



6. PAYING OUR WAY



This chapter highlights the financial implications of investing in the actions previously identified in chapter 5. The discussion includes the following information for each mode through 2045.

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



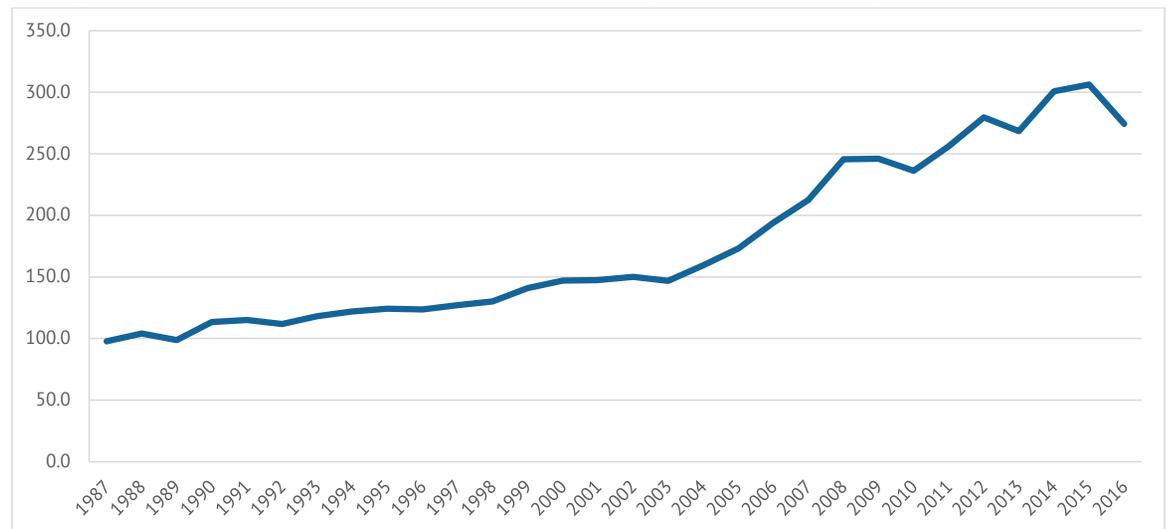
6.1 Introduction

The costs and revenues discussion in this chapter is framed primarily within the context of the Iowa Department of Transportation (DOT) 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 typically increase over time, including those in transportation. 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 (CCI), which is shown using Iowa data in Figure 6.1.

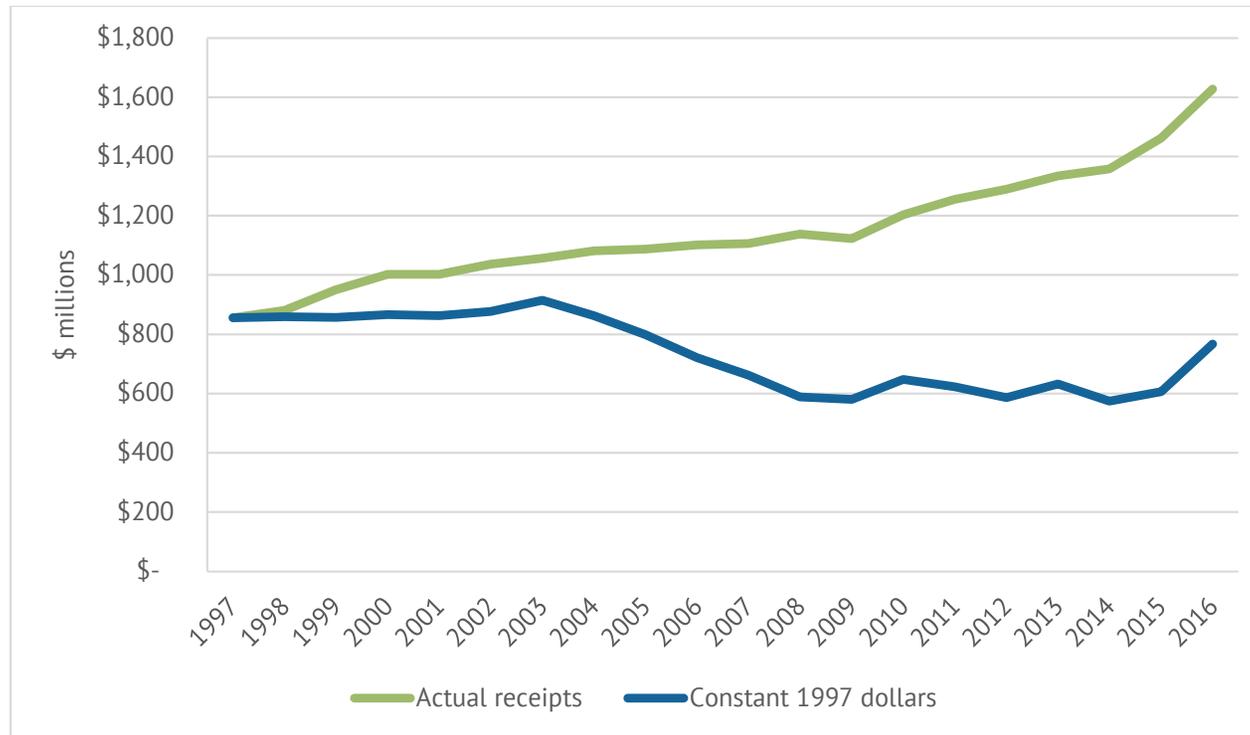
To better illustrate the impacts of this inflation, consider that a \$1 million project in 1987 cost approximately \$2.74 million in 2016. Over time, the effects of cost inflation erode the buying power of available revenue. An example of this is illustrated in Figure 6.2, which shows Road Use Tax Fund (RUTF) revenue history adjusted to constant 1997 dollars based on the Iowa CCI.

