IOWA DOT
I-80 Planning Study

INTERSTATE 80
PLANNING STUDY (PEL)

Vision for Infrastructure Investment

Office of Location and Environment | October 2018 Final

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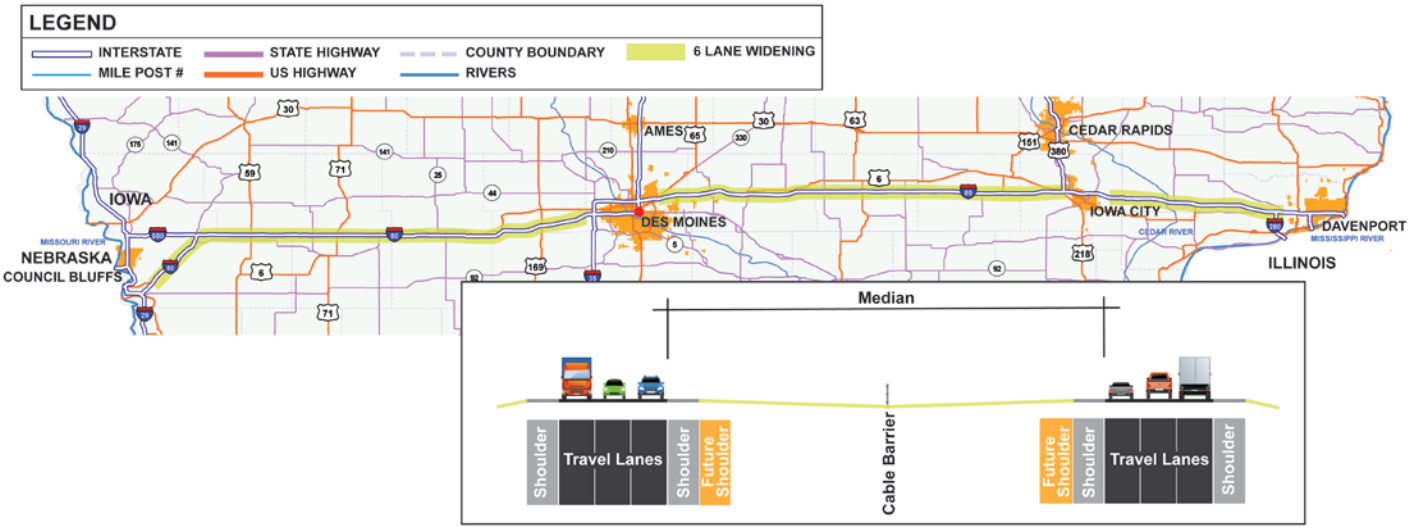
EXECUTIVE SUMMARY

A New Vision for I-80 Across Iowa

As the busiest Interstate, Interstate 80 (I-80) plays a vital role in connecting Iowa's major population centers and distributing people and products throughout the region and nation. It is critical to Iowa's continued economic prosperity. However, due to age and use, it is time to reinvest in this critical route. A new long-term vision for this Interstate is needed – one that preserves past infrastructure investments and positions Iowa for the 21st Century.

