and Wildlife Service
- U.S. Department of Agriculture, Natural Resources Conservation Service
- Meskwaki Tribe

In addition to the abovementioned agencies, the Iowa DOT consulted with a variety of modal interest groups throughout the development of the plan. These groups included, but were not limited to, the Iowa Bicycle Coalition, the Iowa Bicycle and Pedestrian Advisory Committee, the Iowa Transportation Coordination Council, the Mississippi River Trail Executive Committee, the Passenger Rail Advisory Committee, and the Railroad Advisory Committee.

Other plans and studies

According to 23 CFR § 450.214(c), “The long-range statewide transportation plan shall reference, summarize, or contain any applicable short-range planning studies; strategic planning and/or policy studies; transportation needs studies; management systems reports; emergency relief and disaster preparedness plans; and any statements of policies, goals, and objectives on issues that were relevant to the development of the long-range statewide transportation plan.”

The following summarizes some of the documents and planning efforts considered during the development of the Plan.

- **"Americans with Disabilities Act (ADA) Transition Plan" (2011):** This plan, developed by the Iowa DOT, identifies steps the Iowa DOT will take to achieve ADA compliance for pedestrian facilities.
- **"Climate Change Impacts on Iowa" (2010):** This report, prepared by the Iowa Climate Change Impacts Committee and presented to the governor and the Iowa Legislature, contained several policy recommendations and documented the impacts of climate changes on agriculture, flora and fauna, public health, the economy, infrastructure, and emergency services.

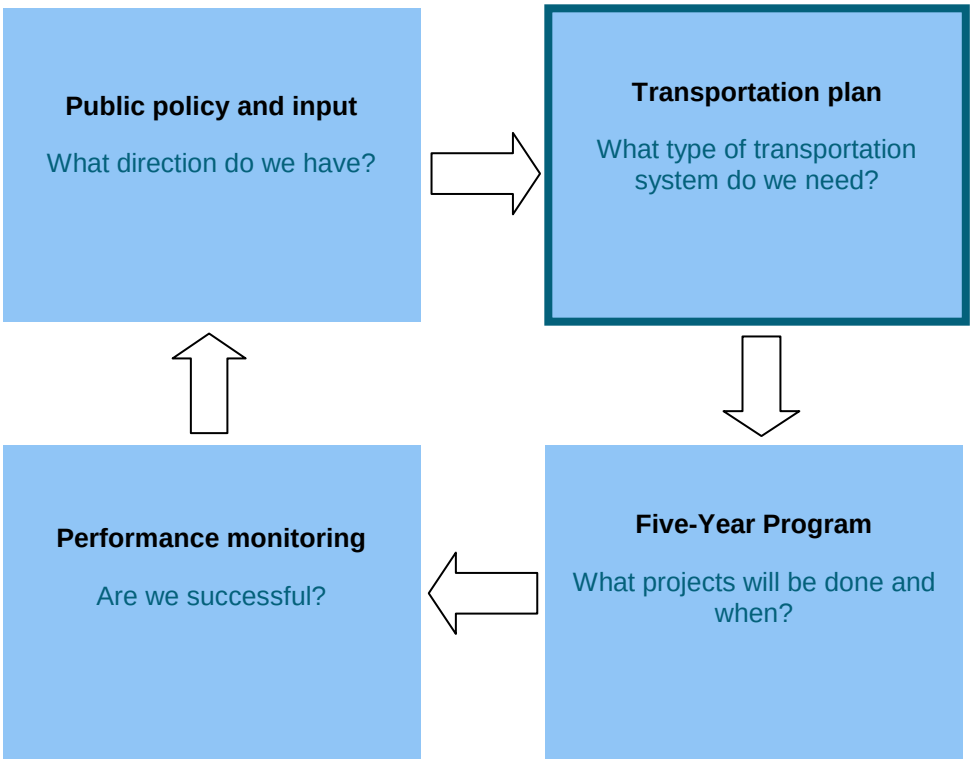
- **"Economic and Health Benefits of Bicycling in Iowa" (2012):** This report, prepared by the University of Northern Iowa for the Iowa Bicycle Coalition, identifies the economic and health impacts of bicycling in Iowa.
- **"Governor's Transportation 2020 Citizen Advisory Commission – Report and Recommendations" (2011):** This report, prepared by the Citizen Advisory Commission and presented to the governor and the Iowa DOT, documented the work of the commission and their recommendations in response to the governor's charge to assist the Iowa DOT in assessing the condition of the roadway system while evaluating current and future funding available to address system needs.
- **"Iowa Air Service Study" (2008):** This study, initiated by the Iowa DOT, reported on the current status of air service in the state and identified strategies to sustain and improve air service for Iowa residents.
- **"Iowa Aviation System Plan Update" (2011):** This plan, prepared by Mead & Hunt Inc. for the Iowa DOT, updated the 2004 system plan and its benchmarks; and reviewed airport roles, goals and objectives for the aviation system.
- **"Iowa Comprehensive Highway Safety Plan" (2006):** This plan engaged a diverse group of safety stakeholders and charted the state's course with the goal of reducing roadway deaths from an annual average of 445 to 400 by the year 2015.
- **"Iowa's Mississippi River Trail Plan" (2003):** This plan, commissioned by the Iowa DOT and prepared by the Center for Transportation Research and Education, provides an in-depth analysis to determine the best route for the Iowa portion of the Mississippi River Trail and a strategic plan for implementation.
- **"Iowa in Motion – State Transportation Plan" (1997):** This plan was developed in response to the Intermodal Surface Transportation Efficiency Act (ISTEA) and contained specific transportation investment directions, improvements, and their estimated costs.
- **"Iowa Passenger Transportation Funding Study" (2009):** This study, prepared by URS Corp. for the Iowa DOT, analyzed current revenue and whether or not it was sufficient to meet future needs, assessed how well the public transit network supports mobility needs, and identified needed improvements.
- **"Iowa Railroad System Plan" (2009):** This plan, developed by the Iowa DOT, was intended to guide the department in promoting access to rail transportation, improving the freight rail system, expanding passenger rail service, and promoting improved safety.

- **"Iowa Trails 2000" (2000):** This plan, developed by the Iowa DOT, provided a framework for the implementation of trail initiatives throughout the state. It offers numerous resources and recommendations to trail planners and implementers in Iowa.
- **"Iowa's Renewable Energy and Infrastructure Impacts" (2010):** This report, published by the Center for Transportation Research and Education, documented the current physical and fiscal impacts of Iowa's existing biofuels and wind power industries, and recommended changes in public policies to deal with these impacts.
- **"Lewis and Clark Multi-Use Trail Study" (2010):** This study, led by RDG Planning & Design, serves as the master plan for the trail, which is one of Iowa's five high-priority trail corridors.
- **"Livability in Transportation Guidebook" (2010):** This resource, prepared by ICF International for the U.S. DOT, illustrates how livability principles should be incorporated into transportation planning, programming, and project design, using examples from state, regional and local sponsors.
- **"Performance Measures for Iowa Transportation Systems" (2006):** This report, published by the Center for Transportation Research and Education, was an initial effort to utilize a set of exploratory performance measures in the context of a statewide, multimodal transportation plan developed by the Iowa DOT.
- **"Policy Strategies for Iowa in Making Major Road Investments" (2002):** This study, developed by the late Dr. David J. Forkenbrock at the request of the Commission, was to serve as a practical guide to assist the Iowa DOT when pursuing policy objectives through transportation investments.
- **"Road Use Tax Fund (RUTF) Study" (2006, 2008, 2011):** These reports, prepared by the Iowa DOT and presented to the Iowa Legislature, reassessed trends in roadway conditions, long-range needs, construction and maintenance costs, and revenues.
- **"The Fix We're In For: The State of Our Nation's Bridges" (2011):** This report, published by Transportation for America, ranks states in terms of the overall condition of the state's bridges.
- **"Transportation Planning and the Environment" (2009):** This resource, published by the Iowa DOT, provided information concerning how MPOs and RPAs can include environmental considerations in their transportation planning efforts.
- **"Uses and Benefits of Aviation in Iowa" (2009):** This report, released by the Iowa DOT, documented how aviation is used in Iowa, and concluded that air transportation is a key contributor to the state's economy.

1.4 How can the Plan be used

The Plan is a multimodal transportation planning effort intended to assist the Commission in making informed transportation investment decisions for the state. Locally, MPO and RPA policy boards and technical committees may use the Plan to help frame their own investment decisions.

Projects programmed within the Iowa DOT's Five-Year Program, which is approved by the Commission, logically flow from the Plan. In addition, modal plans will provide further detail concerning the implementation of elements of the Plan. The following illustration highlights the Plan's role in the transportation planning cycle.



Public policy and input

Congress outlines specific factors to be addressed in planning and programming activities. Federal and state legislation provide parameters for the administration of transportation funds. The governor, state legislature and citizens provide statewide direction, and the Iowa Code lays out numerous program operational criteria.

Transportation plan

The Plan serves as a guide for the development of transportation policies, initiatives, and investment decisions between now and 2040. The Plan evaluates Iowa's transportation components from a system perspective, focusing on the movement of people and freight.

Five-Year Program

The Five-Year Program is a listing of specific departmental project investments and is approved by the Commission on an annual basis. Major elements include individual modal projects scheduled over the next five years, sources of funds, annual accomplishments, and criteria/eligibility of different modal funding programs.

Performance monitoring

The Iowa DOT has been involved with performance monitoring and reporting for many years. However, these monitoring efforts have, for the most part, been done by individual mode. The Plan brings all these modal monitoring elements into a systemwide transportation evaluation process.

In summary, the Plan is an essential component of the statewide transportation planning process, serving as a critical point in transforming the state's policy directions into future investment actions.

2. Understanding Iowa

How will Iowa be different in 2040?

What are some of the key changes we will have to face?

How will future economic development opportunities be addressed?

How will Iowa's transportation system be impacted?

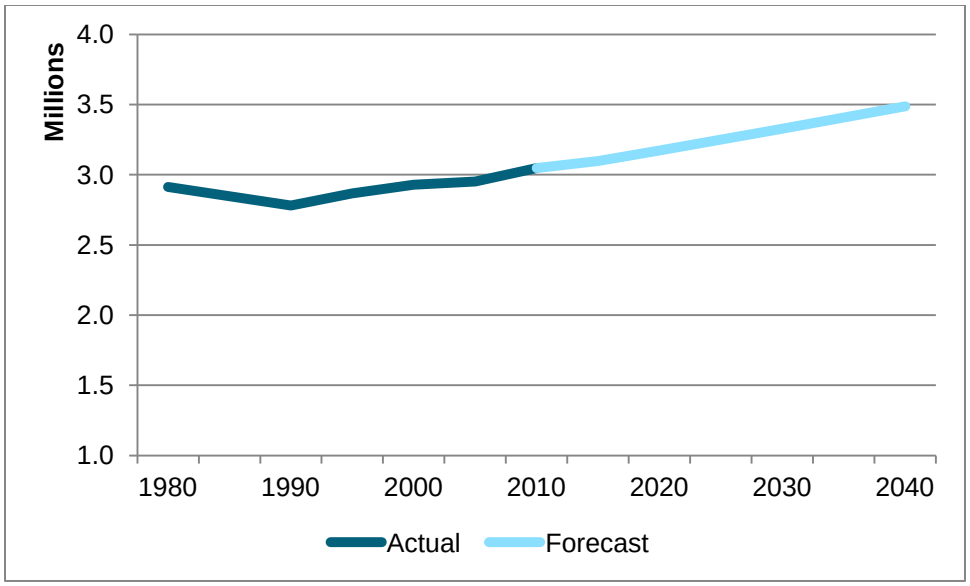
To answer these types of questions, we must have an understanding of where we have been and where we currently are. This chapter looks at many of the key trends that have impacted Iowa in the past, how they are affecting us today, and how they are projected to affect us in the future. An understanding of the characteristics that make Iowa unique will help us in facing our future and planning ahead to meet these challenges.

2.1 Demographic trends

Iowa's population is growing at a slow pace

Iowa's population has remained relatively stable since 1980, growing 4.55 percent over the past 30 years. It is projected that Iowa's population will increase from 3.04 million in 2010 to approximately 3.49 million in 2040.

Figure 2.1: Iowa population, 1980-2040



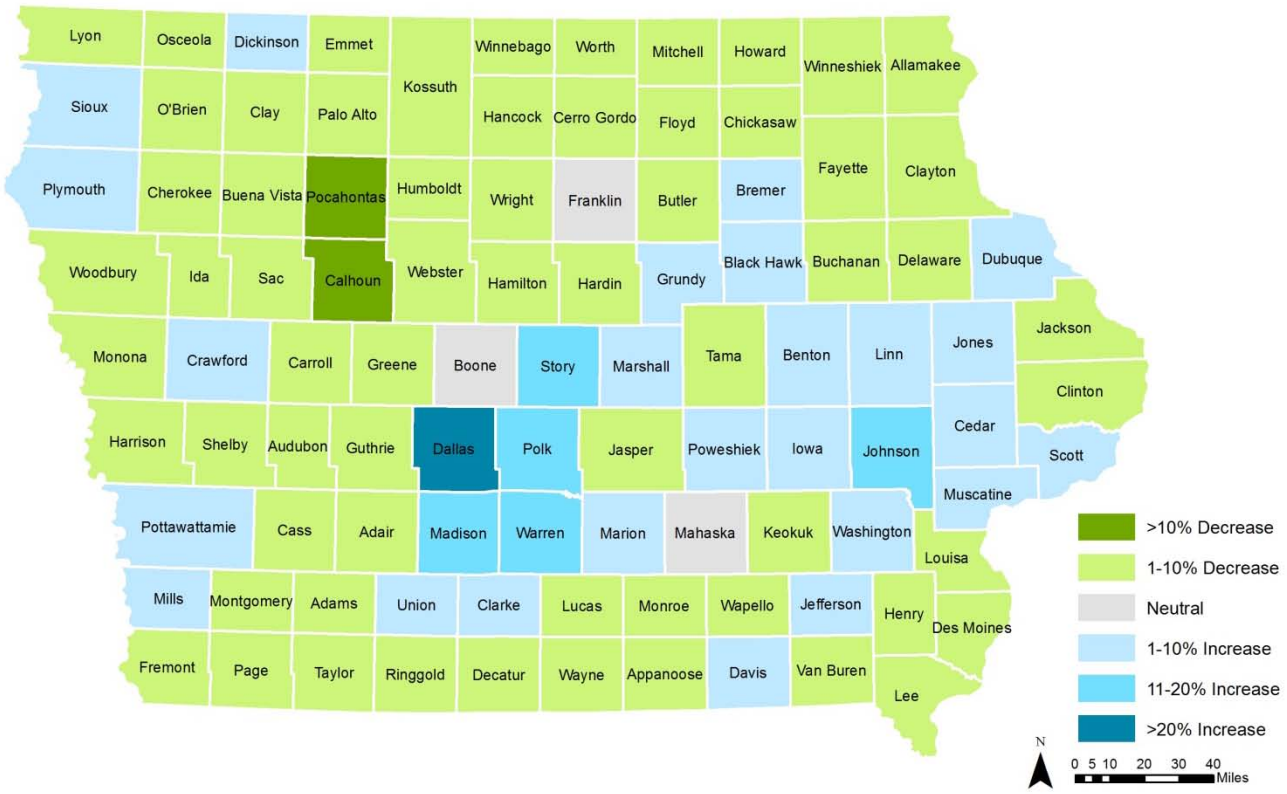
Sources: U.S. Census Bureau, Woods and Poole Economics Inc.

Iowa's population growth from 2000 to 2010 was slower than the national growth rate, but was fairly consistent with the Midwest region (the Census Bureau defines this region as the states of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin). According to the 2010 Census, Iowa's population grew 4.1 percent from 2000 to 2010, compared to 3.9 percent in the Midwest region and 9.7 percent nationally.

Iowa's population growth is not uniform throughout the state

Areas of population growth and decline are scattered around the state. Between 2000 and 2010, 31 of Iowa's 99 counties grew in population, three remained virtually unchanged, and 65 counties declined in population. While there was growth in various locations across Iowa, the majority of population increases took place within or near metropolitan areas. Figure 2.2 illustrates the 2000 to 2010 population change distributed across Iowa's 99 counties.

Figure 2.2: County population change, 2000-2010

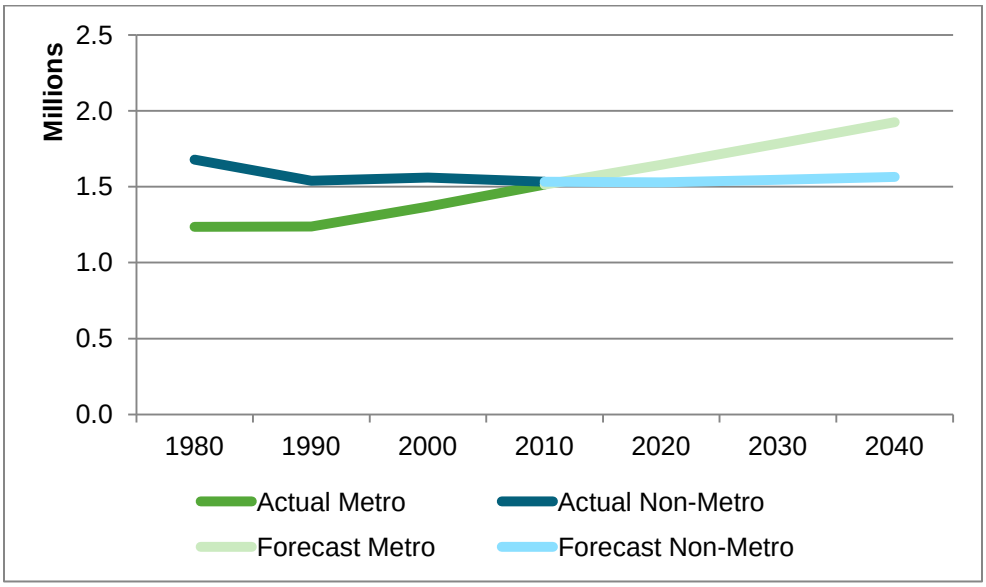


Source: U.S. Census Bureau

Iowa's population is urbanizing

As mentioned previously, Iowa's population is continuing to migrate toward the state's nine metropolitan areas, which have an urban core of at least 50,000 people. Historically, the majority of Iowa's population has resided in nonmetropolitan areas, yet most of the population growth in recent decades has been in counties that contain or are adjacent to metropolitan areas. Assuming this trend continues, Iowa's metropolitan population is expected to account for nearly 60 percent of the state's total population by 2040. Figure 2.3 charts this trend since 1980, and forecasts the expected gap between metropolitan and nonmetropolitan population levels in 2040. Although Iowa's population as a whole is growing at a slow pace, the shift in population from rural to urban communities in recent years has impacts on the transportation system. Increased population in metropolitan areas can create congestion and capacity issues, while local jurisdictions with decreasing population can be faced with less funding for deteriorating roadways.

Figure 2.3: Metropolitan and nonmetropolitan population, 1980-2040



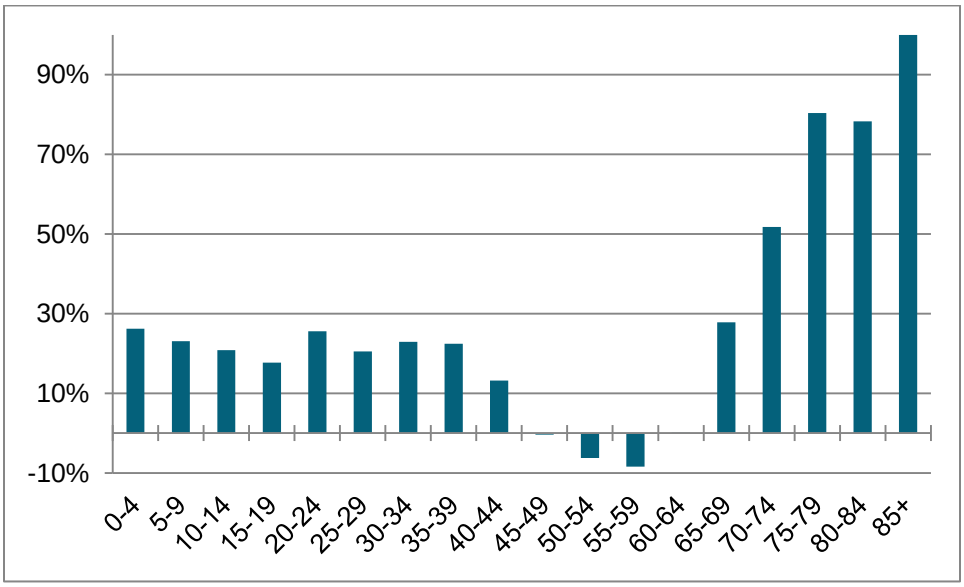
Sources: U.S. Census Bureau, Woods and Poole Economics Inc.

Iowa's population is getting older

Iowa's median age has increased from 30 years in 1980 to 38 years in 2010, and the percentage of Iowa's population older than the age of 65 was 14.9 – the fifth-highest in the United States. This number is expected to continue to grow as the "baby boom" generation reaches this milestone in the coming years. Figure 2.4 shows the projected percent change in five-year age groups between 2010 and 2040. As illustrated in the chart, the highest growth is expected to be among those aged 65 and

older. Relatively stable population growth is expected in the 44-and-under age groups, while the percentage of 45- to 59-year-olds is expected to decline slightly between 2010 and 2040.

Figure 2.4: Projected percent change in population age groups, 2010-2040



Sources: U.S. Census Bureau, REMI Economic Models Inc.

Iowa's older population has specific transportation needs that differ from other age groups. Improving the roadway and driving environment and expanding transportation options are necessary to help meet the needs of older drivers. Some examples of ways to enhance roadway safety and transportation for older drivers include:

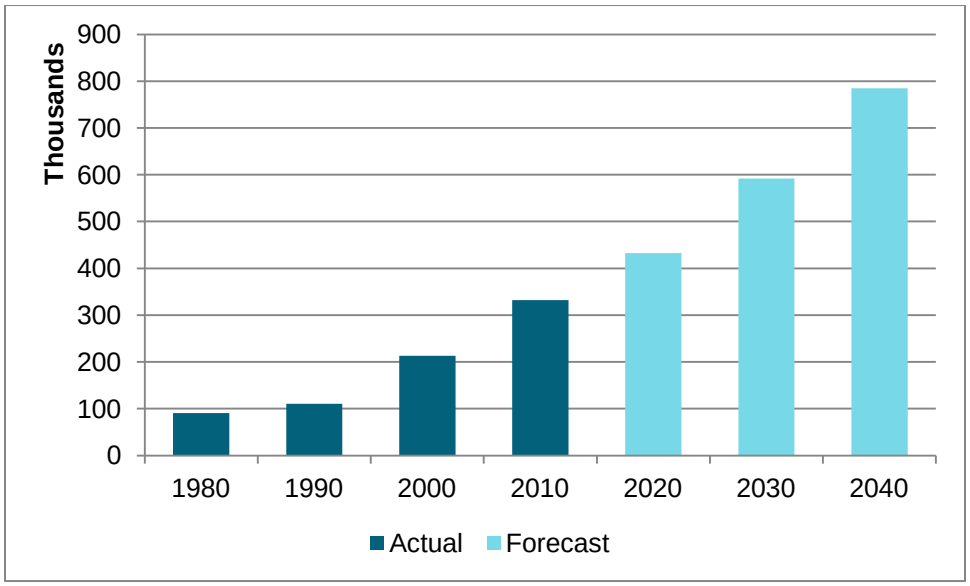
- Larger print on signs.
- Safer turning movements at intersections.
- More visible pavement markings.
- Better roadway lighting.
- Well-connected pedestrian facilities.
- Improved transit options and coordination between transit providers and human service agencies.

Iowa's minority population continues to grow

Iowa's racial and ethnic minority population has more than tripled over the last 30 years. Minorities accounted for 11 percent of Iowa's 2010 population, compared to 3 percent in 1980. By 2040, racial and ethnic minorities in Iowa are projected to account for almost 21 percent of the state's total

population. The Hispanic or Latino population is the fastest-growing minority in Iowa, and has nearly doubled in the past decade. Figure 2.5 shows the actual and forecasted minority population in Iowa from 1980 to 2040.

Figure 2.5: Minorities in Iowa, 1990-2040



Sources: U.S. Census Bureau, REMI Economic Models Inc.

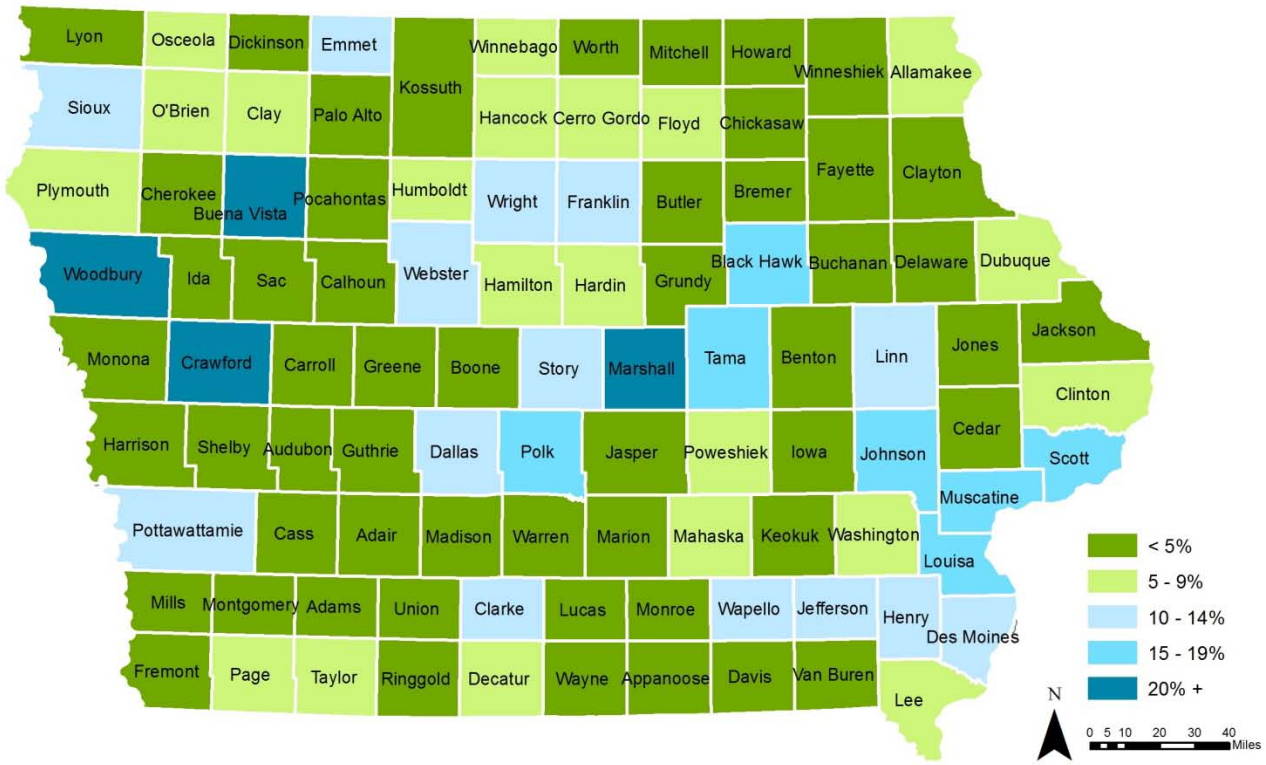
While most of the minority population in Iowa resides in the state's most populated counties, some of the areas with the highest percent minority population are located in counties outside metropolitan areas (see Figure 2.6). In urban areas, these populations can be drawn to a wider variety of economic, cultural and educational offerings; in rural counties, minorities often find work in agriculture, construction, food production, and manufacturing.

It is important to understand the transportation needs of the minority population in Iowa. Most minority groups in Iowa have a lower median household income than nonminority, and these populations are often more inclined to take a mode other than a personal automobile to work. The 2006-2010 American Community Survey's five-year estimates found that among all (minority and nonminority) populations in Iowa, Asian workers were most likely to take public transportation to work (8 percent), and Hispanic and Latino workers were most likely to carpool (23 percent).

As Iowa's minority population increases, so will the need to accommodate persons with limited English proficiency (LEP) on the state's transportation system. While only 2.9 percent of the state's population "speaks English less than 'very well'" – the U.S. Census' threshold for defining LEP – this percentage is

likely to grow. The language most often spoken in Iowa other than English is Spanish, and this can be expected to increase as the Hispanic population is projected to grow faster than any other population group over the next 30 years. It is important that Iowa's LEP population is accommodated on Iowa's multimodal transportation system in ways such as translating maps and transit schedules, and by offering interpretation services at public meetings.

Figure 2.6: Percent minority population by county, 2010



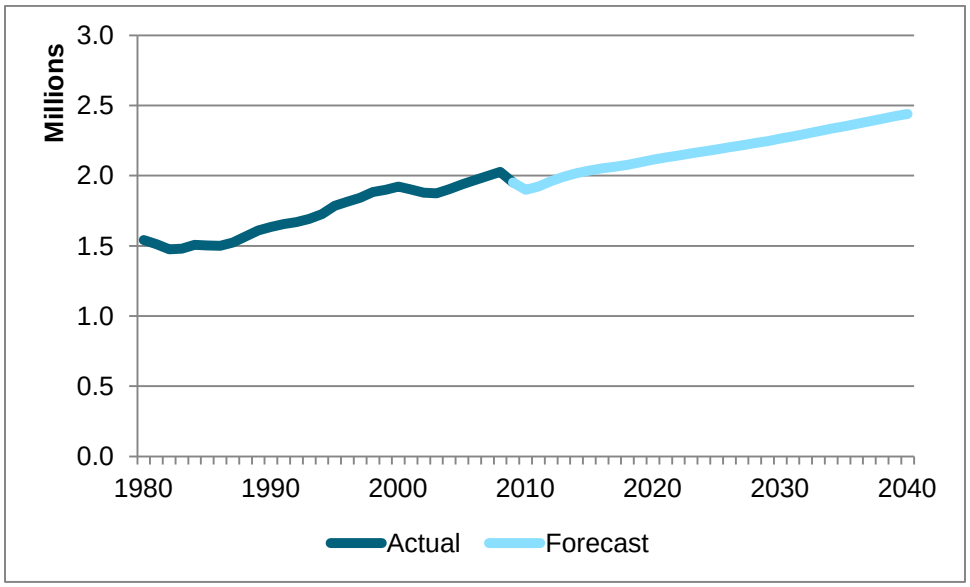
Source: U.S. Census Bureau

2.2 Economic trends

Total employment in Iowa is expected to increase slowly

In the past 30 years, total employment in Iowa has slowly increased, growing about 27 percent from 1980 to 2009. Iowa's employment is expected to continue this growth by increasing another 28 percent by 2040. Figure 2.7 charts the actual and projected total employment in Iowa from 1980-2040.

Figure 2.7: Iowa employment, 1980-2040



Sources: U.S. Bureau of Economic Analysis, REMI Economic Models Inc.

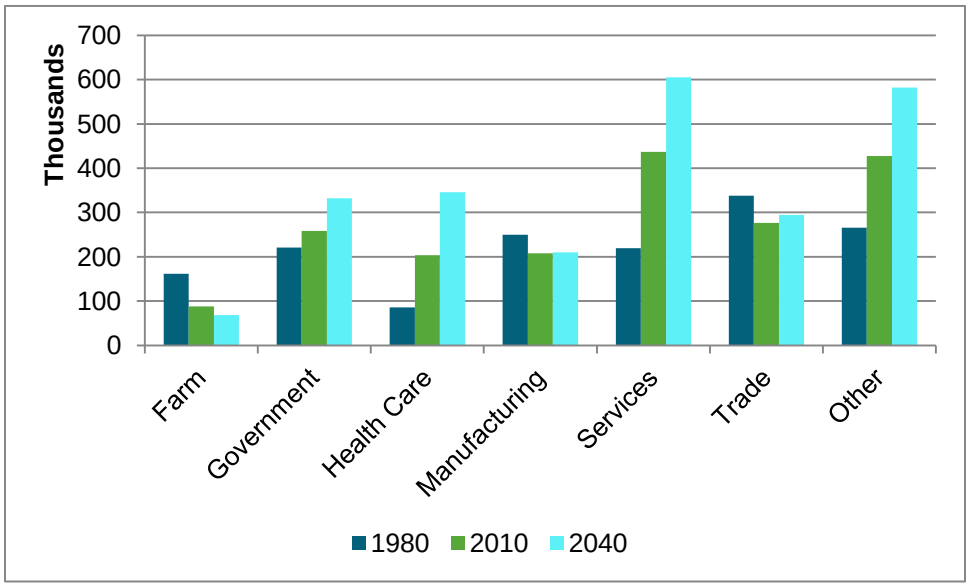
Iowa's traditional employment sectors have changed

Traditionally, farming and manufacturing have been two of the primary employment sectors in Iowa. Technological advancements and economic diversification have changed this in recent years. Since 1980, the farm sector has lost approximately 73,000 jobs, which represents a decline of nearly 45 percent in total farm employment in Iowa. This trend is projected to continue, with this sector losing an additional 19,800 jobs through 2040. There has also been a significant decrease in manufacturing employment since 1980 with approximately 41,700, or 17 percent, fewer jobs than there were 30 years ago. As for the future, manufacturing jobs in Iowa are expected to remain nearly flat, growing an estimated 1 percent over the next 30 years.

The largest employment gain from 1980 to 2010 was in the health care and social assistance sector, which grew 138 percent, or nearly 118,000 jobs. The second-largest gain was in the services sector, growing by 99 percent, or about 217,000 jobs, between 1980 and 2010.

Through 2040, the number of farm jobs is projected to continue to decrease, manufacturing jobs will remain relatively stable, and jobs in other areas — such as health care and services — are forecasted to increase.

Figure 2.8: Iowa employment by sector, 1980-2040



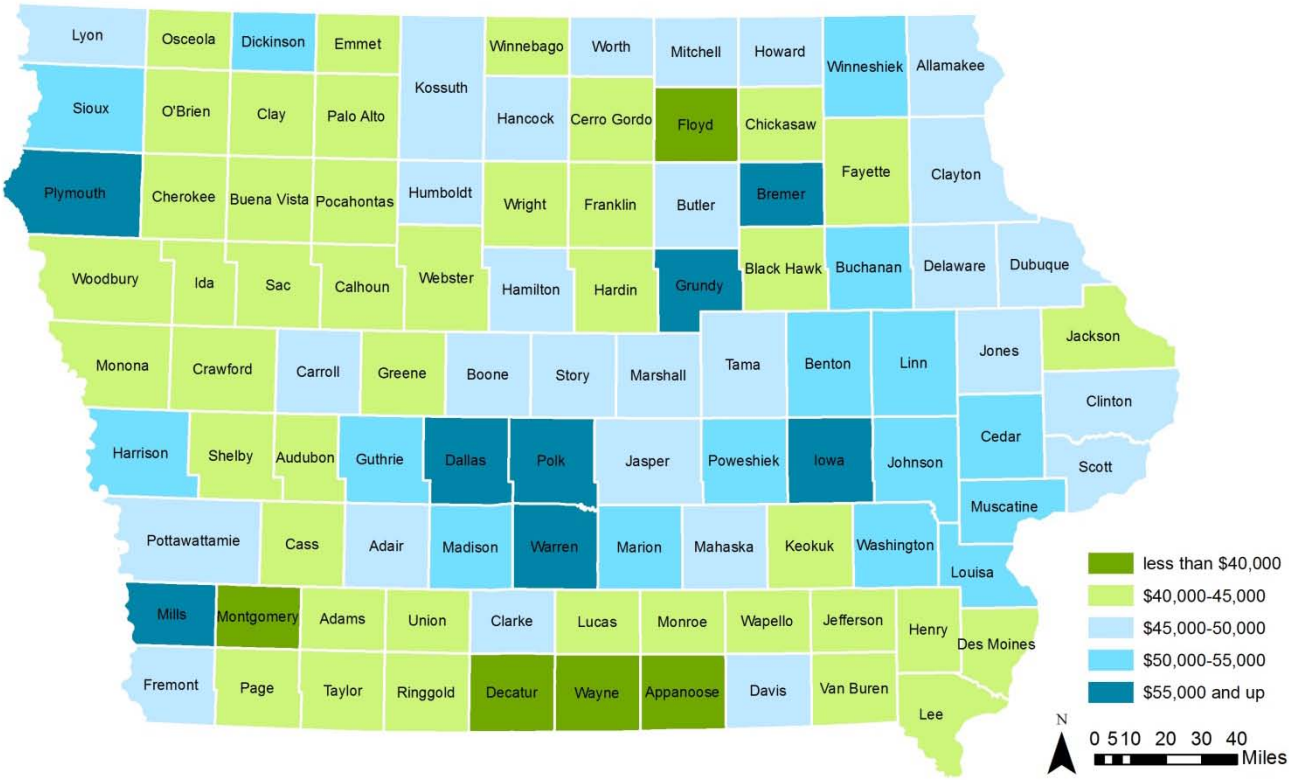
Sources: U.S. Bureau of Economic Analysis, REMI Economic Models Inc.

Iowa's per capita personal income is increasing but remains below the national average

Per capita personal income – which includes total wages and salaries, transfer payments, dividends, interest, and rental income; divided by the total population – is used as a measure of the wealth of an area's population, as well as an indicator of the economic health of that region. Iowa's per capita personal income has grown 9 percent from 2000 to 2010, compared to 4 percent in the United States. While Iowa's per capita personal income is currently 94 percent of the national average, this reflects an improvement from 2000, when Iowans earned 90 percent of the national average. This trend is expected to slowly continue, and by 2040, Iowa's per capita personal income is projected to be 98 percent of the United States average.

Among Iowa's households, the median income in 2010 was $48,872. In general, the counties with the highest median household income are typically in or within close proximity to the state's metropolitan areas. Figure 2.9 shows the 2010 estimated median household income distributed across Iowa's 99 counties.

Figure 2.9: Median household income by county, 2010



Source: U.S. Census Bureau, 2006-2010 American Community Survey's five-year estimates

Iowa is an affordable place to live

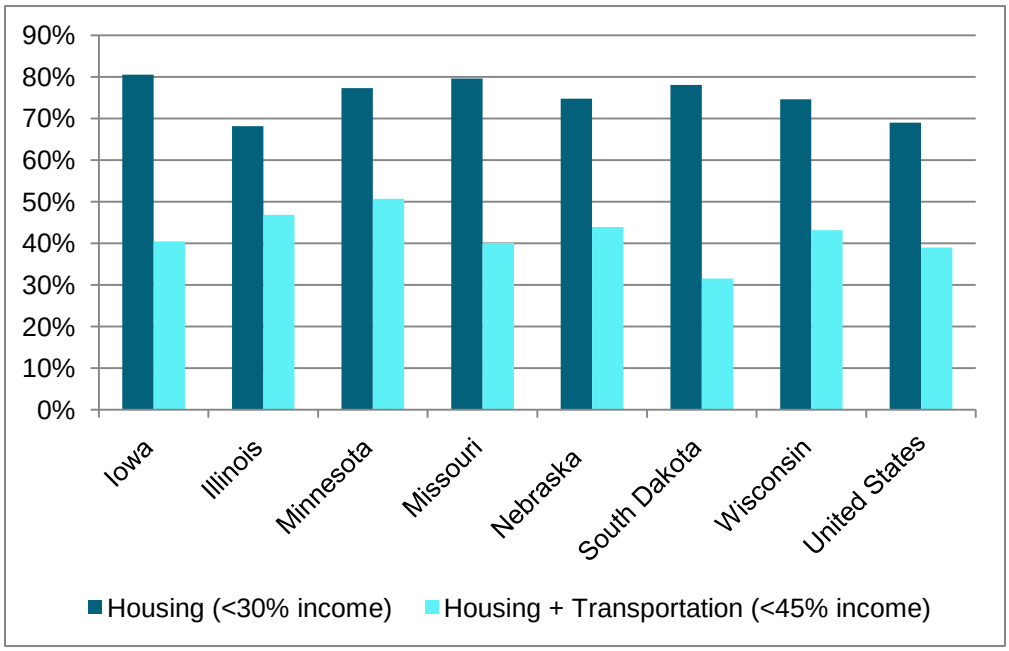
Housing and transportation in Iowa remain affordable when compared to the surrounding region, as well as the nation. According to the Center for Neighborhood Technology's Housing and Transportation (H+T®) Affordability Index, 80.5 percent of communities in Iowa's metropolitan areas are considered affordable using the standard measure of less than 30 percent of income spent on housing. When transportation costs are added in, 40.5 percent of communities are considered affordable using the CNT's H+T measure of less than 45 percent of income spent on both housing and transportation. In comparison, 69 percent of communities in the United States spend less than 30 percent of income on housing, and 39 percent of communities spend less than 45 percent on housing and transportation.

Figure 2.10 shows the percentage of communities in Iowa's metropolitan areas and metropolitan areas in the six states surrounding Iowa (Illinois, Minnesota, Missouri, Nebraska, South Dakota and Wisconsin) that are considered affordable when calculating the cost of housing and transportation as a percent of income. As shown, housing in Iowa is more affordable by this measure than any of the other

states evaluated. This is also shown in the median list price for a home in Iowa, which according to the online real estate database, Zillow, was $134,900 in April 2011. In comparison, this value was $184,900 nationally, and in the six states surrounding Iowa, the average median list price for a home was $155,400.

When factoring in the combined costs of housing and transportation, which considers the relationship between car ownership, car usage, and transit usage with several independent neighborhood and household variables, Iowa's affordability shrinks by nearly half. However, Iowa's affordable percentage is comparable to neighboring states and is still higher than the United States average.