Figure 6.1: Construction Cost Index trend for Iowa highway construction (percent of 1987 base)



Source: Iowa DOT

Figure 6.2: History of Road Use Tax Fund revenue, 1997-2016



Source: Iowa DOT

The impact of increasing costs has been compounded in the past by the fact that much of Iowa's revenue stream for transportation construction, maintenance, and operations remained relatively stagnant over time. Iowa in Motion 2040 noted that Iowa's motor fuel tax had remained the same for more than two decades while highway construction costs had increased by nearly 140 percent. This particular issue was partially addressed by the 2015 passage of Senate File 257, which increased the fuel tax rate by 10 cents per gallon, along with other miscellaneous provisions. The 2015 federal Fixing America's Surface Transportation (FAST) Act also authorized five years of federal funding at slightly higher levels than prior funding bills.

While the additional revenue has provided a significant boost, and largely addressed critical needs on the highway system (see section 6.3), transportation costs have outpaced revenues over time, and Iowa's transportation system will continue to be subject to 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 miles traveled, vehicle fuel efficiency, and the use of alternative fuels (e.g., ethanol, biodiesel, natural gas, electricity). 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 transportation funding by 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 2000-2017	SFY 2017
Highway	\$745.54	\$1,040.75
Aviation	\$3.87	\$4.92
Bike/Pedestrian (trails)*	\$2.16	\$2.50
Public transit	\$12.14	\$15.92
Railroad	\$3.38	\$3.10
General services**	\$76.36	\$88.54
Motor vehicle	\$37.35	\$41.07
Total	\$880.80	\$1,196.80

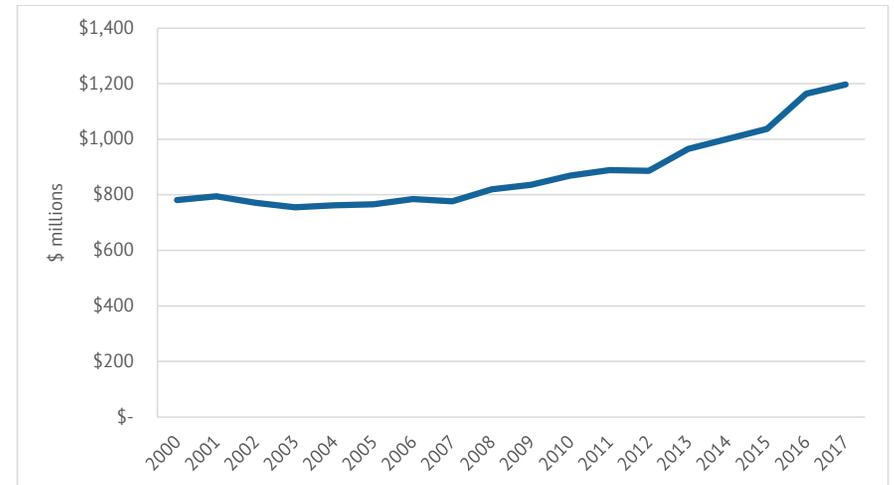
*Trails funding does not include Federal Recreational Trails Program or Statewide Transportation Alternatives Program funding.

**General services include various special purpose operations and capital funding.

Source: Iowa DOT

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 highlights the distribution of funds to highways and various nonhighway categories.

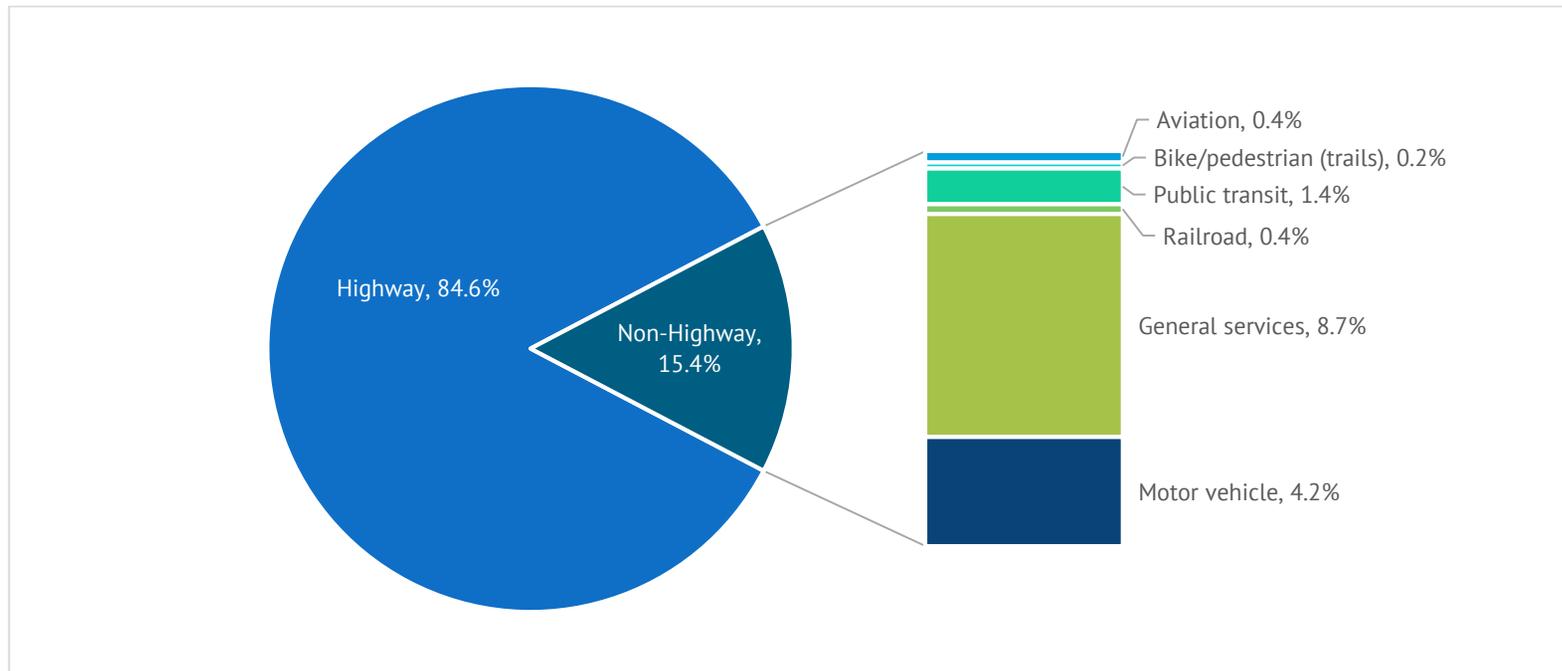
Figure 6.3: History of total Iowa DOT-programmed transportation funding, 2000-2017