THE I-80 VISION



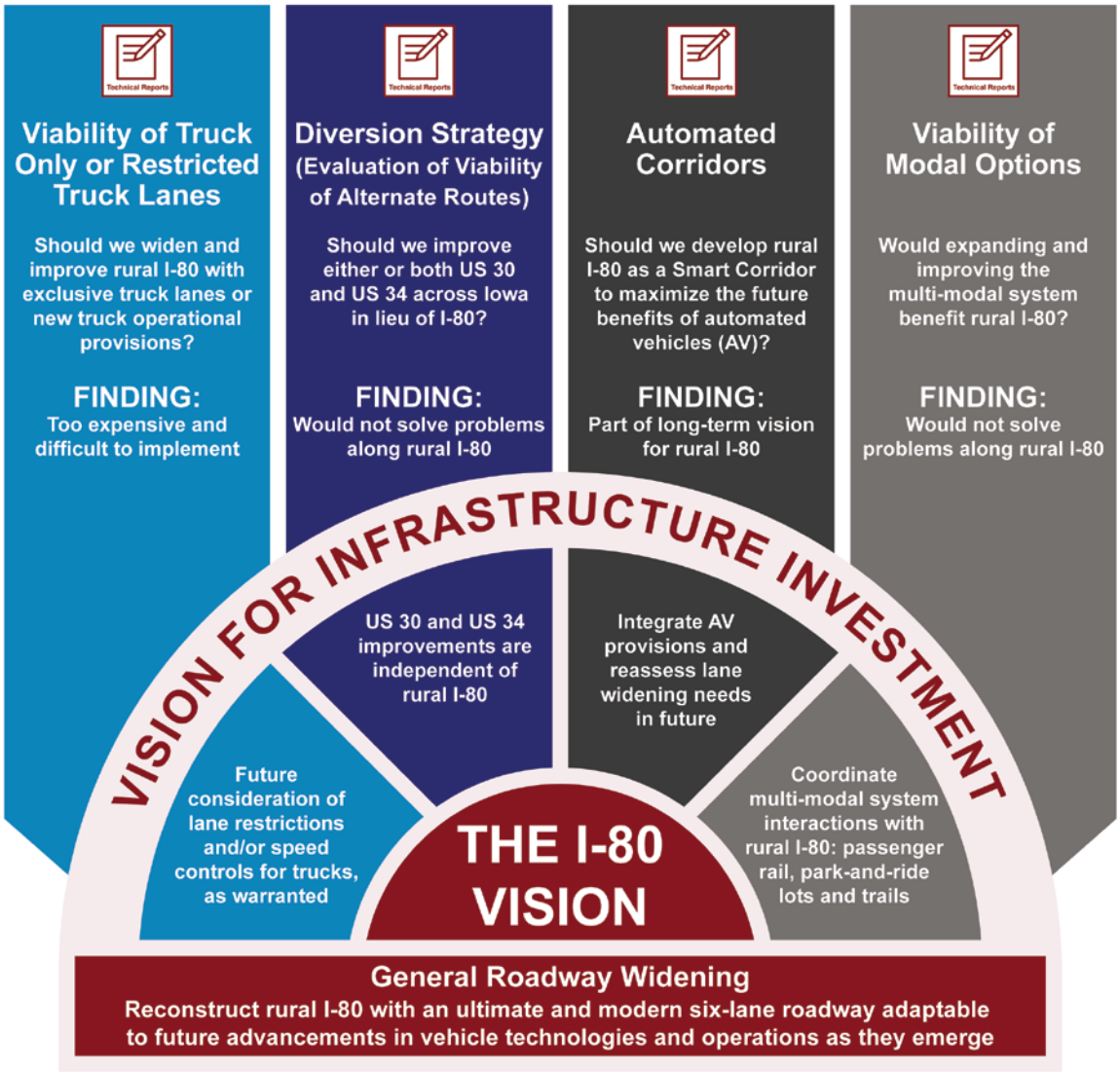
Through a comprehensive planning study, the Iowa Department of Transportation (Iowa DOT) has identified a new long-term strategic plan for rural I-80 across Iowa – the I-80 Vision. This Vision entails the reinvestment in the existing rural I-80 infrastructure. It requires the reconstruction of the existing roadway and bridge infrastructure in phases, over time, as funding and priorities allow. Ultimately providing a new, modern six-lane roadway across the State in the long term, this plan is adaptable to future changes as it is built. While fully accommodating future vehicle technologies and improved operations, the Vision will also adjust to these advancements as they emerge. Through reinvestment and future technology accommodations, the Vision provides a long-lasting and sustainable Interstate to serve Iowa for decades to come.

Features of the I-80 Vision

- Construction cost of $2.99 billion (2017)
- Ultimate six-lane section across Iowa built in phases and stages based on need
- A modern 75 mph design
- Expandable for long-term traffic growth
- Phased implementation and build-out as funding is available
- Accommodates future vehicle technologies
- Maintains two lanes of traffic in each direction during construction
- Interchange improvements to serve future traffic growth and development
- Provisions for truck operations to improve overall traffic flow
- Improved rest areas and facilities
- Improved reliability for increased flooding risks due to changes in weather trends

The I-80 Planning Study

In coordination with its planning partners, and through considerable engagement with key stakeholders and input from the general public, the Vision was identified by the Iowa DOT as the best and most appropriate improvement strategy for rural I-80. This recommendation was based on analyses of travel demand, traffic and safety operations, construction and maintenance costs, potential impacts to environmental resources and statewide travel efficiencies. Through system-level analyses, other types of improvement strategies were considered and documented in separate technical reports. These include truck-only lanes; expansion of alternative routes, such as US 30 and US 34; deployment of automated vehicle (AV) technologies; and multi-modal improvements. While each does not solve the problems along rural I-80 independently, elements of these other strategies are integral to the I-80 Vision. Based on the General Roadway Widening Strategy, the I-80 Vision provides a long-term integrated system solution for east-west travel across Iowa.