Figure 2.10: Percentage of metropolitan areas that are considered affordable in housing and transportation



Source: Center for Neighborhood Technology, H+T Affordability Index, 2010

Iowa's slow and steady employment growth, changing employment sectors, and relatively low cost of living all impact how the state's transportation infrastructure is used. Maintaining an accessible, reliable and well-connected transportation system is an important factor in attracting and retaining employers, while Iowa's affordable housing and low cost of living appeals to workers. Additionally, as the health care and services employment sectors continue to grow faster than other employment sectors in Iowa, there will be changing demands on urban and rural transportation infrastructure to accommodate these businesses.

2.3 Passenger trends

Iowans are traveling more, but passenger travel is not uniform across all modes of transportation

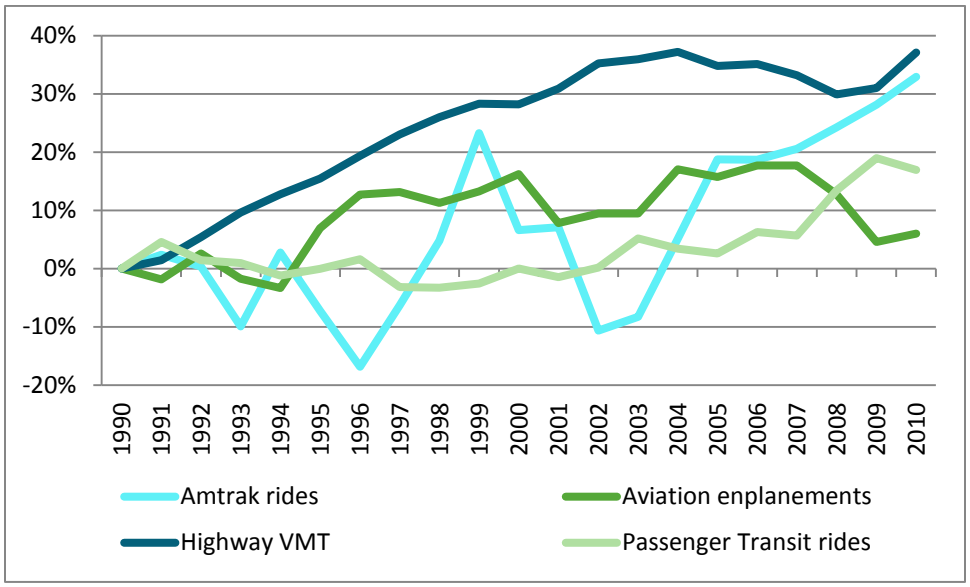
Since 1990, travel across all passenger modes (aviation, highway, passenger rail and public transit) has increased by about 16 percent (see Table 2.1). However, growth in passenger travel in the past 20 years has not been uniform. Highway passenger vehicle-miles traveled (VMT) and aviation enplanements grew the most between 1990 and 2000, while public transit and passenger rail had the most significant increases in passenger travel between 2000 and 2010. If passenger travel trends from the past decade continue, public transit and passenger rail ridership will continue to grow, highway VMT will remain steady or slowly increase, and aviation enplanements may slightly decrease. It should be noted that passenger travel trends are influenced in part by the cost of fuel, and fluctuations in these costs can create some uncertainty in forecasting future travel trends. Figure 2.11 shows the passenger transportation trends for each mode from 1990 to 2010.

Table 2.1: Iowa passenger transportation trends, 1990-2010

	1990	2000	2010
Amtrak rides	51,719	55,146	68,744
Aviation enplanements	1,385,684	1,610,292	1,469,143
Highway VMT	20,323,000,000	26,048,000,000	27,859,000,000
Transit rides	22,417,065	22,423,693	26,209,999

Source: Iowa DOT (Note: Highway VMT includes include automobiles, pickup trucks and motorcycles)

Figure 2.11: Percent change in travel by mode since 1990

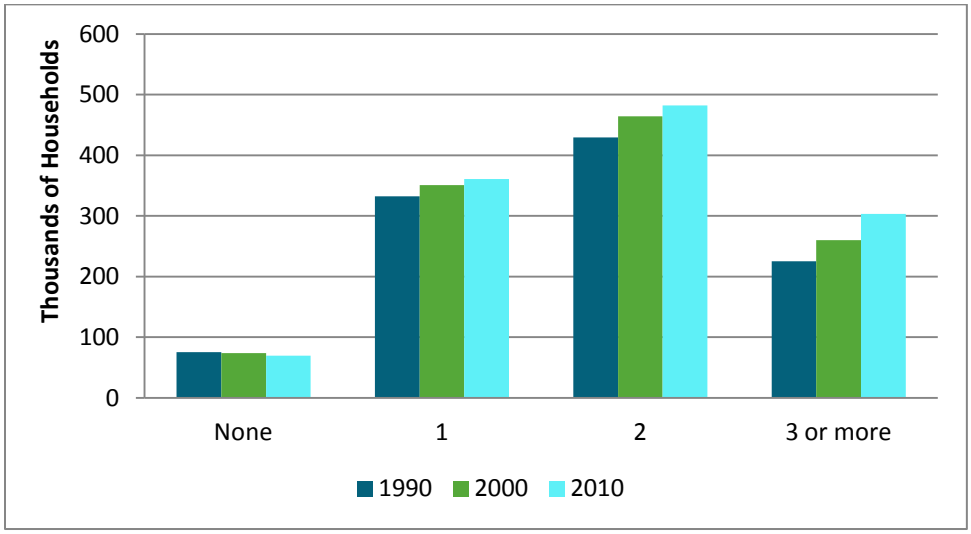


Source: Iowa DOT (Note: Highway VMT includes automobiles, pickup trucks and motorcycles)

The number of vehicles per household has increased

Since 1990, the number of households with three or more vehicles has increased by 35 percent, while the number of households without any vehicles decreased 8 percent. However, as in 1990, the majority of households still have one or two vehicles. Figure 2.12 illustrates the increase in vehicles per household from 1990 to 2010.

Figure 2.12: Number of vehicles available per household in Iowa, 1990-2010



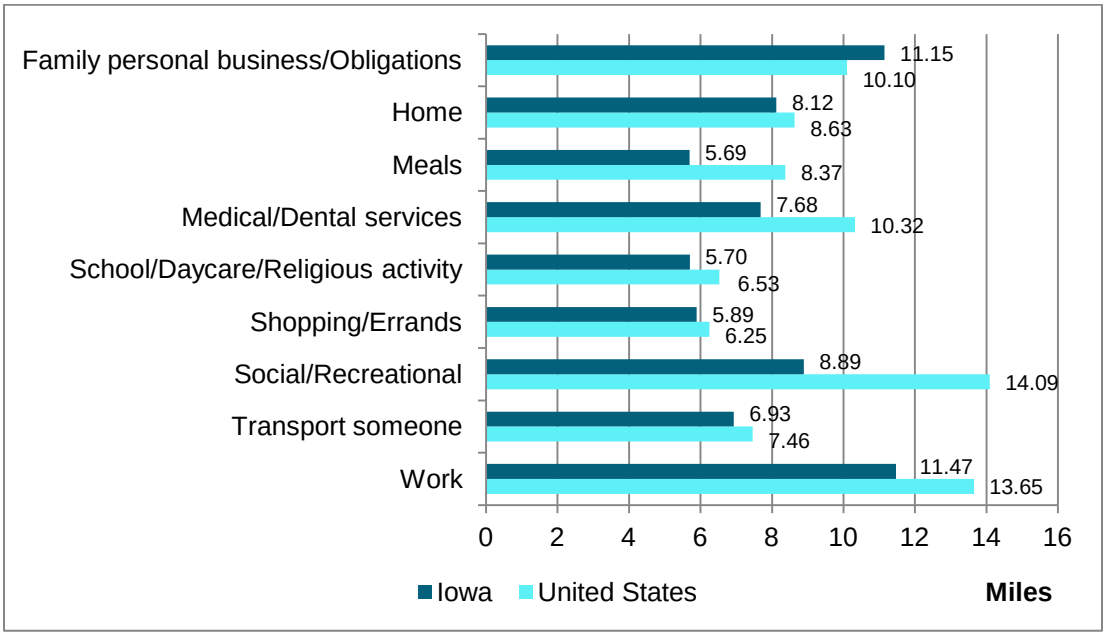
Sources: U.S. Census Bureau, 2006-2010 American Community Survey's five-year estimates

Iowan's average trip length is shorter than the national average

According to the "National Household Travel Survey," Iowa's average trip length in 2009 was about 15 percent shorter than the national average. Of the trip purposes measured, Iowans traveled the greatest distance to work, at 11.47 miles on average, while the shortest average trip length was for meals, at 5.69 miles. The only surveyed destination for which Iowans traveled further than the national average was for family personal business/obligations trips, where the average distance was 11.15 miles in Iowa and 10.10 miles nationally. Lastly, the greatest percent difference between average trip lengths in Iowa and the United States were for social and recreational purposes, where Iowa trips were nearly 37 percent shorter than the national average.

Iowa's shorter average trip length suggests that residents are in closer proximity than the national average to many destinations, such as medical and dental services, school, daycare, shopping and errands, and more. Figure 2.13 shows the average trip length by purpose in Iowa and the United States.

Figure 2.13: Average trip length by purpose, Iowa and the United States, 2009



Source: U.S. DOT, Federal Highway Administration, 2009 National Household Travel Survey

Most Iowans drive to work alone

In 2010, 78.7 percent of workers commuted to work by driving alone, 10.3 percent of Iowans carpooled to work, 3.8 percent walked, and 1.1 percent took public transportation. Additionally, 1.3 percent of the working population took an "other" mode of transportation to work, and 4.8 percent of Iowans worked

from home. These trends remained largely the same between 2000 and 2010 with the exception of those traveling by an "other" mode, which saw a 42 percent increase in the past decade. However, between 1980 and 2010, the percentage of workers driving to work alone increased 27 percent, while carpooling decreased 44 percent, and walking to work decreased 56 percent. Table 2.2 shows how Iowans got to work from 1980 to 2010.

Table 2.2: How Iowans got to work, 1980-2010

	1980	1990	2000	2010
Drove alone	62.1%	73.4%	78.6%	78.7%
Carpooled	18.4%	11.9%	10.8%	10.3%
Public transportation	1.9%	1.2%	1.0%	1.1%
Walked	8.6%	5.8%	4.0%	3.8%
Other (includes bicycle, motorcycle, taxi)	1.6%	0.9%	0.9%	1.3%
Worked at home	7.3%	6.7%	4.7%	4.8%

Sources: U.S. Census Bureau, 2006-2010 American Community Survey's five-year estimates

Average travel time to work has increased, but Iowans still have one of the lowest average commute times nationally

Average travel time to work for Iowans has slowly increased over the past two decades, and this trend will likely continue. Since 1990, the percentage of workers commuting 30 minutes or more to work has increased from 16 percent to 19 percent, while the percentage of workers commuting less than 15 minutes has decreased from 51 percent in 1990 to 45 percent in 2010.

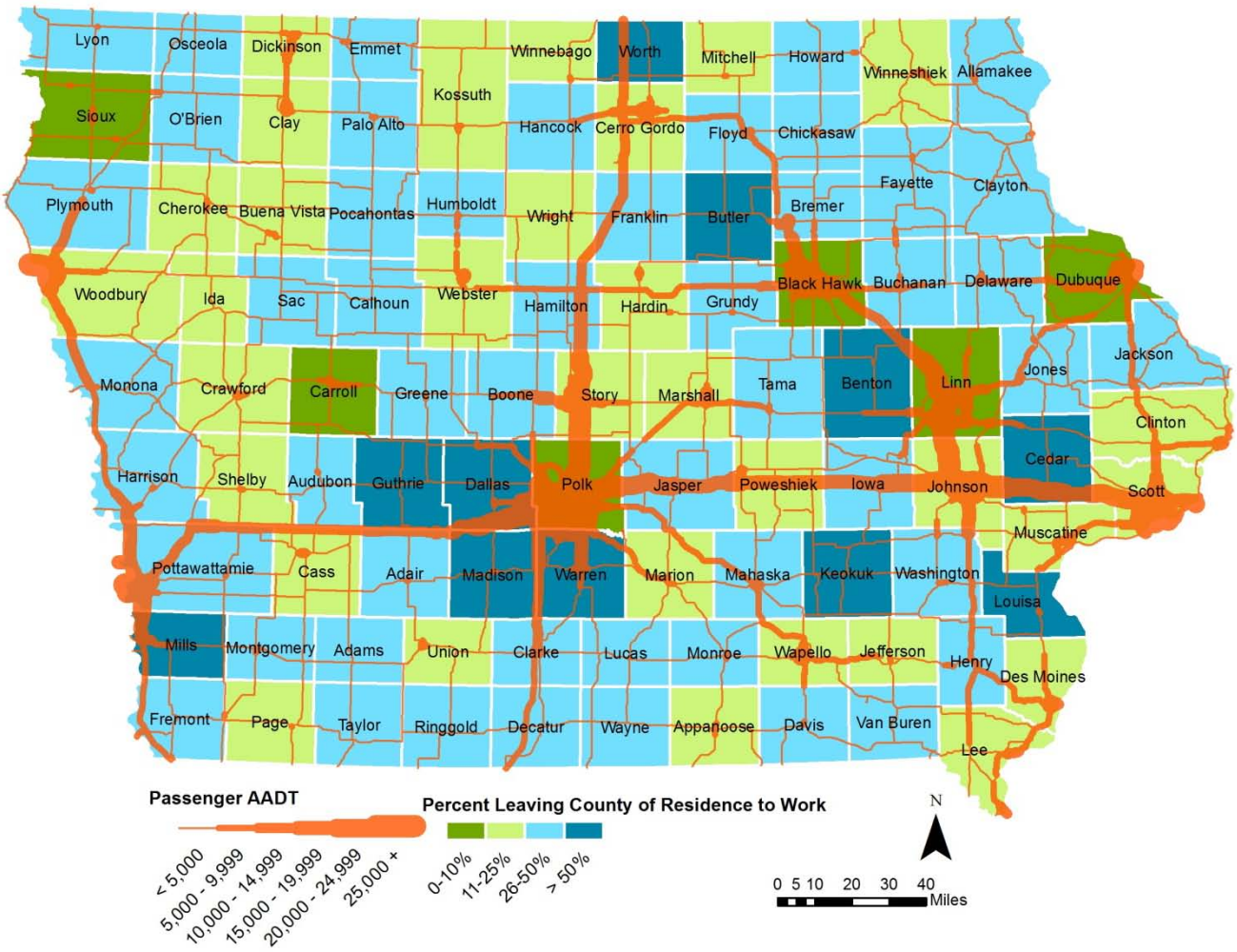
More Iowans are commuting to locations outside their county of residence, which can often result in increased travel times to work. In 1990, approximately 17 percent of workers commuted to a job outside their county of residence, while in 2010, this number was approximately 22 percent. Additionally, there were 11 counties in Iowa where more than 50 percent of residents traveled to jobs outside their home county in 2010, compared to only two counties in 1990. Figure 2.14 illustrates some potential commuter routes, highlighting the passenger vehicle average annual daily traffic (AADT) on primary highways, compared with the percentage of the workforce leaving their county of residence to go to work.

With jobs moving more and more to Iowa's metropolitan areas, commuting has taken on more of a role to support the labor force to these metro areas. The influence of a metropolitan area is no longer just the major core city but includes the surrounding counties as well.

There is still a significant portion of the population that desires to live at the fringe of metropolitan areas, in smaller communities, or in a nonmetropolitan environment. These workers value the lifestyle and quality of life benefits associated with their residence location and are willing to commute to jobs located elsewhere.

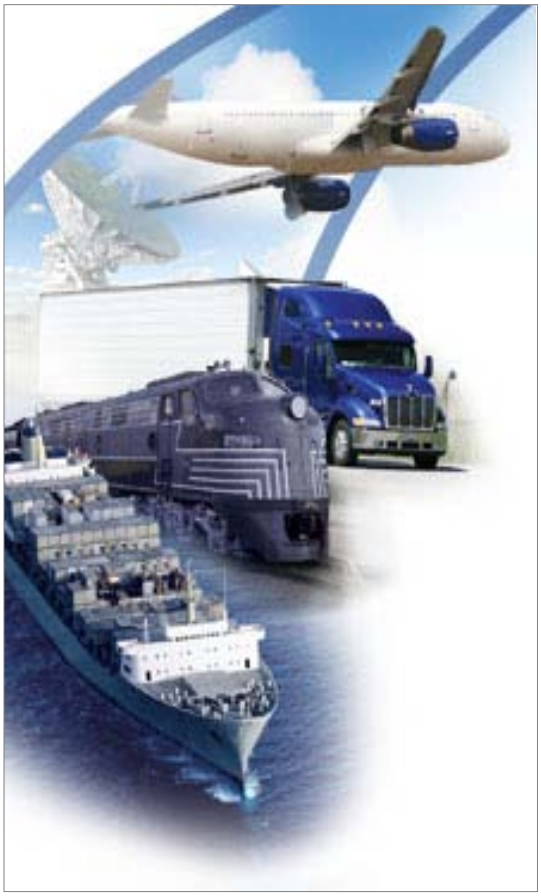
Despite these changes, Iowans still enjoy the seventh-shortest average commute time in the United States. The average travel time to work for Iowans is 18.5 minutes, compared to an average of 25.2 minutes nationally.

Figure 2.14: Commuting trends: passenger AADT on primary highways, and percent of workforce leaving county of residence to work, 2010



Sources: U.S. Census Bureau, 2006-2010 American Community Survey's five-year estimates; Iowa DOT (Note: passenger vehicles include automobiles, pickup trucks and motorcycles)

2.4 Freight trends



The last two federal transportation reauthorization acts encouraged states and metropolitan planning organizations to consider freight movements in their overall planning process. The purpose is to bring attention to freight movement issues affecting transportation infrastructure and economic development. The State of Iowa is part of an enormous economy that demands the efficient movement of freight. There is a growing need for adequate infrastructure to move freight safely, securely and efficiently. Like other states, freight in Iowa is moved a number of ways. The majority of freight is moved by truck and rail, both of which have experienced steady growth over the past two decades.

Iowa's freight is also moved via air and water. Further, over the past 20 years, air cargo movements have remained stable as trucking has been integrated into delivery systems. Although air cargo represents only a small portion of total freight movement, total ton-miles have doubled since the 1980s. Iowa's two major waterways, the Mississippi and Missouri rivers, move primarily grain and other bulk commodities to and from Iowa and provide access to the extensive network of inland waterways in the United States. Located along these rivers are 60 barge terminals, which transfer bulk commodities between barge, rail and truck.

A majority of the movements by air, rail and water are intermodal. These movements usually begin or end with a truck movement. These intermodal connections are critical to Iowa's competitive edge in the marketplace. Table 2.3 identifies locations where roadway connectors provide access between major intermodal facilities and the National Highway System.

Table 2.3: Iowa intermodal connectors

Facility	Type	Connector	Connector ownership
AGRI Grain Marketing, McGregor	Port terminal	IA 76, B St between terminal and US 18	State
Amoco Pipeline Distribution Center, Council Bluffs	Truck/Pipeline terminal	US 275 (eastern ramp termini I-29 to South Expressway), north to WB ramp terminus of I-29/80.	State
Big Soo Terminal, Sioux City	Port terminal	Harbor Dr & Industrial Rd between terminal and I-29	Local
Continental Grain Co., Dubuque	Port terminal	Kerper Blvd, E 16th St, E 11th St, E 9th St, 9th-11th W Conn, between terminal and US 61/151	Local
Des Moines International Airport	Airport	Fleur Dr between ML King Parkway and relocated IA 5	Local
Des Moines International Airport	Airport	Park Ave (63rd to Fleur Dr)	Local
Determann Industries, Camanche	Port terminal	Washington Blvd, US 67 between terminal and US 30	State
Harvest States Peavey, Davenport	Port terminal	IA 22 between terminal and I-280	State
Harvest States Peavey, Dubuque	Port terminal	E 7th St, Central Ave and White St between Terminal and Commercial	Local
Quad Cities Container Terminal, Davenport	Truck/Rail facility	S Rolff St, Rockingham Rd (IA 22), between terminal and I-280	Local
The Eastern Iowa Airport, Cedar Rapids	Airport	Wright Brothers Blvd between I-380 and Cherry Valley Rd	Local
Vandalia Road Pipeline, Des Moines	Truck/Pipeline terminal	E. 30th St/Vandalia Rd (IA 163 to US 65)	Local
Williams Pipeline Co., Sioux City	Truck/Pipeline terminal	41st St & 46th St & Business US 75 (Lewis Blvd) between terminal and US 75	State

Source: FHWA, Intermodal Connector Assessment Tool (ICAT)

Iowa freight will increase but will not be uniform across all modes

In 2010, more than 450 million tons of freight was moved within, from and to the state of Iowa. This number is projected to increase nearly 37 percent, totaling approximately 620 million tons by the year 2040. It has also been estimated that 58 percent of freight was shipped within Iowa while the remaining 42 percent crossed state lines, which is why it is so important to consider Iowa's transportation infrastructure as part of a regional and national network for moving freight. Table 2.4 shows the freight tonnage moved within, from and to Iowa in 2010 by mode, and the projected freight tonnage in 2040.

Table 2.4: Iowa freight flows, 2010 vs. 2040 (millions of tons)

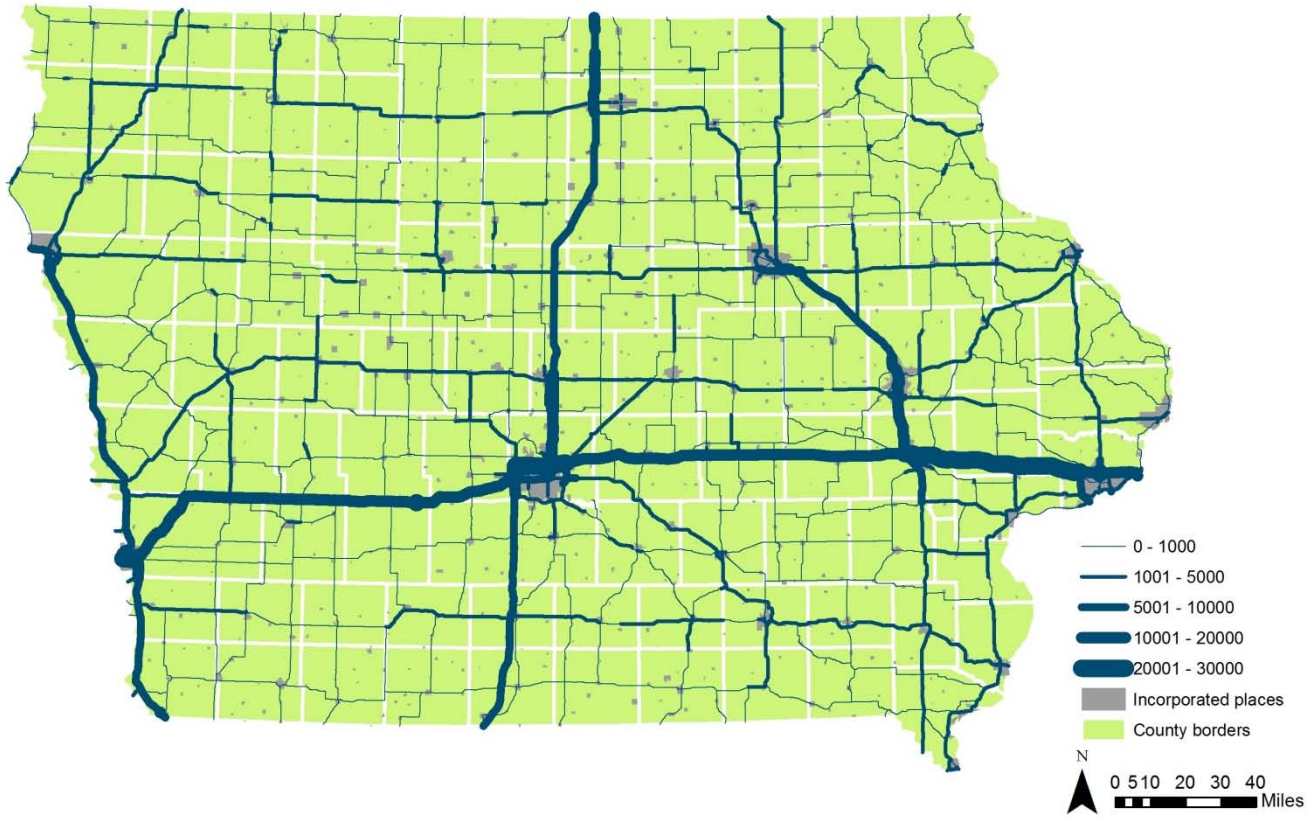
	2010	2040	Percent change
Truck	360.1	514.2	42.6
Rail	65.2	72.5	11.2
Water	6.9	9.7	40.5
Air (including air-truck)	0.02	0.03	50.0
Multiple modes and mail	13.2	16.4	25.0
Pipeline	5.9	5.9	0.5
Other	1.5	1.7	14.0
Total	**453.2**	**620.4**	**36.9**

Source: FHWA, 2009 Freight Analysis Framework

The majority of freight in Iowa is moved by truck

With few exceptions, nearly all freight moves by truck at some point to its final destination. There are more than 6,900 trucking companies operating in Iowa, and interstates 35 and 80 are the two major transcontinental truck routes that account for a significant amount of freight moving through the state. As shown in Figure 2.15, the heaviest average annual daily truck traffic (AADTT) in 2010 occurred on the eastern portion of I-80 between Scott and Johnson counties and also on I-80 in the Des Moines metro area. Both areas experienced between 20,001-30,000 AADTT, and it is estimated that these numbers will increase by 2040. In an effort to reduce trips and increase efficiency for Iowa farmers and businesses, weight limitations on trucks were recently relaxed. According to Iowa law, six- and seven-axle trucks can now weigh up to 90,000 and 96,000 pounds, respectively, on state and federal noninterstate highways.

Figure 2.15: Large truck AADTT on the Primary Highway System, 2010

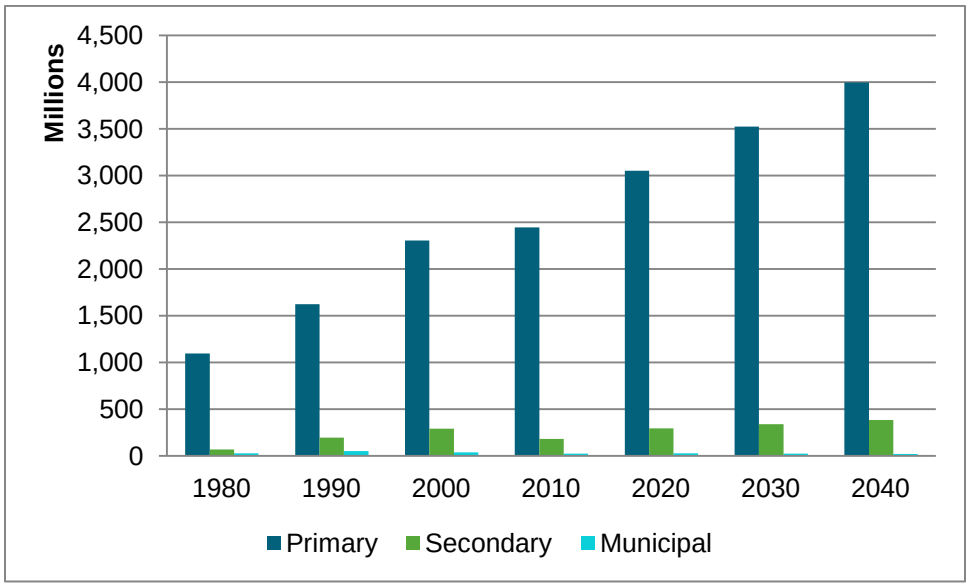


Source: Iowa DOT

Iowa freight movements will continue to increase on certain highway corridors, primarily the National Highway System (NHS)

Large truck traffic on Iowa's highways will continue to increase in the future. Freight movement by truck in Iowa is heavily concentrated on the interstate and Commercial and Industrial Network (CIN), which comprise the NHS. This system, which includes 782 miles of interstate highways and 2,422 miles of other primary highways, carried 85 percent of Iowa's large truck traffic (combination units) in 2010. Figure 2.16 shows the growth in large truck VMT by jurisdiction from 1980 to 2010, and projected to 2040. Over the past 30 years, large truck traffic on Iowa's primary roads showed an increase of 123 percent with the highest truck activity on I-80 in eastern Iowa. During this same period, truck traffic on secondary roads also increased substantially, while truck traffic on municipal roads has remained relatively stable. If these trends continue, large truck traffic will grow approximately 66 percent between now and 2040, which will certainly impact Iowa's highways through increased congestion and deteriorating pavement conditions.

Figure 2.16: Large truck VMT by jurisdiction, 1980-2040

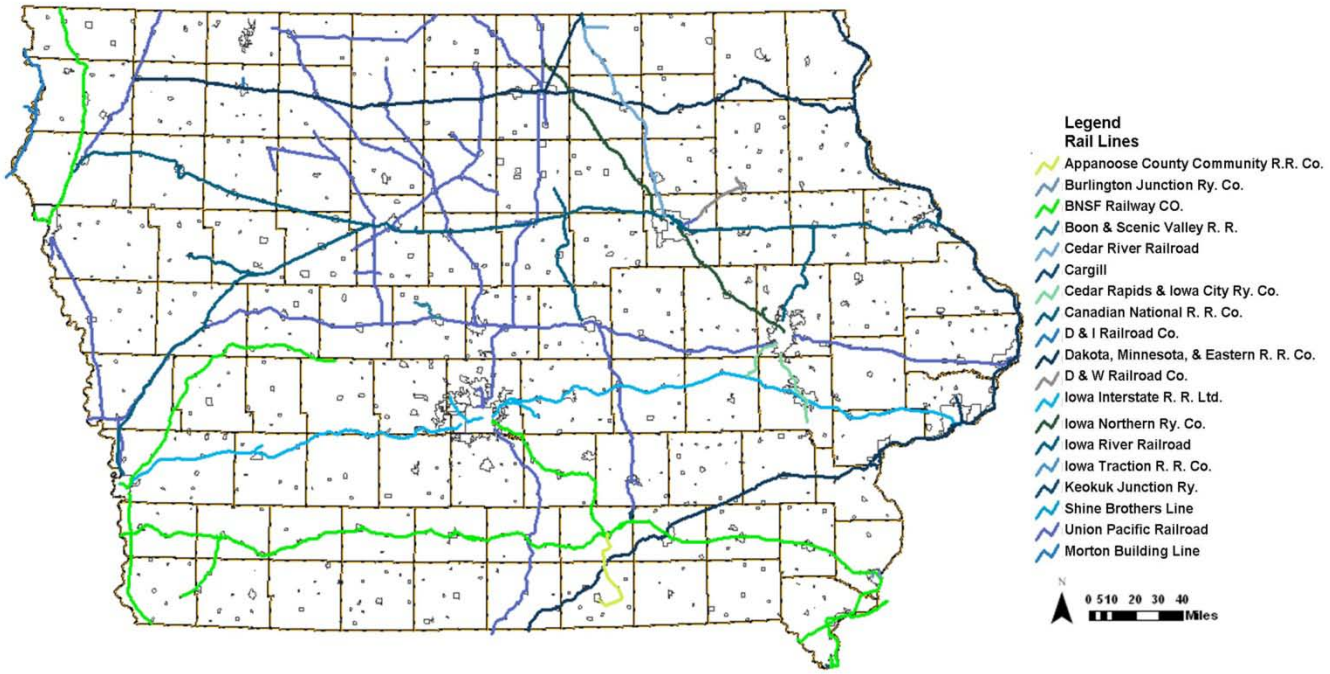


Source: Iowa DOT

Increasing amounts of freight will continue to move through Iowa via rail main lines

In 2009, 370 million tons of freight were moved by rail, indicating that, like highway, Iowa's rail system is also critical to the movement of freight between Iowa and the rest of the nation. Iowa's rail lines support regional and transcontinental freight movement. In Iowa, 3,945 miles of rail freight track are operated and served by 18 railroad companies. Five of these rail carriers are major national companies that operate 59 percent of Iowa's total route miles. Railroads serve 90 out of 99 counties in Iowa and nearly half of Iowa's 947 cities. Iowa's current rail services are shown in Figure 2.17.

Figure 2.17: 2010 Iowa railroad service map

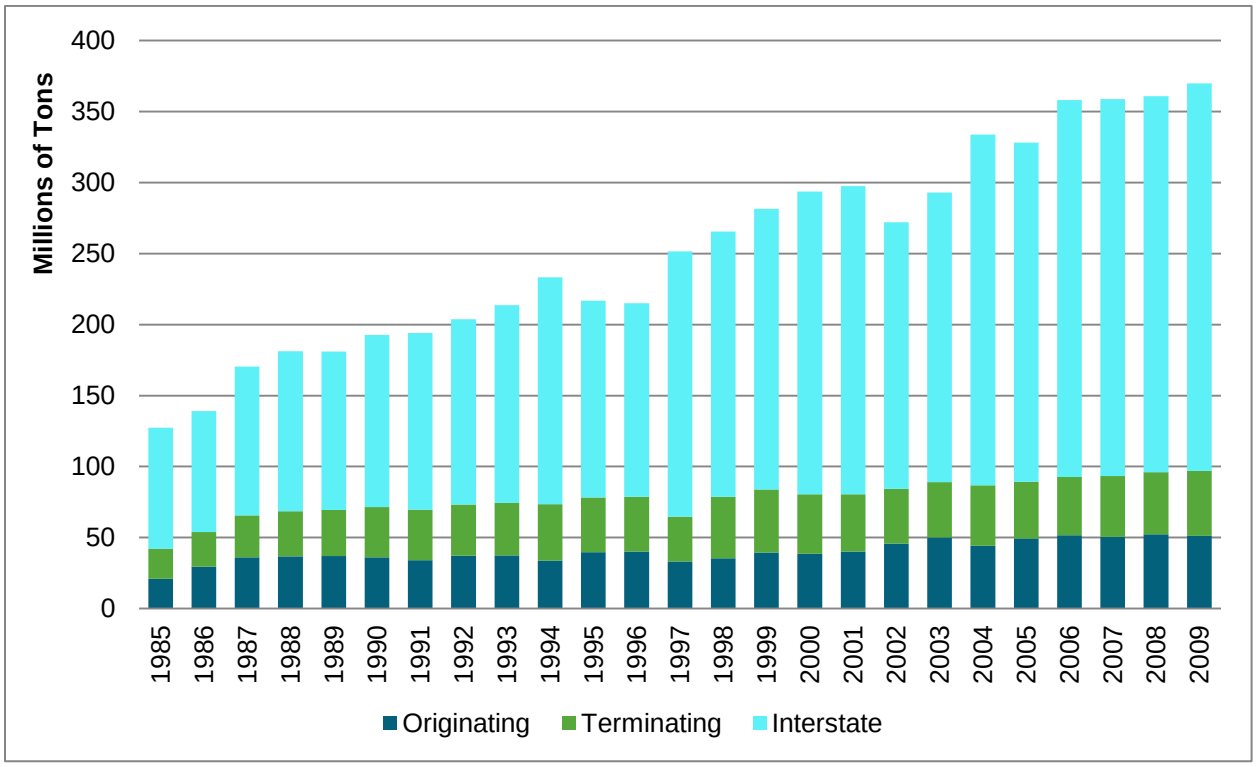


Source: Iowa DOT

Between 1985 and 2009, traffic volumes increased by 121 percent in rail car-miles and 189 percent in net rail ton-miles. Some Iowa rail lines, particularly the east-west main lines, have experienced and will continue to experience dramatic increases in freight traffic through 2040. For the communities that these lines pass through, this means increases in railroad-related impacts, such as traffic congestion, blocked crossings, noise, air pollution emissions, and delays in emergency response.

Although trucking holds a considerably higher share of freight originations, terminations and intrastate traffic, the bulk of rail freight movements in Iowa have involved interstate (pass-through) traffic over the past 20 years, primarily resulting from economic shifts in the railroad industry. Iowa is an important linking state for the Union Pacific Railroad and the BNSF Railway Co. lines. It is important to keep the railroad capacity at an adequate level for originating, terminating and interstate railroad traffic. Figure 2.18 shows the movements of freight by rail in Iowa from 1990 to 2009.

Figure 2.18: Iowa rail movements, 1985-2009



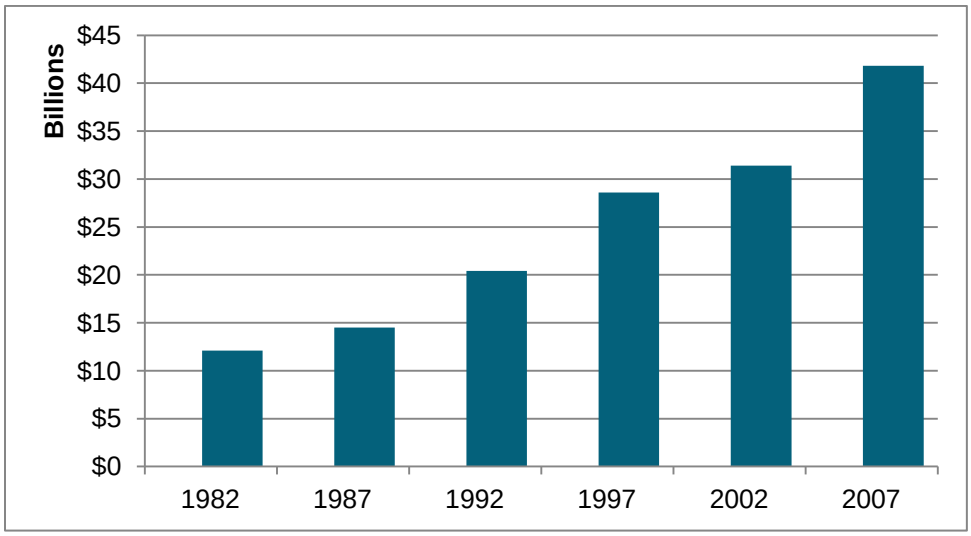
Source: Iowa DOT, 2009 Iowa Railroad System Plan

As value-added production increases in Iowa, freight movements will also increase

Iowa continues to be a leader in such areas as food production and processing, ethanol and biodiesel production, and livestock production. These industries are very dependent on transportation with more movements being involved in the "adding of value" throughout the production process. The demand for value-added production will continue to grow and will depend on a reliable transportation system.

Adding value to a product, such as a manufacturing or agricultural product, increases the consumer appeal and economic value of that commodity. For example, rather than shipping raw agricultural products such as corn out of Iowa, that corn can be converted to ethanol before it leaves the state. By-products of that process such as dry distiller's grain can be utilized as feed for cattle, resulting in further value to the product. As shown in Figure 2.19, these processes have resulted in billions of dollars of value added production to manufacturing in Iowa, and can also result in more freight movements within the state.

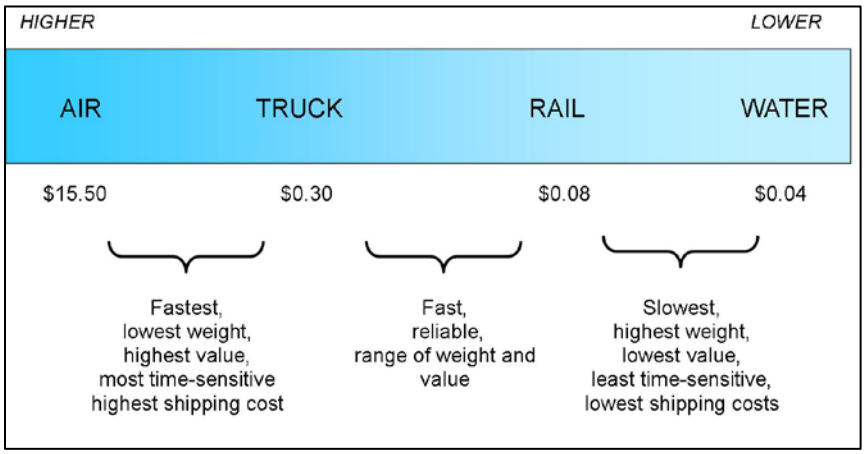
Figure 2.19: Value added to all manufacturing in Iowa, 1982-2007



Source: U.S. Census Bureau, Economic Census

Figure 2.20 shows the per-pound value of freight moved in Iowa by mode for total freight movements (originating, terminating, intrastate and interstate). The value of freight per pound is substantially higher for air, which is also the fastest way to ship. Air handles the most time-sensitive cargo and has the highest shipping costs. Truck and rail carry much lower values per pound and handle higher weights at lower shipping costs. The lowest value per pound is handled by water, which is also the slowest mode with the lowest shipping cost. These comparisons help explain which mode can handle a certain type of commodity most efficiently.

Figure 2.20: Iowa freight comparisons



Source: U.S. DOT, Bureau of Transportation Statistics, 2007 Commodity Flow Survey

Iowa exports to other states and other countries will continue to increase

Domestic exports originating and terminating in Iowa are increasing and are projected to continue to do so through 2040 (see Table 2.5 and Table 2.6).