Source: Iowa DOT



Figure 6.4: Distribution of Iowa DOT-programmed transportation funding (2000-2017)



Source: Iowa DOT

6.3 Future costs and revenues by mode

The following pages highlight the cost of future investment in the state's transportation system versus anticipated Iowa DOT revenues. As was previously mentioned, where possible, 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. These amounts represent the portion of the modal costs that can be considered the Iowa DOT's share, and the portion of modal revenues that can be anticipated through the Iowa DOT. Where detailed forecasts are unavailable, these figures are based on recent historical trends. Both costs and revenues are presented in average annual future year dollars.

It is important to note that the costs identified in this chapter may not align directly with the improvement needs highlighted in Chapter 5. While the needs identified in this Plan help serve as a general guide for the Iowa DOT's future transportation investments, specific costs for each mode were developed from the investment needs identified by individual modal plans and studies. 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.

- **Aviation** – bonding, Federal Aviation Administration Airport Improvement Program, passenger facility charges, property tax levy
- **Bicycle and pedestrian** – local jurisdiction funds, private investment, Resource Enhancement and Protection Fund, Rebuild Iowa Infrastructure Fund
- **Highway** – Farm-to-Market Road Fund, Secondary Road Fund, Street Construction Fund, federal discretionary funds, local option sales tax
- **Public transit** – fare box revenue, federal discretionary funds, property tax levy
- **Rail** – federal discretionary funds, private investment, Railroad Rehabilitation & Improvement Financing program

Aviation

Costs

Costs for aviation were derived from the 2010-2030 Iowa Aviation System Plan. 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. This annual amount was inflated to a total of \$49.8 million in 2016 dollars. The annual costs for meeting these needs were projected to 2045 using an annual inflation rate of 3.67 percent, which was based on the growth of Iowa’s CCI. **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 2006 and 2015, this portion steadily increased and averaged nearly 8.8 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. The percentage attributed to annual Iowa DOT costs was trended over time, due to the steady increase in the state share of costs over the prior decade.

Table 6.2: Average annual aviation costs, 2017-2045 (\$ millions)

	Average annual total costs	Average annual Iowa DOT costs
Total	\$77.179	\$14.659

Source: Iowa DOT

Revenues

Revenues for aviation were derived based on historical and anticipated funding identified in the aviation element of the Five-Year Program. Aviation revenue was held constant throughout the life of the Plan, due to a flat long-term trend in aviation revenue, which is largely dependent upon annual legislative appropriations, aircraft registrations, and fuel sales. **Average annual Iowa DOT revenues** (Table 6.3) over the life of the Plan were then calculated.

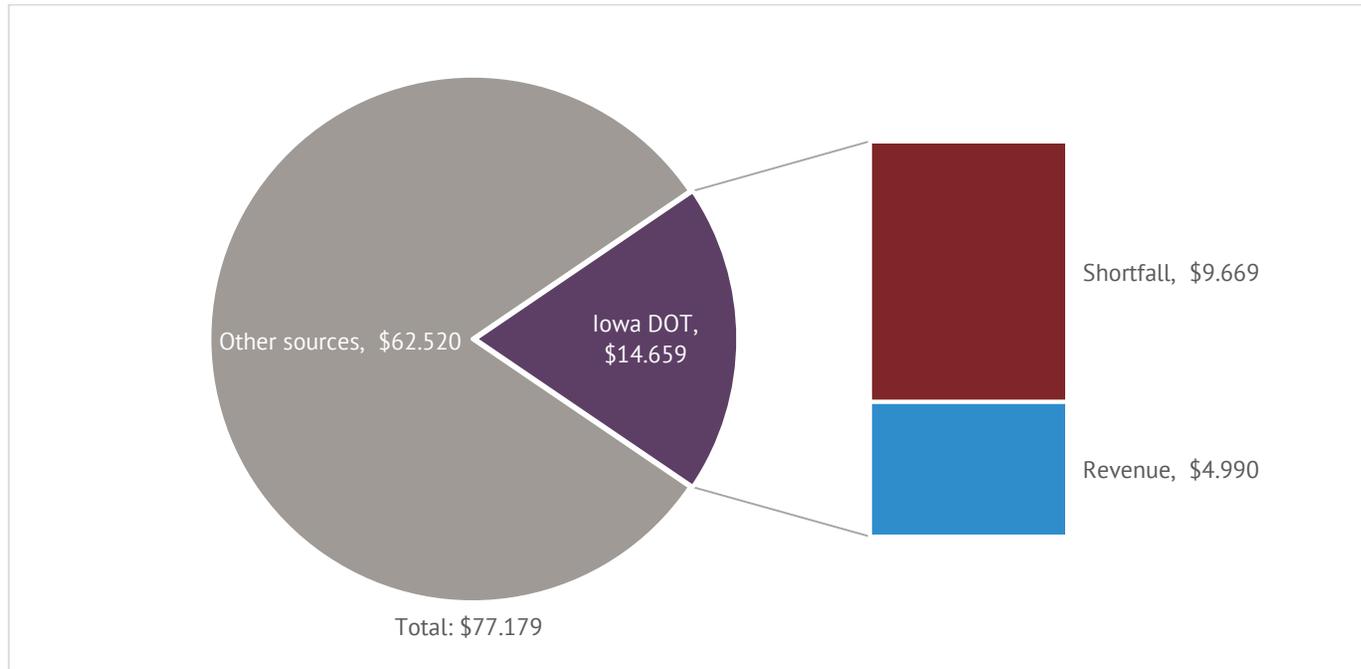
Table 6.3: Average annual aviation revenues, 2017-2045 (\$ millions)