The Vision's Benefits for Iowa

Reinvesting, expanding and modernizing I-80 across Iowa provides long-lasting and sustained mobility services for Iowa's residents, producers, manufacturers, freight carriers and travelers. Given its importance to the State's economy, implementing the Vision would benefit all Iowans. Through improved travel service and reliability, it further establishes I-80 as the backbone of Iowa's economy. Built over time, as funding is available, the Vision would save travelers lost time due to delays, vehicle operations costs, and safety-related costs due to accidents. These benefits would provide real dollar savings to motorists across the State.

Benefits of the I-80 Vision (2018 to 2050)

With the roughly $3 billion reinvestment in rural I-80, the Vision would:

- Improve travel times across Iowa
- Prevent roughly 24,000 total and 180 fatal crashes statewide (estimate)
- Reduce approximately 475 million hours of travel delay statewide (estimate)
- Save around $3.1 billion in travel and safety-related costs statewide (estimate)
- Save around $0.60 billion (net) in existing pavement and bridge rehabilitation costs (estimate)
- Prepare the roadway for future automated vehicle technologies and operations

Implementing the I-80 Vision

Constructing the Vision will be accomplished strategically over time, as funding is available and priorities allow. As a framework for the department's construction planning and programming, individual projects along I-80 will be identified based on the Vision's Implementation Plan. Once identified and funded, the Iowa DOT will conduct additional engineering and environmental planning studies for each project, followed by final design, right-of-way acquisition and construction. These studies will entail more detailed environmental resource studies and preliminary engineering design. During the planning studies, as well as the following final design activities, public meetings will be held to provide additional, more detailed opportunity for public input and comment.

The I-80 Vision's planning studies will include more detailed environmental field surveys to identify and avoid, wherever reasonably possible, existing environmental resources.

Building the I-80 Vision – Corridor Priorities and Staging

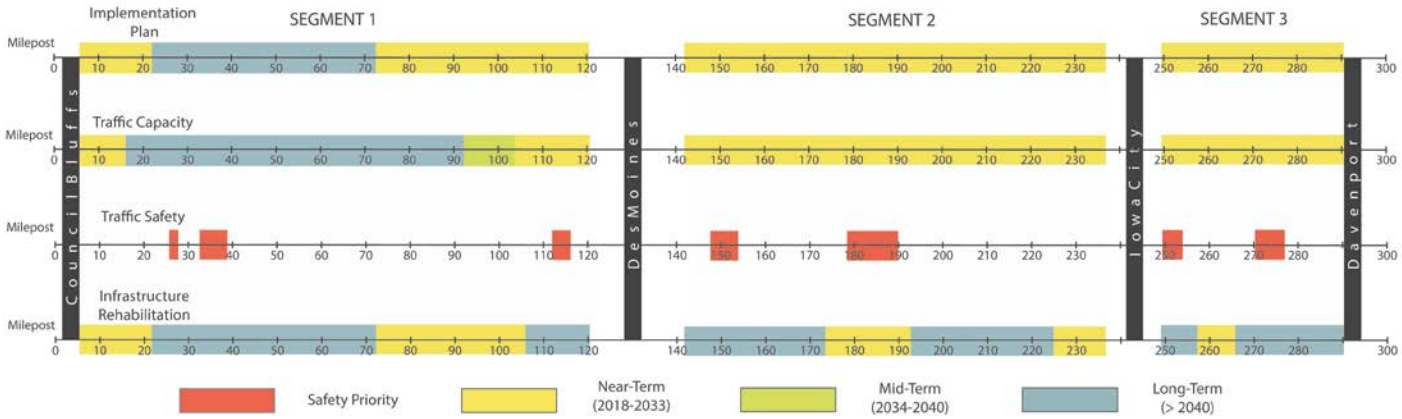
I-80 Vision Implementation Plan Project Priority Triggers