Table 2.5: Exports originating in Iowa, 2009 vs. 2040

	2009	2040	Percent change
Millions of tons	104.5	107.5	2.9
Billions of dollars	$97.6	$103.8	6.4

Source: FHWA, 2009 Freight Analysis Framework

Table 2.6: Exports terminating in Iowa, 2009 vs. 2040

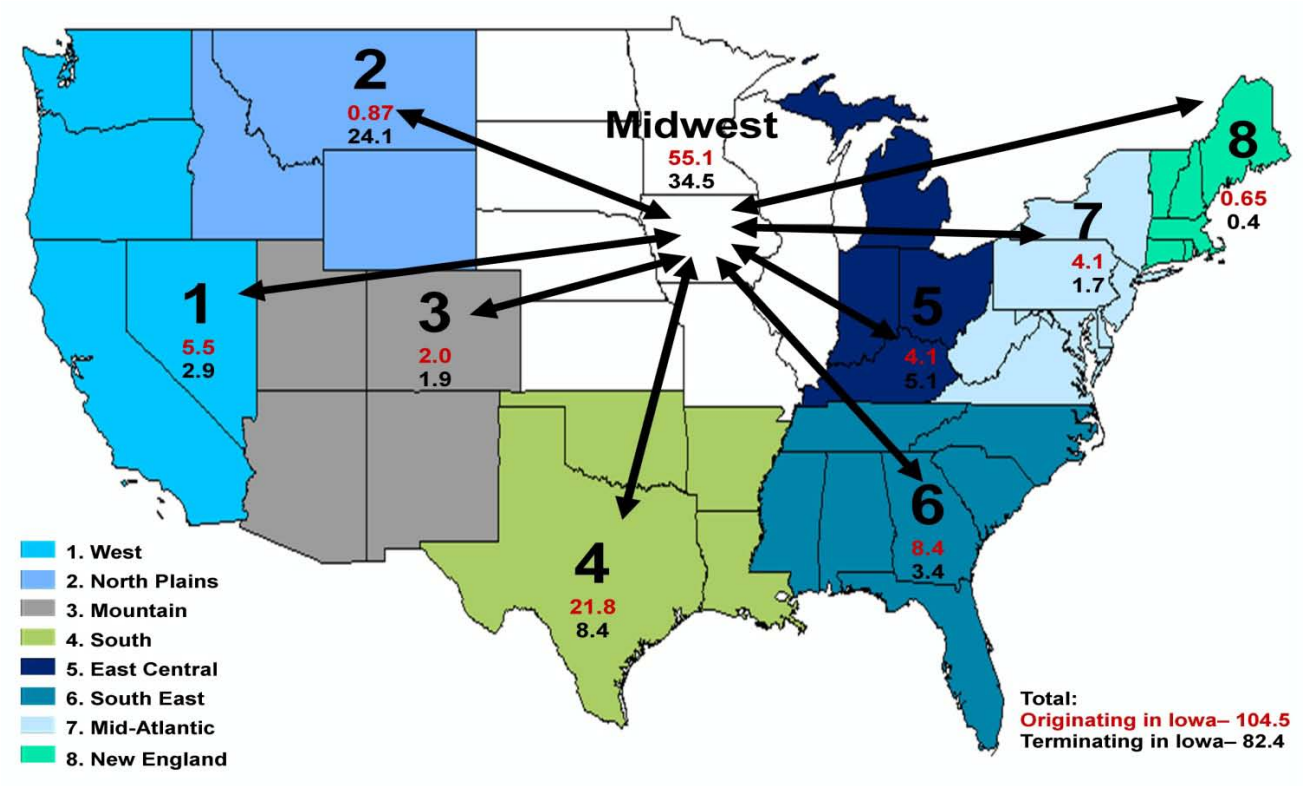
	2009	2040	Percent change
Millions of tons	82.4	166.2	101.7
Billions of dollars	$88.0	$289.8	229.3

Source: FHWA, 2009 Freight Analysis Framework

In 2009, about 53 percent (55.1 million tons) of the freight tonnage leaving Iowa for other parts of the United States goes to states in the Midwest, while 42 percent (34.5 million tons) of the freight tonnage coming into Iowa is from the Midwestern states.

The South – region 4 in Figure 2.21 – receives the second highest outbound freight tonnage from Iowa (21.8 million tons). The second highest amount of inbound freight (24.1 million tons) comes to Iowa from the North Plains – region 2 in Figure 2.21. A large amount of this tonnage is commodities, such as coal coming from Wyoming.

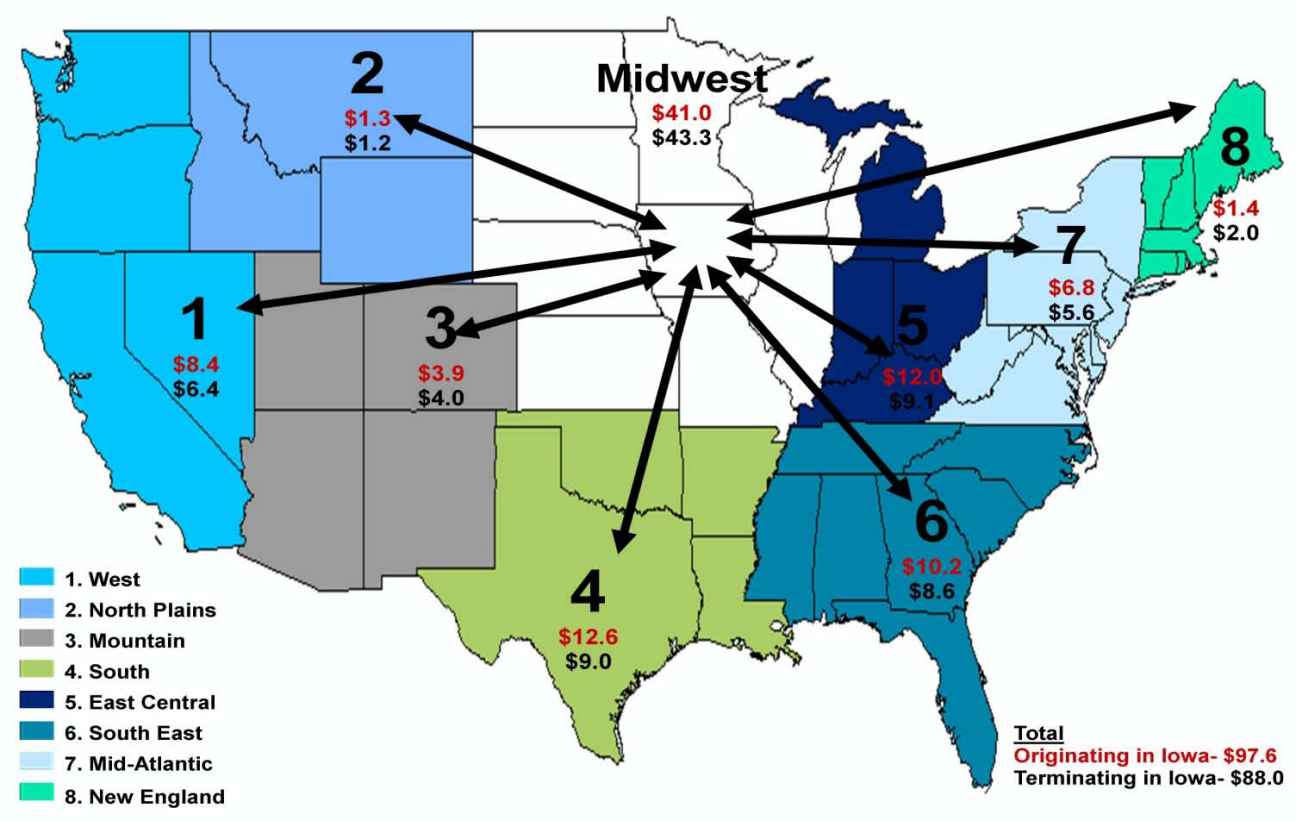
Figure 2.21: Iowa freight tonnage, 2009 (millions of tons)



Source: FHWA, 2009 Freight Analysis Framework

About 42 percent ($41 billion) of the freight value leaving Iowa for other parts of the United States goes to states in the Midwest, while 49 percent ($43.3 billion) of the freight value coming into Iowa is from the Midwestern states. The South – region 4 in Figure 2.22 – receives the second highest outbound value of freight from Iowa ($12.6 billion). This is attributable to the high value of agricultural products leaving Iowa for these states. The second highest amount of the value of inbound freight ($9.1 billion) comes to Iowa from the East Central region – region 5 in Figure 2.22. This can be attributed to industrial products, such as motor vehicles, textiles, machinery, plastics and electronics, coming from the states of Indiana, Kentucky, Michigan and Ohio. Iowa's neighboring states are the largest customers for both tons of freight and value of freight for both inbound and outbound movements. These numbers reinforce the importance of coordinating our infrastructure needs for major corridors with our surrounding states.

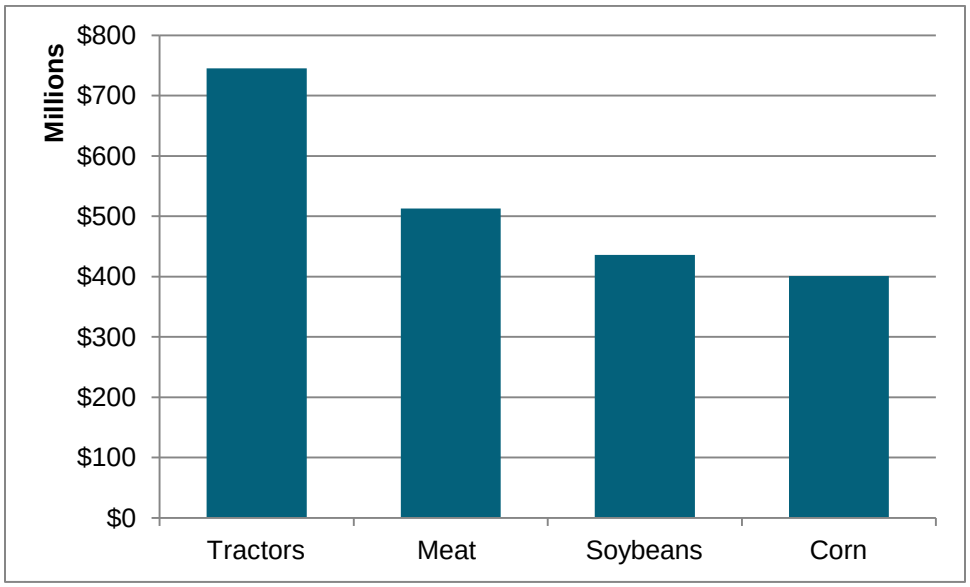
Figure 2.22: Iowa freight values, 2009 (billions of dollars)



Source: FHWA, 2009 Freight Analysis Framework

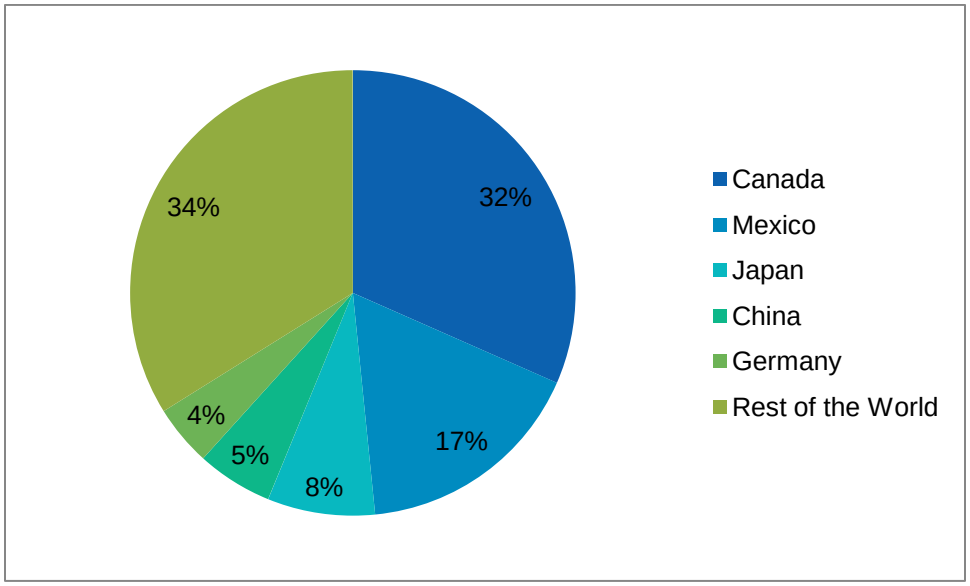
Iowa exports to other countries also continue to increase each year. In 1999, Iowa exported $4.1 billion in goods to other countries, which increased to $10.8 billion in 2010. The top exports from Iowa in 2010 included tractors, soybeans, meat and corn. Iowa's top five trading partners are Canada, Mexico, Japan, China and Germany. Iowa's top exports and top international export markets are shown in Figure 2.23 and Figure 2.24.

Figure 2.23: Iowa's top international exports, 2010



Source: U.S. Census Bureau

Figure 2.24: Top Iowa international export markets, 2010



Source: U.S. Census Bureau

2.5 Implications for transportation

Demographic trends

- Increased population in and around metropolitan areas will create congestion and capacity issues.
- Local jurisdictions with decreasing population will experience additional strain on already tight road budgets.
- Improving the roadway and driving environment and expanding transportation options are necessary to help meet the mobility needs of older drivers.
- It is important that all Iowans, including minority, low-income and disabled populations, have access to employment and services in both metropolitan and nonmetropolitan areas.

Economic trends

- Maintaining an accessible, reliable and well-connected transportation system is an important factor in attracting and retaining employers.
- There will be changing demands on urban and rural transportation infrastructure to accommodate growing employment sectors.

Passenger trends

- As population and vehicle ownership increase, there will be more travel on Iowa's roadway system.
- With more Iowans driving farther to work, it will be increasingly important to identify and maintain commuter routes.
- While the personal automobile is the primary mode of choice, investments are still necessary for aviation, bicycle and pedestrian facilities, public transit, and passenger rail to ensure mobility options for Iowans.

Freight trends

- Growing demand for freight increases concerns about its safety, energy consumption, and environmental impacts.
- With freight projected to increase, the effects of congestion on freight mobility, reliability, and costs will need to be taken into consideration.
- Globalization and growth in both national and international trade are placing more demands on our freight system.

- With value-added production and overall economic activity increasing in Iowa, freight movements will increase.
- Reducing delays and maintaining the state's freight system are key priorities.
- With weight limitations on trucks being relaxed in recent years, the impacts to infrastructure and operations need to be taken into consideration.

3. Planning considerations

There are a wide variety of issues that must be considered as the Iowa DOT plans our future transportation system. While several far-reaching issues are identified in this chapter, these planning considerations do not represent an exhaustive list, and new issues are likely to arise over the life of the Plan.

3.1 Economic vitality

One such consideration critical to the transportation planning process is economic vitality. Throughout Iowa's history, economic growth has occurred along thoroughfares of all forms, from our rivers to our railroads and highways. While, on the surface, the relationship between transportation improvements and economic growth seems rather straightforward, many professionals and academics would argue that it is not yet fully understood. Regardless, it is critical that the potential economic impacts of transportation projects are considered during the planning process.

Within the Iowa DOT, the importance of this consideration is manifested in a number of ways. The Five-Year Program, for example, identifies several transportation policies, the first of which is to promote a system that maximizes economic benefits for Iowa. As part of the programming process, economic development impacts are considered as candidate projects are identified and evaluated. In addition, the Revitalize Iowa's Sound Economy (RISE) Program has funded transportation projects that have supported the creation of nearly 54,000 jobs over the program's 26-year existence. These are just a few illustrations of the value that the Iowa DOT has placed on economic vitality.

Iowa is not alone in these efforts, as many state transportation agencies support economic vitality through various policies and programs. This support can be provided indirectly through policies that recognize economic development as a consideration in funding decisions, or it can be provided more directly through dedicated funding sources for economic development projects. As highlighted in the previous paragraph, the Iowa DOT provides support in both forms through the general programming process and the RISE Program.

3.2 Energy

Energy issues are another consideration fresh in the minds of Iowans. In Iowa, energy issues are primarily discussed within the context of fuel supply and cost, as well as the impact of the biofuels and wind energy industries.

Fuel supply and cost

Both the supply and cost of fuel can directly impact many facets of the transportation industry. For example, when the cost of fuel fluctuates noticeably, driving behavior can change and create an immediate impact on the transportation system through variations in number of miles driven and changes in mode of travel. Such changes in behavior can also have more far-reaching impacts, as notable increases or decreases in travel can impact transportation-related revenues such as those derived from fuel taxes.

The fuel market can also impact transportation construction costs. In recent years, many state DOTs have experienced unprecedented construction cost increases. The escalation of global fuel prices is one of several factors that contributed to higher bid prices. As construction cost inflation continues, buying power for all revenue sources decreases. In fact, cost inflation can even negate the impacts of increased revenue, as was the case with the Road Use Tax Fund (RUTF) in recent years. According to the "TIME-21 Funding Analysis," even with a 2.9 percent annual increase in RUTF revenue in fiscal year (FY) 2008, construction cost inflation resulted in an 11 percent decrease in buying power compared with FY 2007.

In addition to construction costs, the supply and cost of fuel also impact the operational costs associated with maintaining Iowa's expansive and aging public roadway system. If coupled with extreme weather, such as abnormal winter storms, the impacts of high fuel costs are compounded. Increased unit costs for fuel reduces funding available for maintenance, resulting in further deterioration of the system and loss of useful life.

Biofuels and wind energy industries

As Iowa emerges as a national leader in both the biofuels and wind energy industries, the state must deal with the physical and financial impacts of these industries. An example of these impacts is increased large truck traffic during the construction of a biofuels plant, which remains relatively high after construction to support plant operations. Increased rail traffic is also common on the lines that service these plants. This traffic growth leads to accelerated infrastructure deterioration and increased maintenance costs. It is critical that such issues are considered in the transportation planning process.

A 2010 report from Iowa State University's Center for Transportation Research and Education titled "Iowa's Renewable Energy and Infrastructure Impacts" summarized the importance of addressing these issues as: "For both the cellulosic biofuels and the wind power industries in Iowa, the need to support the transportation infrastructure should be understood. Even more, it is necessary to ensure that the transportation infrastructure support needs of these industries are addressed in a fiscally sustainable manner. Otherwise, these industries will not be able to compete in the long run." The study identified several policy and administrative changes that could be made in order to better plan for the impacts of these industries to the state and local jurisdictions. Three of these proposed changes have direct ties to transportation.

- Consider developing policies or regulations as to where these types of plants may locate, based on the proximity of a paved road system.
- Conduct regular pavement evaluations on a county's system to help facilitate the comparison of pavement condition before and after a plant's opening.
- Consider more effective ways to tax (or assess) the industry for appropriate additional costs to the local jurisdiction, such as a tax or fee per bushel of corn, gallon of product, kilowatt-hour or per axle-weight-mile.

The implications of failing to consider these issues in the transportation planning process could be far-reaching. If the supporting transportation infrastructure is allowed to deteriorate, costs to move the materials and products associated with these industries will increase. As this happens, the state will slowly lose its competitive edge in these growing economies.

3.3 Environmental mitigation

According to 23 CFR § 450.214(j), "A long-range statewide transportation plan shall include a discussion of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the long-range statewide transportation plan. The discussion may focus on policies, programs, or strategies, rather than at the project level."

The relationship between long-range transportation planning and environmental studies has consistently become more integrated with each successive federal transportation reauthorization, beginning with the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, to the Transportation Equity Act for the 21st Century (TEA-21) in 1997, and the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy For Users (SAFETEA-LU) in 2005. This connection between transportation and environmental planning is intended to provide a mechanism that allows information, analyses and products from long-range transportation planning efforts to be incorporated into the National Environmental Policy Act (NEPA) of 1969 document decision process (see Figure 3.1).

The following key points serve as the foundation for coordinating transportation and environmental planning on a systemwide basis.

- **Avoidance is the overriding goal.** In concert with federal law, our primary environmental goal in constructing transportation projects is to locate and build these projects without adverse impacts on the environment. Efforts should be undertaken early in the planning process to make adjustments in the location and design of projects in order to avoid harming the environment.
- **Simpler is better.** It is quite easy to become overwhelmed in the environmental arena. It is not necessary to write overly detailed and complicated assessments of environmentally sensitive areas in the early transportation planning process.
- **Straightforward inclusive approach.** Generally, the earlier the public and regulatory agencies are informed of potential impacts on the environment and possible mitigation efforts, the lower will be the level of conflict. The general public, as well as all appropriate state and federal agencies, should be invited to participate as early as possible in the transportation planning process.

With that in mind, there are two separate levels of transportation and environmental planning and coordination. Level one is mandatory, and should be conducted by all planning agencies regardless of known environmental problems. Level two is only necessary if a potential environmental concern has been identified. These two levels of planning and coordination are described below.

Level one: mandatory planning and coordination

This level involves the inclusion of environmental resource inventories in the planning process and a comparison of transportation planning inputs and outputs to any environmentally sensitive resources. This is done to determine possible conflicts or benefits. Every planning agency must conduct this work.

Inventories

A key to informed decision making involves a thorough research of exactly “what is out there." It is important to develop an inventory of environmentally sensitive resources within the planning area. One way to display this information visually is to overlay the existing transportation system, as well as any planned transportation projects, onto these environmental resource inventory maps — a practice commonly used by the Iowa DOT and many transportation planning agencies throughout the state.

Consultation

Possible contacts for some of these environmentally sensitive resources may involve agencies at various levels of government that deal with air quality, hazardous waste, historic and archaeological preservation, noise pollution, threatened and endangered species, water quality, wetlands, woodlands, etc. This is not an exhaustive list of environmental resources to investigate, and other environmental interests in the project area should also be inventoried. All consultation should be documented.

Mitigation discussion at the systemwide level

Transportation plans should include a generalized discussion of environmental mitigation activities at the policy and strategy level. This discussion should be developed in consultation with resource agencies, land management agencies, and tribal governments. Planning inputs should be thoroughly evaluated to ensure that environmental mitigation opportunities are not limited or eliminated by planned growth. Potential mitigation strategies must be considered in planning for the future, because, as growth occurs, mitigation will likely be required.

Level two: an environmental concern has been identified

This level of planning and coordination is only necessary if a specific environmental concern has been identified in relation to a planned transportation project. Note that if a planning agency is primarily focused on system maintenance, it is less likely that this level of planning will be necessary.

The NEPA purpose and need statement

A sound transportation planning process should be the primary source of the project purpose and need. The transportation planning process provides a potential forum to define a project’s purpose and need by framing the scope of the

problem to be addressed by a proposed project. Clearly defined and documented goals and objectives within the transportation planning decision-making process establish the basis for developing the project's NEPA purpose and need statement.

Mitigation measures

It is important to clearly outline any policy for mitigating potential impacts and disturbances that may occur. These potential impacts can be identified by comparing a proposed transportation project to the inventory of environmentally sensitive resources. It is important to realize that just because a transportation project crosses into an environmentally sensitive resource area, this does not automatically define the project as "unjustified." Instead, it alerts stakeholders to a range of possible impacts. The ultimate goal is to make informed transportation planning and project construction decisions while protecting our natural resources.

It is important that early transportation planning be completed in such a manner that it is thoroughly acceptable for inclusion in later environmental compliance documents. For this to successfully occur, a planning agency needs to establish or reinforce a commitment to:

- Avoid damage to the environment. This is the critical first step. If this cannot be achieved, then
- Minimize impacts on the environment. Every reasonable effort possible should be undertaken in order to minimize impacts. Once impacts are minimized, then
- Compensate for impacts to the environment caused by transportation projects.

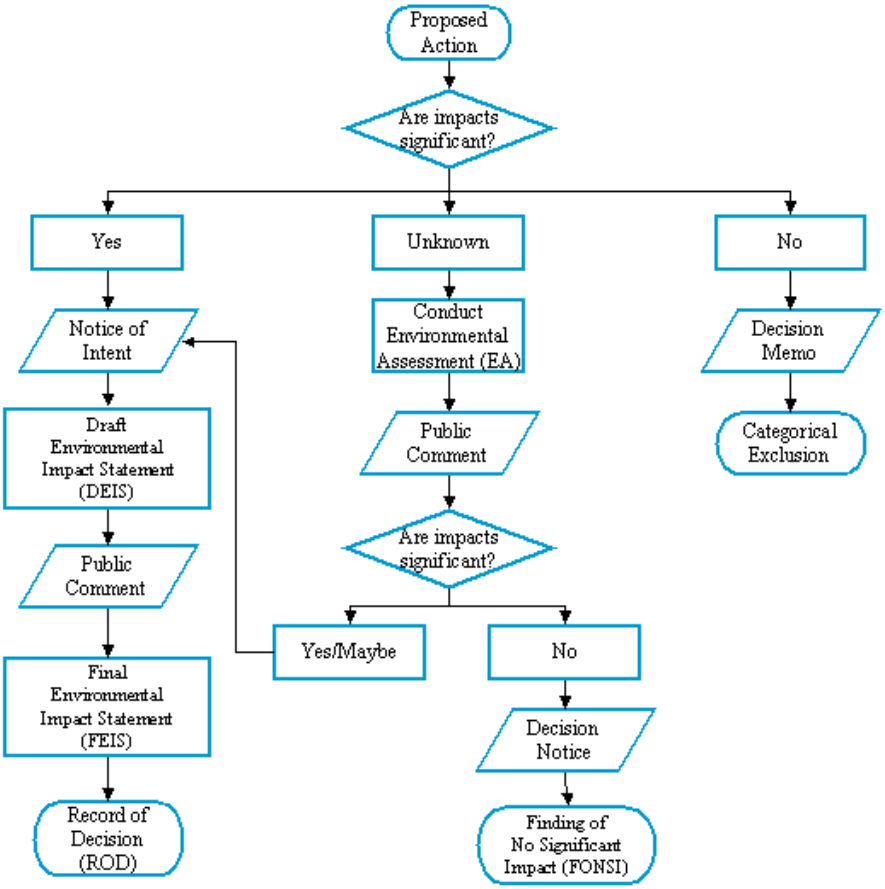
Some example mitigation activities may include:

- Replace impacted wetlands at a minimum of 1:1 (or 1:1.5) ratio.
- Replacement of parkland at 1:1 ratio or equivalent usage ratio.
- Avoid parking and/or storing construction equipment in the vicinity of potential groundwater contamination.
- Preserve trees along watercourses to protect aquatic life and prevent streambank erosion.
- Construct noise and/or visual barriers.
- Physically move the impacted resource while maintaining the structural integrity and historic qualities.
- Document the historical nature of a structure prior to demolition.

The mitigation activities highlighted above have the potential to be very costly. However, these expenses should be considered as a cost of doing business, and should be reflected in the overall project cost estimates. Ultimately, the planning and coordination described in this section involves

approaching a project area as one functioning ecosystem, which has the potential to be impacted by any planned activity. The Federal Highway Administration encourages this type of holistic approach when addressing environmental mitigation.

Figure 3.1: NEPA document decision process



Source: U.S. Environmental Protection Agency

Air quality and climate change

Two issues closely tied to the subject of environmental mitigation — air quality and climate change — have received a considerable amount of attention in recent years. Like many agencies throughout the state, the Iowa DOT has been monitoring a number of recent air quality developments, particularly those related to the National Ambient Air Quality Standards (NAAQS) for particulate matter and ozone. Generally speaking, transportation conformity is a method for ensuring that federally funded transportation projects are consistent with an area's air quality goals.

As Iowa prepares for the possibility of increasing air quality regulation, the state is also experiencing the effects of a changing climate. This has been manifested through higher humidity levels, greater precipitation, and a higher occurrence of extreme weather events. These changes not only affect the state in areas such as agriculture and public health, but there are also serious implications of climate change on Iowa's transportation infrastructure. According to "Climate Change Impacts on Iowa," a 2010 report by the Iowa Climate Change Impacts Committee, the 2008 flooding in Iowa accounted for $0.66 billion in infrastructure losses. As we adjust to changes in our climate, it is important to consider how our transportation system can adapt as well.

The committee's report also included several policy recommendations to help combat some of the effects of climate change. For infrastructure, the report's policy recommendation is to "advocate for federal highway construction standards that consider the effects of climate change and encourage the Iowa DOT to explore interim construction designs that account for trends in Iowa's climate." As Iowa is expected to continue to receive higher levels of precipitation than in the past, some areas of the state have already started implementing elements of "green" infrastructure to better manage stormwater runoff, through the use of permeable pavements, bioswales, rain gardens, and more.

Iowa's changing climate and air quality levels have the potential to greatly affect the state's current transportation infrastructure and future project decisions, and it is vital that these issues are considered during the planning process.

3.4 Environmental justice

On Feb. 11, 1994, Executive Order (E.O.) 12898 was signed into law by President Clinton, and required that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States." It was through E.O. 12898 that the policies set forth in the Civil Rights Act of 1964 and Title VI of the National Environmental Policy Act of 1969 are clarified and enforced.

In accordance with E.O. 12898, 23 CFR § 450.3 and U.S. DOT Order 5610.2, a metropolitan planning organization (MPO) is required by law to incorporate environmental justice (EJ) into their long-range transportation planning practices. A MPO is a federally mandated organization that serves the general purpose of conducting comprehensive, cooperative and continuous transportation planning for the dissemination of federal highway and transit funds. While federal regulations do not specifically require

EJ to be considered in the development and content of a long-range statewide transportation plan, the Iowa DOT believes that the importance of this issue warranted inclusion in the Plan.

EJ defined

According to the U.S. Environmental Protection Agency, EJ is defined as:

> "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

EJ is the term used to collectively describe the uneven environmental and social hardships that disadvantaged groups bear. EJ is a broad and multifaceted social welfare issue with the goal of improving the disparate or unequal impacts of growth and development, such as crime, hazardous waste sites and pollution. It also aims to ensure equitable access of physical and social opportunities, such as clean air and water, education, food, jobs and transportation.

EJ and transportation planning

Within the realm of transportation, consideration of EJ is important given that impacts of transportation can be both beneficial (e.g., improved access and mobility) and burdensome (e.g., increased noise and traffic). As a result of the diverse and potentially uneven transportation impacts, it is important that EJ be included throughout the transportation planning process, including short- and long-range planning and public participation outreach efforts. Specifically, by identifying the transportation patterns of socially disadvantaged groups (e.g., minority and low-income) and involving them in the public participation process, the needs of these groups can be determined and assessed to guide transportation investment and ensure impacts are distributed as evenly as possible.

Americans with Disabilities Act of 1990 (ADA) compliance

Another issue closely tied to EJ under the umbrella of civil rights is that of compliance with ADA. Title II of this legislation emphasizes the accessibility of infrastructure within the public right of way, and requires the Iowa DOT to develop a transition plan to bring facilities into compliance with ADA. As a result, a transition plan was developed that identifies specific steps the Iowa DOT will take to achieve ADA compliance for pedestrian facilities. These steps are:

1. Identify physical obstacles limiting the accessibility of programs or activities to individuals with disabilities.
2. Describe in detail the methods that will be used to make facilities accessible.
3. Develop a schedule for achieving compliance.
4. Identify the Iowa DOT's ADA coordinator who will be responsible for ADA compliance.
5. Develop a grievance procedure to review complaints.
6. Initiate public involvement and provide community awareness.

The first four steps are the minimum requirements for a transition plan as set forth by 28 CFR § 35.150. The remaining steps are additional requirements for achieving ADA compliance as set forth by Title II. In addition to the above steps, the Iowa DOT will track and report on their progress. To ensure ongoing compliance with ADA requirements, the Iowa DOT will perform periodic reviews of the plan and update as necessary.

3.5 Land use and livability

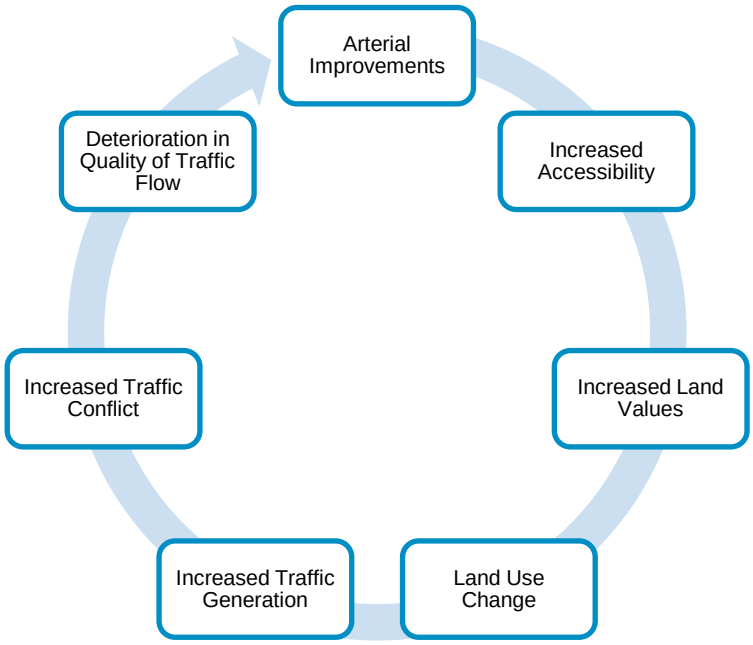
The 2005 federal transportation bill, SAFETEA-LU, emphasized the need to consider land use and quality of life as one of the bill's eight transportation planning factors. This planning factor, which states: "(E) Protect and enhance the environment, promote energy conservation, improve quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns," has been used to guide the following discussion on planning for transportation, land use, and livability in Iowa.

Land use

Land use can be defined as the human management of land. In land use planning, areas are often classified to accommodate a variety of uses, such as residential, commercial, industrial, agricultural, and more. Coordinating land use and transportation planning is essential in creating more sustainable, vibrant, and well-connected communities. Several recent planning initiatives, such as New Urbanism, smart growth, complete streets, and transit-oriented development, are only achievable when cooperation between the transportation and land use sectors takes place. In addition to creating healthier, safer and more efficient communities, sensible land use decisions are essential to Iowa's economy, where urban sprawl can permanently destroy valuable farmland.

The linkage between transportation and land use is also demonstrated through access management, which is the management of vehicular access points to adjacent land parcels. Managing access points increases safety and efficiency for travelers. Common access management techniques include providing larger spaces between driveways and side streets; increasing the distance between access points and traffic signals; safe turning lanes; median treatments; and right-of-way management.

Figure 3.2: Transportation and land use cycle



Source: FHWA

While policies, principles and strategies for integrating transportation and land use can be established on the state level, the most visible coordination takes place on the local level. Figure 3.2 illustrates the need to continuously be mindful of present and future land use needs when making transportation investment decisions.

Livability

In June 2009, the U.S. DOT, in partnership with the U.S. Department of Housing and Urban Development and the EPA, announced a new interagency Partnership for Sustainable Communities. This partnership, which aims to "improve access to affordable housing, provide more transportation

options, and lower transportation costs while protecting the environment in communities nationwide," is founded on livability principles, including:

1. Provide more transportation choices.
2. Promote equitable, affordable housing.
3. Enhance economic competitiveness.
4. Support existing communities.
5. Coordinate policies and leverage investment.
6. Value communities and neighborhoods.

In the transportation planning process, livability is an important consideration in maintaining a community's quality of life. A livable community has a well-connected transportation network with many transportation choices and better facilities, which in turn provides access to quality jobs, housing, schools and other amenities.

Enhancing livability in Iowa through transportation can be achieved by investing in multiple transportation modes, maintaining our current road infrastructure, expanding our bicycle and pedestrian facilities, utilizing new technologies, and coordinating new investments with surrounding communities. As Iowa's population grows, it is important to strengthen our communities through valuing and supporting the existing transportation network. By taking these steps to emphasize livability in transportation, the Iowa DOT can make progress toward achieving its long-term goals of safety, efficiency and quality of life.

3.6 Maintenance and preservation

Routine maintenance refers to the daily functions and activities that provide for an acceptable level of service on our transportation system. Typical highway activities, for example, may address maintenance needs related to potholes, pavement markings, roadway shoulders, snow removal, or traffic signs and signals. Maintenance activities usually address immediate system needs, but they do not address underlying infrastructure deterioration due to time and usage.

In contrast to routine maintenance, preservation strategies appreciably extend the useful life of infrastructure. Preservation strives to use cost-effective and well-timed strategies, such as a surface treatment, to extend the life of system components. Safety and user expectations are important

considerations in selecting a specific preservation strategy. Preservation strategies for all modes include a wide variety of improvement categories with specific corrective actions that must be matched to the current age and condition of the candidate component.

In recent years, especially in light of limited funding, the efficient management of Iowa's existing transportation system has been identified as the priority investment path. The citizens of Iowa have overwhelmingly expressed their support of this stewardship and keeping our existing system in a state of good repair before expansion needs are pursued. Some expansion of the existing system is needed, but will only occur when and where careful planning efforts have identified the need to do so. Yet even with minimal expansion, funding limitations will make maintaining and preserving the existing system at an acceptable level a challenge.

Challenges

Iowa's transportation system was developed over many decades and involves extensive infrastructure and services. This existing system is the foundation on which future investments will be made, and maintaining and preserving the system faces several challenges. In addition to limited funding, which was identified above, some other notable challenges include the following.

- Aging infrastructure
- Increasing costs
- Increasing user demand
- Impacts due to system size
- Impacts due to rural nature
- Environmental impacts
- Demographic changes
- Heavy agricultural equipment and oversize loads

Much of Iowa's highway system was built in the 1930s and 1940s, with the interstate system dating from the 1950s and 1960s. Iowa is also unique with its rural gravel road and farm-to-market system, ranking 13th nationally in total miles of public roadway. The large rural road system also brings with it a large number of bridges, with Iowa ranking fifth nationally in the number of such structures. Iowa has one of the most extensive roadway systems in the nation while ranking just 38th in population density according to the 2010 Census.

With proper maintenance, the lifespan for roadways can be up to 60 years prior to complete reconstruction, while bridges can last up to 75 years. Yet keeping up with current and future

replacement needs creates huge financial challenges. The same is true for maintenance and preservation needs. As costs continue to increase, buying power has decreased. With stagnant funding levels, Iowa cannot keep pace with maintenance and preservation needs. This has resulted in project delays and a backlog of much-needed work. As the backlog grows, project costs continue to increase, multiplying the effect on already strained budgets.

Planning efforts are critical

When budgets are tight, planning efforts become even more critical as a means to optimize investment in our existing transportation system. The importance and value of planning for transportation investments was clearly identified with federal legislation requiring the establishment of MPOs. In addition, Iowa has established rural planning agencies or regional planning affiliations (RPAs) to further enhance planning at the local level. The Iowa DOT, MPOs and RPAs all produce long-range transportation plans to guide future transportation investments.

The planning and programming processes in Iowa utilize many evaluation tools to guide investment decisions. These evaluation tools result in more informed decision making, which is critical when funding is limited. Some of these evaluation tools include the following.

- Airport Runway Condition Index
- Bridge structure ratings
- Highway sufficiency ratings
- Level of service ratings
- Ride quality ratings
- Transit fleet management systems

Beyond infrastructure: maintaining and preserving a multimodal system

It is important to note that maintenance and preservation of the transportation system is about more than highways and the maintenance of those highways. All modes of transportation have critical maintenance and preservation needs. In addition to including all modes, maintenance and preservation also addresses more than just the infrastructure components of these modes.

The transportation system also involves the services and support functions that keep things operational. Examples of these functions include air traffic control, construction materials testing, driver's license renewal, highway patrol duties, intelligent transportation systems, lock and dam operation, planning support, transit fleet dispatching, and weight-restriction enforcement. Iowa has a comprehensive transportation system that involves many functions and roles that keep it operational.

Asset management

As defined by the American Association of State Highway and Transportation Officials' Subcommittee on Asset Management, "transportation asset management is a strategic and systematic process of operating, maintaining, upgrading and expanding physical assets effectively through their life cycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision making based upon quality information and well defined objectives." Given the challenges posed by issues such as aging infrastructure and escalating construction and operating costs, tools such as asset management are increasingly valuable when seeking to balance funding realities with public needs and expectations.

According to FHWA, an effective asset management program can:

- Track system condition, needs and performance.
- Clearly identify costs for maintaining and preserving existing assets.
- Clearly identify public expectations and desires.
- Directly compare needs to available funding, including operating and maintenance costs.
- Define asset conditions so decisions can be made on how best to manage and maintain assets.
- Determine when to undertake action on an asset, such as preservation, rehabilitation, reconstruction, capacity enhancement, or replacement.

Asset management provides insights and tools to help transportation professionals make wise investments that result in improved service and greater cost-effectiveness. Within the context of transportation planning and programming, asset management can positively influence every phase of the process. This influence is illustrated in Table 3.1.

Table 3.1: Influence of asset management on planning and programming

Common practice	Asset management best practice
Transportation options considered in the long-range plan reflect primarily the choices included in the current transportation program.	The long-range plan identifies transportation options broadly in terms of potential modes and intermodal linkages, types of investments, and program or funding alternatives.
Methods, formulas and criteria to prioritize projects reflect an historical evolution of engineering, financial and political factors.	Methods, formulas and criteria to prioritize projects reflect stated policy objectives, and performance measures and targets.
Projects are evaluated largely in terms of initial cost and judgment as to potential benefit.	Projects are evaluated in terms of realistic estimates of lifecycle costs, benefits, and performance impacts.
Programming is based mainly on intuitive judgment.	Programming is based to the degree possible on objective information, supported by sound analytical procedures.
Management systems and condition surveys are used as engineering or research tools, but are not applied to program building or budgeting.	Information from condition surveys and management systems directly informs the process that builds the recommended program and budget.
Management systems are used only to rank the condition of assets; needs are programmed based on “worst first.”	Management systems guide the programming of projects based on valid engineering and economic criteria.