	Average annual Iowa DOT revenues
Total	\$4.990

Source: Iowa DOT

The average annual costs for aviation, Iowa DOT share, and difference between Iowa DOT average annual costs and revenues is illustrated in Figure 6.5. It is estimated that anticipated revenues would cover approximately 34 percent of the anticipated Iowa DOT costs.

Figure 6.5: Aviation average annual total costs, Iowa DOT share, revenue, and shortfall, 2017-2045 (\$ millions)



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.
- Planning for infrastructure, air space protection, and other key planning initiatives to ensure the most efficient and safe system may be inadequate.
- Protection of existing investments could be limited.



Bicycle and pedestrian

Costs

Iowa in Motion 2040 based its cost analysis for bicycle and pedestrian on completion of the statewide trails vision. For this Plan, an updated methodology based on the on-road needs of the primary system was utilized, as much of the statewide trails vision will be funded and completed by entities other than the Iowa DOT. As mentioned in Chapter 5, the Iowa DOT has been in the process of developing an updated bicycle and pedestrian plan, and staff anticipates completing the plan following the completion of Iowa in Motion 2045. As part of that plan development, an initial assessment of needs has been conducted for the entire Primary Highway System, excluding interstates.

Costs were based on providing the recommended type of treatment for roadways, which is determined based primarily on annual average daily traffic (AADT), roadway width, and speed (see Tables 5.2 and 5.3). In general, the treatments would improve the bicycle compatibility rating of the roadway from poor or moderate to good, though a rating of moderate was deemed acceptable for a portion of four-lane highways and higher AADT two-lane highways. It was assumed that accommodations would be constructed in conjunction with other highway work rather than as standalone projects, which reduces their cost. Costs also are only for the portion of the accommodation that would not be addressed through standard highway work (e.g., in many cases the recommended accommodation would involve a slight widening of the paved shoulder that would typically be installed).

This analysis includes the full primary system costs, which are spread across the timeframe of the plan. Costs were developed in 2016 dollars, and then inflated to 2045 using an annual inflation rate of 3.67 percent, which was based on the growth of Iowa’s CCI. **Average annual total costs** over the life of the Plan were then calculated.

These costs represent improvements to the primary system, and do not include the cost to improve the secondary or municipal systems, or to complete portions of the statewide trail vision that are not aligned with the primary highway network. These costs would represent a full “build-out” of bicycle accommodations, which may not occur as other factors such as percentage of highway project cost, connectivity, and potential usage could factor into whether or not accommodations are built (see Table 6.4).

Table 6.4: Average annual bicycle and pedestrian accommodation costs, 2017-2045 (\$ millions)

	Average annual total costs
Rural primary system	\$27.854
Urban primary system	\$10.897
Total	\$38.751

Source: Toole Design Group; 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/Statewide Transportation Alternatives Program, and Primary Road Fund used for on-road accommodations. This represents the total funding currently available for bicycle/pedestrian improvements. However, it is important to note that some of these sources can be spent on noninfrastructure uses, and many of these sources are awarded to other entities and spent on projects off the Primary Highway System. The actual amount of these sources spent on Primary Highway System bicycle and pedestrian accommodations will

vary from year to year, and will generally be substantially less than the average annual amount. Historical data from SFY 2006 through 2015 was used to develop a linear trend, and then projected out to 2045. **Average annual Iowa DOT revenues** (Table 6.5) over the life of the Plan were then calculated.

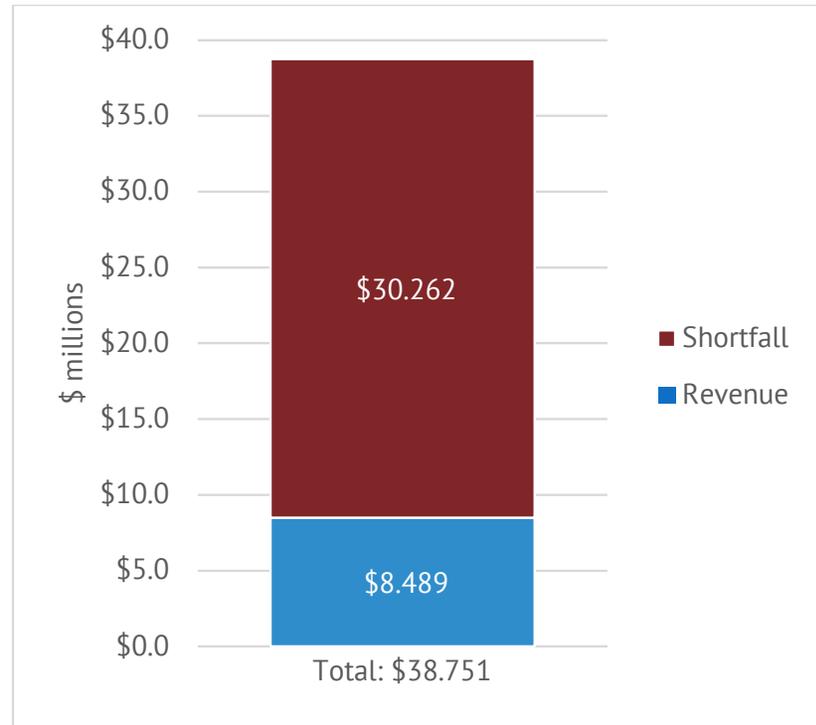
Table 6.5: Average annual bicycle and pedestrian revenues, 2017-2045 (\$ millions)