- **Traffic Capacity** – Traffic operations not meeting operational objective
- **Traffic Safety** – Priority areas with high crash rates
- **Infrastructure Rehabilitation** – End of pavement and bridge service life requiring full replacement to maintain state of good repair

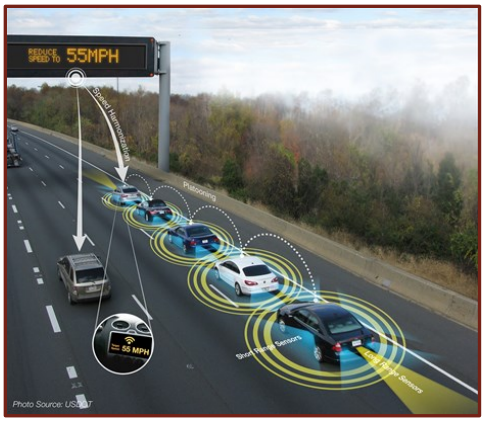
The emerging needs and priorities along rural I-80 will determine how the Iowa DOT selects projects and sequences the Vision's construction. The intent is to effectively sequence its implementation, in logical and connected sections, based on the highest needs as funding is available. This needs-based prioritization of projects will be based

on three primary triggers: Traffic Capacity, Traffic Safety and Infrastructure Rehabilitation. Based on projections of these triggers, the Vision's Implementation Plan identifies construction priorities within three time horizons. This plan provides framing and flexible guidance for the department's future construction planning and programming. It is not a guarantee when a project will be constructed.

THE I-80 VISION - IMPLEMENTATION PRIORITIES



The Vision is a long-term strategic plan, extending beyond 2040. It provides an ultimate, expandable six-lane roadway template across Iowa that is adaptable to the timing of needs. By staging its implementation, the plan can adjust to; 1) the availability of funding and changing priorities, 2) the timing of needs, and 3) changes in traffic operations due to the emergence of AV technologies. As an example, for areas needing full reconstruction but not yet requiring six lanes, such as in rural western Iowa, an initial four-lane staging of the plan could be implemented. In similar fashion, throughout rural I-80, as existing bridges reach the end of their service life, the replacement bridge could be built and staged according to the ultimate configuration.



The Vision is adaptable to driverless cars and AV operations, which in the future may impact the number of travel lanes across Iowa.

In addition, as the Vision is built across Iowa, especially in the later years, the department will continue to assess the impacts of AV technologies and operations. The timing of the need for six lanes in western Iowa, currently projected soon after 2040, could be extended due to the benefits of AV operations. Similarly, the future potential need for additional travel lanes in central and eastern Iowa, beyond the six lanes provided, could be impacted. Within these areas, currently projected to exceed the department's traffic operations objective by around 2040, additional traffic capacity needs could be fulfilled by repurposing travel lanes for exclusive AV use. The Vision accommodates this possibility. The Iowa DOT will continue to assess the benefits of AV operations as the plan is implemented, and will adjust accordingly.

Paying for the I-80 Vision

Completing the Vision is an important commitment of the State and will require a significant portion of Iowa DOT's funding in the future. For example, if it would be fully built by 2040, roughly 75 percent of the department's future Interstate funding would need to be allocated. During its construction, this commitment could impact the department's ability to address other needs across Iowa. Moving forward, the Iowa DOT will continue to assess the many important, yet competing needs across Iowa, including I-80, in determining how best to spend limited resources. Furthermore, by staging the construction based on the timing of needs and the future benefits of AV technologies and operations, the Iowa DOT could defray its costs over a longer period, beyond 2040.

Next Steps for the I-80 Vision

The I-80 Vision provides strategic direction and a long-term framework for programming and planning future improvements along rural I-80. This enables the department to maintain the existing infrastructure and plan, program and construct projects along rural I-80 based on the Vision for long-term compatibility and cost efficiency.

Ongoing maintenance of the existing I-80 pavement and bridges will continue as the Vision is constructed over time across Iowa.

The next steps for implementing the Vision include:

- **Rural I-80 Operations and Maintenance** – As part of normal Interstate condition assessments and maintenance programming, major roadway and bridge rehabilitation activities will be coordinated with the Vision's implementation as future phases are identified and programmed.