Source: AASHTO

The Iowa DOT has begun an effort to develop and implement asset management strategies. The Office of Systems Planning, along with input from several Iowa DOT offices, completed a self-assessment from AASHTO’s Transportation Asset Management Guide to determine what needs must be met to put into practice an asset management plan. The Iowa DOT believes asset management is necessary to continue a high level of service for infrastructure users while balancing maintenance and expansion costs of Iowa’s transportation system. The next step for the Iowa DOT is to develop clearly defined strategic goals, as well as performance measures to track progress toward those goals. This will be accomplished through the development of the Iowa DOT's Asset Management Plan.

3.7 Safety

Safety is a key consideration in this Plan, identified later as one of the document's three goals. The department emphasizes safety in all efforts, including enforcement, education, engineering, and emergency response. Safety is most often thought of in terms of the highway mode, but each modal area is part of an interrelated transportation system and carries equal importance. The overriding goal for all aspects of transportation safety is to reduce injuries and fatalities, thereby reducing personal and economic losses experienced by families, employers and communities, and improving Iowa's quality of life. This can be achieved by educating users, designing safer facilities, and joining with partners in collaborative efforts.

Federal transportation safety legislation

In August 2005, Congress implemented transportation funding legislation that included a comprehensive highway safety approach. This legislation created a new core Highway Safety Improvement Program (HSIP) "to achieve a significant reduction in traffic fatalities and serious injuries on public roads."

The SAFETEA-LU legislation also mandated state strategic highway safety plans and required each state's department of transportation to lead diverse road safety disciplines, such as engineering, education, enforcement, and emergency response services in collaborating to develop their state's plan. Proposed strategies were required to address safety needs of all public roads, include projects or strategies that are regularly evaluated, and be reported to the secretary of the U.S. DOT on an annual basis.

Safety plan development and strategies

According to 23 CFR § 450.214(d), "The long-range statewide transportation plan should include a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects contained in the Strategic Highway Safety Plan ..."

Iowa's version of the strategic highway safety plan, known as the Comprehensive Highway Safety Plan (CHSP), was developed in 2006 through an extensive process involving a diverse group of stakeholders. Because approximately half of Iowa's roadway fatalities occur on local city and county

roads, local organizations were included in the process. The completed plan identified two categories of actionable strategies that had the best potential for safety gains based on available data and proven countermeasures. One category requires policy or legislative action for implementation. The second category identifies strategies that existing programs or collaborating organizations have the capacity to implement. The priority policy and program strategies targeted in Iowa's CHSP include:

Policy strategies (legislative)

- **Young drivers:** Strengthen minor school license and graduated driver's license laws with stronger provisions that are proven to reduce specific risks and save lives.
- **Occupant protection:** Require occupant restraints in all automotive vehicle seating positions.
- **Motorcycle safety:** Restore a motorcycle helmet law.
- **Traffic safety enforcement:** Support traffic safety enforcement with adequate resources.
- **Traffic Safety Improvement Program:** Increase Iowa's Traffic Safety Improvement Program funding from 1/2 percent to a full 1 percent of Iowa's RUTF.

Program strategies (administrative)

- **Lane departure:** Enhance lane departure-related design standards and policies (e.g., paved shoulders, rumble strips and median cable barriers).
- **Safety corridors:** Identify safety corridors and use multidisciplinary strategies to mitigate specific crash causes, such as impairment, speeding, driver inattention, and other factors.
- **Intersections:** Promote innovative intersection designs, such as roundabouts and other configurations.
- **Local roads:** Create local multidisciplinary safety teams to identify and resolve local crash causes.
- **State traffic records:** Enhance data availability and use by all stakeholders.
- **Senior mobility:** Develop a single point of contact to help older persons and their caregivers navigate existing programs regarding changing mobility needs.
- **Safety training and education:** Provide state and local multidisciplinary traffic safety education programs for professionals and the driving public.
- **Unpaved rural roads:** Promote public awareness of the risks of driving on unpaved rural roads.

CHSP goal

In setting a long-term strategic goal, the CHSP stakeholders agreed that the recommended policy strategies have the most potential to save lives (25 annually) and change the culture in Iowa. Additionally, the program strategies could save more lives (20 annually) if fully implemented. A significant decrease in deaths (45 annually) could be achieved if all strategies are implemented. Believing that "one death is one too many," Iowa's highway safety stakeholders are committed to implementing these vital policy and program strategies to meet Iowa's 2015 goal of 400 or fewer average crash fatalities.

Potential program performance measures

The Iowa CHSP is reviewed on an annual basis and progress is reported to FHWA. Some of the performance measures that have been used to track the effectiveness of strategies as they are developed and implemented include the following.

- **Legislation:** The passage of safety legislation elements detailed in the CHSP.
- **Lane departure:** The number of fatal and serious injury lane-departure crashes by system and surface type. The number of lane-departure crashes as a percentage of all crashes.
- **Safety corridors:** The successful development of a safety corridor program. Targeted before and after results on the program corridors.
- **Intersections:** The number of fatal and serious injury crashes at intersections that have higher crash rates than the state average. The fatal and serious injury crashes at intersections on urban local roads. The severity of crashes at intersections.
- **Local roads:** The number of local roads teams developed within Iowa. The number of fatal and serious injury crashes on Iowa's low-volume local roads (less than 400 vehicles per day).
- **State traffic records:** Data availability and its use by all stakeholders.
- **Senior mobility:** Successful creation of a single point of contact to help older persons and their caregivers navigate existing programs regarding changing mobility needs.
- **Safety training and education:** The development and delivery of safety practitioner training. The development and delivery of public education and information efforts.

- **Unpaved rural roads:** The number of fatal and serious injury crashes on Iowa's unpaved local roads. The development and delivery of a public awareness program on the risks of driving on unpaved rural roads.

Accomplishments

Policy strategies implemented

Iowa's traffic safety stakeholders have collaborated to provide consistent research and data to assist legislators in enacting these measures to improve highway safety.

- All passengers in all seating positions who are age 17 or under must be restrained in a safety belt or appropriate child seat.
- All drivers are prohibited from "texting" while driving.
- Young drivers on provisional licenses are also prohibited from using any electronic devices (including cell phones) while driving.

Program strategies implemented

- The Iowa DOT has adopted several design standards addressing lane departure (e.g., paved shoulders, rumble strips, median cable barriers), and these are being implemented both as part of ongoing system renewal and in specific safety-enhancing projects.
- Safety corridor sites have been identified, studied, and prepared for enforcement and public education implementation.
- The department has provided extensive roundabout education and provides free consultant services to local entities interested in solving local intersection safety challenges with roundabouts.

Highway safety status

In the past decade, Iowa has achieved a highway safety record better than national analysts had projected considering Iowa's increasing travel volumes and extensive roadway systems. Iowa's comprehensive, data-driven approach and stakeholder collaboration are credited for this success. Although progress has been made, suffering an average of more than 400 preventable deaths per year is not acceptable and represents a serious public health risk for Iowans. Iowa's CHSP continues to promote the belief that "one death is one too many" and will work toward achieving the goal of further reducing highway-related deaths.

Safety efforts for all modal areas

As was previously mentioned, safety is most often thought of in terms of the highway mode, yet it is an important component of each mode in the transportation arena.

Aviation safety

Iowa complies with all federal and state safety programs addressing pilot safety education, landing and navigational aids, land acquisition for protection zones, new technologies, maintenance certification of aircraft, airport infrastructure, runway safety training, control operations, and safety management awareness. Private and commercial aviation can have specific and divergent safety criteria, but the overall goals are the same.

Bicycle and pedestrian safety

Bicycle and pedestrian facilities interplay with highway and local street systems, and include both shared and separated facilities. Iowa has incorporated many safety strategies and programs to protect those using bicycle and pedestrian facilities, including the Safe Routes to School program, federal and state recreational trails programs, complete streets design, safety compliance, AASHTO design guidelines, facility compliance, optimization of signal design, and support for bicycle helmet use.

Public transit safety

Safety is integrated throughout every aspect of public transit including planning, design, operations, maintenance, employee training, technology development, and implementation of the Federal Transit Administration's drug and alcohol testing programs. Intelligent technology systems, such as in-vehicle cameras and radio communications, are incorporated when possible to enhance safety.

Rail safety

Iowa's rail system includes both commercial freight and passenger rail. Due to the large number of rail and highway intersections, rail crossing safety is critical. Several rail crossing safety programs are administered by the Iowa DOT, involving both federal and state funding. Safety programs support projects such as grade separations, track maintenance and signal upgrades. The Iowa DOT also cooperates with implementation of the National Rail Safety Action Plan and supports Operation Lifesaver, which is a nonprofit education and awareness program dedicated to ending tragic highway-rail collisions.

Multidisciplinary safety approach

To maximize safety improvement efforts, the Iowa DOT has partnered with other public and private agencies to develop a multidisciplinary approach. Solutions to safety concerns can often be achieved by including input from law enforcement, emergency response, tow companies, firefighters, transit agencies, and many others. This multidisciplinary approach is promoted by FHWA and other national organizations. The Iowa DOT also partners with several state agencies to promote safety efforts, such as the Governor's Traffic Safety Bureau, Iowa Department of Public Safety, Iowa Department of Education, and Iowa Department of Natural Resources.

The state's 27 transportation planning agencies are also included in multidisciplinary safety efforts and incorporate safety into their planning activities. Planning efforts involving safety are supported and coordinated at all levels through the Federal Highway Safety Improvement Program, Iowa DOT's CHSP, and the MPO and RPA long-range plans. The CHSP has identified that half of all crashes in Iowa occur on local roadways, making it critically important to incorporate multidisciplinary efforts at the local level.

Additional safety issues

Driver distraction

Driver distraction from use of cell phones for calling and texting has seen increased media attention in recent years. Along with many other states, Iowa has implemented legislative and law enforcement countermeasures to address driver distraction. The department will continue to monitor research on the safety impact of restrictions on cell phone use while driving and will consider further countermeasures if the data support it.

Emergency operations support

To improve and manage incident and emergency response, the Iowa DOT initiated the statewide emergency operations (SEOP) section in 2008. More detail on the functions of this group is included in the following section.

For more information

More detailed and comprehensive transportation safety information can be found on the Iowa DOT's website: http://www.iowadot.gov/traffic/sections/safety.htm. This website contains a PDF version of the CHSP, as well as safety information for each modal area.

3.8 Security

Security is an important consideration in the transportation planning process, and has received heightened attention since the terrorist attacks of Sept. 11, 2001. Security should not be thought of only in terms of criminal or terrorist attacks, but also vulnerability to natural and manmade incidents, such as floods, tornadoes, and hazardous materials spills. In Iowa, recent flooding and winter weather events have dramatically impacted both rural and urban transportation systems, requiring adjustments to response policies and procedures. All modes of transportation are vulnerable to disruption due to natural or manmade incidents. The Iowa DOT partners with agencies at all levels of government, as well as private firms, to implement security initiatives.

National response framework

The U.S. Department of Homeland Security issued the National Response Framework (NRF) in January 2008. The NRF outlines key principles, roles and frameworks that enable all response partners to prepare for and initiate a national response to emergencies and disasters. This comprehensive framework outlines a national approach to incidence response within the United States. Iowa complies with the principles outlined in the NRF, which include:

- **Tiered response:** Incidents must be managed at the lowest possible jurisdictional level and supported by additional capabilities when needed.
- **Unity of effort through unified command:** Effective unified command is essential to response efforts and requires clear understanding of the roles and responsibilities of each organization that will participate.
- **Partnership engagement:** All leaders at all levels must communicate and support engaged partnerships by developing shared goals and aligning capabilities so that in times of crisis no one is overwhelmed.
- **Readiness to act:** All partners must be in a state of readiness to act, but must also balance this with an understanding of risk.
- **Scalable, flexible and adaptable operational capabilities:** When incidents change in scope, size and complexity, the response must adapt to meet requirements.

National Incident Management System (NIMS)

The NIMS is a support document to the NRF, which outlines standard command and management features that apply to response activities. This system enables all levels of government and private partners to provide a consistent nationwide structure to work together to prepare for, prevent, respond

to, recover from, and mitigate the effect of incidents. The NIMS covers all incidents from daily occurrences to those of the highest national level. Iowa incorporates features of the NIMS into its incident management programs.

Iowa DOT's intelligent transportation system (ITS)

The Iowa DOT's ITS efforts support activities related to security and emergency response. Iowa has a 511 Traveler Information System in operation. The system has important applications for both emergency operations and homeland security concerns. The 511 system is a nationwide program that is administered and funded at the state level and provides callers with free access to real-time, route-specific travel conditions, weather conditions, incidents, congestion and construction information. The Iowa system operates through an automated, voice-activated menu, and is capable of providing Amber Alerts.

Dynamic message signs are also part of roadway safety and security ITS applications. The Iowa DOT has placed large electronic signs on interstates and primary highways for congestion mitigation, traffic management, and emergency diversion efforts. This system can be operated remotely from the Iowa DOT.

Iowa DOT's statewide emergency operations

The SEOP section was started in October 2008 and resides within the Office of Maintenance, which is located within the Highway Division's Statewide Operations Bureau. The SEOP section has two functional elements: 1) the Operations Support Center (OSC); and 2) homeland security and emergency management.

The OSC is the 24-hour operations center, which maintains the state's 511 system. The OSC's functions include, but are not limited to, the following.

- Providing 24/7 support to department operations statewide.
- Leveraging the Iowa DOT's ITS technology to provide statewide traffic management on the Primary Highway System.
- Coordinating the Iowa DOT's response in multidiscipline incidents and operations involving local, state and federal partners.

- Providing real-time traffic and incident notifications internally, to public safety agencies and the traveling public.

The homeland security and emergency management group's functions include, but are not limited to, the following.

- Staffing the Iowa DOT's transportation desk during activations of the State Emergency Operations Center (SEOC) at Camp Dodge in Johnston.
- Coordinating the Iowa DOT's response to disasters.
- Overseeing Iowa DOT recovery activities following disasters.
- Working with other state agencies on various emergency management issues.
- Representing the Iowa DOT in homeland security-related matters.
- Working on Iowa DOT's Continuity of Operations and other emergency management plans.

Partnering and coordination

The Iowa DOT partners and coordinates security-response efforts with a variety of entities, including local agencies, such as county sheriffs' and city police departments, which provide critical local enforcement services. Private companies, such as rail lines, trucking companies, emergency medical services and tow trucking firms, also play a critical role in transportation security. This is especially true where the Iowa DOT has little jurisdictional authority. Other important partners include local urban and rural planning agencies, the Iowa Governor's Traffic Safety Bureau, and the Iowa Department of Homeland Security.

Security will continue to be a key consideration in the department's efforts. A proactive approach and coordination with many public and private partners will achieve the greatest success.

4. Measuring our system condition

4.1 Aviation

Iowa's air transportation system plays a critical role in the economic development of the state and the quality of life for Iowans. Airports are key transportation centers and economic catalysts, moving people and goods quickly and efficiently. With more than 1 million annual aircraft operations conducted at 109 publicly owned airports, more than 2,600 based aircraft, and 5,600 licensed pilots, the aviation system provides a valuable transportation mode to meet the needs of businesses, residents and visitors.

Iowa's commercial service and general aviation airports provide access to the many different types of aviation system users. More than 1.4 million people are boarded (enplanements) on commercial aircraft and nearly 98,000 tons of cargo are shipped from Iowa's eight commercial service airports each year. General aviation users, including agriculture, business, charter, flight instruction, law enforcement, medical transport, and recreational activities, account for nearly 1 million operations annually.

Iowa's airports

Airports in Iowa serve varying types of users and levels of demand. An airport's role in the aviation system depends on the aviation demand and type of facilities and services provided. As such, airports are categorized by one of five roles defined by a set of related criteria (see Figure 4.1). Facility and service targets have been determined for each airport role that will ensure the system is able to meet the needs of users.

Commercial service: Airports that provide regularly scheduled commercial airline service and have the infrastructure and services to support a full range of general aviation activity. Eight Iowa airports meet these criteria.

Enhanced service: Airports with a 5,000-foot or greater paved runway that have facilities and services to support most general aviation aircraft, including business jets, and have weather observation equipment. Enhanced service airports serve business aviation and are regional transportation centers. Fifteen Iowa airports meet these criteria.

General service: Airports with a 4,000-foot or greater paved runway that have facilities and services to support twin- and single-engine general aviation aircraft, as well as some business jets. General Service airports are important economic assets for their communities. Thirty-one Iowa airports meet these criteria.

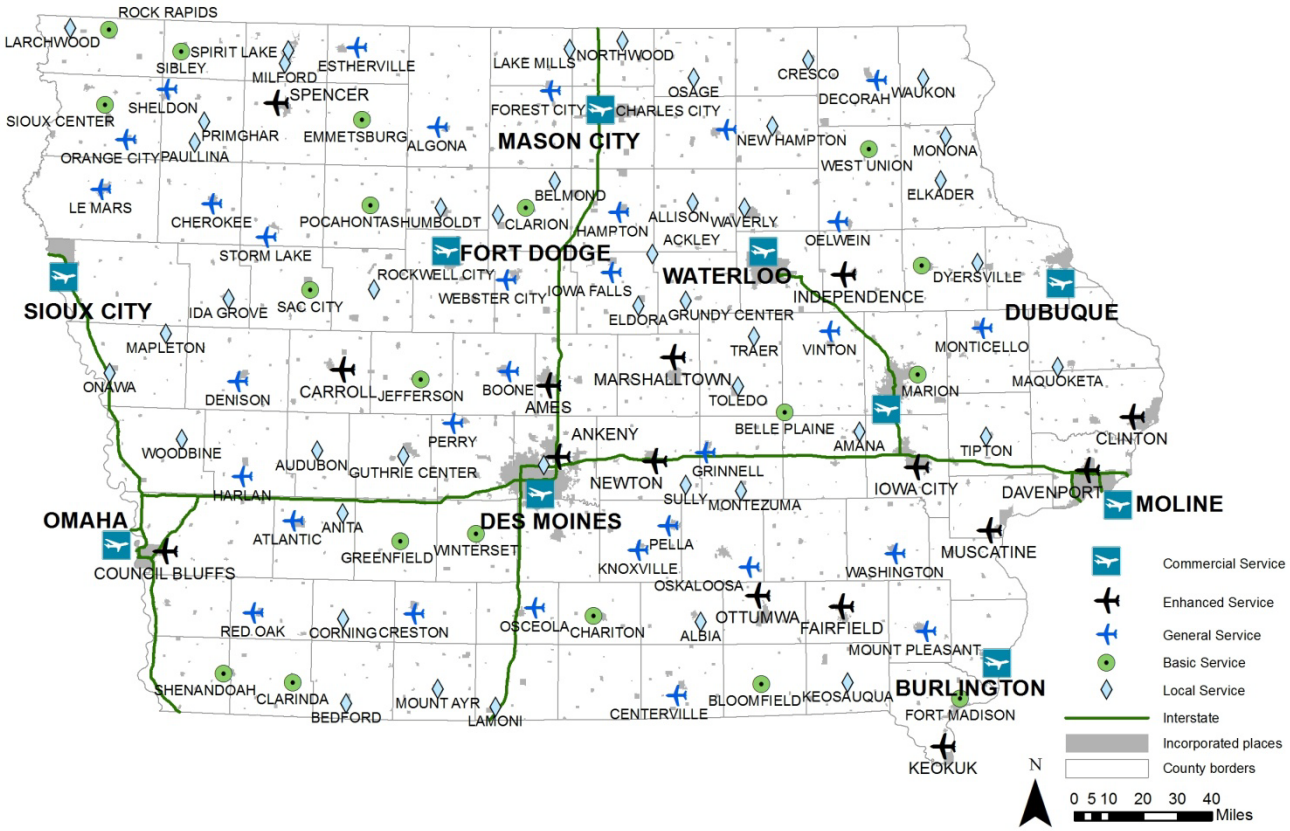
Basic service: Airports with a 3,000-foot or greater paved runway that have facilities and services to support single-engine aircraft, as well as some smaller twin-engine aircraft, and provide fuel. Nineteen Iowa airports meet these criteria.

Local service: Airports with runways less than 3,000 feet, many of which are turf runways, and have little or no airport services. Forty-four Iowa airports, which do not meet the criteria for any other roles, fall into this category.

Impact of aviation on Iowa's economy

In 2009, a study was completed by the Iowa DOT's Office of Aviation that documented the impact of Iowa's aviation system on the state's economy. The 2009 "Uses and Benefits of Aviation in Iowa" report found that aviation supports more than 47,000 jobs statewide and has a $5.4 billion impact on Iowa's economy. It was estimated that Iowa's aviation system also contributes approximately $12.8 billion to increased business productivity, and $214 million to increased agricultural productivity.

Figure 4.1: Iowa airports by role



Source: Iowa DOT, Office of Aviation

Highlights of Iowa's aviation system

Iowa's aviation system plays a key role in moving people and goods both in and out of state. Highlights of this system include:

- Supports our growing economy through current and expanding air freight service in Iowa.
- Is essential to business recruitment and retention for communities and economic development groups.
- Provides essential business and recreational travel needs.
- Supports many vital functions, including emergency response, that improve the quality of life for Iowa's residents.
- 71 percent of Iowa's population lives within 30 minutes of a commercial or enhanced service airport.

- 99 percent of Iowa's population lives within 120 minutes of a commercial or enhanced service airport.
- 79 percent of Iowa's employers are located within 30 minutes of a commercial or enhanced service airport.

Current trends

In the last decade, the aviation industry has experienced volatility related to security, the economy, the cost of aircraft operation, and changes in aircraft and navigational options. Declines in enplanements and cargo transport reflect the economic downturn and higher fuel costs. The decline in cargo transported by air is also the result of cargo security changes that have limited the volume of freight transported on passenger flights.

Despite these recent trends, forecasts indicate that passenger traffic will experience modest annual increases of 3 percent during the next 20 years. Over the same period, general aviation activity is expected to increase in both based aircraft and operations. An increase in business aviation will influence the facilities and services needed at airports, and additional enhanced service airports may be needed. Another segment of aviation experiencing growing activity is agricultural aviation. Finally, light sport aircraft is expected to provide a more affordable alternative to the private pilot, both in terms of time needed to acquire a license and cost of aircraft.

Additional trends that will be monitored for potential impacts to Iowa's aviation system include the transition to global positioning system navigation, the potential change from the use of leaded to non-leaded fuel, the use of unmanned aerial vehicles (UAV), and the influence of sustainability on the aviation industry.

Aviation system goals and performance

As part of the 2010 Iowa Aviation System Plan (IASP), the Iowa DOT's Office of Aviation, with input from the aviation industry, identified six goals for the aviation system that highlight key areas and provide a framework to guide future development and preservation of the system. These goals address the following areas.

- **Safety and security:** Provide a safe and secure system of airports.
- **Infrastructure and user support:** Provide an airport system that meets current and future user needs.
- **Accessibility:** Provide a system of airports that is adequately accessible from both the ground and the air.

- **Economic support:** Support economic development through the airport transportation system.
- **Planning:** Establish local planning to guide the development and operation of airports in Iowa.
- **Education and outreach:** Provide local aviation education opportunities that promote understanding, safety, utilization, and career development.

Objectives for each goal were evaluated to measure how well the system is meeting the established goals. To view this evaluation and other contents of the IASP, please visit: http://www.iowadot.gov/aviation/studiesreports/systemplanreports.html.

Key issues

The IASP is a guide for aviation stakeholders to ensure that the aviation system is able to meet the needs of users over the next 20 years. The plan includes recommendations for airport sponsors, the Iowa DOT and Federal Aviation Administration that address the following issues.

- Approach obstruction mitigation is needed to improve the percent of primary runways with clear approaches.
- Height zoning is needed to encourage compatible land use around airports.
- Continuation of aviation weather observing stations maintenance and operation is needed for pilot safety and weather information dissemination.
- Strategic planning is needed for airport sponsors to incorporate business and local concerns in airport planning.
- Increased funding is needed to improve the percent of airports meeting recommended facility targets for their respective role.
- Recommended service targets should be met to provide services adequate to meet user needs.
- Air service changes should be monitored to identify potential impacts to communities in Iowa.
- Continued safety initiatives are needed, including wildlife mitigation, pilot safety programs, pavement marking, and maintenance.

4.2 Bicycle and pedestrian

Bicycling and walking are important in the daily lives of Iowans. Bicycle and pedestrian facilities range from urban sidewalks and street crosswalks to specialized multiuse trails designed primarily for recreation. Federal and state legislation have placed an increased focus on bicycling and walking. Iowa has one of the most extensive rural paved highway systems available for bicyclists.

Iowa's trail vision

Iowa Trails 2000, a plan that has provided a framework for the implementation of trail initiatives throughout the state, proposed a 4,908-mile trail network for Iowa. This network is shown on the statewide trails vision map in Figure 4.2. The mileage in this vision represented a considerable increase over the 3,000 miles set forth in the 1990 plan. In addition, it should be noted that there have been many miles of trails constructed that are not represented on this map.

The Iowa DOT divides the state's trail system into state, regional and local level trail facilities. This helps to prioritize trail development and other bicycle and pedestrian investment actions in the future.

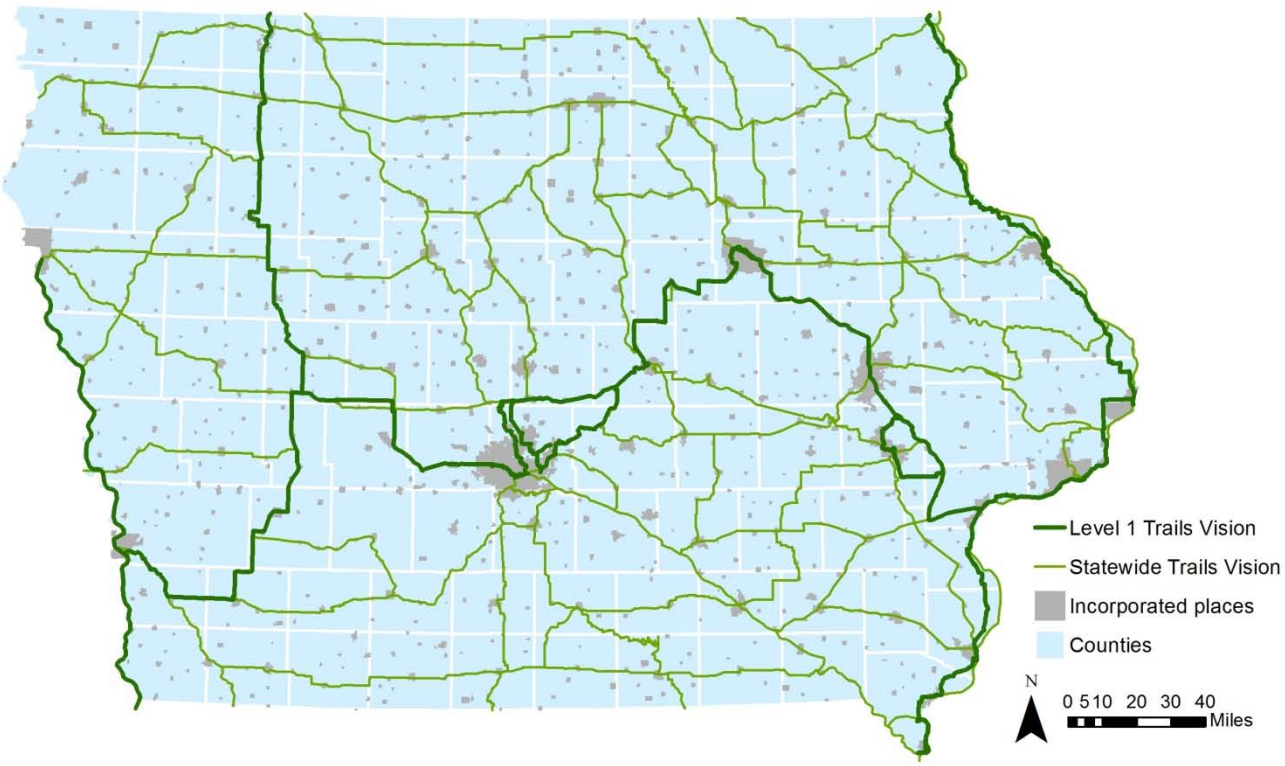
Level 1 – trails of statewide significance: These trails, which are a subset of the larger statewide trails vision network, are part of Iowa's primary trail corridor network and are a priority of the Iowa DOT. Completing these trail corridors will result in the expansion and improvement of a statewide network of safe and convenient routes for bicycle transportation and tourism, including access to and through many of the state's urban areas. Iowa's Level 1 trails include the following.

- American Discovery Trail
- Central Iowa Loop
- Iowa Great Lakes Connection
- Lewis and Clark Trail
- Mississippi River Trail

Level 2 – trails of regional significance: Level 2 trails are identified as trails that either connect to a Level 1 trail and are at least 10 miles in length or are part of an existing or programmed trail network of at least 25 miles in length. These trails result in significant economic impacts to the state by providing for longer rides and attracting more out-of-state visitors.

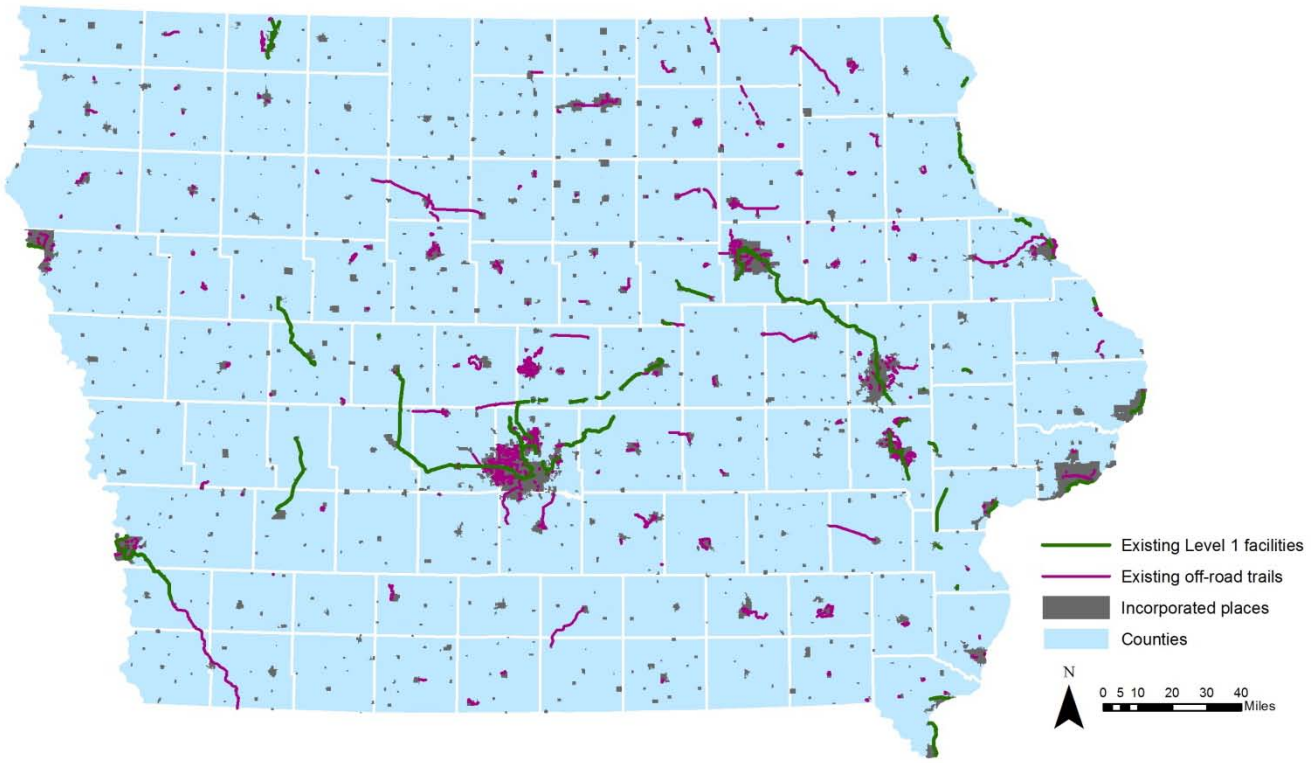
Level 3 – trails of local significance: These trails are shorter in length, and are located in communities and counties across Iowa. Level 3 trails typically do not draw visitors from afar, but are very important in providing a better quality of life and improved mobility for many Iowa communities.

Figure 4.2: Statewide trails vision



Source: Iowa DOT

Figure 4.3: Iowa's existing trail network



Source: Iowa DOT

Types of facilities

There are currently more than 2,300 miles of bicycle and pedestrian facilities in Iowa. Of this, approximately 1,780 miles are off-road, multiuse trails (see Figure 4.3). The remaining miles consist of several different types of on-road facilities, such as bicycle lanes, paved shoulders and widened sidewalks. Existing bicycle and pedestrian facilities in Iowa include:

Bicycle lane: A portion of the roadway designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists. Bicycle lanes should always be one-way facilities carrying bicycle traffic in the same direction as adjacent motor vehicle traffic, and they should not be placed between parking spaces and the curb. Bicycle lanes offer a channelizing effect on motor vehicles and bicycles.

Path: A bikeway and/or walkway physically separated from motorized vehicular traffic by an open space or barrier, and either within the highway right of way or within an independent right-of-way.

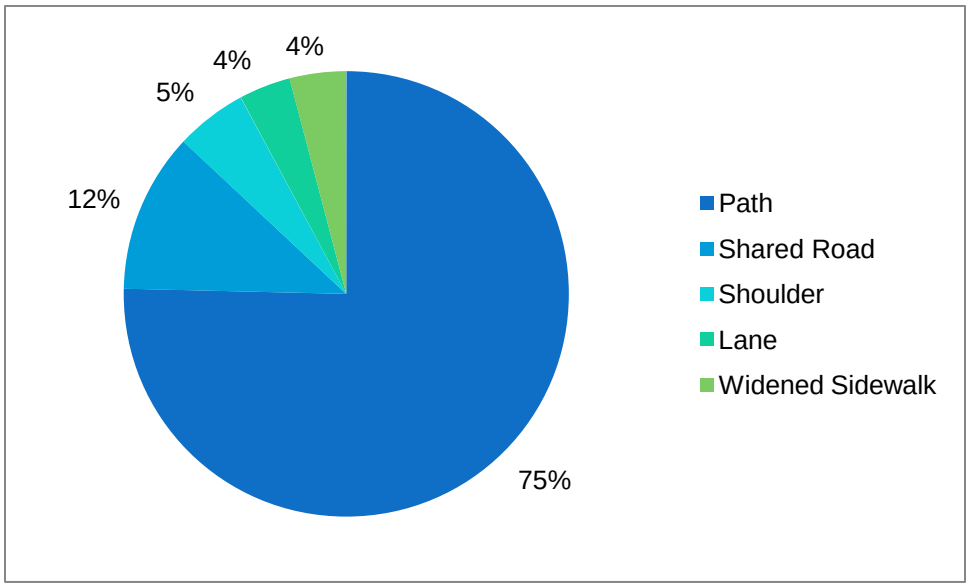
Sharrow: Pavement markings placed in the roadway lane, indicating that motorists should expect to see and share the road with bicyclists.

Shoulder: A paved portion of the roadway to the right of the white pavement marking at the edge of the roadway. Paved shoulders are particularly practical for bicycle accommodation improvements in rural areas. Bicycle traffic on a paved shoulder will typically be one-directional with the flow of traffic; therefore, both shoulders will be paved when providing accommodation for bicyclists.

Sidewalk: Usually 4 to 5 feet wide, sidewalks accommodate pedestrian travel.

Widened sidewalk: Accommodates more pedestrian traffic than a traditional sidewalk, and is typically at least 6 feet wide.

Figure 4.4: Iowa bicycle and pedestrian facilities by type



Source: Iowa DOT

Impact of bicycle and pedestrian facilities on Iowa's economy

A study was completed in the fall 2011 by the University of Northern Iowa to look at the economic and health impacts of bicycling in Iowa. The report, "Economic and Health Benefits of Bicycling in Iowa," estimated that commuter-cyclist spending generates $51,965,317 annually in direct and indirect impacts to the State of Iowa, assuming that each commuter spends on average $1,160 per year on bicycle-related activities. Recreational riders, assumed to spend approximately $1,208 per travel party on bicycle-related activities in Iowa, were estimated to generate $364,864,202 annually in direct and indirect benefits.

Another significant contribution to the state's economy through bicycling is the Register's Annual Great Bicycle Ride Across Iowa (RAGBRAI). This weeklong bicycle ride across the state garners international attention every summer, and more than 275,000 riders from all over the world have participated in RAGBRAI since the ride began in 1973. According to the UNI study, total direct spending in Iowa for RAGBRAI is estimated at $16,908,642 annually.

In addition to attracting tourists, bicycle and pedestrian facilities are increasingly more important to the recruitment and retention of Iowa businesses and their employees. Many communities have found that properties located adjacent to trails often increase in value, generating greater overall revenue for the community. Overall, walking and biking trails improve the quality of life for Iowa's citizens, providing an essential option for Iowans to get to work, school and other destinations.

Highlights of Iowa's bicycle and pedestrian facilities

- Integration of pedestrian, bicycle and transit needs with vehicular movements is improving.
- Trail use is increasing.
- Bicycle helmet use is rising.
- Businesses have identified trails as an aid in recruitment.
- Demand for urban sidewalks has increased.
- Rising public attention for healthy lifestyles has caused an increase in bicycling and walking, including children traveling to and from schools.

Current trends

As trail usage increases, many of Iowa's communities are seeing increasing economic and social benefits of bicycle and pedestrian facilities. For example, a 1998 survey of users of the Raccoon River Valley Trail in Dallas County identified five positive impacts of the trail: availability of recreational opportunities, a positive image for Dallas County, increased visitation, community pride, and improvements to the local economy.

However, despite rising demand for new bicycle and pedestrian facilities in Iowa, there is limited funding for expansion. Additionally, ongoing maintenance needs on the

existing system often go unfunded as well. Taking into consideration these constraints, there has been a growing effort to stretch the available funds by coordinating trail projects and creating well-connected trail networks.

In some cities and regions in Iowa, there has been a push to better accommodate more modes of transportation on the existing and future roadway system. These “complete streets,” as defined by the National Complete Streets Coalition, are “designed and operated to enable safe access for all users.” Pedestrians, bicyclists, motorists, and transit riders of all ages and abilities must be able to safely move along and across a complete street. Elements of a complete street may include bicycle lanes, widened sidewalks, special bus lanes, median islands, roundabouts, and more.

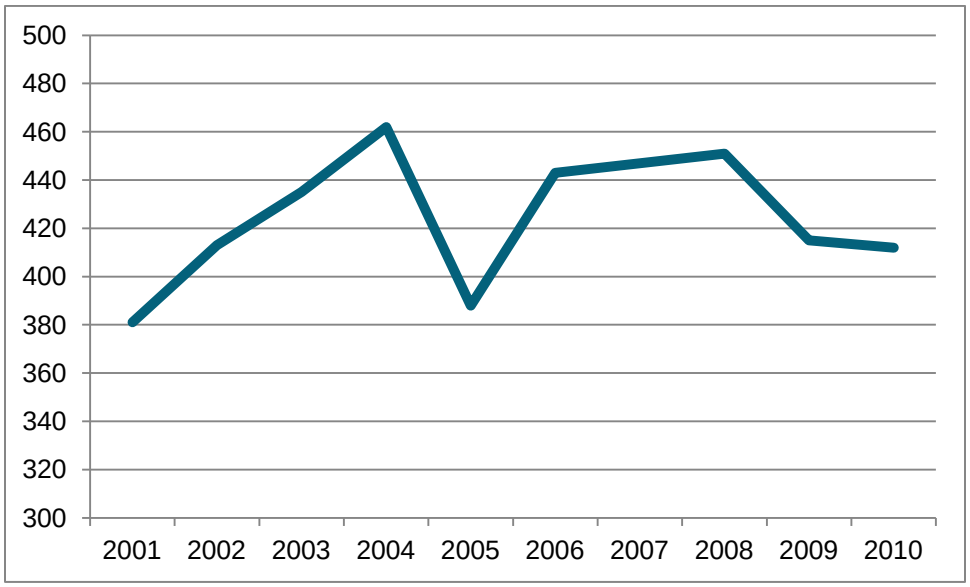
In Iowa, complete streets policies or resolutions have been adopted in Cascade, Des Moines, Dubuque, Iowa City, Johnson County and by the Bi-State Regional Commission in the Quad Cities. For bicyclists and pedestrians, these policies help ensure that all road users are considered in the development and redevelopment of Iowa’s roadways. Figure 4.5 shows an example of a complete street project in Postville, Pa.

As bicycle and pedestrian travel increases in Iowa, the continuing need to educate all users on proper usage and safety is important. From 2001 to 2010, there were a total of 53 fatalities in Iowa from cyclist-related crashes. Figure 4.6 charts the total number of cyclist-related crashes on Iowa’s roads from 2001 to 2010.

Figure 4.5: Example of a complete streets project, Postville, Pa.

Source: National Complete Streets Coalition

Figure 4.6: Cyclist-related crashes in Iowa



Source: Iowa DOT

Key issues

- Additional funding is needed for system expansion and maintenance.
- Many communities are not bicycle- and pedestrian-friendly, which could be addressed through the expansion of complete streets policies at the local and state level.
- Infrastructure improvements are needed to address deficiencies and ongoing maintenance problems.
- Bicycle and pedestrian fatalities and injuries are too prevalent.
- Improved coordination and cooperation is needed to better connect Iowa's trail systems.
- The Level 1 trail system is not well-connected in many areas as half of the system remains undeveloped.
- Additional education is needed, including safety programs for bicyclists and pedestrians and training on the health benefits of bicycling and walking.