	Annual average Iowa DOT revenues
Total	\$8.489

Source: Iowa DOT

The difference between average annual costs and revenues is illustrated in Figure 6.6. As discussed previously, this would represent construction of the maximum on-road accommodations on the Primary Highway System, and the maximum use of current funding sources for bicycle/pedestrian improvements. Since much of that funding may be distributed to other entities for non-Primary Highway System projects, or spent on developing the statewide trails vision, this funding analysis helps show the significant need for additional sources of funding for bicycle and pedestrian projects. As discussed in strategy 19 in Chapter 5, same-source funding for bicycle and pedestrian accommodations as part of road projects could be one potential option to help address the shortfall.

Figure 6.6: Bicycle and pedestrian average annual total costs for primary system, revenue, and shortfall, 2017-2045 (\$ millions)



Note: Per the preceding discussion, this represents the maximum amount of revenue available for primary system improvements, much of which is currently directed to other entities and projects. The actual amount of this revenue spent on Primary Highway System bicycle and pedestrian accommodations will vary from year to year, and will generally be substantially less than the average annual amount noted here.

Source: Iowa DOT

Implications of the shortfall

- Bicycle and pedestrian accommodations may not be able to be constructed for primary highway projects when warranted.
- Some trails, including trails of statewide significance, may not be built, creating a disconnected and segmented system.
- Some existing facilities may not be adequately maintained.
- There may be fewer facilities available to accommodate potential bicyclists and pedestrians for transportation and 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 and 2016 Road Use Tax Fund (RUTF) studies. The 2011 study identified both total statewide needs and critical statewide needs, with the latter 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** for Iowa's entire public roadway system were then projected over the life of the Plan. To bring these costs into the context of the Five-Year Program, the portion of statewide needs that could 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: Average annual total highway costs, 2017-2045 (\$ millions)

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

Source: Iowa DOT

Table 6.7: Average annual critical highway costs, 2017-2045 (\$ millions)

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

Source: Iowa DOT

Revenues

Revenues for highway were also derived from the Iowa DOT's 2011 and 2016 studies of roadway needs and RUTF revenues. Revenues saw a significant increase following the 2015 passage of Senate File 257, which included several funding provisions, most notably a 10 cents per gallon fuel tax rate increase. Future revenue assumptions for federal formula funds, RUTF revenues, and Transportation Investment Moves the Economy in the Twenty-First Century (TIME-21) Fund revenues were applied to fiscal year 2017 funding levels for each of these sources and then projected out to 2045. **Average annual Iowa DOT revenues** (Table 6.8) over the life of the Plan were then calculated.

Table 6.8: Average annual highway revenues, 2017-2045 (\$ millions)

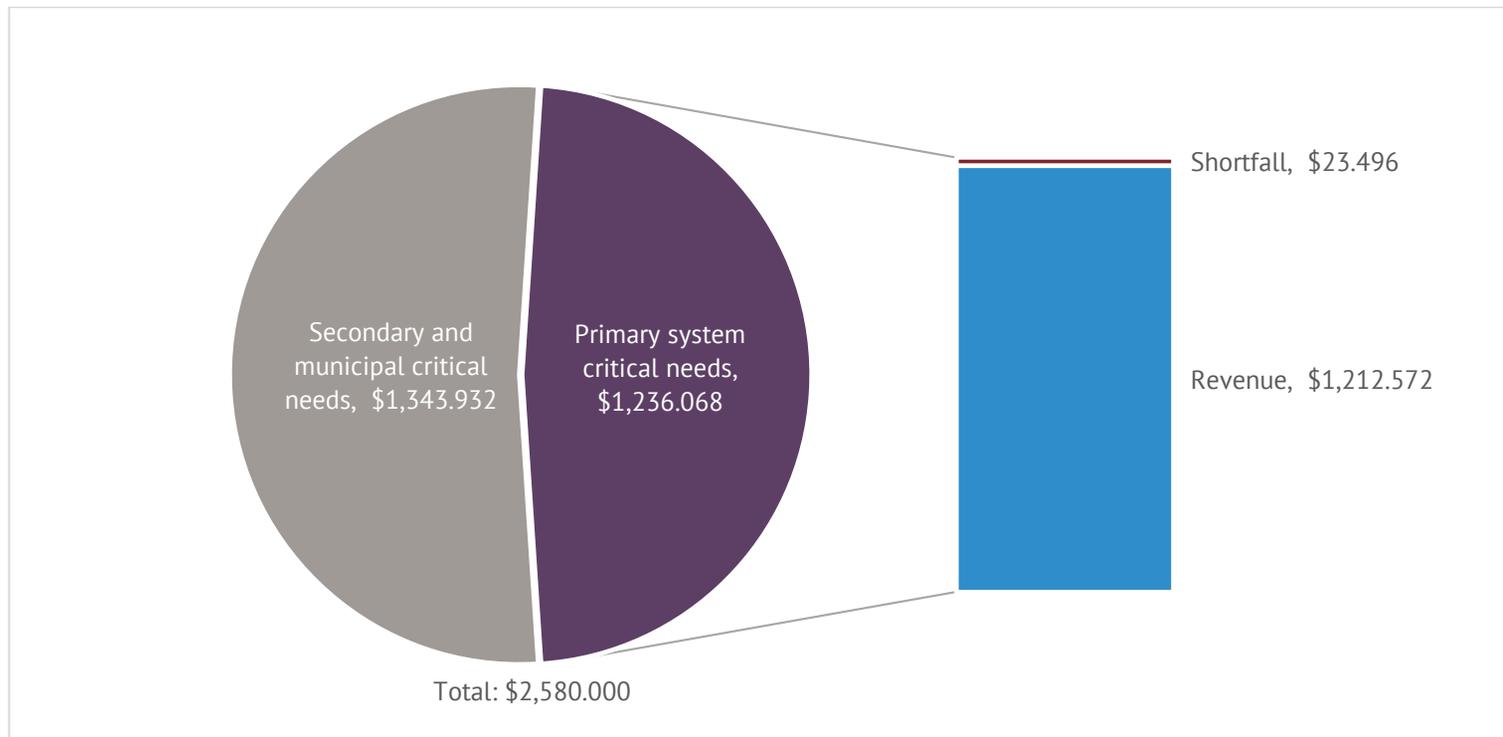
Average annual Iowa DOT revenues	
Total	\$1,212.572

Source: Iowa DOT

The difference between average annual critical costs and revenues is illustrated in Figure 6.7. As illustrated, anticipated revenues largely address the critical funding shortfall identified in the 2011 study.

However, it is important to note that large portions of the system will continue to experience deteriorating pavement and bridge conditions at the projected funding levels. Figure 6.8 highlights the results of an analysis performed with the Federal Highway Administration (FHWA) resource Highway Economic Requirements System – State Version (HERS-ST). The analysis forecasts the primary highway system’s average international roughness index (IRI), which is a common measurement of road roughness, from a base year of 2014 through 2044. As shown, current investment levels will slow the rate of deterioration but still result in a worsening IRI over time.

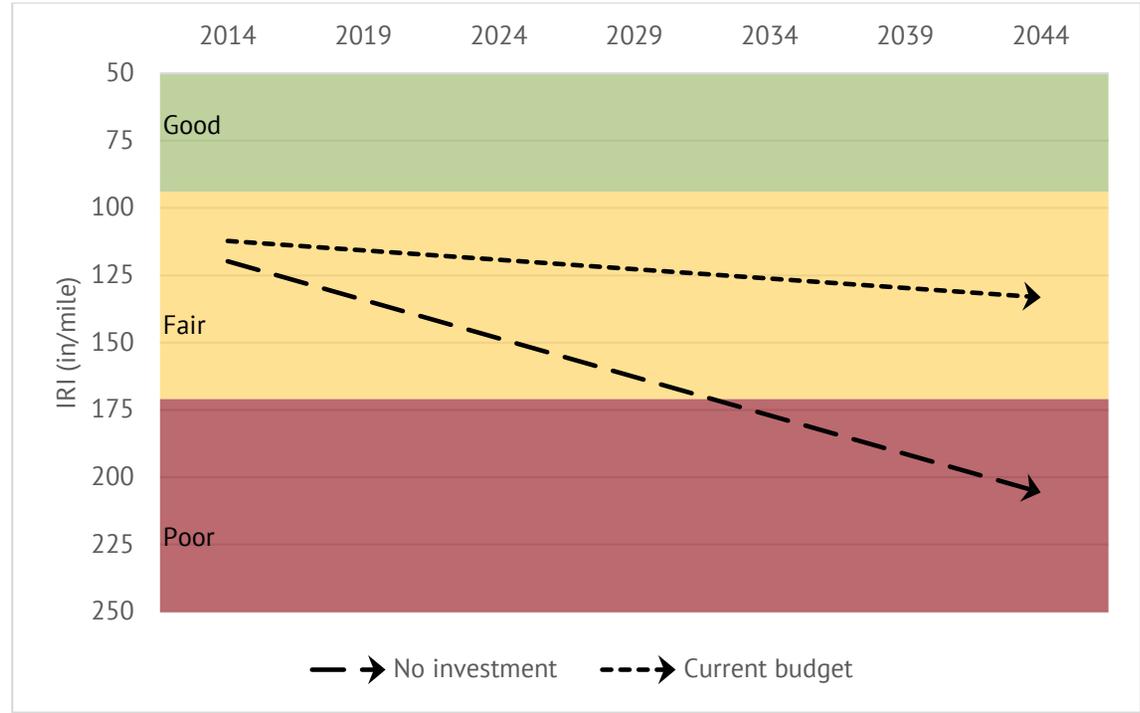
Figure 6.7: Highway average annual critical needs, Iowa DOT share, revenue, and shortfall, 2017-2045 (\$ millions)



Source: Iowa DOT



Figure 6.8: Forecast trend for primary highway system pavement condition, current budget versus no investment



Source: HERS-ST

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 and congestion.
- 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 for small and large urban fixed-route systems.
- Expand daily service hours for large urban systems.
- Expand daily regional paratransit trips.