4.3 Highway

Highways are the backbone of Iowa's transportation system and provide service to all areas of the state. Iowa's roadways range from six-lane interstates, four-lane divided facilities, and multilane urban streets to paved secondary roads, gravel roads and municipal streets. Iowa's bridges provide crossings of thousands of streams, rivers, railroads and trails. These bridges range from 10-foot structures to multispan major river crossings. This combination of roadways and bridge structures created an extremely accessible network that provides a high level of mobility.

Iowa's highway system

Iowa is uniquely positioned at the crossroads of two major interstate highways: I-80 and I-35. As shown in Table 4.1, the state's public roadway system is comprised of more than 114,000 miles with approximately 25,000 bridge structures. While the size of the state's roadway system has not increased considerably in recent years, the infrastructure burden remains significant. As was mentioned in the previous chapter, Iowa ranks fifth nationally in number of bridges and 13th in miles of roadway, yet the state ranks just 38th in population density according to the 2010 Census.

Table 4.1: Summary of Iowa public roadway system, 2010

	Mileage	Percent of total mileage	Total VMT (millions)	Percent of total VMT	Large truck VMT (millions)	Percent of total large truck VMT
Primary	9,400.77	8.2	19,463	61.6	2,449	92.2
Secondary	89,866.00	78.7	5,296	16.8	183	6.9
Municipal	14,886.80	13.0	6,820	21.6	23	0.9
Total	**114,153.56**		**31,579**		**2,655**	

Source: Iowa DOT

According to the Iowa Code, Iowa's primary system (see Figure 4.7) is defined as "those roads and streets both inside and outside the boundaries of municipalities which are under Iowa DOT jurisdiction."

This system, which makes up 9,400 miles of the 114,000-mile public system, is divided into five classifications according to priority. These include:

1. **Interstate:** Comprised of 782 centerline-miles, the Interstate Highway System provides connections to the national transportation network and major metropolitan areas.
2. **Commercial and Industrial Network (CIN):** Comprised of 2,391 centerline-miles, the CIN provides connections for Iowa cities with populations of 20,000 or greater to major metropolitan areas, and was identified by the state legislature to enhance opportunities for the development and diversification of the state's economy.

   Other Primary Highways comprise the remaining 5,712 miles, and include the following routes.
3. **Area Development:** Provide connections for cities with populations of 5,000 or greater to the CIN and major commercial and industrial centers.
4. **Access Routes:** Provide connections for cities with populations of 1,000 or greater to employment, shopping, health care, and education facilities.
5. **Local Service:** Provide connections for cities with populations less than 1,000 to local commercial and public service.

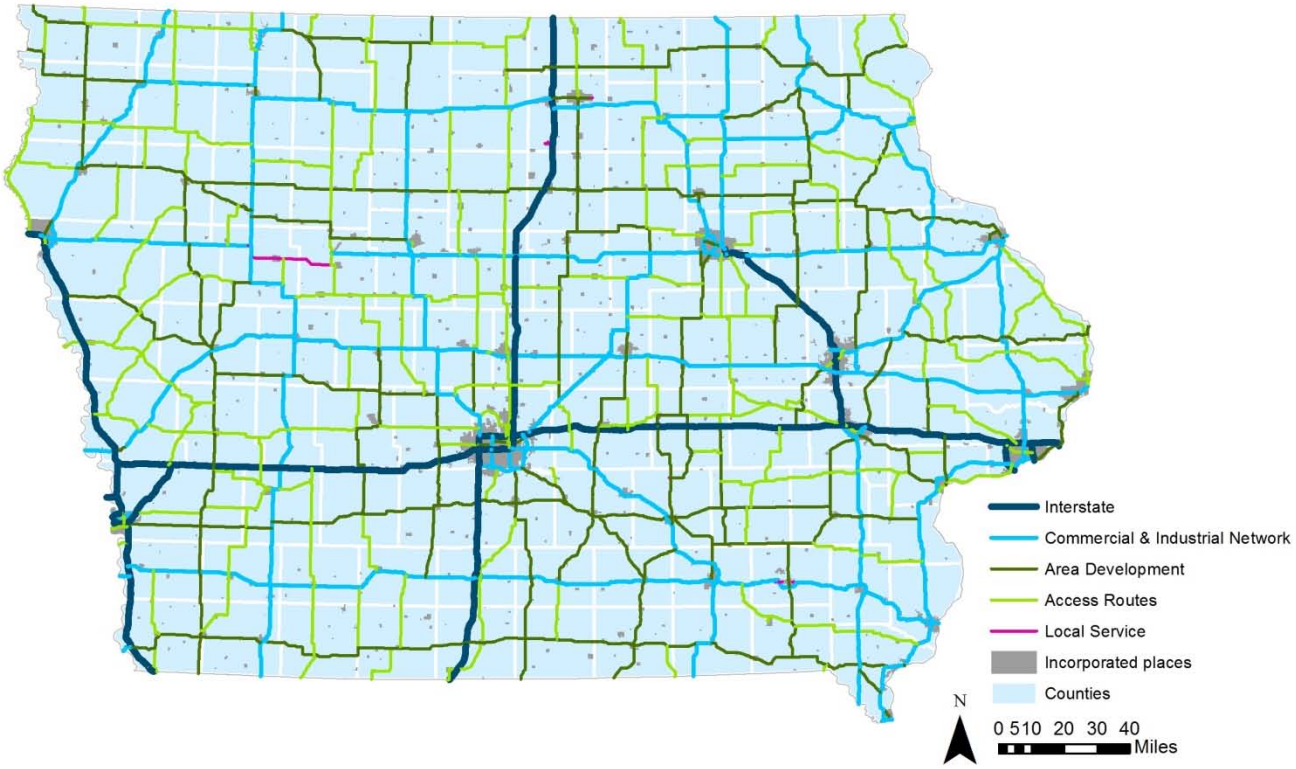
Impact of highway transportation on Iowa's economy

While it is difficult to assign a dollar figure to the far-reaching economic impacts of Iowa's highway system, the system is clearly the key link in connecting all modes of transportation and is the fuel for the state's economic engine. Construction projects lead to immediate job opportunities for workers representing a wide variety of professions. Businesses and industries locate near the highway network due to the ease of travel for both people and goods, bringing with them new jobs and increased tax revenues. On a regional level, highways can help reduce economic disadvantages by increasing connectivity and transportation efficiency. The highway system also supports the state's growing biofuels and wind energy industries, which are critical to Iowa's economic competitiveness.

Highlights of Iowa's highway system

- Motor vehicles travel more than 30 billion miles on Iowa's public roads each year.
- Moves more than 360 million tons of freight annually.
- The weighted average daily traffic on the Interstate Highway System in municipal areas is more than double that in rural areas.
- Includes approximately 216,300 acres of roadside right of way that is maintained by the state.
- Iowa DOT maintenance crews plow approximately 24,500 lane-miles with each winter storm event, nearly equivalent to one trip around the earth.

Figure 4.7: Iowa's primary highways, 2010



Source: Iowa DOT

Current trends

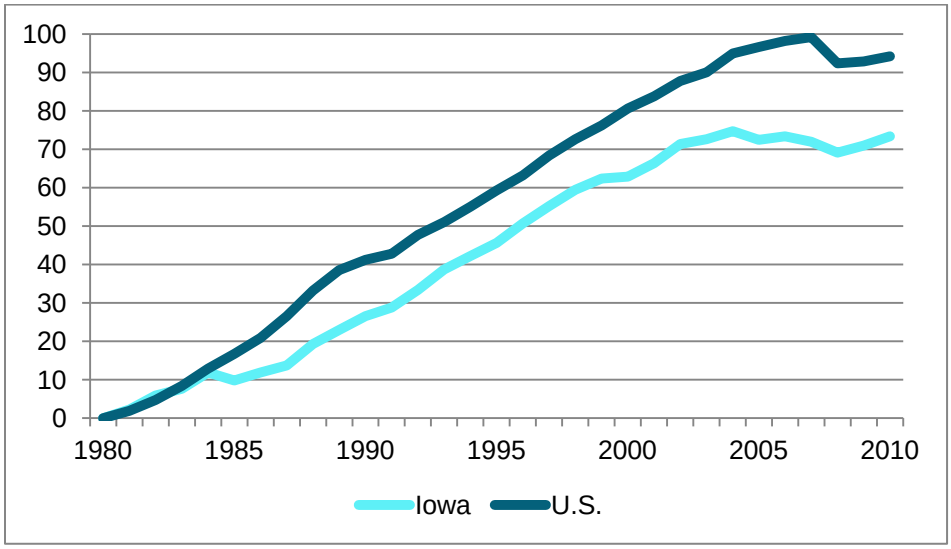
Following some recent declines due to a variety of economic factors, statewide travel is again trending upward (see Figure 4.8). Iowans are commuting longer distances and more goods are moving through the state by truck. While traffic continues to increase, crash statistics have remained relatively steady or declined in most cases.

While safety may be trending in a positive direction, the same cannot be said for the condition of Iowa's public roadway system. Pavement conditions, which are measured using the Pavement Condition Index (PCI), are deteriorating across the primary system (see Figure 4.9), and a significant percentage of this system is rated below the Iowa DOT-established PCI "cutoffs" that represent an acceptable pavement condition (see Figure 4.10).

Approximately one-quarter of Iowa's primary system also fails to meet a sufficiency rating considered tolerable or above. These ratings are derived from Iowa DOT records of traffic, crashes, and pavement condition and geometrics. In addition, the percentage of bridge structures that are considered

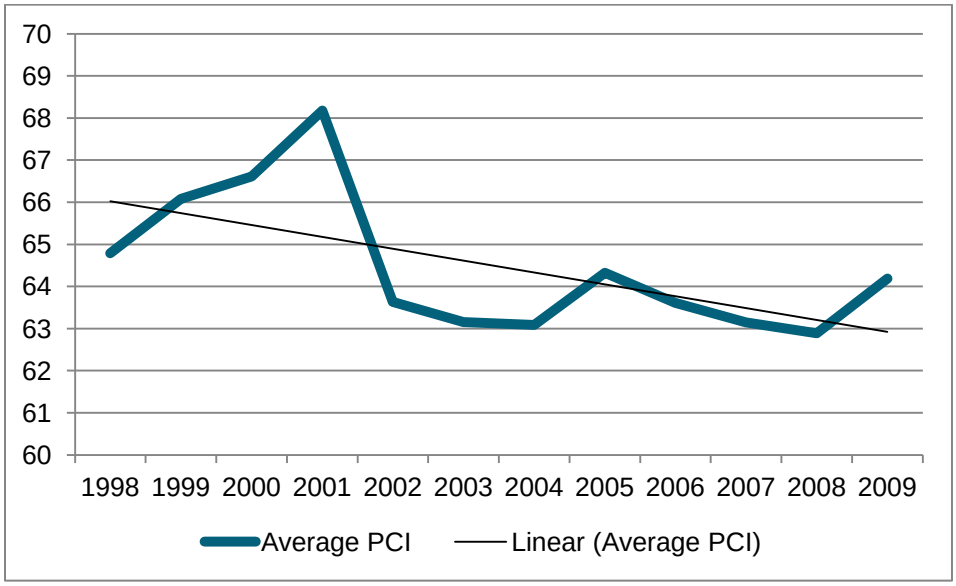
structurally deficient is on the rise (see Figure 4.11). A 2011 report by Transportation for America, "The Fix We're In For: The State of Our Nation's Bridges," found that Iowa had the third-highest percentage of structurally deficient bridges in the nation at 21.7 percent. If these trends continue, travelers will experience additional congestion, delays, and safety-related hazards that result from increasing traffic volumes on an obsolete system.

Figure 4.8: Percent change in traffic, base year 1980



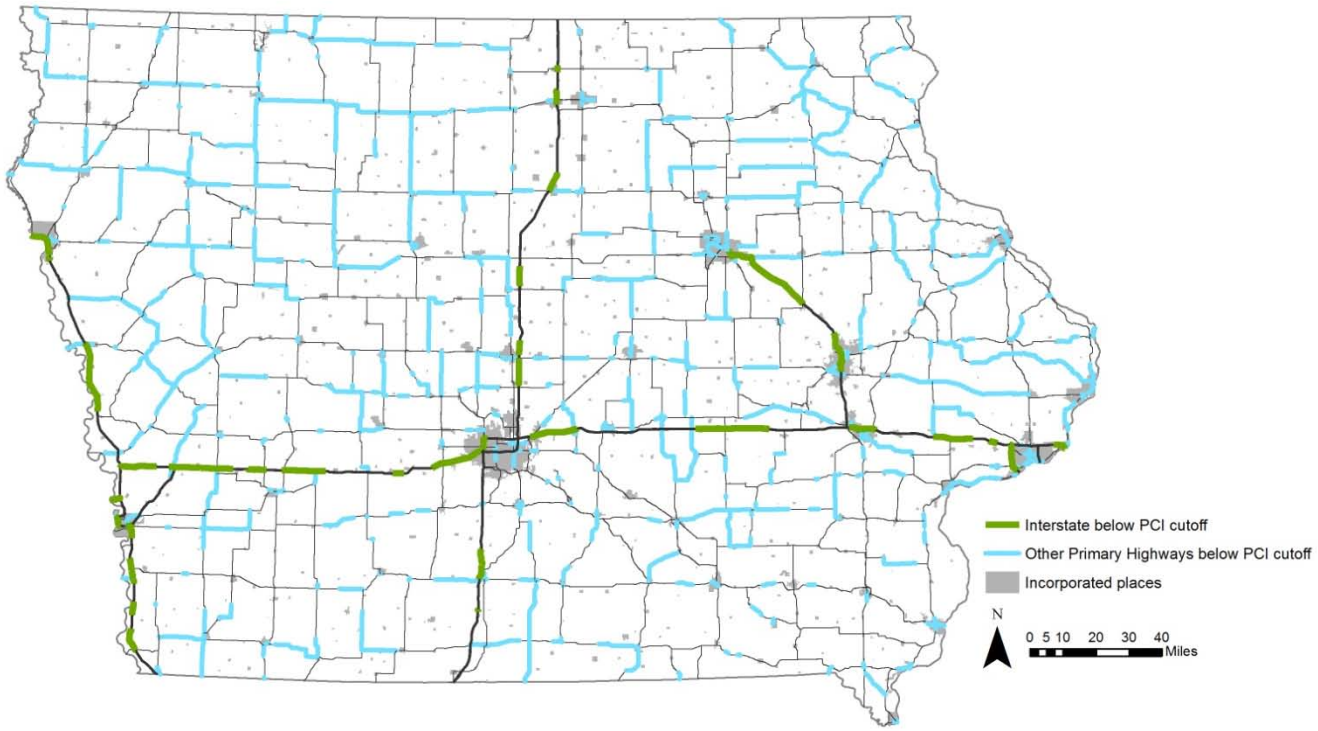
Source: Iowa DOT

Figure 4.9: Average PCI rating, primary system



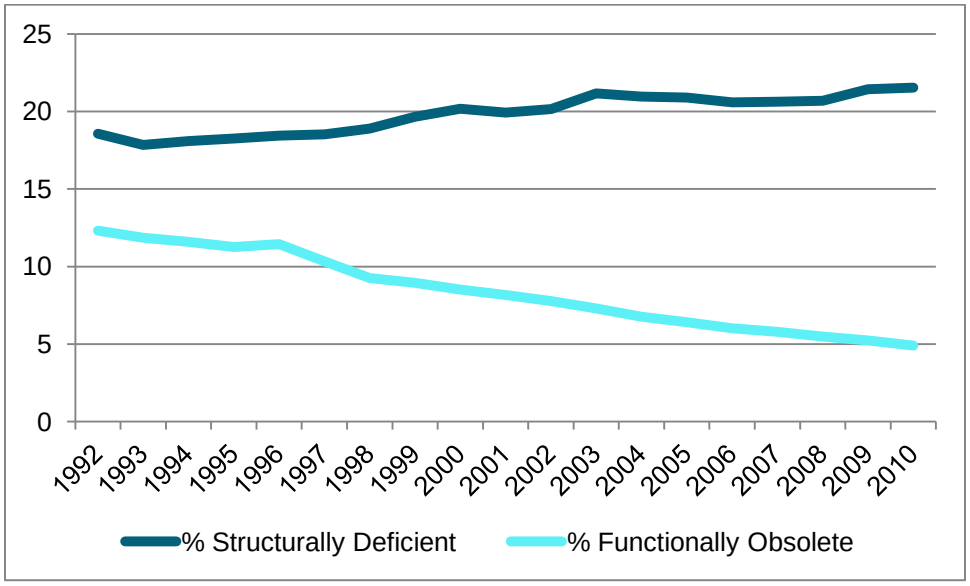
Source: Iowa DOT

Figure 4.10: Primary system segments below PCI cutoff, 2009



Source: Iowa DOT

Figure 4.11: Percent of bridge structures considered structurally deficient or functionally obsolete



Source: Iowa DOT

Key issues

- Additional funding is needed to maintain acceptable condition ratings for roadways and bridge structures.
- Many high-cost bridge structures have major deficiencies.
- Urban and commuter route congestion is growing.
- Rural and urban interstate congestion is more prevalent.
- Safety needs exist on the system.
- Additional on-road accommodations are needed for bicycle and pedestrian trips.

4.4 Public transit

Iowa's public transit system provides many benefits to its citizens, fulfilling a key alternative transportation role. In general, the transit market in Iowa includes commuters, elderly residents, low-income residents, college students, disabled residents, and youth. However, especially in metropolitan areas, people are increasingly making the choice to ride public transit for economic, practical or environmental reasons.

Iowa's public transit services

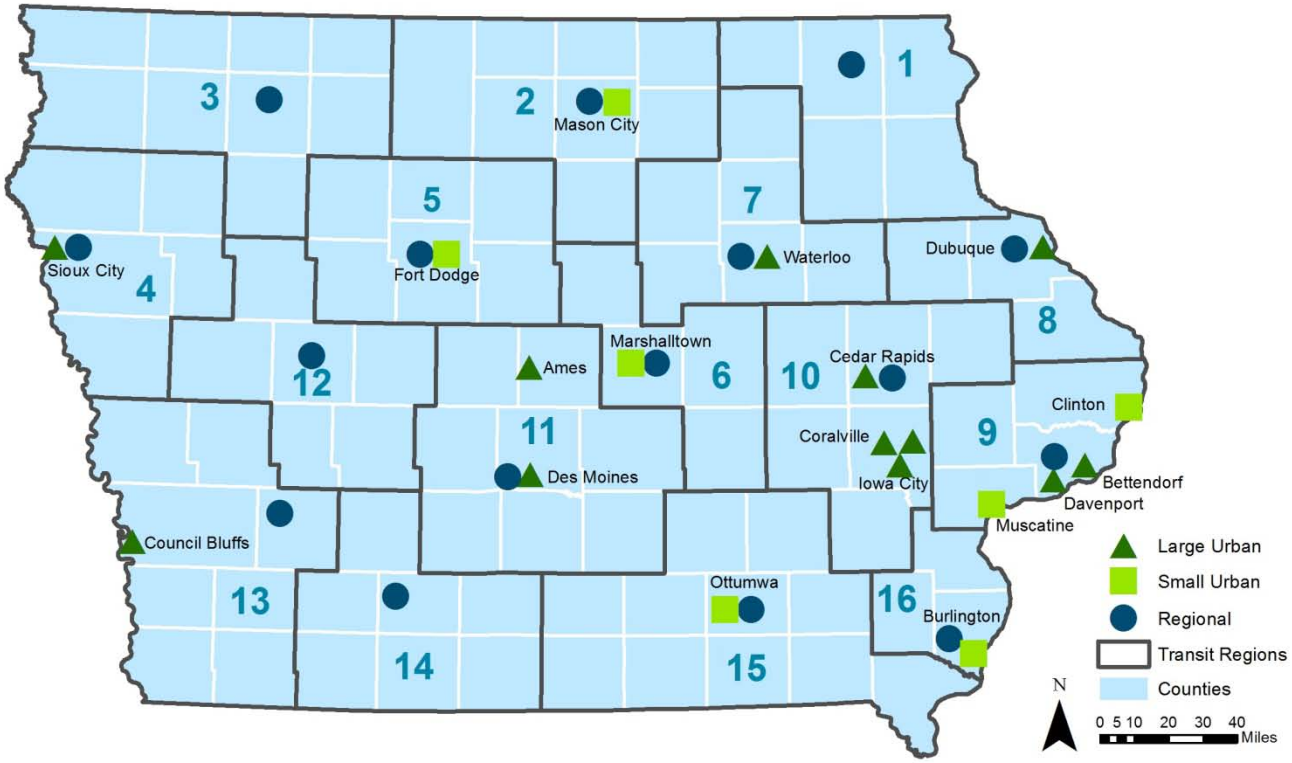
Iowa is served by 12 large urban, seven small urban, 16 regional, and four intercity transportation bus services. Large urban systems provide service for metropolitan areas with a population of 50,000 or greater, and account for approximately 81 percent of total transit ridership in Iowa. Small urban systems are located in communities of 20,000 to 50,000 people. The 16 regional transit systems support all 99 counties in Iowa. The state's transit system also includes vanpools, carpools, bus charter companies, and taxis that allow travel within Iowa between urban areas or regions, as well as connections to destinations across the country. A map of Iowa's large urban, small urban, and regional transit systems is shown in Figure 4.12.

Impact of public transit services on Iowa's economy

Public transit services positively impact Iowa's economy. Transit ridership reduces fuel consumption and demand, as well as costs for passenger, business and commuter trips. Additionally, public transportation services provide transit-dependent workers with reliable and essential access to employment opportunities.

Availability of public transit services in all 99 Iowa counties also enables the elderly, who are no longer able to drive but in good health otherwise, to remain in their own homes longer. This increases their quality of life and reduces assisted living or nursing home costs.

Figure 4.12: Large urban, small urban, and regional transit systems



Source: Iowa DOT, Office of Public Transit

Highlights of Iowa's public transit services

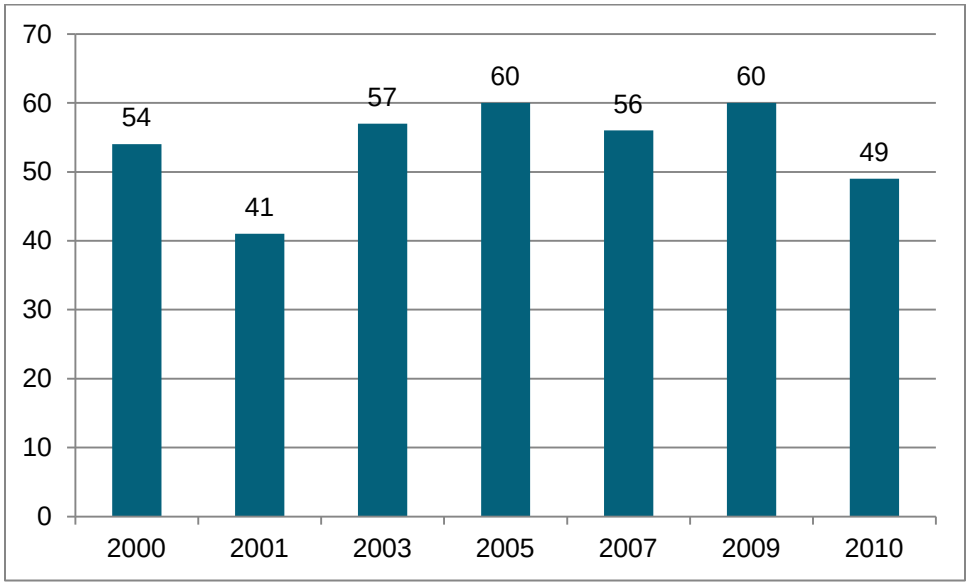
Iowa's transit systems reduce automobile dependence, and have many mobility and quality of life benefits. Some highlights of Iowa's public transit systems include:

- Serves all 99 counties and 947 cities.
- Vital to the quality of life for all citizens by providing access to community services, as well as making communities stronger and more vibrant.
- Provides more than 21.2 million rides annually from large urban systems, 3.4 million rides from regional systems, and 1.6 million rides from small urban systems.
- Provides access to work, school, medical, retail and community resources that utilize connections between modes.
- Allows individuals to maintain independence.
- Provides commuters and others with choice of transportation.

Current trends

In recent years, operation and maintenance costs for transit services in Iowa have been increasing much faster than revenues. Consequently, it has been difficult to pay for necessary improvements, such as facility upgrades, bus replacements and fleet expansions. Approximately 49 percent of Iowa's public transit vehicles are currently over the age threshold for replacement. That percentage topped 60 percent as recently as 2009 (see Figure 4.13). The infusion of American Recovery and Reinvestment Act of 2009 funding for bus replacements aided greatly in reducing the fleet age. However, with close to 50 percent of Iowa's buses at or over their replacement age threshold, a great need still remains. According to the National Transit Database, for reporting year 2009, Iowa ranked second in the nation for oldest large urban bus fleet with an average age of 10.2 years. Only Nebraska's large urban systems ranked higher with an average bus fleet age of 10.4 years.

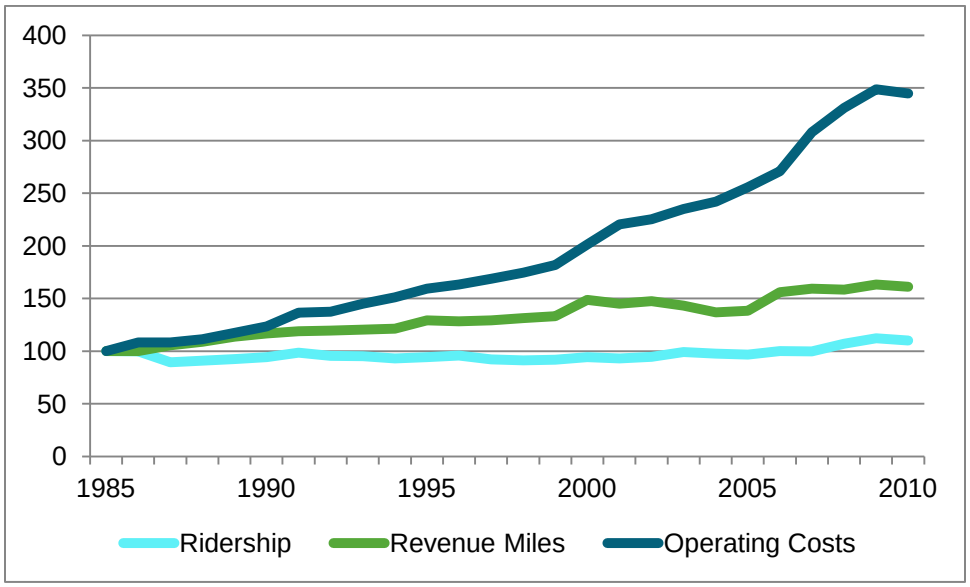
Figure 4.13: Percentage of transit vehicles over FTA age threshold



Source: Iowa DOT, Office of Public Transit

From 1985 through 2010, transit ridership in Iowa has grown from 23.8 million annual rides to 26.2 million annual rides, with the largest increase in 2008 and 2009 being fueled by the sudden, dramatic increase in gasoline prices. Ridership is likely to increase in the future as Iowa's population base continues to age and as more people embrace environmentally friendly transportation options. Trends in transit operations are illustrated in Figure 4.14.

Figure 4.14: Trend in Transit Operations Index (1985 = 100)



Source: Iowa DOT, Office of Public Transit

According to the 2009 "Statewide Passenger Transportation Funding Study," currently there is public demand for additional transit services in Iowa. The service needs include additional off-peak hours, greater frequency between trips, weekend services, expanded service areas, more intercity connections, increased coordination between adjacent transit systems and human service agencies, consideration of new public transportation modes (rail), and increased marketing and education of passenger transportation services.

According to the study, to close the “baseline” demand gap (by increasing fixed-route frequency to 30 minutes, expanding daily fixed-route service to 11 p.m. weekdays, and expanding daily regional demand-response trips by 90 percent), an additional $125 million per year would be required. To close the “choice” demand gap (by increasing fixed-route frequency to 15 minutes, expanding daily fixed-route service to 11 p.m. weekdays, expanding daily regional demand-response trips by 90 percent, and expanding large urban Sunday service to eight hours a day), an additional $350 million annually would be needed.

The 2008 "Iowa Statewide Transit Facility Needs Analysis" showed that Iowa’s public transit systems are in need of 186,000 square feet of maintenance space, 14,000 square feet of operations area needs, and 660,000 square feet of indoor vehicle storage space. These facility needs come with a construction cost estimate of $74.5 million in 2008 dollars.

Other notable trends include increasing coordination between transit providers and health and human service agencies (especially through the Passenger Transportation Plan process), more employment outside of core business hours, increasing awareness of the transportation needs of Iowa's working poor, and a heightened emphasis on security needs.

Transit system goals

The Iowa DOT's Office of Public Transit identified goals specific to the transit system to guide future expansion and preservation of the system. These goals, which align with the systemwide goals identified in Chapter 5 of the Plan, include the following.

- Maintain a statewide fleet not more than 20 percent over its federal useful life.
- Provide indoor storage for all transit vehicles in Iowa.
- Improve safety of transit passengers and drivers through the use of new technologies and a public education process.
- Improve security of transit vehicles and facilities through the use of fencing and surveillance technologies.
- Provide public transit service to all areas and residents of the state a minimum of one day per week.
- Maintain an average cost-per-ride increase of less than 6 percent per year over the next 30 years.

Key issues

- Additional operational and capital funding is needed.
- The public is generally reluctant to use transit services.
- Transit ridership cost per trip is increasing.
- Seamless transfers are needed between the 35 transit systems and intercity bus service.
- Older buses require more maintenance and repairs.
- More coordination is needed between transit systems, human service organizations and school districts.
- Expanded transit services, including additional hours and weekend service, are needed.
- Indoor bus parking facilities are needed.

4.5 Rail

Railroads are a vital part of Iowa's overall transportation system, helping to move both freight and passengers safely and efficiently. Iowa has an extensive rail transportation system which transports goods throughout Iowa, the United States and to foreign markets. The ability of rail transportation to haul large volumes of freight in a safe, energy-efficient and environmentally sound manner is a major factor in Iowa's economy. In addition to freight rail transportation, Iowa has two passenger rail routes that stop at a total of six locations daily.

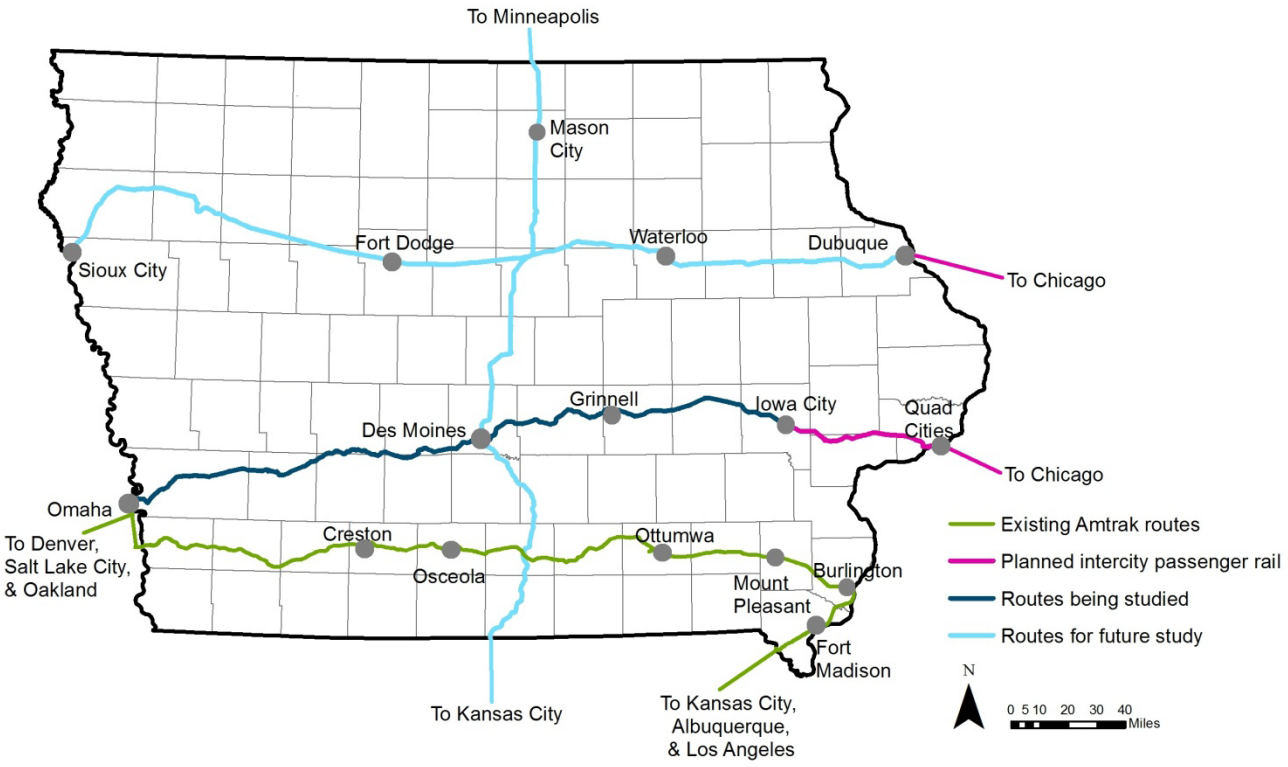
Iowa's rail system

Iowa's freight rail system, which has shrunk over time due to abandonments, consists of 3,947 miles of track. The network is owned by 18 private, for-profit railroad companies, five of which are major national and international companies operating throughout much of the United States. These companies finance the vast majority of all rail infrastructure maintenance and improvement, providing a significant public benefit with limited public investment. While rail accounts for only three percent of Iowa's 130,000-mile freight system, it carries nearly 14 percent of the state's freight tonnage. Most of Iowa's rail shipments consist of bulk commodities, such as grain, grain products, coal, biofuels and fertilizers.

Amtrak provides two long-distance passenger rail routes through southern Iowa: the California Zephyr from Chicago, Ill., to Oakland, Calif.; and the Southwestern Chief from Chicago, Ill., to Los Angeles, Calif. Together these two lines provide daily service in each direction with a total of six stops in southern Iowa (see Figure 4.15). Over the past few years, ridership on these lines has increased slightly with about 60,000 to 70,000 riders in Iowa each year.

While these two lines are a tremendous asset for the state, there is concern that most of Iowa's largest communities do not have convenient passenger rail connections to Chicago, Omaha, Minneapolis and Kansas City. The Iowa DOT's 10-Year Strategic Passenger Rail Plan envisions a network that provides service connecting Iowans to major cities, regional destinations and many other communities not typically served by commercial air or current passenger rail. The immediate goal in the first phase of this vision is to achieve passenger rail service from Iowa City (via the Quad Cities) to Chicago, as well as Dubuque to Chicago, with later phases exploring further expansion.

Figure 4.15: Passenger rail service in Iowa



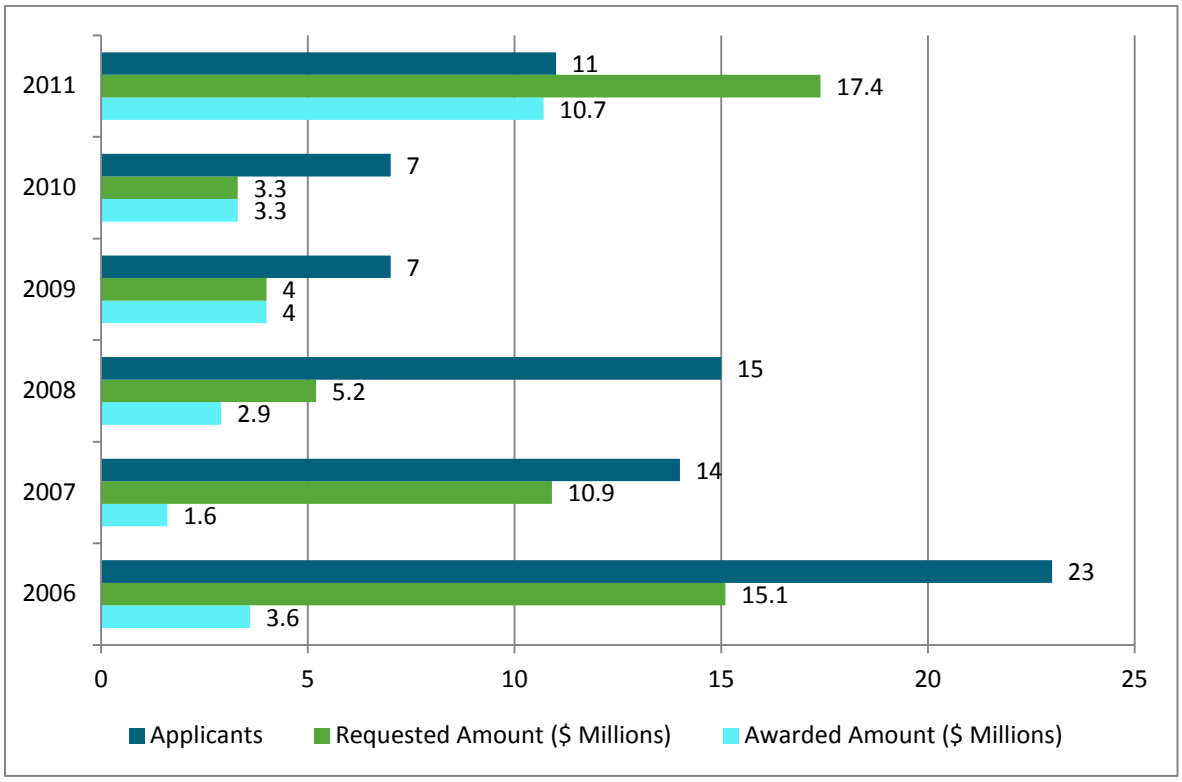
Source: Iowa DOT

Impact of rail transportation on Iowa's economy

Iowa's rail industry employs more than 4,000 workers and accounts for $277 million in wages and benefits. In 2009, railroad operation in Iowa contributed an estimated $408 million to Iowa's economy to maintain and improve their rail infrastructure. Without efficient railroad transportation, the state's economy would suffer greatly. Railroads are critical for many of Iowa's freight commodities, including corn, soybeans, chemicals, motor vehicles and other equipment, wood and paper products, minerals and ores, coal, and biofuels. The railroad's ability to haul large volumes over long distances at low costs will continue to be a major factor in moving freight and improving the economy of Iowa.

The Iowa DOT supports economic growth through rail transportation with the Railroad Revolving Loan and Grant (RRLG) Program. The RRLG Program (see Figure 4.16) provides assistance to improve rail facilities that will spur economic development and job growth, and provide assistance to railroads for preservation and improvement of the railroad transportation system. Both grants and loans are available and are awarded based on competitive applications.

Figure 4.16: Demand for RRLG Program assistance



Source: Iowa DOT, Office of Rail Transportation

In an economy greatly impacted by rising oil prices, passenger rail offers an energy-efficient and cost-effective alternative to automobile and air travel, and can connect businesses and individuals in cities across the Midwest. Passenger rail contributes significantly to economic growth and can strengthen a state's manufacturing, service and tourism industries. Along with economic benefits, passenger rail also provides environmental benefits, including reduced air pollutant emissions, fewer land use requirements, and fewer habitat and water resource disturbances.

Highlights of Iowa's rail system

- Iowa's railroads serve 90 of 99 counties and nearly half of Iowa's 947 cities.
- One train can carry the load of approximately 400 trucks.
- Each ton-mile of freight moved by rail rather than highway reduces greenhouse gas emissions by two-thirds or more.
- Railroads move a ton of freight an average of 484 miles for each gallon of fuel consumed – close to four times as far as it could be moved by truck.
- Served by two Amtrak long-distance routes, the California Zephyr and the Southwest Chief.

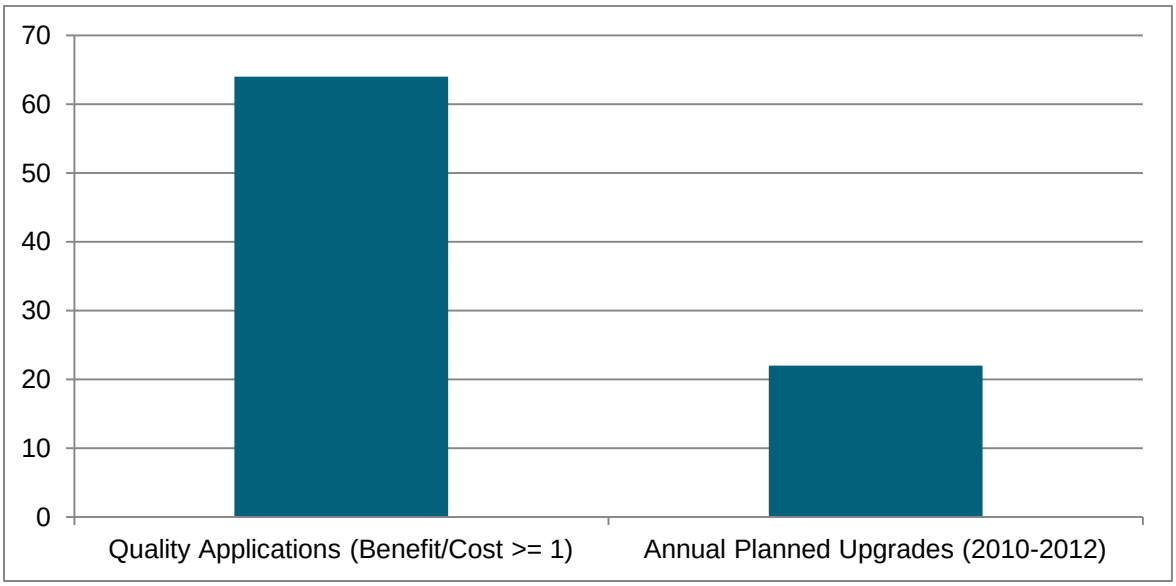
Current trends

Recent growth in freight demand has impacted rail service and equipment needs, yet a variety of issues, including financial constraints, have limited the ability to expand capacity. Manufacturers of other commodities, including wind turbines, are looking to locate along rail lines in Iowa. These developments may also result in increased freight traffic in some parts of Iowa and may lead to changes in the infrastructure needed. As a result of this growing demand and changes in the rail freight industry, rail cars are growing in size and trains are getting longer. Improvements are necessary to meet these capacity needs as nearly 20 percent of Iowa's rail-miles are not able to carry the industry-standard 286,000-pound cars.