The total annual costs for meeting baseline demand were identified in the funding study in 2009 dollars. These costs were inflated to 2016 dollars, and then projected to 2045 using an annual inflation rate of 3 percent, which aligns with typical annual inflation in public transit costs. **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 Program funds. Between 2006 and 2015, this portion was just more than 11 percent of costs. 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: Average annual public transit costs, 2017-2045 (\$ millions)

	Average annual total costs	Average annual Iowa DOT costs
Capital	\$43.654	-
Operating	\$367.498	-
Total	\$411.152	\$45.640

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 SFY 2006 through 2015 and then projected out to 2045. **Average annual Iowa DOT revenues** (Table 6.10) over the life of the Plan were then calculated.

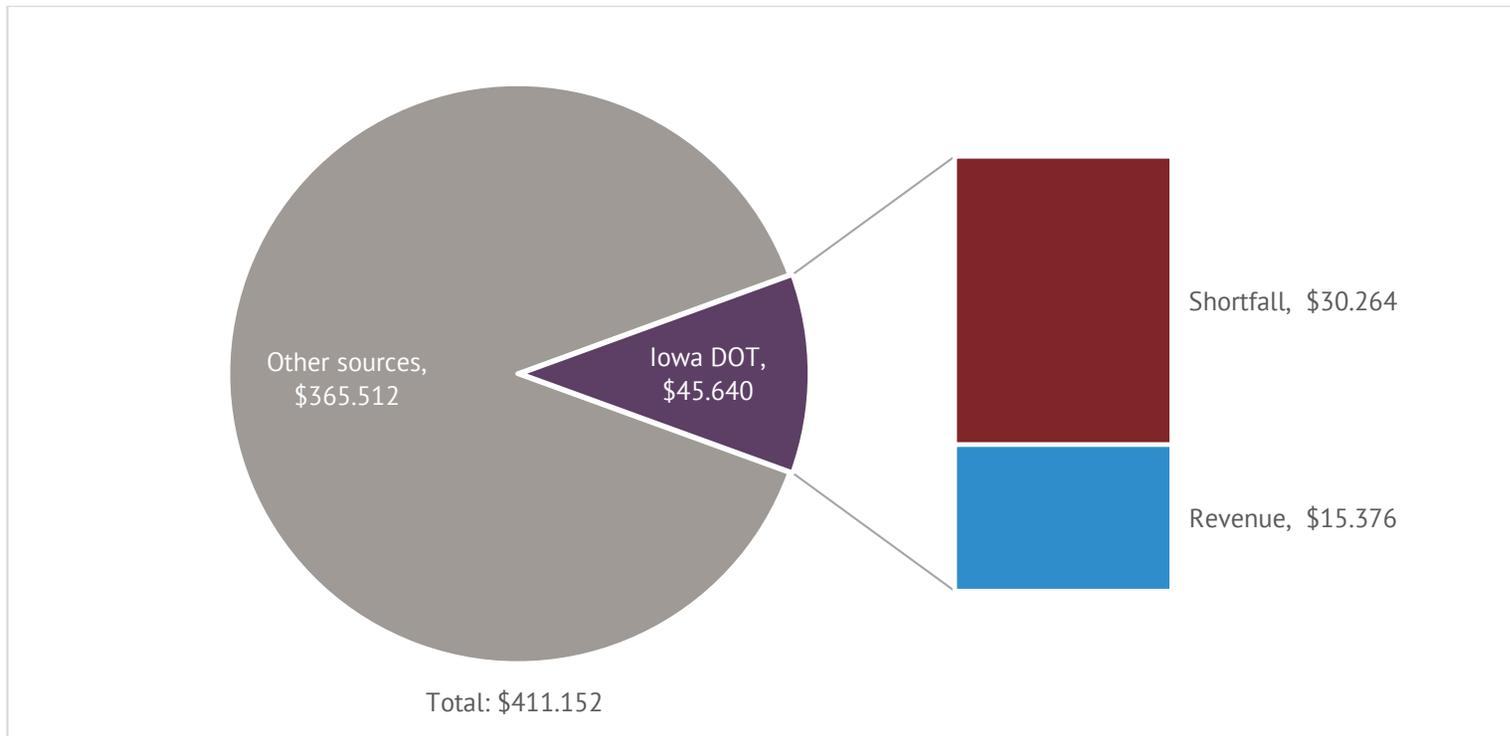
Table 6.10: Average annual public transit revenues, 2017-2045 (\$ millions)

	Average annual Iowa DOT revenues
Total	\$15.376

Source: Iowa DOT

The difference between average annual costs and revenues is illustrated in Figure 6.9. It is estimated that anticipated revenues would cover approximately 34 percent of the anticipated Iowa DOT costs.

Figure 6.9: Public transit average annual total costs, Iowa DOT share, revenue, and shortfall, 2017-2045 (\$ millions)



Source: Iowa DOT

Implications of the shortfall

- Slow bus replacement will accelerate aging of the bus fleet, already well beyond useful life standards, and increase maintenance costs.
- Transit operational funding may need to be used to replace aging vehicles in disrepair, which could decrease service.
- 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 the Iowa State Rail Plan, which was completed in 2017. The plan identifies, describes, and prioritizes specific potential rail projects for short- and long-term implementation. The proposed projects are based largely on increasing the efficiency of rail operations of Iowa’s railroads; enhancing rail access and expanding or constructing multimodal facilities for handling freight more economically and efficiently; and enhancing safety at crossings. Focus areas for these potential projects include enhancing access to the state’s rail network for shippers; fixing rail service gaps; improving infrastructure and the capacity, safety, and efficiency of rail service and operations; adapting for climate change and environmental sustainability; and economic development.