Safety on Iowa's railroad system appears to be improving as the state is seeing fewer train derailments and highway-railroad grade crossing crashes, despite growth in both rail and highway traffic. However, although Iowa continues to improve its highway-railroad crossings, the number of crossings funded for safety and surface improvements each year lags far behind the number of crossing improvement applications (see Figure 4.17 and Figure 4.18).

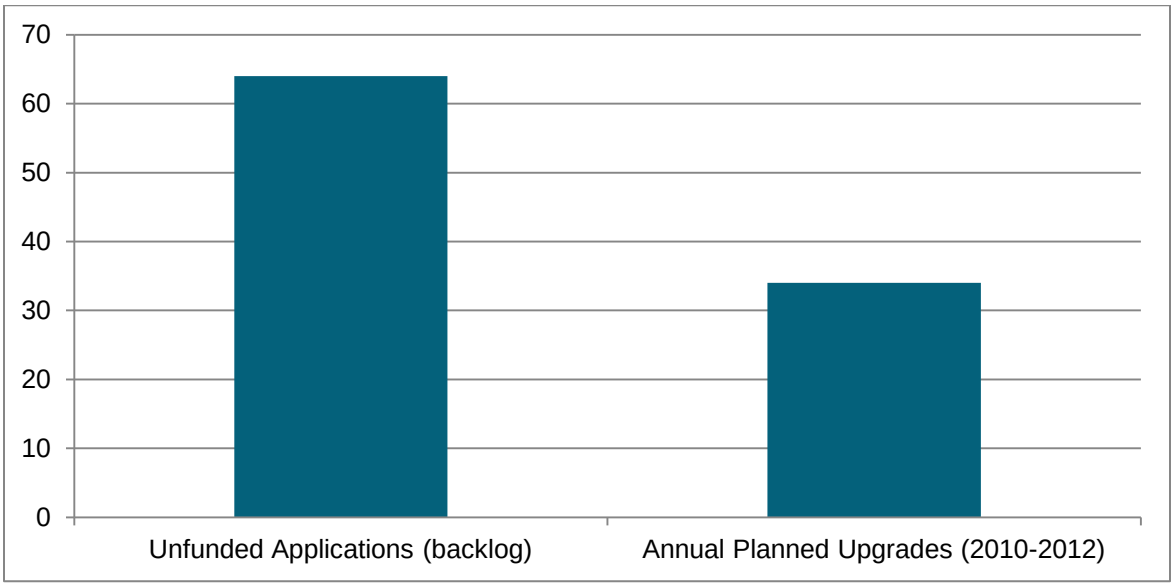
Effective Aug. 27, 2010, Iowa was one of 10 states that were required by the Federal Railroad Administration to write a five-year highway-railroad grade crossing safety action plan. This plan must focus on crossings with multiple crashes or those that are "at risk" and identify specific solutions, including closure and consolidation of at-grade crossings. The Iowa DOT anticipates approval of this plan within the one-year deadline with an implementation period between calendar years 2012 and 2016.

Figure 4.17: Crossing safety program



Source: Iowa DOT, Office of Rail Transportation

Figure 4.18: Crossing surface program



Source: Iowa DOT, Office of Rail Transportation

Key issues

- Additional funding is needed to support necessary capital expenditures.
- Additional rail capacity is needed to meet future demand.
- Additional rail spurs are needed to accommodate businesses and industries wanting to locate or expand in Iowa.
- Safety concerns related to rail infrastructure and highway-railroad crossings persist.
- Rail passenger service is limited, with no service to Iowa's larger population centers.
- Growing highway and rail traffic is increasing delays and conflicts.
- Branch line improvements are needed to handle heavier rail cars.

4.6 Water

Iowa's waterway system plays a key role in moving grain and bulk commodities to and from Iowa. This system provides Iowans a gateway to an extensive inland-waterway network that has access to international ports. While the Iowa DOT does not directly invest in this system, the department does have an advisory role with representation on the Upper Mississippi River Basin Association and the Missouri River Association of States and Tribes.

The U.S. Army Corps of Engineers maintains and improves the rivers, as well as the locks and dams, which allow safe and secure navigation for freight movement and recreational activities. To achieve a 9-foot channel in the Upper Mississippi River, the construction of a system of navigation locks and dams was authorized in 1930. Dams are built on rivers to hold back water and form deeper navigation pools, allowing river vessels to use a series of locks to "step" up or down the river from one water level to another.

Water transport fills an important role in freight movement as it has the ability to carry the most weight while offering the lowest shipping cost per ton of commodity. Although they rely on truck and rail to deliver goods, private barge terminals on the Mississippi and Missouri rivers are a key part of grain and commodity movement for products moving into and out of Iowa. The Iowa DOT maintains a River Barge Terminal Directory, which contains key information about these private terminals. The directory can be accessed at the Iowa DOT's website: http://www.iowadot.gov/barge.htm.

Impact of waterway systems on Iowa's economy

The Mississippi River and Missouri River waterway systems create a substantial impact on Iowa's economy. Some of the areas impacted by or directly related to these waterways include commercial navigation, recreation, tourism, energy production, commodity transfer, manufacturing, and mineral resources. In 2009, nearly 11 million tons of commodities (mostly grain, coal and fertilizer) moved to, from and within Iowa by water. Grain comprised the largest quantity of this tonnage, followed by coal.

Iowa borders 312 miles of the Upper Mississippi River. This area is a vital segment of the inland waterway system, providing an economic transportation link from the upper Midwest to the lower Mississippi Valley and the Gulf of Mexico. An economic profile study for the Upper Mississippi River system illustrated this impact, concluding that this river system contributes $145 billion in revenue to businesses in the corridor, with approximately 870,000 jobs associated with this economic activity. Iowa counties account for much of this corridor, which runs from Minneapolis/St. Paul, Minn., to the southern points of Missouri and Illinois.

Highlights of Iowa's waterway system

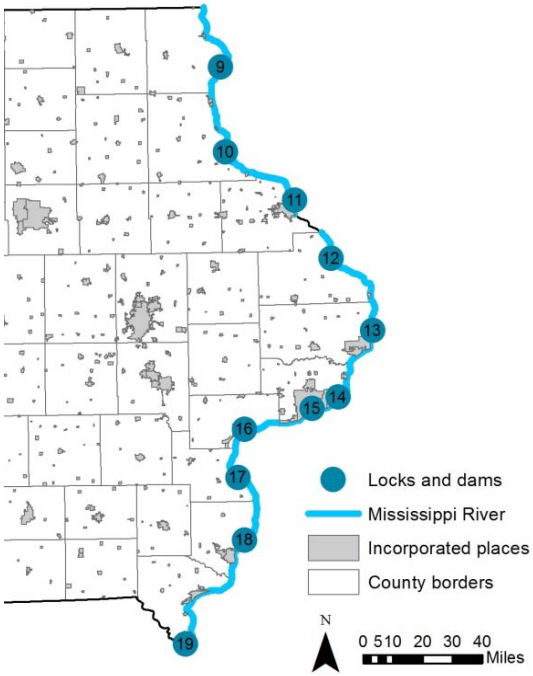
- Iowa is the only state in the nation bordered by two navigable rivers, the Mississippi and Missouri.
- All but one of the main locks located along Iowa's Mississippi River border have a 110-foot by 600-foot chamber (see Table 4.2). A 15-barge tow must double-lock, which takes about 90 minutes.
- The 1200-foot lock at Keokuk can accommodate an entire barge tow, which significantly reduces the locking time.
- Keokuk is the northernmost port on the Mississippi River open to barge traffic throughout the winter.
- One barge carries the equivalent of 13.4 jumbo train hopper cars or 58 large semitrucks.
- Water transport is more energy-efficient than both rail and truck movements.

Table 4.2: Iowa Mississippi River locks summary

Lock	Location	Chamber	River /mile	Year open	Length (feet)	Width (feet)	Owner/ Operator	Gate type
19	Keokuk, Iowa	Main	364.3	1957	1200	110	Corps	Vertical
18	Gladstone, Ill.	Main	410.5	1937	600	110	Corps	Miter
17	New Boston, Ill.	Main	437.1	1939	600	110	Corps	Miter
16	Muscatine, Iowa	Main	457.2	1937	600	110	Corps	Miter
15	Rock Island, Ill.	Main	482.9	1934	600	110	Corps	Miter
15	Rock Island, Ill.	Aux 1	482.9	1934	360	110	Corps	Miter
14	Le Claire, Iowa	Aux 1	493	1939	320	80	Corps	Miter
14	Le Claire, Iowa	Main	493	1922	600	110	Corps	Miter
13	Clinton, Iowa	Main	522.5	1938	600	110	Corps	Miter
12	Bellevue, Iowa	Main	556.7	1939	600	110	Corps	Miter
11	Dubuque, Iowa	Main	583	1937	600	110	Corps	Miter
10	Guttenberg, Iowa	Main	615.1	1936	600	110	Corps	Miter
9	Harpers Ferry, Iowa	Main	647.9	1938	600	110	Corps	Miter

Source: Iowa DOT

Figure 4.19: Lock and dam locations

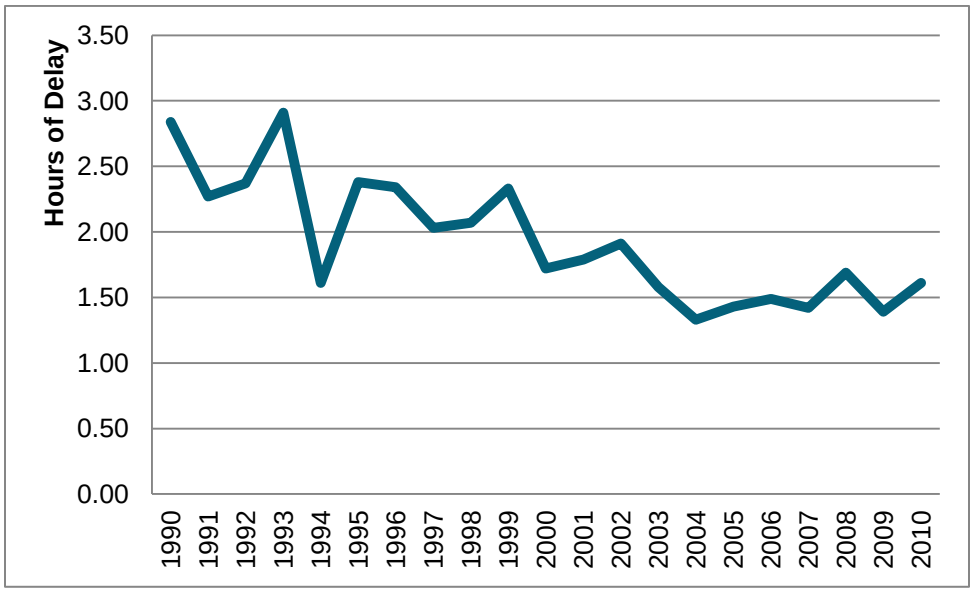


Source: Iowa DOT

Current trends

Iowa's locks and dams continue to get older. With most of the Mississippi River locks along Iowa's border having been constructed in the late 1930s, most of these structures have surpassed 70 years of age. The average delay at the locks along Iowa's border is approximately 1.5 hours (see Figure 4.20) and demand for shipping on the Mississippi River has remained stable. While demand on the Mississippi River has held strong, the Missouri River has experienced a continual drop in freight tonnages.

Figure 4.20: Average delays for Iowa Mississippi River locks



Source: Iowa DOT

Key issues

- Capacity improvements are needed on the Mississippi River.
- Flows on the Missouri River are limited in their ability to enable freight movements.
- Additional funding is needed.

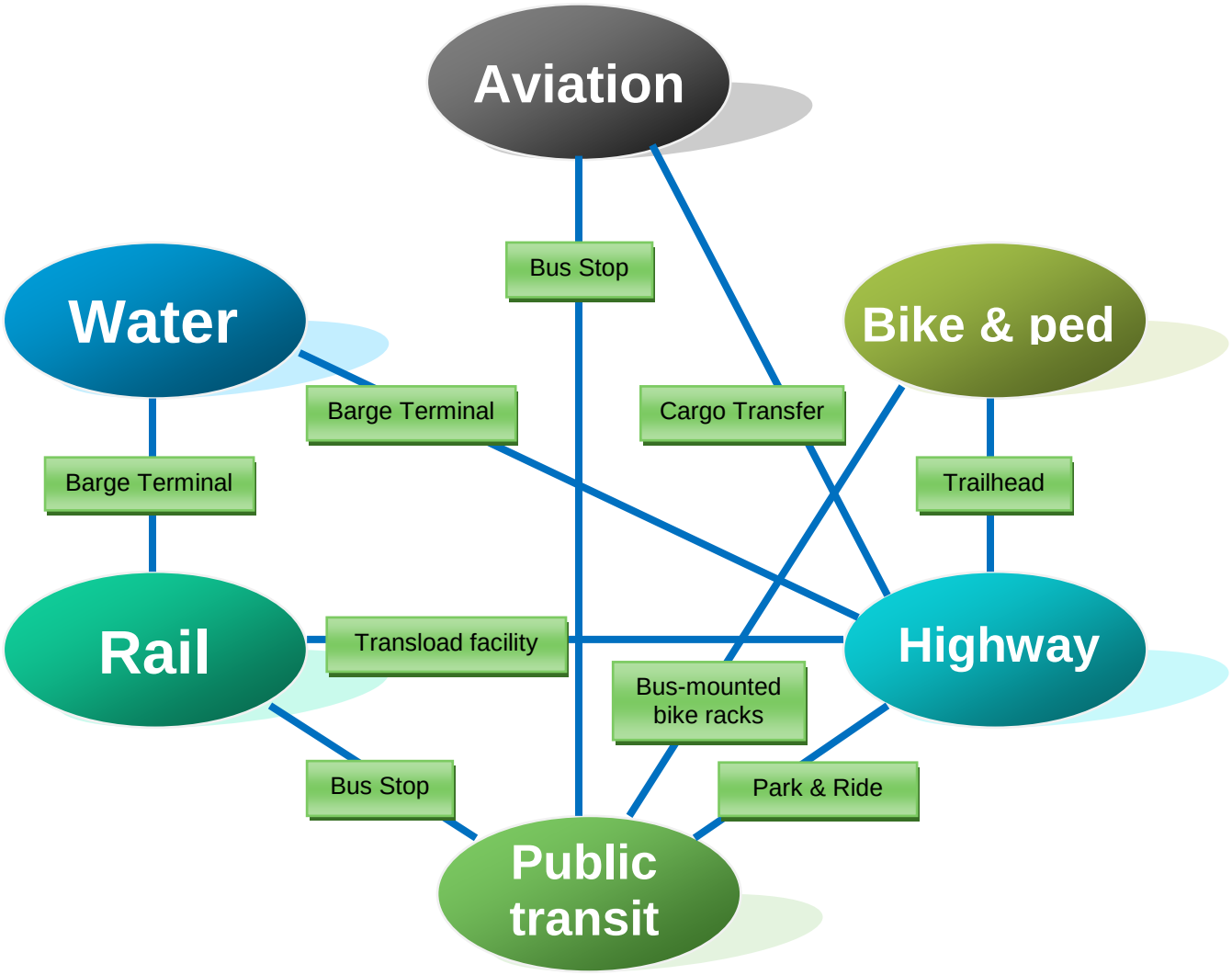
4.7 Intermodalism

According to 23 CFR § 450.214(a), "The long-range statewide transportation plan shall consider and include, as applicable, elements **and connections between** public transportation, nonmotorized modes, rail, commercial motor vehicle, waterway, and aviation facilities …" The connections referred to in this regulation are the basis for intermodalism.

The terms intermodal and multimodal are often used interchangeably, yet they can have entirely different meanings. The previous sections in this chapter have highlighted the multimodal aspects of Iowa's transportation system. The focus has been on the different modal options that could be utilized to move people or goods from one place to another. Intermodalism, however, focuses on how two or more of these modes can connect at what typically amounts to a transfer point. To put it another way, multimodal options provide the links in the transportation system, while intermodal connections are the nodes.

The Iowa DOT understands the importance of these connections, specifically as they relate to each of the goals identified in the Plan, and supports a number of funding options that can be used to finance intermodal projects. Figure 4.21 on the following page highlights some examples of intermodal facilities commonly found in the state of Iowa.

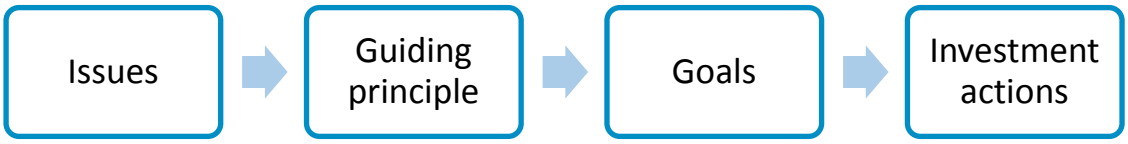
Figure 4.21: Intermodal facilities



5. Choosing our path

As discussed in Chapter 1, the first step in the development of the Plan was to collect a wide variety of input from transportation stakeholders and members of the public from across the state. The purpose of this process was to identify a comprehensive set of state, regional and local transportation issues, and to consider these needs when establishing a direction for Iowa's future transportation investments.

Key issues were identified in the previous section by each mode. Many issues are of a statewide nature, such as the increasing difficulty of maintaining acceptable condition ratings for roadways and bridges. Other issues are more regional in nature, such as river issues important to those areas along the Mississippi and Missouri rivers. Finally, some issues are very local in nature, such as a lack of sidewalks and limited trail connectivity. Through the identification of these issues, a pathway was developed for the future direction of the Plan, including the development of the guiding principle, goals, and investment actions. The following diagram illustrates this path.



5.1 Summary of issues

The following pages include a summary of the numerous issues that have been identified across the state. Addressing the following state, regional and urban issues with limited financial resources will be a challenge throughout the life of the Plan.

State transportation issues

State issues were identified in consultation with the Iowa DOT's modal offices and serve as a summary of the "key issues" identified by mode in Chapter 4.

- Inadequate funding.
- Growing systemwide maintenance needs.
- Airport facility and service improvement needs.
- Increasing demand for well-connected bicycle and pedestrian facilities.
- Increasing traffic and congestion, and continuing highway safety concerns.
- Major bridge structure concerns and increasing restrictions.
- Excessive age of transit vehicles.
- Need for expanded transit service and more coordination.
- Existing rail infrastructure is not adequate to meet future demand.
- Aging locks and dams.

Regional and urban transportation issues

Regional and urban issues were identified in consultation with the state's 18 regional planning affiliations (RPAs) and nine metropolitan planning organizations (MPOs).

Regional issues

- Regional airport facilities have expansion and maintenance needs.
- Regional bicycle and pedestrian facilities should be expanded with better connectivity and coordination with local facilities; ongoing maintenance and rehabilitation of existing facilities is needed.
- Deficiencies exist across the roadway network, including high-cost bridges, and the secondary system is impacted by heavy agricultural equipment.
- Transit user needs are changing due to an aging rural population; maintenance and expansion of services, coordination between transit systems and human service agencies, and replacement of old and inefficient buses are needed.
- Train-vehicle conflicts are increasing at rail crossings; additional intermodal facilities are needed, as is improved communication between railroads, shippers and communities.
- Outdated locks and dams create congestion and operational problems for river transport and intermodal connections at river terminals.

Urban issues

- Airport improvements and continued marketing are needed to increase air freight and passenger demand.
- More bicycle and pedestrian facilities are needed, including walkable communities with safe walkways and more seamless transfers with other modes and facilities.
- New roadway capacity is needed in some metro areas due to deficiencies related to congestion and safety at selected locations, including high-cost bridges.
- There is a need to maintain existing transit service levels, expand where justified, and improve coordination between transit systems and other modes.
- Rail crossings conflict with high-traffic roadways in metro areas; rail infrastructure needs improvement due to growing freight demand; future passenger service is a desired travel option in some metro areas.
- Outdated locks and dams create congestion and operational problems for river transport and intermodal connections at river terminals.

5.2 Guiding principle

The Plan's guiding principle, highlighted below, focuses on the provision of safe and modern transportation systems and services for individuals who travel in Iowa, as well as for the movement of freight. This guiding principle is accomplished when transportation investments support the goals identified in the following section.

"Safely moving people and goods through investments that strengthen our economic vitality."

5.3 Goals

In order to support a renewed emphasis on the stewardship of our existing transportation system, a philosophy defined in the introduction to the Plan, three broad-based and far-reaching goals have been identified.

Safety — to make Iowa a safer place to travel

Efficiency — to make the best use of resources

Quality of life — to make Iowa a better place to live, work and travel

These goals serve as the pillars upon which the investment actions are based. They are the basis for decision making and will guide investments covering all modal areas. The Plan requires a combination of preserving what infrastructure and services we currently have, as well as adding capacity where demand levels warrant. A well-maintained system that has consistent design characteristics and fosters modal interactions is essential for Iowa's continued success. Iowans have a strong desire to have a transportation system that is also sensitive to elements of the environment, such as clean air and water, protected wildlife and vegetation, low noise levels, and well-conceived land use plans.

Safety

Transportation safety and security continue to be a primary concern and an integral element in the planning and programming processes. Increased transportation safety through the reduction of crashes is the foremost element in an effective transportation system.

Efficiency

Transportation efficiency is a systemwide theme, which at its core implies the best use of available funding and a reduction in financial costs. Effective use of resources enhances Iowa's ability to compete economically. Many evaluation tools are available and will be used to achieve optimal investment decisions.

Quality of life

One of Iowa's greatest resources is the quality of life that exists within its borders, which is directly supported by the state's transportation services. Iowans value the ability to travel with ease, and the mobility provided by Iowa's transportation services supports its residents and economy while being sensitive to the environment.

Why invest in these goals?

Increased safety reduces societal impacts.

- Lost lives
- Physical, emotional and financial hardship
- Lost productivity due to disability
- Demand on emergency response

Increased efficiency reduces financial costs.

- System preservation and construction costs
- Travel time costs
- Freight shipping costs
- Vehicle operating and maintenance costs

Improved quality of life reduces migration out of Iowa.

- Supports retention and creation of good-paying jobs
- Maintains convenient access to amenities
- Enhances lifestyle options
- Provides a pleasant travel experience

Safe, Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users (SAFETEA-LU)

The current federal surface transportation bill is SAFETEA-LU. Being compliant with SAFETEA-LU is an important consideration in the transportation planning process. The three goals identified above are tied very closely to each of the eight SAFETEA-LU planning factors, which include:

1. Support economic vitality, especially by enabling global competitiveness, productivity and efficiency.
2. Increase the safety of the transportation system for motorized and nonmotorized users.
3. Increase the security of the transportation system for motorized and nonmotorized users.
4. Increase the accessibility and mobility of people and for 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 and between modes, for people and freight.
7. Promote efficient system management and operation.
8. Emphasize the preservation of the existing transportation system.

The relationships between the Plan's goals and the SAFETEA-LU planning factors are outlined in Table 5.1 .

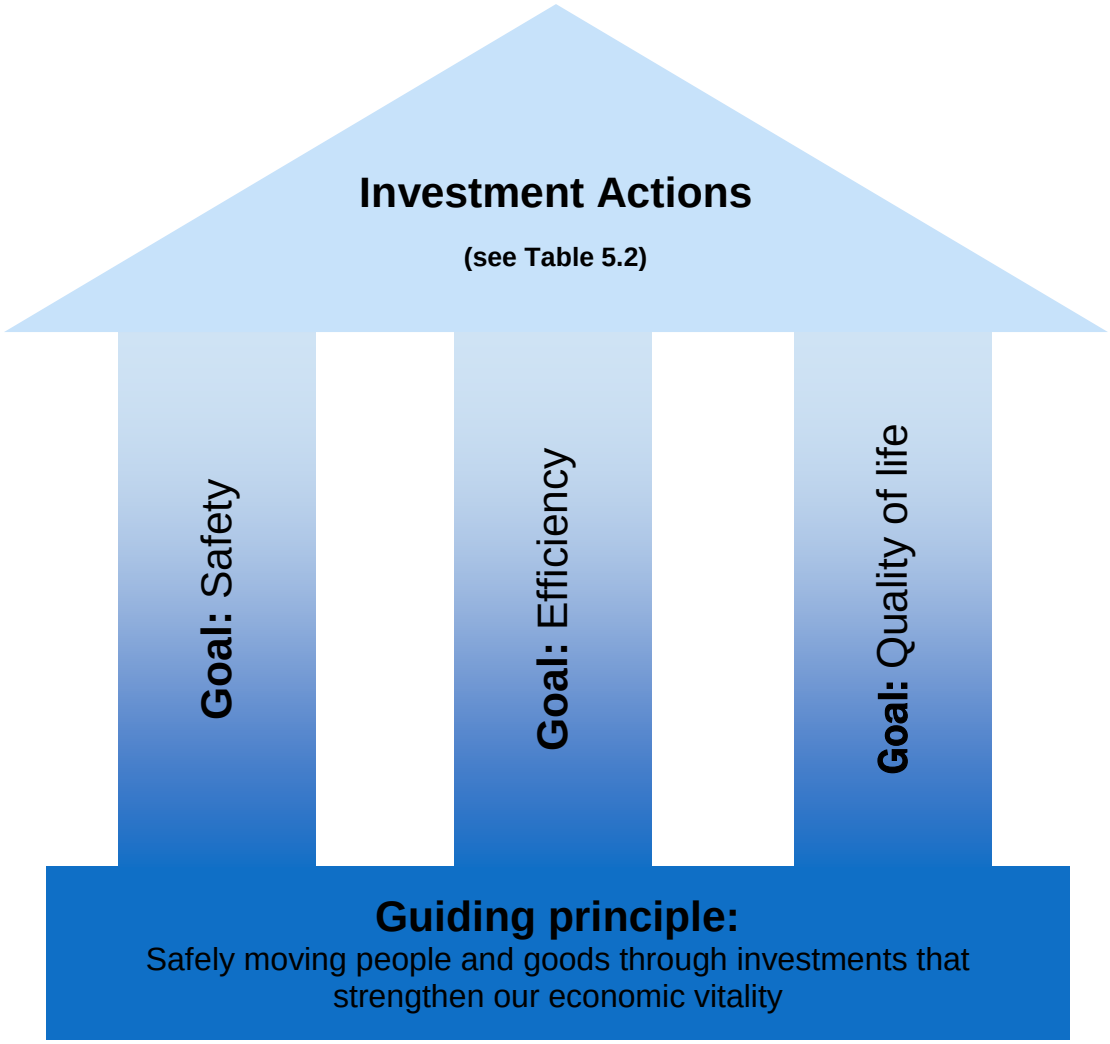
Table 5.1: Relationship between Plan goals and SAFETEA-LU planning factors

	Safety	Efficiency	Quality of life
1. Economic vitality	✓	✓	✓
2. Safety	✓		
3. Security	✓		
4. Accessibility and mobility			✓
5. Environment, energy, quality of life and consistency	✓	✓	✓
6. Connectivity			✓
7. Efficient system management and operation		✓	
8. System preservation		✓	

Source: Iowa DOT

It should be noted that possible future planning factors are currently being discussed at the national level. Some of these may eventually become part of the next federal transportation bill. Common themes have included performance-based planning, mobility and access, alternative transportation, sustainability, and livability. However, because no bill has been passed to date, these hypothetical planning factors were not specifically addressed in Table 5.1.

Guiding principle and goals



As a result of the identification of the guiding principle and goals, the investment actions were then considered.

5.4 Investment actions

The investment actions listed on the following pages are categorized by the three goals — safety, efficiency and quality of life — and are grouped by each mode. These investment actions will serve as a guide for the Iowa DOT's future financial investments. In addition, as the Iowa DOT's MPO and RPA partners draft their long-range transportation plans, they are also developing investment actions and projects that align with both their local planning goals and these statewide initiatives.

The investment actions in Table 5.2 were derived from the input received as part of the Iowa DOT's public outreach efforts as well as other departmental plans, studies and reports. Other considerations were the analysis of Iowa's demographic and economic trends, movement of people and goods, and condition of the system. The investment actions build upon the previous state transportation plan and will complement and support this Plan's guiding principle and goals and the stewardship of our existing transportation system.

Appendix 2 contains information that reflects public input related to the prioritization of the following investment actions.

Table 5.2: Investment actions by mode and goal

	Safety	Efficiency	Quality of life
Aviation	Enhance aviation safety through awareness and education programs Maintain and enhance the statewide network of aviation weather observation systems Improve runway approaches through obstruction removal and mitigation funding Promote implementation of compatible land use guidelines near airports Promote and assist in active wildlife management at airports Promote communication between airports and local emergency personnel	Maintain and enhance airside facilities Maintain and enhance aviation vertical infrastructure facilities Maintain adequate accessibility to commercial air service Maintain adequate accessibility to airports with weather reporting and instrument approaches Encourage airport long-range business model planning Evaluate implementation of NextGen navigation within the state	Support a system of airports that meets the air transportation needs of businesses and citizens Promote an understanding of the benefits of Iowa's air transportation system Support a system of airports that provides educational and career opportunities Promote the need for aviation services to meet user needs at airports

	Safety	Efficiency	Quality of life
Bicycle and pedestrian	Develop recommended facility maintenance and signage practices Develop pedestrian safety program Expand bicycle safety program Develop projects that minimize barriers and promote more walking and bicycling to school	Focus investments on statewide Level 1 trails Continue investments on regional and local Level 2 and 3 trails Improve coordination and cooperation among trail developers (in-state and across borders) Maintain a bicycle and pedestrian facility data inventory Support the acquisition of abandoned rail lines for trail development	Provide accessible accommodations on Iowa's roadway corridors for bicycles and pedestrians (e.g., complete streets policy) Promote bicycling and walking as an alternative to driving to reduce emissions and improve the health and mobility of citizens Continue and enhance proactive involvement in education, promotion, and advocacy Update state bicycle map on a regular basis

	Safety	Efficiency	Quality of life
Highway	Target highway investments to reduce fatalities and major injuries Support the Iowa Comprehensive Highway Safety Plan Better accommodate the increasing number of elderly drivers Support access management improvements and planning Enhance security of highways and bridge structures	Preserve and rehabilitate existing highways and bridge structures Target selected capacity improvements to address access and operational needs Incorporate intelligent transportation systems (ITS) to improve system operation Enhance multimodal freight planning Support highway research initiatives Support living roadways and roadside vegetation to minimize maintenance costs Consider work zone impacts throughout the project development process to maximize vehicular mobility and work zone safety	Support economic development projects for local governments Reduce transportation-related congestion and emissions Accommodate other modes as appropriate Support living roadways and roadway vegetation to enhance our environment Develop projects in a context sensitive manner that supports all users and enhances natural resources Accommodate public utilities as appropriate

	Safety	Efficiency	Quality of life
Public transit	Improve safety for transit passengers Assist transit agencies with driver training, including efforts to enhance the safety of pedestrians exposed to transit vehicle traffic Assist transit agencies' efforts to improve and maintain worker safety at transit facilities Assist transit agencies in improving security of transit vehicles and facilities	Assist transit agencies in acquiring new vehicles and facilities Improve and maintain existing transit facilities Support commuter services Support intercity bus services Assist transit agencies in developing computerized dispatch capabilities Encourage increased coordination between transit agencies, human service organizations and school districts	Focus on public transit's role to improve Iowa's economy and overcome mobility barriers Encourage transit agencies and intercity bus companies to provide seamless service across agency boundaries and between modes Promote transit and intercity bus as an alternative to driving to reduce congestion and emissions Consider and promote accessible pedestrian connections to transit facilities
Rail	Improve highway-rail crossing safety Monitor rail safety and security conditions Promote general rail safety	Improve the rail system physical infrastructure Preserve existing rail freight and passenger service and develop additional passenger service Assist business community in improvement of spur tracks and construct where appropriate Monitor rail regulatory issues Educate potential users on the benefits of rail transportation and facilitate availability of rail to shippers	Reduce rail-related congestion and air pollution Develop rail passenger services to provide increased mobility and encourage economic development Preserve historic and cultural rail facilities Serve as rail information and conflict resolution clearinghouse Promote rail as a sustainable freight and passenger alternative

	Safety	Efficiency	Quality of life
Water	Support navigation safety improvements	Support navigation infrastructure improvements Promote commercial navigation	Support river ecosystem restoration activities
Miscellaneous	Participate in and promote safety and security planning and programs Support local governments and planning agencies in safety conscious planning	Support regional and metropolitan transportation planning activities Participate in freight and passenger planning efforts Conduct and participate in transportation research Better integrate internal technology for efficient analysis and support	Enhance and expand the 511 system Expand Intelligent Transportation System (ITS) development

Some of the investment actions outlined above will be accomplished by departmental staff efforts and are covered by internal administrative funding. Other investment actions will be paid for by dedicated federal, state and local transportation funding sources.

The following chapter, “Paying Our Way,” provides information on how the Iowa DOT will pay for the investment actions outlined in this chapter.

6. Paying our way

In this chapter the Plan will highlight the financial implications of investing in the actions previously identified in Chapter 5, “Choosing our path." The discussion includes the following information for each mode through 2040.

- Cost to maintain and improve the system
- Anticipated future revenues
- Potential shortfall and its implications

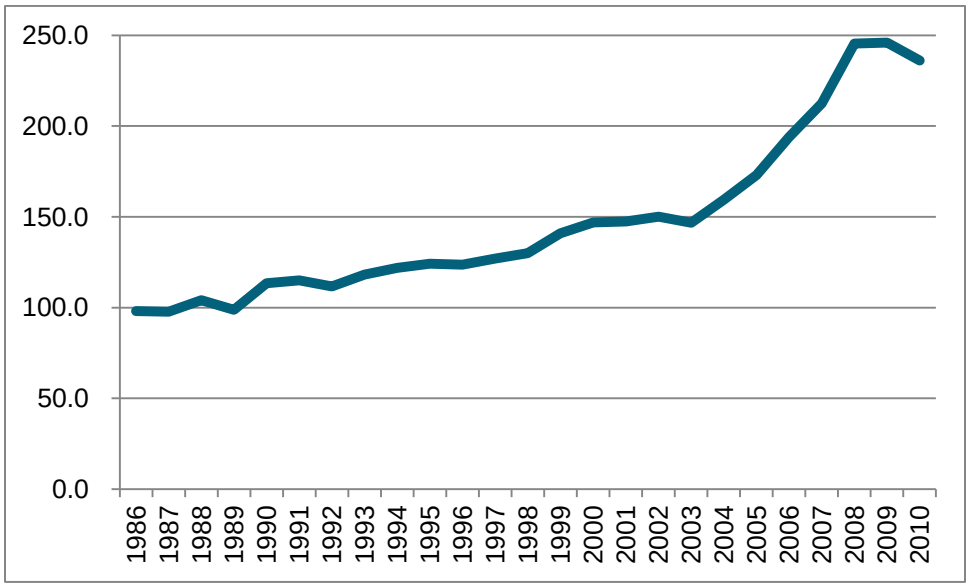
6.1 Introduction

The costs and revenues discussion in this chapter is framed primarily within the context of the Iowa DOT’s Five-Year Program, which is the basis for the terms “Iowa DOT costs” and “Iowa DOT revenues” used in this chapter. Both costs and revenues are presented in average annual future year dollars. The most critical piece of information presented in this chapter is the shortfall between anticipated future costs and revenues.

The costs associated with nearly all goods and services, including those in transportation, typically increase over time. The term for this increase in costs over time is inflation, which is often expressed as a rate or index. An oft-referenced index in the transportation industry is the Construction Cost Index, which is shown using Iowa data in Figure 6.1.

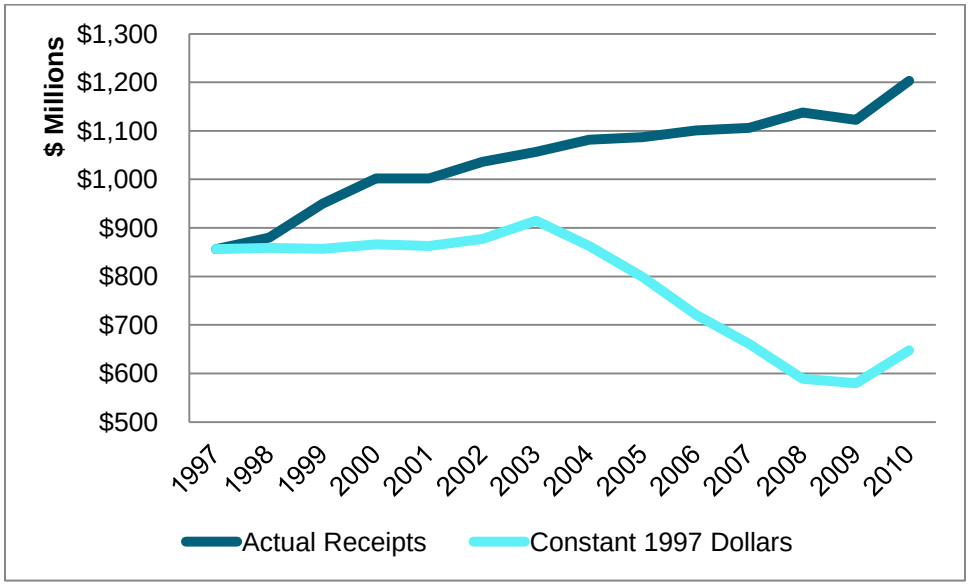
To better illustrate the impacts of this inflation, consider that a $1 million project in the mid-1980s would cost approximately $2.4 million today. Over time, the effects of cost inflation erode the buying power of available revenue. An example of this is illustrated in Figure 6.2, which shows Road Use Tax Fund (RUTF) revenue history adjusted to constant 1997 dollars based on the Iowa Construction Cost Index.

Figure 6.1: Composite Price Trend Index for Iowa highway construction (percent of 1986 base)



Source: Iowa DOT, Office of Contracts

Figure 6.2: History of Road Use Tax Fund revenue



Source: Iowa DOT

The impact of increasing costs is compounded by the fact that much of Iowa's revenue stream for transportation construction, maintenance and operations has remained relatively stagnant. An example of this is Iowa's motor fuel tax, which has effectively remained the same for more than two decades while highway construction costs have increased by nearly 140 percent. In comparison, four of the six states bordering Iowa have a higher fuel tax, averaging $0.27 per gallon.

With transportation costs increasing faster than revenues, Iowa's transportation system will be subject to more widespread deterioration. The level of revenues received is affected by a number of factors, including, but not limited to, the amount of federal dollars appropriated, vehicle fuel efficiency, and the use of alternative fuels, such as ethanol and biodiesel. Regardless, an adequate level of revenue is necessary to support the state's future transportation system and keep Iowa competitive in an ever-changing economy.

6.2 Annual transportation funding

Table 6.1 highlights the budgeted distribution of new transportation funding to the Iowa DOT by state fiscal year (SFY). Note that these figures do not include federal highway or transit funds administered by the Iowa DOT but transferred to local jurisdictions for local programming authority.

Table 6.1: Annual Iowa DOT Transportation funding ($ millions)

	Annual average, SFY 2000-2011	SFY 2011
Highway	$672.826	$741.986
Aviation	$3.336	$4.450
Bike/Pedestrian (trails)*	$1.583	$0
Public transit	$11.150	$12.239
Railroad	$3.351	$13.100
General services**	$71.899	$76.006
Motor vehicle	$36.219	$40.659
Total	**$800.364**	**$888.440**

Source: Iowa DOT, Office of Program Management

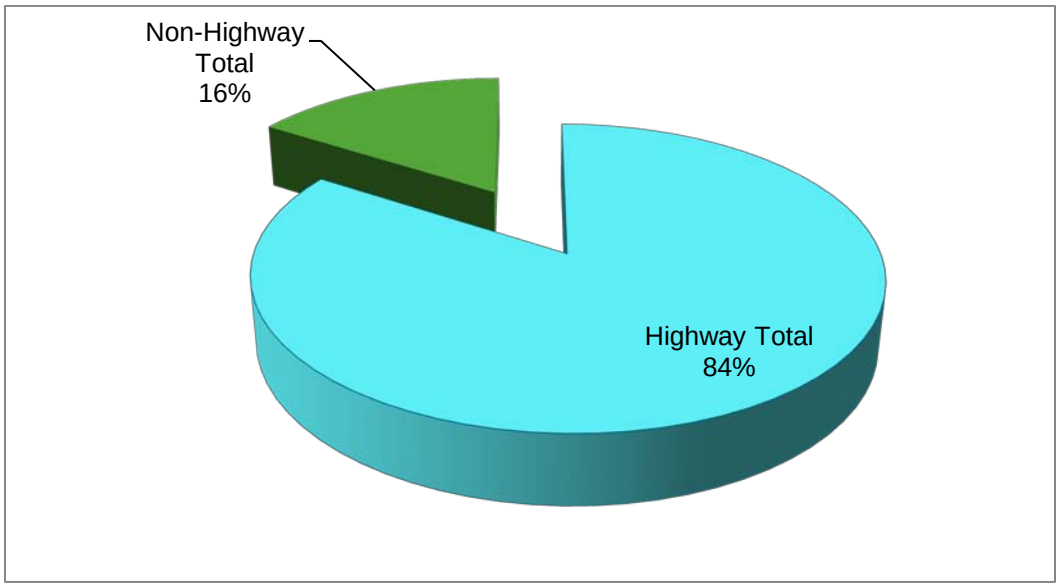
*Trails funding does not include Federal Recreational Trails program or Statewide Transportation Enhancement program funding.
**General services include various special purpose operations and capital funding.

Figure 6.3 illustrates the recent history of total Iowa DOT-programmed transportation funding. While this total has increased at a steady pace in recent years, it cannot fully address the growing list of needs and escalating costs associated with meeting those needs. Figure 6.4 and Figure 6.5 highlight the distribution of funds to highways and various nonhighway categories.

Figure 6.3: History of total Iowa DOT-programmed transportation funding

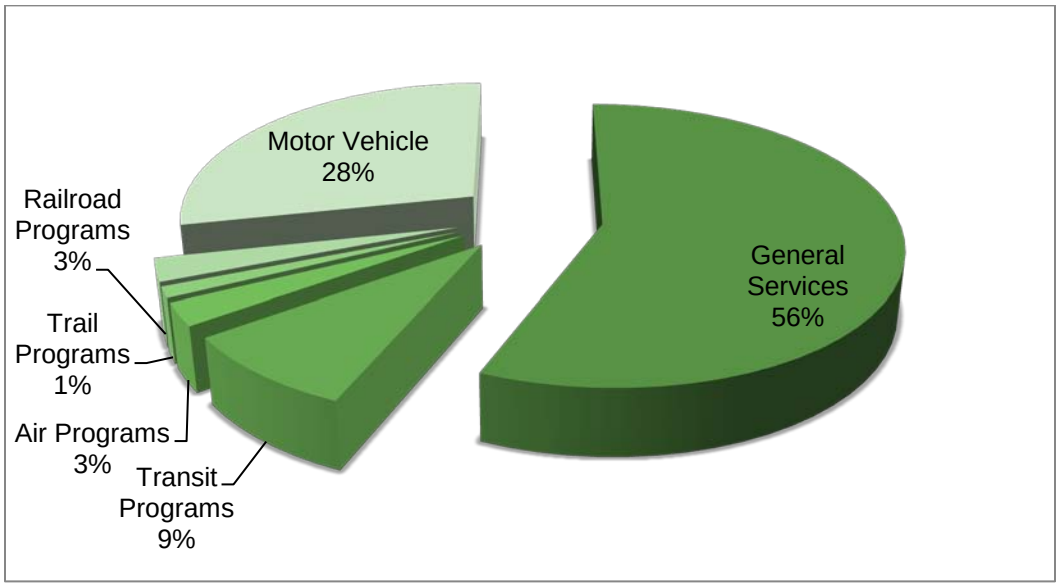
Source: Iowa DOT, Office of Program Management

Figure 6.4: Distribution of Iowa DOT-programmed transportation funding (2000-2011)



Source: Iowa DOT, Office of Program Management

Figure 6.5: Distribution of Iowa DOT-programmed, nonhighway transportation funding (2000-2011)



Source: Iowa DOT, Office of Program Management

6.3 Future costs and revenues by mode

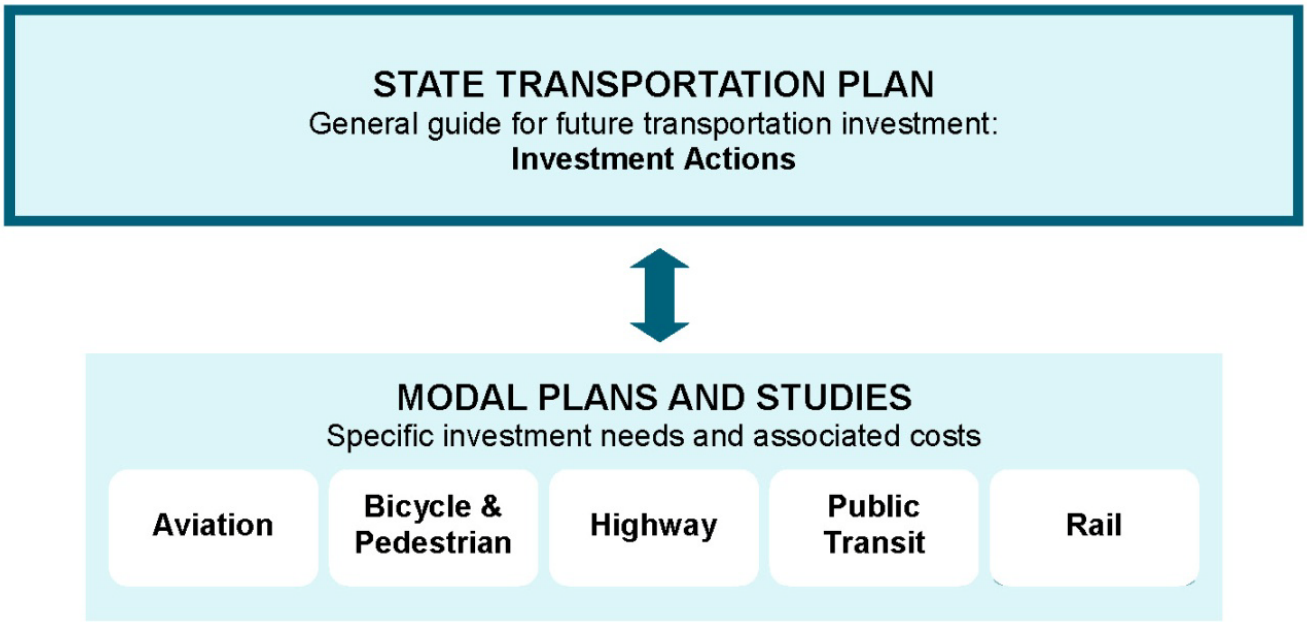
The following pages highlight the cost of the Iowa DOT's future investment in the state's transportation system versus the anticipated revenues. As was previously mentioned, this discussion is framed within the context of the Iowa DOT's Five-Year Program, which is the basis for the terms "Iowa DOT costs" and "Iowa DOT revenues" used in this section. Both costs and revenues are presented in average annual future year dollars.

It is important to note that the costs identified in this chapter are not derived directly from the investment actions highlighted in Chapter 5. While the investment actions serve as a general guide for the Iowa DOT's future financial investments, specific costs for each mode were developed from the investment needs identified in the individual modal plans and studies (see Figure 6.6). These plans and studies are referenced in the following sections.

Also, while the focus of this chapter is on Iowa DOT revenues, it should be noted that there are significant sources of revenue for each mode that can be applied toward those costs that exceed or are not eligible for Iowa DOT-programmed funds. Some examples of these revenue sources include, but are not limited to, the following (listed alphabetically).

- **Aviation:** Bonding, Federal Aviation Improvement Program, passenger facility charges, property tax levy
- **Bicycle and pedestrian:** Local jurisdiction funds, private investment, Resource Enhancement and Protection funds
- **Highway:** Farm-to-Market Road Fund, Secondary Road Fund, Street Construction Fund, federal discretionary funds
- **Public transit:** Fare box revenue, federal discretionary funds, property tax levy
- **Rail:** Federal discretionary funds, private investment, Railroad Rehabilitation & Improvement Financing program

Figure 6.6: Relationship between investment actions and specific modal costs



Source: Iowa DOT

Aviation

Costs

Costs for aviation were derived from the Iowa Aviation System Plan update that was completed in 2011. The system plan identified statewide maintenance and improvement needs that totaled approximately $816 million over the 20-year planning period, or nearly $41 million annually (in 2010 dollars). The annual costs for meeting these needs were projected to 2040 using an annual inflation rate of 5.9 percent, which was based on the growth of Iowa's Construction Cost Index. **Average annual total costs** over the life of the Plan were then calculated.

To bring these costs into the context of the Five-Year Program, the portion of total aviation costs statewide that has historically been addressed through the aviation element of the Five-Year Program was examined. (The aviation element of the Five-Year Program has included State Aviation Fund, Rebuild Iowa Infrastructure Fund, and annual appropriation funds.) Between 2005 and 2010, this portion was nearly 7.2 percent. This percentage was then applied to the average annual total costs mentioned above to estimate **average annual Iowa DOT costs** shown in Table 6.2.

Table 6.2: Aviation costs ($ millions)

	Average annual total costs	Average annual Iowa DOT costs
Total	$113.406	**$8.122**

Source: Iowa DOT

Revenues

Revenues for aviation were derived from historical funding identified in the aviation element of the Five-Year Program. A linear trend line was applied to the historical data from state fiscal years 2000 through 2011 and then projected out to 2040. **Average annual Iowa DOT revenues** (Table 6.3) over the life of the Plan were then calculated. Note that aviation revenues are largely dependent upon annual legislative appropriations, aircraft registrations and fuel sales.

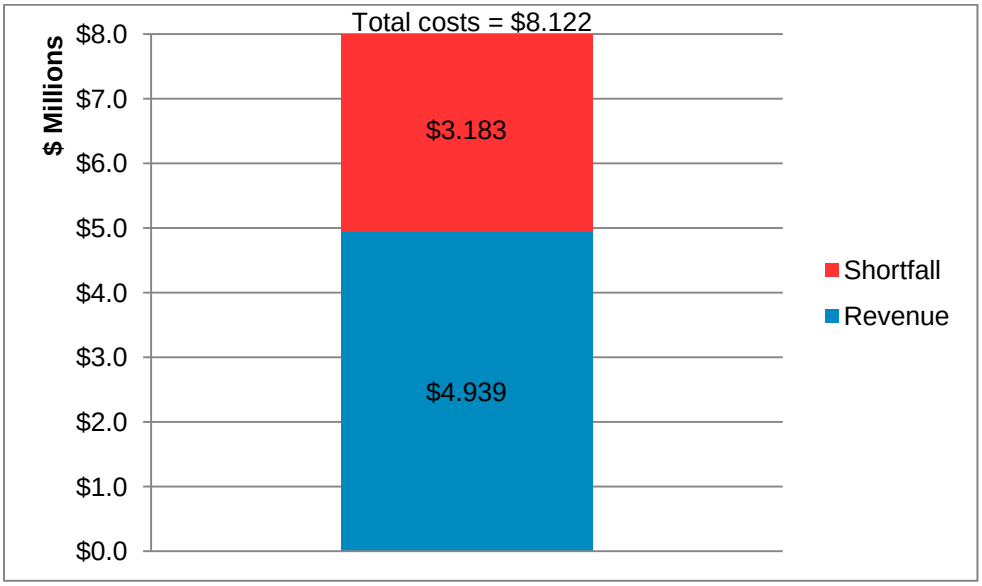
Table 6.3: Aviation revenues ($ millions)

	Average annual Iowa DOT revenues
Total	**$4.939**

Source: Iowa DOT

The difference between average annual costs and revenues is illustrated in Figure 6.7. As estimated, anticipated revenues would cover approximately 60 percent of the anticipated costs.

Figure 6.7: Aviation shortfall



Source: Iowa DOT

Implications of the shortfall

- All objectives related to infrastructure and services may not be met, affecting the ability to address the needs of aviation users.
- Access to aviation services may not be maintained or enhanced, negatively impacting economic development.
- Planning for infrastructure, air space protection, emergency response, and local business development to ensure the most efficient and safe system may be inadequate.

Bicycle and pedestrian

Costs

Costs for bicycle and pedestrian were derived from the statewide trail network envisioned in the Iowa Trails 2000 plan. This 4,908-mile network was expected to be completed by 2056 if the average rate of trail construction at the time (78 miles per year) continued. For the purposes of the Plan, bicycle and pedestrian costs were calculated assuming the remaining portion of the network (approximately 3,100 miles) would be completed by 2060. This would necessitate the construction of nearly 64 miles of trails each year.

With this construction rate in mind, annual costs were calculated using per-mile construction and rehabilitation costs (based on a 20-year life cycle) derived from Iowa Trails 2000. These costs (factored to 2010 dollars) were projected to 2040 using an annual inflation rate of 5.9 percent, which was based on the growth of Iowa's construction cost index. **Average annual total costs** over the life of the Plan were then calculated.

To bring these costs into the context of Iowa DOT costs, the portion of annual statewide trail construction supported through the programs mentioned in the following section was used. On average, this portion is approximately 47 percent. This percentage was then applied to the average annual total costs mentioned above to estimate **average annual Iowa DOT costs** shown in Table 6.4.

A similar methodology was used to calculate the costs associated with Iowa's Level 1 trail network, which is a smaller priority subset of the larger Iowa Trails 2000 network. An estimated 577 miles of this 1,230-mile system have been constructed. The costs shown in Table 6.4 assume that the remaining 653 miles will be completed by 2040.

Table 6.4: Bicycle and pedestrian trail costs ($ millions)

	Average annual total costs	Average annual Iowa DOT costs
New construction	$24.957	-
Rehabilitation	$57.027	-
Total	$81.984	**$38.259**
Construction and rehab. (Level 1 only)	$51.440	**$24.005**

Source: Iowa DOT

Revenues

Revenues for bicycle and pedestrian were derived from historical funding identified in the trail element of the Five-Year Program (which includes only the State Recreational Trails Program) plus funding from the Federal Recreational Trails Program, Statewide Transportation Enhancement Program, and Primary Road Fund used for on-road accommodations. A linear trend line was applied to the historical data from state fiscal years 2000 through 2011 and then projected out to 2040. **Average annual Iowa DOT revenues** (Table 6.5) over the life of the Plan were then calculated.

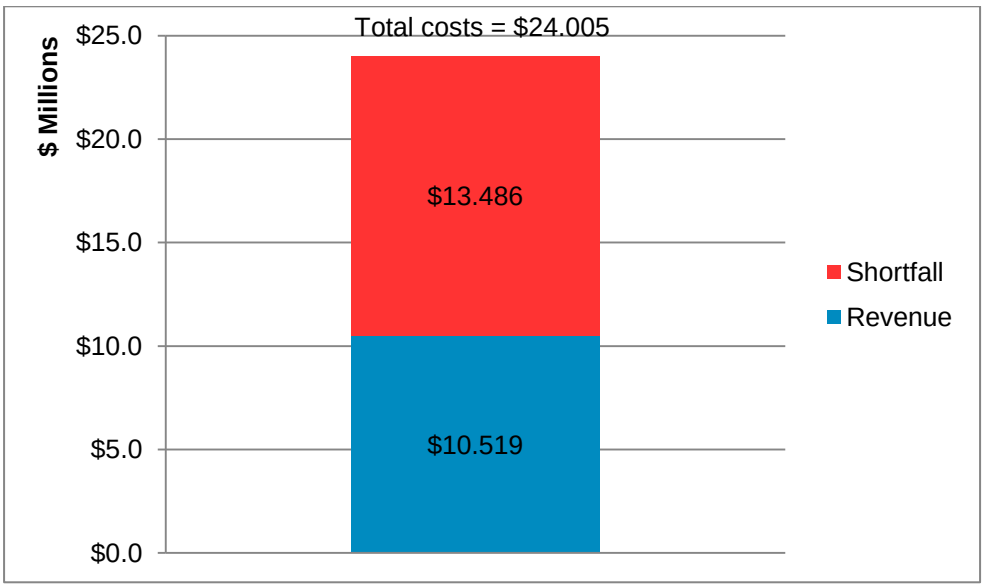
Table 6.5: Bicycle and pedestrian revenues ($ millions)

	Average annual Iowa DOT revenues
Total	**$10.519**

Source: Iowa DOT

The difference between average annual costs and revenues is illustrated in Figure 6.8. As estimated, anticipated revenues would cover approximately 44 percent of the anticipated costs associated with rehabilitation and Level 1 construction. By comparison, the same revenues would only fund an estimated 27 percent of the costs associated with the larger Iowa Trails 2000 network.

Figure 6.8: Bicycle and pedestrian shortfall



Source: Iowa DOT

Implications of the shortfall

- Some trails, including Level 1 trails, may not be built, creating a disconnected and segmented system.
- Some existing trails may not be adequately maintained.
- There may be fewer facilities available to accommodate potential bicyclists and pedestrians for recreational opportunities, adversely impacting health, quality of life, and the state's tourism economy.

Highway

Costs

Costs for highway were derived from the Iowa DOT's 2011 study of roadway needs and RUTF revenues. The study identified both total statewide needs and critical statewide needs, with the critical need level being the amount of funding necessary to meet the most critical pavement and bridge preservation needs on Iowa's roadways. In addition, the critical need level would partially support the following categories of needs.

- Capacity improvements on high-volume Commercial and Industrial Network (CIN) roads.
- Reconstruction of high-volume roads with poor pavement.
- Repair/replacement of functionally obsolete bridges on high-volume roads.
- Repair/replacement of structurally deficient bridges on low-volume roads.
- Resurfacing of low-volume roads.

Each category of needs (i.e., costs) was provided as both a 20-year total and as an average annual figure. These **average annual costs** were then projected over the life of the Plan.

To bring these costs into the context of the Five-Year Program (i.e., the Primary Highway System), the portion of statewide needs that can be attributed to the Primary Highway System was examined. This percentage was then applied to the average annual total and critical costs mentioned above to estimate **average annual Iowa DOT costs** shown in Table 6.6 and Table 6.7.

Table 6.6: Total highway costs ($ millions)

	Average annual total costs	Average annual Iowa DOT costs
Total	$3,990.000	$1,911.594

Source: Iowa DOT

Table 6.7: Critical Highway Costs ($ millions)

	Average annual critical costs	Average annual Iowa DOT costs
Total	$2,580.000	**$1,236.068**

Source: Iowa DOT

Revenues

Revenues for highway were also derived from the Iowa DOT's 2011 study of roadway needs and RUTF revenues. Future revenue assumptions for federal formula funds, RUTF revenues, and Transportation Investment Moves the Economy in the Twenty-First Century Fund (TIME-21) revenues were applied to fiscal year 2012 funding levels for each of these sources and then projected out to 2040. **Average annual Iowa DOT revenues** (Table 6.8) over the life of the Plan were then calculated.

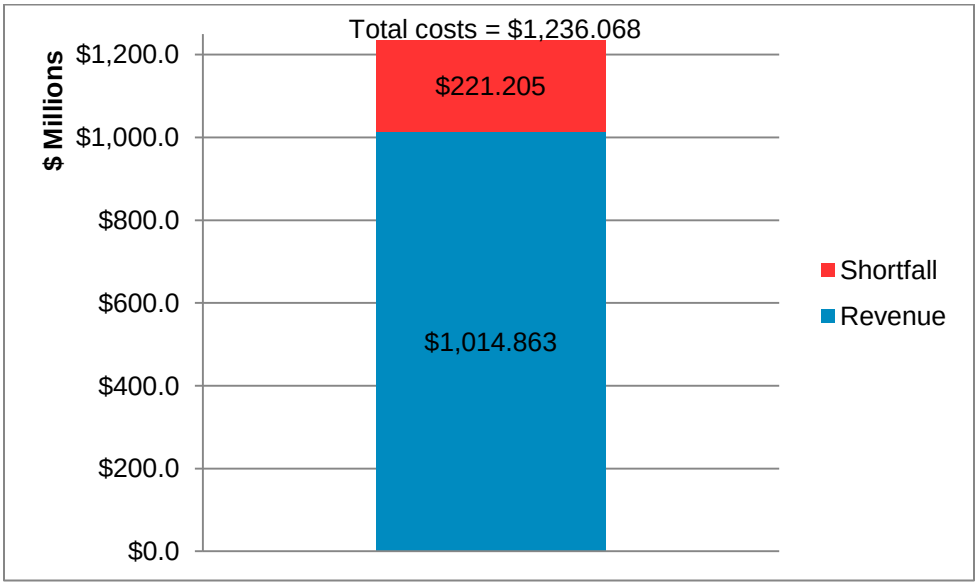
Table 6.8: Highway revenues ($ millions)

	Average annual Iowa DOT revenues
Total	**$1,014.863**

Source: Iowa DOT

The difference between average annual critical costs and revenues is illustrated in Figure 6.9. As estimated, anticipated revenues would cover approximately 82 percent of the anticipated costs.

Figure 6.9: Highway shortfall



Source: Iowa DOT

Implications of the shortfall

- Some improvements on the urban interstate system may not be addressed, which could lead to increased congestion and travel times.
- Some improvements on the rural interstate system may not be addressed, which could lead to poorer pavement conditions.

- Some improvements on the CIN may not be addressed, which could lead to fewer economic development opportunities and slower job growth.
- Some corridor improvements and work on other major projects, including major bridge structures, may not be addressed.
- Future modernization of the existing system will be a challenge.

Public transit

Costs

Costs for public transit were derived from the "Iowa Passenger Transportation Funding Study" that was completed in 2009. The funding study identified annual operating and capital costs for current services offered by the state's 35 public transit providers, as well as annual incremental costs associated with addressing unmet "baseline" and "choice" demand. For the purposes of the Plan, the costs for meeting the baseline demand were used, which would support both current services and the following statewide improvements.

- Increase service frequency to 30 minutes for small and large urban fixed-route systems.
- Expand daily service to 11 p.m. on weekdays for large urban systems.
- Expand daily regional paratransit trips by 90 percent.

The total annual costs for meeting baseline demand (identified in the funding study in 2009 dollars) were projected to 2040 using an annual inflation rate of 3.2 percent, which has been the annual inflation in public transit costs over the past decade. **Average annual total costs** over the life of the Plan were then calculated.

To bring these costs into the context of the Five-Year Program, the portion of total public transit costs statewide that has historically been addressed through the transit element of the Five-Year Program was examined. (The transit element of the Five-Year Program includes State Transit Assistance funds and Public Transit Infrastructure Grant funds.) Between 2000 and 2011, this portion was just more than 12 percent. This percentage was then applied to the average annual total costs mentioned above to estimate **average annual Iowa DOT costs** shown in Table 6.9.

Table 6.9: Public transit costs ($ millions)

	Average annual total costs	Average annual Iowa DOT costs
Capital	$52.357	-
Operating	$361.559	-
Total	$413.916	**$49.902**

Source: Iowa DOT

Revenues

Revenues for public transit were derived from historical funding identified in the transit element of the Five-Year Program plus an average annual amount of Iowa's Clean Air Attainment Program (ICAAP) funding that has been awarded to transit projects over the life of the program. A linear trend line was applied to the historical data from state fiscal years 2000 through 2011 and then projected out to 2040. **Average annual Iowa DOT revenues** (Table 6.10) over the life of the Plan were then calculated.

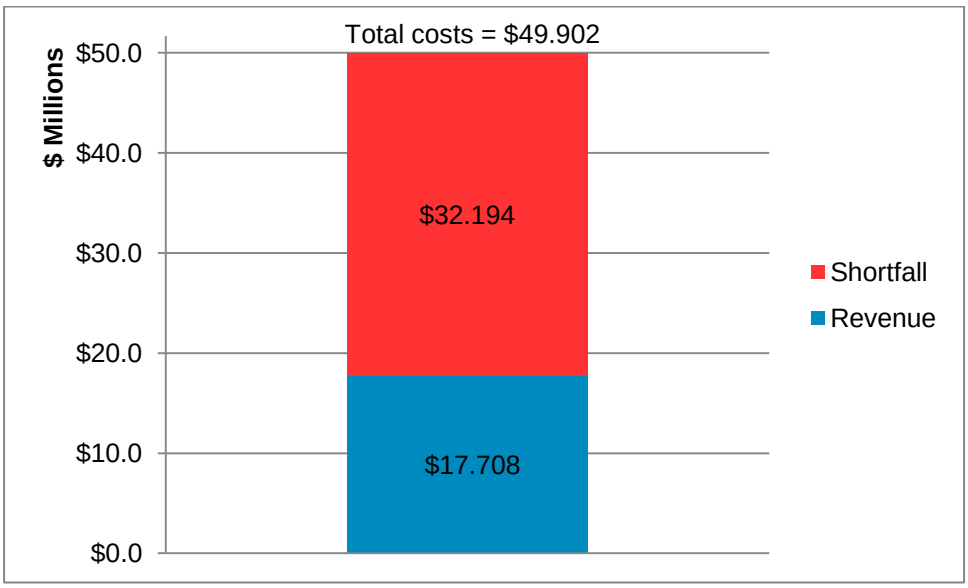
Table 6.10: Public transit revenues ($ millions)

	Average annual Iowa DOT revenues
Total	**$17.708**

Source: Iowa DOT

The difference between average annual costs and revenues is illustrated in Figure 6.10. As estimated, anticipated revenues would cover approximately 35 percent of the anticipated costs.

Figure 6.10: Public transit shortfall



Source: Iowa DOT

Implications of the shortfall

- Slow bus replacement will lead to an aging bus fleet and increasing maintenance costs.
- Future plans for service expansions may be delayed, and some existing services may be eliminated.
- Transit facilities may not be repaired or improved in a timely manner.

Rail

Freight rail costs

Costs for freight rail were derived from an analysis of historical and anticipated costs associated with each of the funding programs managed by the Iowa DOT's Office of Rail Transportation, which includes the Federal Rail Grade Crossing Safety Fund, Highway-Railroad Grade Crossing Surface Repair Fund, Primary Road Highway-Railroad Crossing Surface Improvements, Signal Maintenance, and the Rail Revolving Loan and Grant Program. In addition to the costs associated with these programs, an additional $30 million in annual needs beyond the capacity of these programs was identified. Annual costs, including this $30 million, were projected to 2040 using an annual inflation rate of 6.2 percent, which was based on the growth of the Railroad Cost Recovery Index published by the Association of American Railroads. **Average annual total costs** over the life of the Plan were then calculated.

Bringing these costs into the context of the Five-Year Program, as was done with the other modes, was not possible as two of the above-mentioned programs are not identified in the Five-Year Program. Instead, the portion of total costs above that could be reasonably addressed through these state-managed programs was examined. This was then applied to the average annual total costs mentioned above to estimate **average annual Iowa DOT costs** shown in Table 6.11.

Table 6.11: Freight rail costs ($ millions)

	Average annual total costs	Average annual Iowa DOT costs
Total	$210.068	**$33.203**

Source: Iowa DOT

Freight rail revenues

Revenues for freight rail were derived from historical funding for the five programs mentioned above. A linear trend line was applied to the historical data from state fiscal years 2000 through 2010 and then projected out to 2040. **Average annual Iowa DOT revenues** (Table 6.12) over the life of the Plan were then calculated.

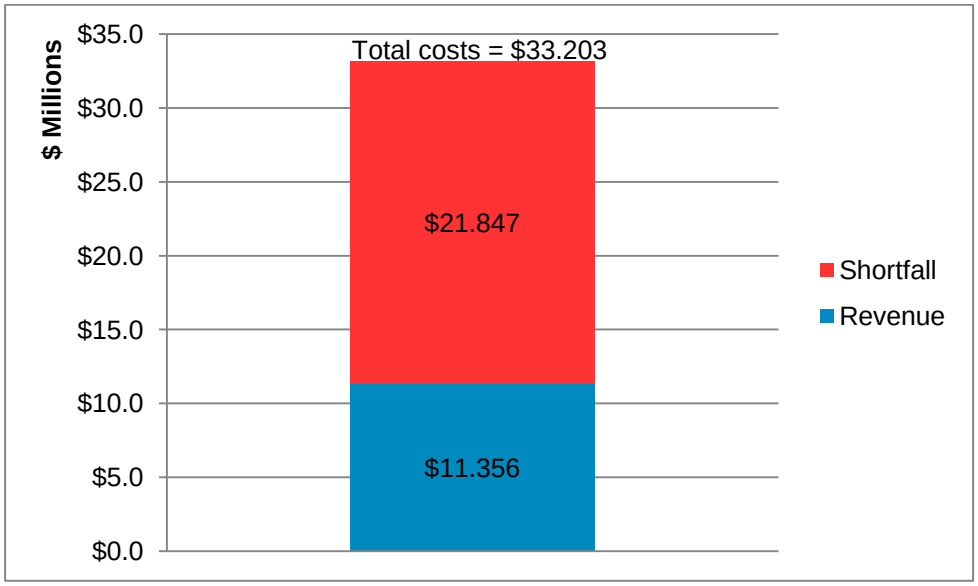
Table 6.12: Freight rail revenues ($ millions)

	Average annual Iowa DOT revenues
Total	**$11.356**

Source: Iowa DOT

The difference between average annual freight rail costs and revenues is illustrated in Figure 6.11. As estimated, anticipated revenues would cover approximately 34 percent of the anticipated costs.

Figure 6.11: Freight rail shortfall



Source: Iowa DOT

Passenger rail costs

Costs for passenger rail were derived from an analysis prepared for the draft Iowa DOT's 10 Year Strategic Passenger-Rail Plan (strategic plan) and include the following route segments.

- Chicago to Iowa City via the Iowa Interstate Railroad (IAIS)
- Iowa City to Des Moines via the IAIS
- Des Moines to Council Bluffs via the IAIS
- Chicago to Dubuque via the CN

Annual costs were projected to 2040 using an annual inflation rate of 4.5 percent. Bringing these costs into the context of the Five-Year Program, as was done with the other modes, was not possible as passenger rail funding is not identified in the Five-Year Program. Instead, the financial analysis for the strategic plan identified annual Iowa DOT costs for development and operations and maintenance. For the purposes of the Plan, it was assumed that the Iowa DOT would be responsible for 20 percent of development costs and 50 percent of the necessary operations and maintenance subsidy. This allowed for the estimate of **average annual Iowa DOT costs** shown in Table 6.13.

Table 6.13: Passenger rail costs ($ millions)

	Average annual Iowa DOT costs
Total	**$13.419**

Source: Iowa DOT

Passenger rail revenues

Revenues for passenger rail are also identified in the financial analysis for the strategic plan. However, these revenues are based on ridership assumptions for the various route segments, with the Iowa DOT being responsible for a share of the previously mentioned development and operations and maintenance costs. To date, revenue sources earmarked to begin addressing these costs are limited to a remaining balance of $3 million in state passenger rail appropriations. From this figure, **average annual Iowa DOT revenues** (Table 6.14) over the life of the Plan were calculated. However, beyond this short-term commitment, the average annual Iowa DOT revenues over the life of the Plan are effectively zero.

Table 6.14: Passenger rail revenues ($ millions)

	Average annual Iowa DOT revenues
Total	**$0.103**

Source: Iowa DOT

Implications of the shortfall

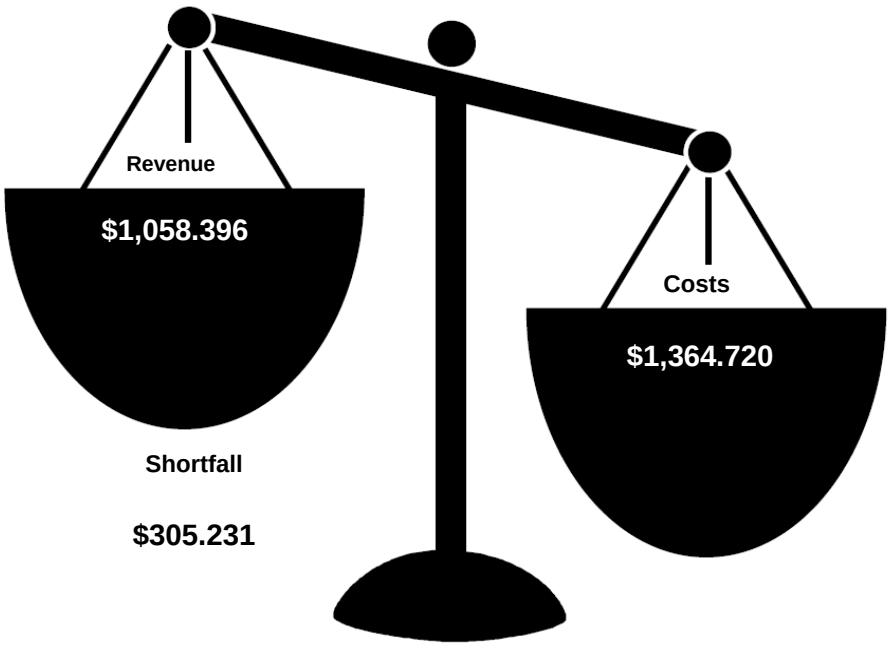
- Some highway-railroad crossings may not receive timely improvements, which could lead to potential safety hazards for railroad and roadway travel.
- Inadequate funding for spur tracks to new or expanding industries may impact future economic development and job creation opportunities.
- Some industries and communities may lose access to rail service if preservation of abandoned lines is unavailable, causing industries to close or relocate.
- Rail service may be impacted if railroads are unable to recover, without financial assistance, from natural disasters that cause infrastructure damage.
- Without adequate intermodal connections to rail, business and industry may not be able to take advantage of competitive rail rates for shipments.

- New passenger rail service may not be initiated, delaying the potential for multimodal system benefits (e.g., lower transportation costs due to alternative passenger options and improved freight infrastructure, reduced highway usage).

6.4 Overall funding outlook

Figure 6.12 highlights the imbalance between projected average annual costs and revenues. To fund anticipated costs across all modes, an average of $1,364.720 million would be required on an annual basis between now and 2040. Over this same period, anticipated revenues will average $1,059.489 million per year. This leaves an average annual shortfall of approximately $305 million. Revenues would have to increase by 29 percent for the investment needs to be addressed.

Figure 6.12: Total shortfall across all modes ($ millions)

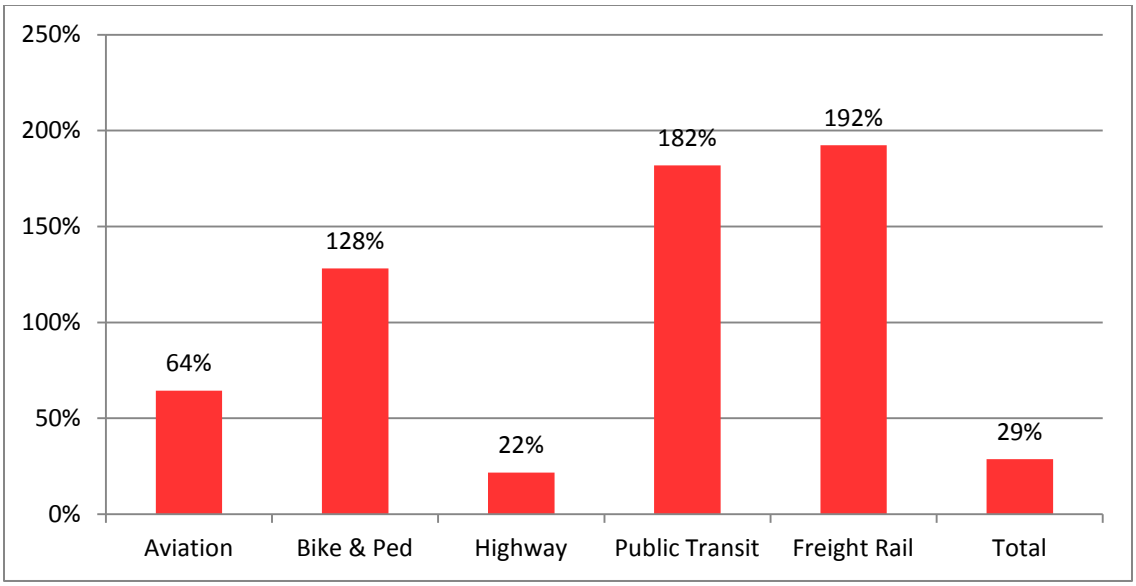


Final assessment

The preceding pages identified the revenue shortfalls for each mode in average annual dollars and, by far, the largest shortfall in absolute dollars is tied to highways. However, examining this information from a different angle, each of the remaining modes has a greater shortfall as a percentage of revenue. This is illustrated in Figure 6.13. (Note that passenger rail has been excluded from this figure given the limited amount of committed revenue.)

Clearly, current revenues are not adequate to maintain and improve Iowa's multimodal transportation system now and into the future. As the gap between costs and revenues continues to widen, options for addressing this shortfall must be considered. A wide variety of such options is identified in the following chapter.

Figure 6.13: Shortfall as percent of revenue



Source: Iowa DOT

7. Making it happen

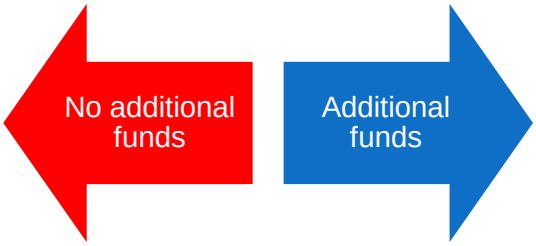
Implementing the Plan will require three important steps, which include addressing the funding shortfalls identified in the previous chapter, programming future investments, and continuous performance monitoring.

7.1 Addressing the shortfall

The first step in implementation involves gathering the resources necessary to make much-needed investments in Iowa's transportation system. With limited resources, efficient investment actions made through the Five-Year Program are extremely important to support the stewardship of Iowa's existing transportation system.

As illustrated below, Iowa is at a major crossroads concerning transportation investments. Difficult decisions must be made in dealing with Iowa's funding shortfall. Projects could be delayed, postponed or canceled with programming and implementation moved out into the future years or dropped entirely. This option is not conducive to fostering economic development and job growth, and a stronger state of Iowa. The more appropriate and preferred option is to keep project development on schedule by acquiring additional financial resource

- ✓ Projects delayed or canceled
- ✓ Fewer jobs created and retained
- ✓ More deaths and injuries
- ✓ Higher shipping costs
- ✓ Poorer air and water quality
- ✓ Higher vehicle operating costs
- ✓ Increased travel time
- ✓ More congestion
- ✓ Deteriorated system condition



- ✓ Projects kept on schedule
- ✓ Increased economic activity
- ✓ More higher paying jobs
- ✓ Fewer deaths and injuries
- ✓ Lower shipping costs
- ✓ Improved air and water quality
- ✓ Lower vehicle operating costs
- ✓ Reduced travel time
- ✓ Less congestion

Appendix 1 identifies various options for addressing the funding shortfalls identified in Chapter 6, including some mechanisms that may be more applicable to a single mode, and others that could be used to generate revenue for various modes as discussed at the end of this section. It should be noted that some of these mechanisms are already in place, and additional revenue would need to be generated through some adjustment to how the mechanism is applied. Also, while various advantages and disadvantages are identified in the table, the purpose of this information is not to advocate for any specific revenue generating mechanism(s).

In evaluating these mechanisms, the following principles should be considered, which were publically expressed during the Governor's Transportation 2020 Citizen Advisory Commission's input gathering process.

- The user fee concept should be preserved, where those who use the system pay for the system, including nonresidents.
- Revenue-generating mechanisms should be fair and equitable across users.
- Implement revenue generating mechanisms that are viable now, but also begin to implement and set the stage for longer-term solutions that bring equity and stability to funding.
- Continue Iowa's long-standing tradition of pay-as-you-go financing.

Governor's Transportation 2020 Citizen Advisory Commission (CAC) recommendations

At the March 8, 2011, Iowa Transportation Commission (Commission) meeting, Governor Branstad announced his "Transportation 2020" initiative and named his appointees to the CAC. This group was charged with assisting the Iowa DOT in an assessment of the condition of Iowa's roadway system while evaluating the current and future funding available to best address system needs. As part of this process, the CAC gathered public input related to the need for additional revenue and many of the revenue sources identified in the previous table.

More than 500 people attended the seven public meetings held across Iowa through the months of August and September, with 198 providing verbal or written comment at the meeting or online. Comments were received from a wide array of individuals. It is useful to note that more than half of those that provided input were nongovernmental. Among the individuals who spoke, there was overwhelming support for raising additional revenue to help repair roadways. Reasons cited for this support included meeting needs for manufacturing and agriculture, supporting economic development, preserving the valuable public road infrastructure, and creating and supporting jobs.

More than 90 percent of the verbal or written comments were in support of additional funding for Iowa's roads and bridges. Almost two-thirds supported increasing the state fuel tax. Other revenue enhancement ideas supported by some presenters were a one cent tax per bushel of corn/soybeans that would be spent on local roads in the county from which the revenue was generated; an increase of the fee for new registration from 5 percent to 6 percent; raising the cost of a driver's license; a sales tax on fuel purchases; a flat fee charged on high fuel-efficient, alternatively fueled, and hybrid vehicles; and a fuel tax rate tied to an inflation index. Although most presenters identified raising the state's fuel tax as the preferred option, some discussed it as a short-term solution to meet the current needs and suggested that other revenue generating methods, such as a vehicle-miles traveled (VMT) fee, should be pursued for the long-term sustainability of Iowa's roadways.

Following this input process, the CAC concluded that Iowa's public roadways are facing a severe funding shortfall and the lack of adequate funding has resulted in the state and Iowa's counties and cities under investing in the system and utilizing other funding mechanisms, such as property tax and bond revenues. Consequently, the CAC made the following recommendations.

1. Increase the state fuel tax rates across the board by eight to 10 cents.
2. Increase the "Fee for New Registration" from 5 percent to 6 percent.
3. Iowa DOT should evaluate and recommend a funding mechanism in their report to the Legislature that applies to alternatively fueled, hybrid, and high fuel efficiency vehicles (including commercial vehicles).
4. Consistent with existing Code of Iowa requirements, new funding should go to the Transportation Investment Moves the Economy in the Twenty-First Century (TIME-21) Fund up to the cap ($225 million) and remaining new funding should be distributed consistent with the Road Use Tax Fund (RUTF) distribution formula.
5. The Code of Iowa should be changed to require the study of the sufficiency of the state's road funds to meet the road system's needs every two years instead of every five years.
6. Iowa DOT should at least annually convene meetings with cities and counties to review the operation, maintenance and improvement of Iowa's public roadway system to identify ways to jointly increase efficiency; efficiency actions should be quantified, measured and reported to the public on a regular basis.
7. By June 30, 2012, Iowa DOT should complete a study of vehicles and equipment that use Iowa's public roadway system but pay no user fees or substantially lower user fees than other vehicles and equipment.