Costs were provided for projects in 2016 dollars, and inflated to the midyear of the short- and long-range periods using an annual inflation rate of 2 percent. **Average annual total costs** over the life of the Plan were then calculated (see Table 6.11). These costs would be divided amongst a range of entities – the Iowa DOT, other federal funding sources, local funding sources, and the railroad companies or other private funding sources.

Table 6.11: Average annual freight rail costs, 2017-2045 (\$ millions)

Average annual total costs	
Total	\$105.359

Source: Iowa DOT

Freight rail revenues

Revenues for freight rail were derived from historical funding for five funding programs managed by the Iowa DOT’s Office of Rail Transportation. Programs includes the federal Highway Rail Grade Crossing Safety Fund, Highway-Railroad Crossing Surface Repair Fund, Primary Road Highway-Railroad Crossing Surface Improvements, Signal Maintenance, and the Railroad Revolving Loan and Grant Program. A linear trend line was applied to the historical data from SFY 2006 through 2015 and then projected out to 2045. **Average annual Iowa DOT revenues** (Table 6.12) over the life of the Plan were then calculated.

Table 6.12: Average annual freight rail revenues, 2017-2045 (\$ millions)

Average annual Iowa DOT revenues	
Total	\$15.941

Source: Iowa DOT

The difference between average annual freight rail costs and revenues is illustrated in Figure 6.10. It is estimated that anticipated revenues would cover approximately 15 percent of the total anticipated costs. As previously mentioned, the remaining costs would be divided among a range of entities, including other federal funding sources, local funding sources, and the railroad companies or other private funding sources.

Passenger rail costs

Costs for passenger rail were also derived from the Iowa State Rail Plan. The plan identifies, describes, and prioritizes specific potential future rail projects for short- and long-term implementation. The proposed projects are based largely on upgrading existing passenger rail stations and the potential for expanding intercity passenger rail services. Capital projects that may provide opportunities for improved coordination, integration, and operations of passenger rail services in the state were also identified.

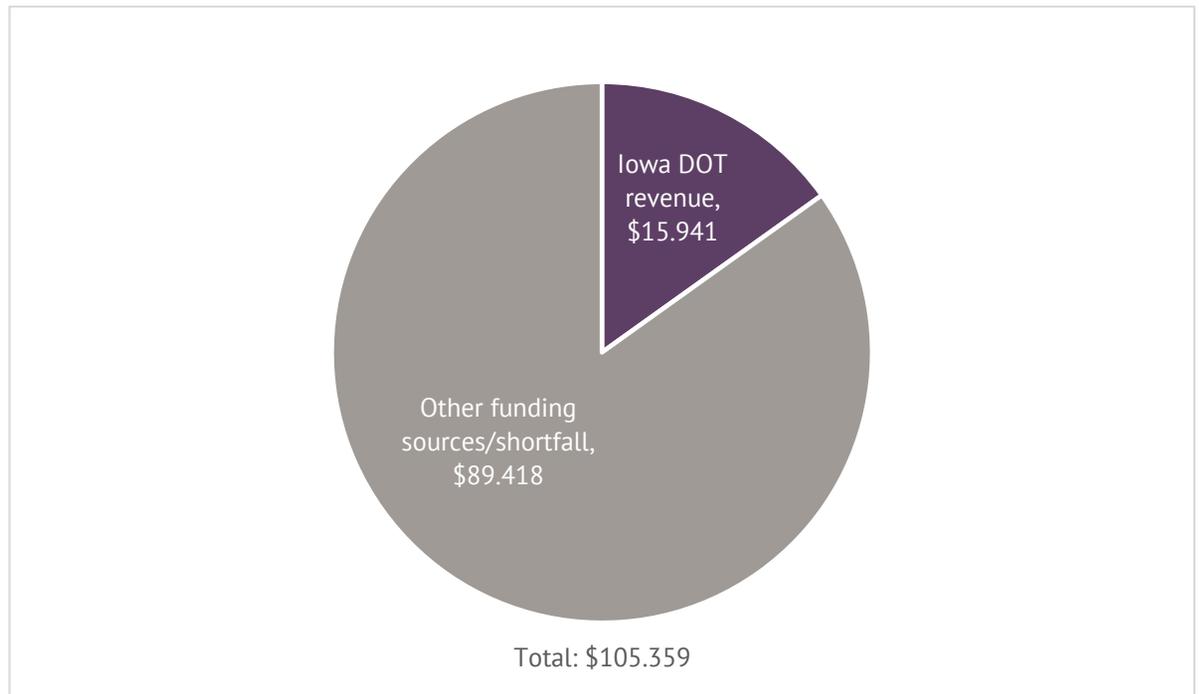
Costs were provided for projects in 2016 dollars, and inflated to the midyear of the short- and long-range periods using an annual inflation rate of 2. percent. **Average annual total costs** over the life of the Plan were then calculated (see Table 6.13). These costs would be divided amongst a range of entities – the Iowa DOT, other federal funding sources, local funding sources, and the railroad companies or other private funding sources.

Table 6.13: Average annual passenger rail costs, 2017-2045 (\$ millions)

	Average annual total costs
Total	\$199.344

Source: Iowa DOT

Figure 6.10: Freight rail average annual total costs, Iowa DOT revenue, and other funding sources/shortfall, 2017-2045 (\$ millions)



Source: Iowa DOT

Passenger rail revenues

Federal funding sources have enabled initial study of passenger rail from Chicago westward to Omaha. Federal funding will likely continue to be needed to advance many of the proposed passenger rail projects. An average annual Iowa DOT revenue figure is not provided, because there is not a substantial enough funding history of passenger rail initiatives by the state.



Implications of the shortfall

- Rail safety and service may be affected if rail revenue is not sufficient for needed infrastructure improvements.
- 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 affect 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).