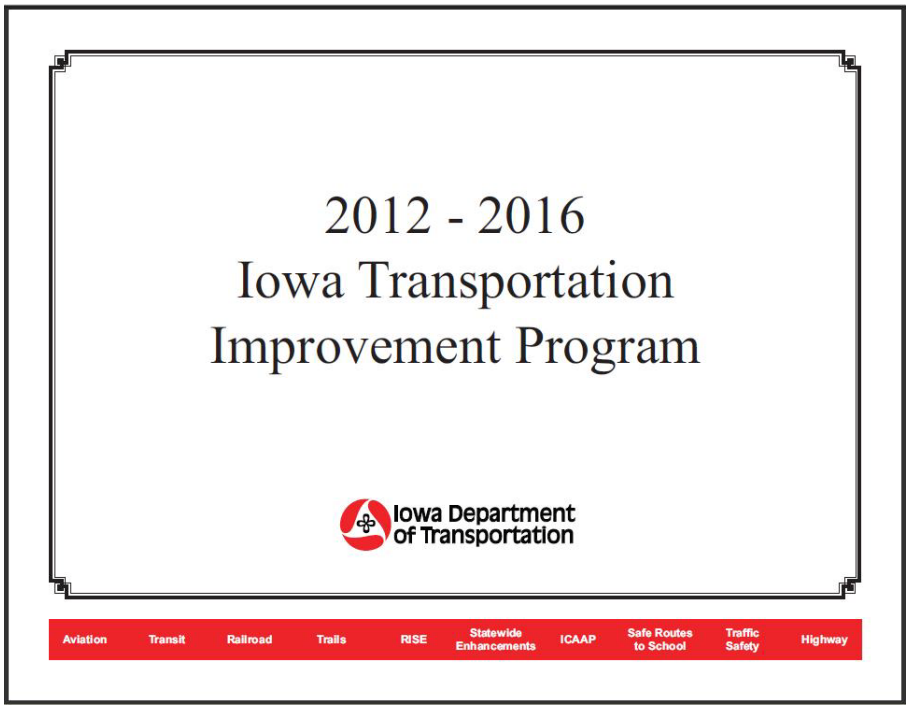
In addition, the Iowa DOT's "2011 Road Use Tax Fund (RUTF) Study" (a report to the Iowa Legislature per Iowa Code 307.31) very closely mirrored the CAC's report with the following recommendations.

1. Through a combination of efficiency savings and increased revenue, a minimum of $215 million of revenue per year should be generated to meet Iowa's critical roadway needs.
2. Current Code of Iowa language requires the Iowa DOT to "periodically review the current revenue levels of the road use tax fund and the sufficiency of those revenues for the projected construction and maintenance needs of city, county, and state governments in the future." This study is required every five years. The Iowa DOT recommends the Code of Iowa be changed to require this study be completed every two years timed to coincide with the biennial legislative budget appropriation schedule. In addition, an increased frequency of study will allow the Legislature to better respond to changing conditions, changing roadway needs and new technology. If this recommendation is implemented, the next study will be due Dec. 31, 2012.
3. Modify the current registration fee for electric vehicles to be based on weight and value using the same formula that applies to most passenger vehicles.
4. Consistent with existing Code of Iowa requirements, any new funding should go to the TIME-21 Fund up to the cap ($225 million) and remaining new funding should be distributed consistent with the RUTF distribution formula.
5. The CAC recommended the Iowa DOT at least annually convene meetings with cities and counties to review the operation, maintenance and improvement of Iowa's public roadway system to identify ways to jointly increase efficiency. In direct response to this recommendation, Governor Branstad directed the Iowa DOT to begin this effort immediately with a target of identifying $50 million of efficiency savings that can be captured from the more than $1 billion of state revenue already provided to the Iowa DOT and Iowa's cities and counties to administer, maintain and improve Iowa's public roadway system. This would build upon past joint and individual actions that have reduced administrative costs and resulted in increased funding for improvement of Iowa's public roadway system. Efficiency actions should be quantified, measured and reported to the public on a regular basis.
6. Iowa DOT should undertake a study looking at vehicles and equipment that use Iowa's public roadway system but pay no user fees or substantially lower user fees than other vehicles and equipment. This study should result in an assessment of whether fee structures should be modified and/or created so all vehicles and equipment using Iowa's public roadways are paying equitable user fees. This study should be completed by June 30, 2012.

While the activities of the CAC and the content of the RUTF study are certainly focused on Iowa's roadway system, the intent of this section and Appendix 1 is to identify options for addressing the funding shortfalls associated with each of the modes. As previously mentioned, some of the mechanisms noted in Appendix 1 may be more applicable to a single mode. However, there are several options that could be used to generate revenue for various modes. Some examples include bonding, gaming/lottery tax, public-private partnerships, sales tax, and transportation improvement districts. While these mechanisms represent those that are more clearly multimodal in their possible application, it should be noted that the legislation associated with all revenue generating mechanisms could be structured in such a way to direct funds to any transportation mode(s).

7.2 Programming

The second step in implementation involves the development of Iowa's Five-Year Transportation Improvement Program (Five-Year Program), which is done by the Commission and the Iowa DOT. This document is used to inform Iowans of planned investments in our state's multimodal transportation system. The Five-Year Program is typically updated and approved each year in June, and encompasses investments in aviation, transit, railroads, trails and highways.



Program development and management

Each day Iowans are affected by some facet of the transportation system, whether it is to get to work or a medical appointment, receive mail, allow groceries and other goods to be stocked on local shelves, or the many other ways transportation keeps people, goods and services moving in our state. The process of making the critical decisions about what investments will be made to preserve and expand the state-managed system is complex. It involves input from a wide range of individuals and organizations, and is based on an expansive programming process. The major steps in that process include:

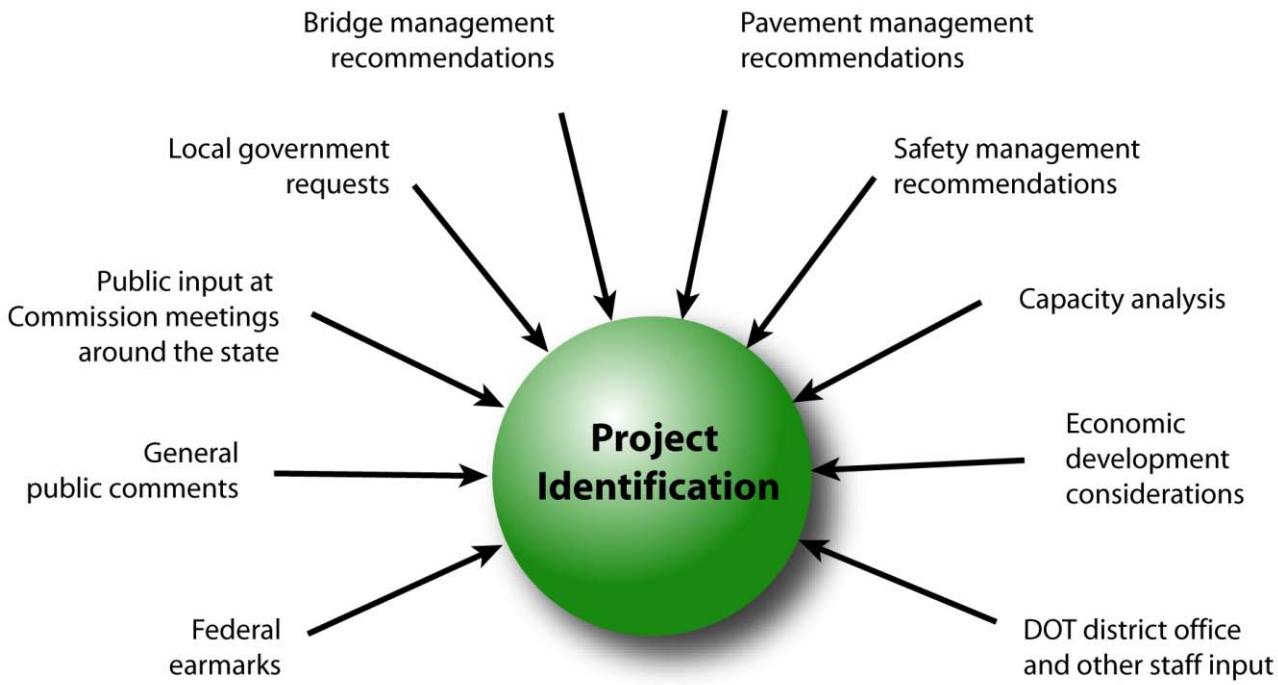
1. Identifying projects.
2. Establishing programming objectives.
3. Evaluating potential projects.
4. Developing the final program.

Project identification

Figure 7.1 illustrates the wide range of sources from which projects are identified. Some requests are generated through the Iowa DOT's bridge, pavement, and safety management systems that track the needs of these existing systems. Others are garnered through requests from the Iowa DOT's district offices, local governments and public input. Additional projects are identified through special federal appropriations, commonly referred to as congressional earmarks.

The projects compiled in this step are extensive and far exceed funding capabilities; thus, they must be further analyzed and prioritized in accordance with the Commission's investment objectives.

Figure 7.1: Project identification

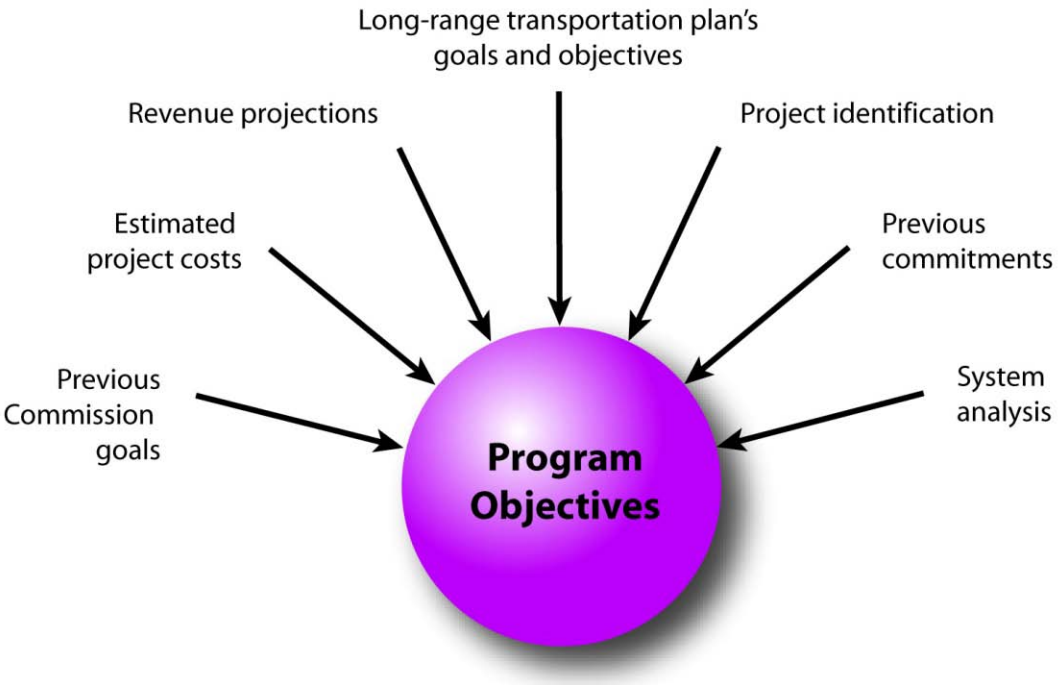


Source: Iowa DOT, Office of Program Management

Establishing the Commission's annual programming objectives

Figure 7.2 illustrates the complexity of the programming process. It is during this process when the Commission not only takes into consideration the projects identified during Step 1, but also the Commission's previous program goals and commitments to development of projects or corridors. Other considerations include estimated project costs, revenue projections, the Plan's goals and investment actions, and a highway system analysis.

Figure 7.2: Program objectives



Source: Iowa DOT, Office of Program Management

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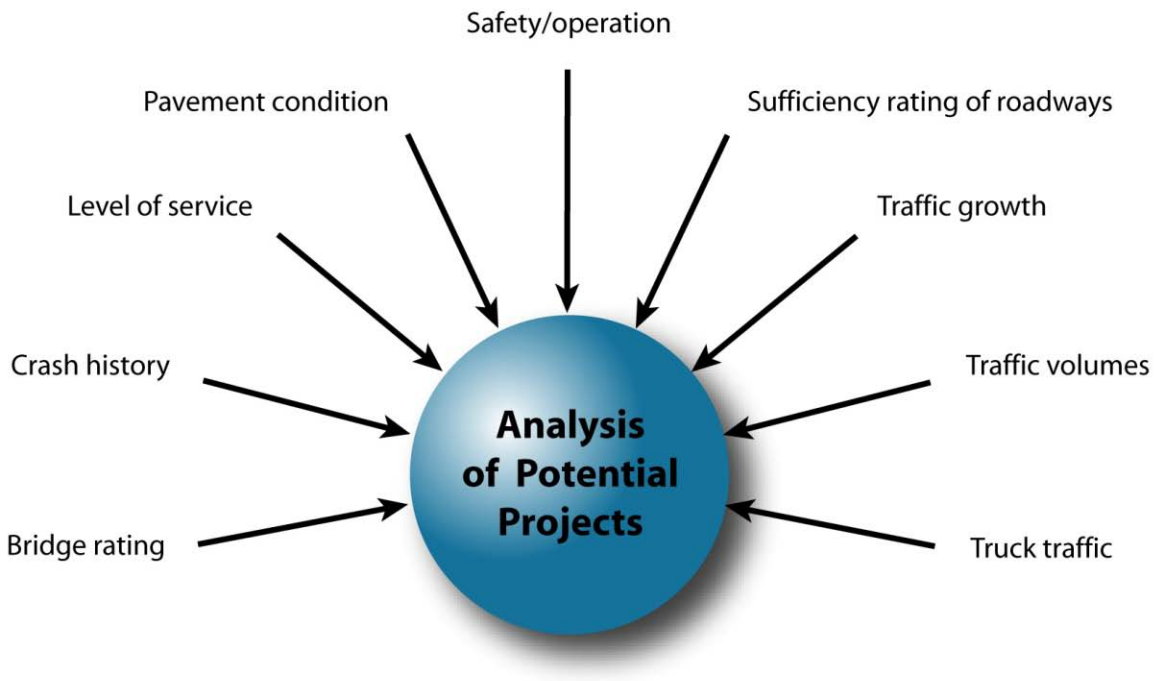
Evaluating potential project candidates

After the Commission establishes its programming objectives, Iowa DOT staff members evaluate potential projects based on technical factors, such as highway safety, engineering, traffic management, and other criteria. This step is illustrated in Figure 7.3.

Figure 7.3: Project/System analysis criteria

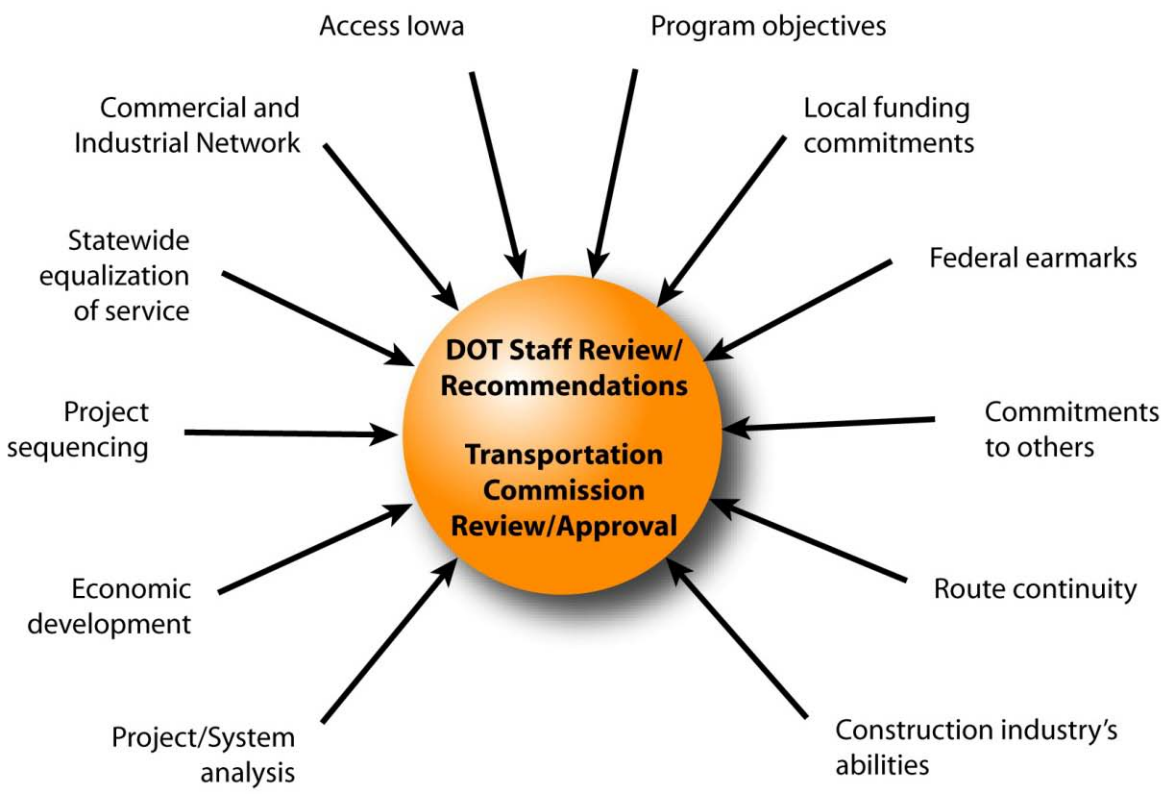


Source: Iowa DOT, Office of Program Management

Developing the final program

Figure 7.4 illustrates the final step in the process, which involves Iowa DOT staff and Commission review and consideration of additional nontechnical factors, including economic development, project sequencing or staging, and statewide equalization of service. Consideration is also given to whether the project is part of Iowa's Commercial and Industrial Network or is an Access Iowa corridor, or if any funding commitments have been made in conjunction with local governments or others. Route continuity and the construction industry's ability to perform the work within the contracting period at a competitive market price are also given consideration.

Figure 7.4: Programming considerations



Source: Iowa DOT, Office of Program Management

Multimodal programming

It should be noted that the programming process described on the preceding pages is more directly applicable to the highway portion of the Five-Year Program. As previously mentioned, the document is multimodal in nature, and contains the following program sections that are directly related to one of the five nonwater modes discussed in the Plan.

- Aviation Program
- Transit Program
- Railroad Program
- State and Federal Trails Programs
- Revitalize Iowa Sound Economy (RISE) Program
- Iowa Statewide Transportation Enhancements
- Iowa's Clean Air Attainment Program
- Safe Routes to School Program
- Traffic Safety Improvement Program
- Highway Program

With few exceptions, the funding for the nonhighway programs is associated with an application-based process in which applications are solicited, typically on a routine basis, by Iowa DOT staff. Eligible applications are then evaluated by staff and/or a standing committee against a set of established criteria. Following the evaluation process, a funding recommendation is developed and presented to the Commission for their review. The Commission then holds final approval authority for each of the individual programs contained in the Five-Year Program.

The funding cycle and program monitoring

The transportation programming process is a continuous, year-round effort. The Iowa DOT's contracting and revenue experiences are closely monitored and monthly updates are reviewed by the Commission. Because Iowa uses a "pay-as-you-go" investment model, adjustments to the Five-Year Program may be warranted throughout the year to ensure the investment plan remains balanced and expenses do not exceed revenues. If revenues or expenses significantly exceed projections, projects may be added or removed.

A copy of the Five-Year Transportation Improvement Program can be found on the Iowa DOT's website: http://www.iowadot.gov/program_management/five_year.html.

7.3 Performance monitoring

The third step in implementation is the process of performance monitoring. This process allows a public agency to demonstrate how well the transportation system is performing relative to stated goals and expectations. Through the statewide transportation planning process, performance measures were identified that will allow the department to do the following.

- Improve decision making and make more prudent investments.
- Address the need for increased and enhanced accountability.
- Comply with legislative mandates.
- Monitor performance progress.
- Improve internal organization and management.
- Communicate, cooperate and build consensus.

Performance-based planning

A 2010 report from American Association of State Highway and Transportation Officials' National Forum on Performance-Based Planning identified six performance-based planning elements common among transportation agencies transitioning to a more performance-driven and outcome-based decision process. These six elements are:

1. **Setting goals and objectives.** This step is addressed through the Plan and the guiding principle and goals highlighted in Chapter 5.
2. **Selecting performance measures.** While the Iowa DOT has utilized performance measures in many ways, the information in this chapter formalizes the selection of these measures and their application going forward.
3. **Setting performance targets**. The performance measures identified on the following pages are each tied to 2010 data, which provides a benchmark for current performance. In addition to considering past and current performance, a combination of peer performance, industry standards, and professional judgment will lay the groundwork for setting future performance targets.
4. **Allocating resources.** As was highlighted in section 7.2 of this chapter, the Iowa DOT's programming process is used to allocate resources and incorporates many performance-driven factors.

5. **Measuring and reporting results.** Periodic reporting, which can be done in subsequent plan updates or independently, will allow the Iowa DOT to articulate both accomplishments and unmet needs.
6. **Data and analysis tools.** The data and necessary analysis tools already exist for most of the identified performance measures, and are decentralized among the various Iowa DOT offices responsible for managing the specific data.

Performance measures

Performance measures are used in the plan implementation phase as a way to identify specific measures that monitor progress toward achieving the three goals of the Plan. Among other things, system performance measures should be specific, measurable, relevant and meaningful.

Some of the performance measures in Table 7.1 specifically measure the Iowa DOT's progress toward meeting the Plan's goals, while others have been included for tracking purposes. (Note: These tracking measures have been identified by an asterisk, and the Iowa DOT does not necessarily invest in or directly impact the performance of these measures.) These measures were developed in consultation with the Iowa DOT's modal offices, and many were previously established in modal system plans and the 2006 report by Iowa State University's Institute for Transportation, "Performance Measures for Iowa's Transportation Systems."

As shown in Table 7.1, each of the identified performance measures and associated benchmarks are tied to a specific mode and one of the Plan's three goals highlighted in Chapter 5. Benchmarks contain 2010 data unless otherwise noted.

Table 7.1: Performance measures by mode and goal

	Safety	Efficiency	Quality of life
Aviation	Percentage of airports with clear runway approaches (Benchmark: 37%) Percentage of cities/counties that have comprehensive planning that addresses land use around their airport (Benchmark: 43%)	Percentage of airports that meet all facility targets for their role (Benchmark: 61%)[1] Percentage of airports with a Pavement Condition Index (PCI) of 70 or above on paved runways (Benchmark: 87%)[2] Percentage of airports that store all based aircraft in covered hangars (Benchmark: 78%)	*Percentage of Iowans within a two-hour drive of commercial air service (Benchmark: 99%) *Percentage of employment within a half-hour drive of a commercial service or enhanced service airport (Benchmark: 78%) *Percentage of commercial service, enhanced service, and general service airports that offer aircraft rental and flight instruction (Benchmark: 83%) Percentage of airports that meet 75% of service targets for their role (Benchmark: 70%)[3]
	Safety	**Efficiency**	**Quality of life**
Bicycle and pedestrian	Annual number of bicycle fatalities from on-road crashes (Benchmark: 8) Annual number of on-road, reported bicycle and pedestrian crashes (Benchmark: 412) Number of Safe Routes to School projects in Iowa (Benchmark: 72)	Percentage of off-road trails construction less than 20 years old (Benchmark: 73%) Percentage of Level 1 trail mileage complete (Benchmark: 44%)[4]	Miles of off-road trails (Benchmark: 1,780)[5] Percentage of public transit vehicles equipped with bicycle racks (Benchmark: 45%)

*Tracking measure. For more information, see Chapter 7, p. 148.
[1] For more information on airport roles, see Chapter 4, p. 65-66.
[2] For more information on Iowa's Pavement Condition Index, see Chapter 4, p. 79.
[3] For more information on airport roles, see Chapter 4, p. 65-66.
[4] Level 1 trails include trails of statewide significance. For more information, see Chapter 4, p.79.
[5] 2011 benchmark data.

	Safety	Efficiency	Quality of life
Highway	Overall crash rate (Benchmark: 171 crashes per 100 million VMT) Number of fatalities (Benchmark: 364)[6] Miles of new paved shoulders awarded for construction on the Primary Highway System (Benchmark: 471.5) The overall annual percentage of all districts' A and B highway miles returned to a reasonable, near-normal surface condition within 24 hours after the end of a winter storm (Benchmark: 98.6%)[7]	Percentage of highway miles that meet or exceed a sufficiency rating of tolerable or above (Benchmark: 73%)[8] Percentage of bridges on the Primary Highway System that are structurally deficient or functionally obsolete (Benchmark: 11.7%)[9] *Highway fuel use per vehicle-mile (Benchmark: 0.0729 gallons per vehicle-mile) Percentage of the Primary Highway System below pavement condition index (PCI) cutoff across all planning classes (Benchmark: 34.5%)[10]	Average International Roughness Index (IRI) rating weighted by length on the Primary Highway System (Benchmark: 1.74)[11] Percentage of Interstate Highway System operating at level of service 'C' or better (Benchmark: 95.4%)[12] *Total annual vehicle-miles traveled (VMT) (Benchmark: 31,579,000,000)

*Tracking measure. For more information, see Chapter 7, p. 148.
[6] 2011 benchmark data.
[7] A and B highway miles include the interstate and the Commercial and Industrial Network.
[8] For more information on sufficiency ratings, see Chapter 4, p. 79.
[9] For more information on bridge condition ratings, see Chapter 4, p. 80-81.
[10] 2009 benchmark data. For more information on Iowa's Pavement Condition Index, see Chapter 4, p. 79.
[11] 2009 benchmark data. The International Roughness Index rating compares the roughness of different roads. The scale ranges from 0 (perfectly smooth) to 10 or more (extremely rough ride).
[12] Level of service (LOS) is a measure of traffic flow. The scale ranges from LOS 'A' (free flow), to 'F' (forced or breakdown flow). LOS 'C' describes stable flow operations.

	Safety	Efficiency	Quality of life
Public transit	Public transit crash rate (Benchmark: 593 crashes per 100 million VMT) *Percentage of negative drug and alcohol tests among drivers (Benchmark: 99.2%)[13] Percentage of public transit fleet with security cameras on-board (Benchmark: 41.4%) Percentage of fixed-route bus stops with shelters (Benchmark: 3%)	Percentage of public transit systems with in-house routine and preventative maintenance capabilities (Benchmark: 71.4%) Percentage of public transit fleet operating within Federal Transit Administration's normal useful life standards (Benchmark: 51%)[14] Number of public transit agencies practicing mobility management (Benchmark: 15 of 35 agencies)[15]	*Percentage of total employment within ¼ mile of fixed-route transit service (Benchmark: 43%) Annual nonemergency medical transportation ridership (Benchmark: 76,610)[16] Percentage of public transit fleet with global positioning system on-board (Benchmark: 33.3%) *Annual statewide transit ridership (Benchmark: 26,209,999)
	Safety	**Efficiency**	**Quality of life**
Rail	Total crashes at railroad-highway crossings (Benchmark: 55) *Derailments per million ton-miles (Benchmark: 0.002)	Percentage of track-miles able to operate at 40 mph or higher (Benchmark: 69.8%) Percentage of track-miles able to handle 286,000-pound cars (Benchmark: 82%)[17] *Rail ton-miles per gallon of fuel (Benchmark: 500)	Percentage of Iowans within a two-hour drive of a passenger rail station (Benchmark: 72%) *Annual passenger rail ridership (Benchmark: 68,744)
Water	Water-related performance measures were not included as the Iowa DOT does not directly invest in water transportation infrastructure.		

*Tracking measure. For more information, see Chapter 7, p. 148

[14] For more information on Federal Transit Administration's useful life standards, see Chapter 4, p. 85.

[15] Mobility management can be described as a strategic approach to service coordination and customer service that enhances the ease of use and accessibility of transportation networks.

[16] Nonemergency medical transportation rides include rides for Medicaid recipients.

[17] 286,000-pound cars are the current rail industry standard.

Periodic review

The purpose of a periodic review of these performance measures is to bring the Plan into a more focused short-term perspective while providing more detailed information to decision makers. The review will function as a planning tool that can raise red flags concerning potential adjustments decision makers may consider. This assessment can consider all elements impacting transportation investment, including guidance for activities such as design, programming, and location studies. When done in advance of programming activities, the review can provide direction and guidance for including specific investment actions in the Five-Year Program.

7.4 Keys to making it happen

Outside of the three important steps identified earlier in this chapter, there are additional keys to implementing the plan that should be noted. One such key is to maintain and strengthen the Iowa DOT's partnership with the state's metropolitan planning organizations (MPOs) and regional planning affiliations (RPAs). This partnership is cultivated both through day-to-day interactions and more formalized interactions, such as the quarterly meetings of these agencies that are hosted by the Iowa DOT. The state's MPOs and RPAs will be critical in the development and implementation of future statewide transportation plans.

Another key to "making it happen" will be to diligently update the Plan as needed given recent developments and progress toward implementation. It is possible that future federal legislation may require statewide transportation plans to be updated on a specific schedule. In the meantime, it is important that the Plan be continuously evaluated, revised and updated in accordance with 23 CFR § 450.214(o). It is generally agreed that a minimum five-year update cycle is appropriate for such long-range transportation plans.

7.5 What we learned

The investigation and analysis conducted throughout development of the Plan has led to the following general conclusions.

- The state is completing a transition from building the system to efficiently managing the existing system through a philosophy of stewardship.
- The state has a good system overall, but additional improvements are needed.
- There is a funding shortfall that will dramatically worsen over time if action is not taken to identify new/additional financial resources.
- Action must be taken immediately to ensure the future viability of the transportation system and the future economic health of the state.

Appendix

Appendix 1: Revenue generating mechanisms

	Description	Advantages	Disadvantages
Agriculture bushel tax	A tax charged on each bushel of agriculture-based products.	Creates new source of sustainable revenues. If products are shipped by road, a strong link exists between agriculture production and system usage.	Requires enabling legislation. Revenues would fluctuate based on production levels. Administration and collection system would need to be developed.
Alternative-fuel vehicle tax	A tax or additional registration fee charged on electric vehicles. Replaces lost fuel tax revenue associated with the use of electric vehicles.	Ensures that electric vehicles pay toward operations and maintenance of the highway system.	Requires enabling legislation. Potentially discourages the use of emerging efficient-vehicle technologies.
Auto rental excise tax	Percent tax on automobile rental fees.	Collection and administration process already in place.	Yield is minimal without a substantial increase in the tax. Potential negative impact on automobile rentals.

	Description	Advantages	Disadvantages
Bonding	A written promise to repay borrowed money at a fixed rate on a fixed schedule.	Allows earlier and faster construction of some facilities. Satisfies urgent infrastructure need that exceeds available finances. Avoids inflationary construction costs.	Requires enabling legislation. Requires state or community to extend payments for long periods of time. Does not generate new money. May cost more over time due to bond interest. Requires existing annual resources be used for debt service rather than new needs. May have a negative impact on statewide transportation decision making. Poses staffing issues for government agencies and contractors due to significantly changing project expenditure levels.
Container tax	Fee imposed on containers moving through a designated geographic area.	Creates opportunity to generate revenue on shipments passing through the state.	Requires enabling legislation. Does little to promote efficiency. Ongoing administrative costs.
Development impact fee	Fee charged to developers for off-site infrastructure needs that arise as a result of new development.	Additional source of funding to off-set increased needs due to new development. Places the cost of improvement on the development that caused the need.	Typically a local jurisdiction fee and is difficult to apply statewide. Potential negative impact on future development. Can be difficult to establish and administer. Can be an equity issue when costs are passed on to homeowners in the case of a housing development.

	Description	Advantages	Disadvantages
Driver's license fee	A fee charged for the privilege to operate a motor vehicle.	Collection and administration process already in place. Does not fluctuate with economic cycles.	Not proportional to system usage.
Energy tax (generation)	Cents per kilowatt-hour (kwh) tax on energy generation.	Moderate yield potential. Burden spread over large population (if passed to consumer).	Requires enabling legislation. New tax/fee. Administration and collection system would need to be developed.
Energy tax (use)	Cents per kwh tax on energy use.	Minor/moderate yield potential. Burden spread over large population.	Requires enabling legislation. New tax/fee. Administration and collection system would need to be developed. Marginally regressive as attached to necessity item.
Fee for new registration	Percent fee imposed on the sale of new and used motor vehicles and trailers, and aircraft.	Collection and administration process already in place. Provides revenue source based on ability to pay. Proportional to cost of motor vehicle or aircraft.	Not proportional to system usage. May discourage sales of motor vehicles and aircraft. Fluctuates with economic cycles.

	Description	Advantages	Disadvantages
Fuel tax	Cents per gallon tax on fuels, including some alternative fuels.	Collection and administration process already in place. Generally proportional to system usage. Generates significant portion of revenue from out-of-state users. Paid by all users of the system.	Increased fuel-efficiency results in lower revenue. Higher fuel prices lead to reduced consumption and reduced fuel tax collections. Fees are fixed and do not adjust for inflation.
Gaming/Lottery tax	Tax on wagering and/or gaming licenses. Tax on lottery sales.	Collection and administration process already in place. Proportional tax – only pay tax if choose to play. Typically does not fluctuate with economic cycles.	Yield is minimal without a substantial increase in the tax. Need to modify enabling legislation. Competes with General Fund programs.
Imported oil tax	A tax charged on imported oil based on either the volume or value of the imported oil.	Could help promote U.S. energy production.	Requires enabling legislation. Imported oil can be used for purposes other than transportation. Could result in larger free trade issues.
Insurance premium tax	Percent tax on insurance premiums paid.	Collection and administration process already in place. Significant yield potential. Burden spread over large population.	Requires enabling legislation. Competing with General Fund programs. Potential negative impact on insurance business.

	Description	Advantages	Disadvantages
Interstate logo sign fees	Annual fee charged for logo signs paid for by businesses advertising their location off an interstate interchange.	Would be easily implemented.	Requires enabling legislation. No link to highway use. Signs are intended to be a service to drivers rather than a source of revenue.
Oversize/Overweight permits	A fee charged for permission to operate an oversized or overweight vehicle for a period of time.	Collection and administration process already in place. Current fees are relatively low.	Yield is minimal without a substantial increase in the tax. Need to modify enabling legislation.
Per-mile tax	Tax based on the vehicle-miles traveled within a state.	Direct measure of actual costs incurred. Highly related to needs for capacity and system preservation because, as travel and revenue increase, the need for capacity and preservation improvements increases. May be graduated based on vehicle size, weight, emissions or other characteristics.	Requires enabling legislation. Administration and collection system would need to be developed. Potentially high administrative, compliance and infrastructure costs. Technology needs to mature. Privacy concerns.

Appendix 2: Public prioritization of investment actions

The following table contains the investment actions that were identified in Chapter 5, "Choosing our path." The investment actions have been sorted based upon input received at public meetings and via an online survey. The percentages indicate the percent of respondents who identified that investment action as a priority. Italicized investment actions are those that were not included in the original listing but were identified during the public input process.

	Safety	Efficiency	Quality of life
Aviation	Maintain and enhance the statewide network of aviation weather observation systems (20.49%) Promote implementation of compatible land use guidelines near airports (18.75%) Promote communication between airports and local emergency personnel (17.36%) Improve runway approaches through obstruction removal and mitigation funding (17.01%) Promote and assist in active wildlife management at airports (13.19%) Enhance aviation safety through awareness and education programs (11.46%)	Maintain and enhance airside facilities (21.70%) Maintain adequate accessibility to commercial air service (20.31%) Maintain and enhance aviation vertical infrastructure facilities (17.19%) Encourage airport long-range business model planning (14.06%) Maintain adequate accessibility to airports with weather reporting and instrument approaches (13.19%) Evaluate implementation of NextGen navigation within the state (11.98%)	Support a system of airports that meets the air transportation needs of businesses and citizens (37.75%) Promote the need for aviation services to meet user needs at airports (27.71%) Promote an understanding of the benefits of Iowa's air transportation system (17.27%) Support a system of airports that provides educational and career opportunities (15.86%)

	Safety	Efficiency	Quality of life
Bicycle and pedestrian	Develop projects that minimize barriers and promote more walking and bicycling to school (37.82%) Develop recommended facility maintenance and signage practices (21.39%) Expand bicycle safety program (20.59%) Develop pedestrian safety program (15.25%)	Continue investments on regional and local Level 2 and 3 trails (26.08%) Support the acquisition of abandoned rail lines for trail development (25.22%) Improve coordination and cooperation among trail developers (in-state and across borders) (19.00%) Focus investments on statewide Level 1 trails (18.48%) Maintain a bicycle and pedestrian facility data inventory (8.29%)	Provide accessible accommodations on Iowa's roadway corridors for bicycles and pedestrians (e.g., complete streets policy) (31.31%) Promote bicycling and walking as an alternative to driving to reduce emissions and improve the health and mobility of citizens (26.76%) Update state bicycle map on a regular basis (21.44%) Continue and enhance proactive involvement in education, promotion, and advocacy (18.22%)

	Safety	Efficiency	Quality of life
Highway	Target highway investments to reduce fatalities and major injuries (30.93%) Enhance security of highways and bridge structures (20.49%) Support the Iowa Comprehensive Highway Safety Plan (16.89%) Support access management improvements and planning (16.32%) Better accommodate the increasing number of elderly drivers (12.52%) *Enhance night-driving aids (e.g., more visible pavement markings and signs)*	Preserve and rehabilitate existing highways and bridge structures (31.14%) Support living roadways and roadside vegetation to minimize maintenance costs (19.74%) Target selected capacity improvements to address access and operational needs (13.96%) Incorporate intelligent transportation systems (ITS) to improve system operation (9.63%) Consider work zone impacts throughout the project development process to maximize vehicular mobility and work zone safety (9.63%) Enhance multimodal freight planning (8.03%) Support highway research initiatives (4.65%) *Complete the development of corridors designated as ACCESS-Iowa highways*	Support economic development projects for local governments (21.40%) Support living roadways and roadway vegetation to enhance our environment (20.53%) Reduce transportation-related congestion and emissions (18.07%) Develop projects in a context sensitive manner that supports all users and enhances natural resources (15.96%) Accommodate other modes as appropriate (14.91%) Accommodate public utilities as appropriate (6.84%)

	Safety	Efficiency	Quality of life
Public transit	Assist transit agencies with driver training, including efforts to enhance the safety of pedestrians exposed to transit vehicle traffic (31.71%) Improve safety for transit passengers (30.73%) Assist transit agencies in improving security of transit vehicles and facilities (19.76%) Assist transit agencies' efforts to improve and maintain worker safety at transit facilities (16.34%)	Encourage increased coordination between transit agencies, human service organizations and school districts (21.19%) Support commuter services (20.68%) Assist transit agencies in acquiring new vehicles and facilities (17.80%) Improve and maintain existing transit facilities (17.29%) Support intercity bus services (13.90%) Assist transit agencies in developing computerized dispatch capabilities (7.12%)	Focus on public transit's role to improve Iowa's economy and overcome mobility barriers (26.78%) Encourage transit agencies and intercity bus companies to provide seamless service across agency boundaries and between modes (25.24%) Promote transit and intercity bus as an alternative to driving to reduce congestion and emissions (24.28%) Consider and promote accessible pedestrian connections to transit facilities (21.39%)
Rail	Improve highway-rail crossing safety (39.41%) Promote general rail safety (31.90%) Monitor rail safety and security conditions (25.47%)	Preserve existing rail freight and passenger service and develop additional passenger service (28.49%) Improve the rail system physical infrastructure (25.70%) Educate potential users on the benefits of rail transportation and facilitate availability of rail to shippers (20.72%) Assist business community in improvement of spur tracks and construct where appropriate (17.53%) Monitor rail regulatory issues (5.38%)	Develop rail passenger services to provide increased mobility and encourage economic development (32.51%) Promote rail as a sustainable freight and passenger alternative (30.85%) Preserve historic and cultural rail facilities (20.08%) Reduce rail-related congestion and air pollution (8.49%) Serve as rail information and conflict resolution clearinghouse (4.97%) *Support the development of quiet zones*

	Safety	Efficiency	Quality of life
Water	Support navigation safety improvements	Support navigation infrastructure improvements Promote commercial navigation	Support river ecosystem restoration activities
Miscellaneous	Support local governments and planning agencies in safety conscious planning (20.50%) Participate in and promote safety and security planning and programs (10.77%)	Support regional and metropolitan transportation planning activities (26.92%) Participate in freight and passenger planning efforts (18.22%) Conduct and participate in transportation research (12.01%) Better integrate internal technology for efficient analysis, *project delivery*, and support (7.87%)	Enhance and expand the 511 system (11.80%) Expand Intelligent Transportation System (ITS) development (10.77%)

As illustrated in the table above, the public input gained from the online survey provided some common investment direction themes. In general, according to the survey respondents, the highest priority investment areas included safety improvements, preserving Iowa's existing transportation system, and supporting economic development opportunities. In addition to these priority areas identified through the survey, there was a small percentage of respondents who felt that, in light of current transportation funding shortfalls, the Iowa DOT should not be allocating resources to the expansion of bicycle and pedestrian facilities or passenger rail service.