- **Coordination of Statewide Projects** – Statewide improvement programs, such as rest areas and park and ride facilities, will be coordinated to accommodate the Vision's implementation.

- **Additional I-80 Studies** – For corridor-wide applications, additional studies will be performed to further define common design standards and infrastructure requirements. As necessary, additional studies could be performed sometime in the future to assess improved truck operations policies.

- **Project Programming** – As part of the department's regular planning and construction programming activities, projects will be identified and programmed. Accordingly, coordination with the FHWA and others, as necessary, will be performed to identify the limits of each project and the necessary type of environmental analysis and documentation. Based on the unique circumstances of each project, the Iowa DOT will determine how best to phase and stage the improvements based on the Vision's

ultimate configuration, including the impacts of AV operations on the number of required travel lanes.

- **Funding Options** – The department will continue to assess alternative funding options. While utilizing tolls to fund and finance the improvements is not currently planned, it may become an option worth considering as State funding priorities change or if new federal funding opportunities or incentives become available. Any future decision regarding tolls would entail a series of decision steps, in ascending level of detail, including considerable additional study and coordination with the state's policymakers and the public.

Commenting on the I-80 Vision

A study website has been instrumental in communicating with the public and receiving comments. Over 120 comments and 5,500 completed questionnaires have been received. Online information available for review includes public meetings and technical reports. Comments on the I-80 Vision can be submitted at https://iowadot.gov/interstatestudy/home.

1. INTRODUCTION

Transportation and the Economy

Transportation impacts Iowans every day, connecting residents to jobs and products to consumers. It is the backbone of the State's economy.

Since the recent Great Recession, Iowa's economic growth and recovery have outpaced the nation's. With its central geographic location, diversifying economy and extensive transportation system, this growth is expected to continue into the future. But with it comes additional demands on its transportation system. Sustaining and reinvesting in Iowa's transportation system, including Interstate 80 (I-80), are vital to the State's continued economic prosperity.

I-80 has the highest truck volumes in Iowa and connects Iowa's largest metropolitan areas.

A New Vision for Rural I-80

To prepare for and support Iowa's future economic growth, the Iowa Department of Transportation (Iowa DOT) has conducted a long-term planning study of I-80 across Iowa. Focused on the rural areas, the purpose of the study is to develop a new long-term vision for this Interstate route. Originally built in the 1950s and 1960s, with age and ever-increasing traffic, a new vision and improvement plan are needed. Reinvestment in I-80 is a necessity to maintain its vital role in the state's transportation system and to support Iowa's continued economic growth. But simply rebuilding the existing infrastructure may not meet the needs of an undetermined future. This new vision, called the I-80 Vision, must be able to adapt to future changes to serve Iowans well into this century. As the mobility needs of future generations continue to evolve, and as new vehicle technologies emerge, the I-80 Vision must accommodate future design requirements, while meeting the immediate and short-term needs of Iowa.

As part of the US Interstate Highway System, I-80 is a major transcontinental Interstate highway extending from California to New York City, connecting Iowa's largest cities with the nation.

The I-80 Planning Study

This planning study of I-80 across Iowa (i.e., Planning Study) was conducted using the federally adopted Planning and Environmental Linkages (PEL) Study process. As such, the study's findings can be referenced by subsequent environmental and engineering studies for the implementation of the recommended improvements, thereby streamlining the next steps in the process.

The goal of the Planning Study is to identify the best long-term plan for improving the rural portions of I-80. This entails evaluating a number of different types of improvement strategies, such as rebuilding and modernizing the existing roadway, improving other parallel roadways, constructing passenger rail lines, or a combination of strategies. Through coordination and input from Iowans and public officials, a plan was identified based on mobility, environmental and funding considerations. The I-80 Vision, identified and defined by this study, including a plan for implementation, enables near-term improvements to be planned, designed and constructed over time consistent with the overall plan.

What is a Planning and Environmental Linkages (PEL) Study?

A PEL Study is a systems planning process, adopted and endorsed by the Federal Highway Administration, used to identify solutions for transportation issues, priorities and environmental concerns. It is a concept-level decision-making tool for DOTs, supported by planning analysis.

Types of PEL planning decisions include:
- General mode, scope and concept for the improvements
- Environmental setting and issues to be addressed
- Plan for implementing and funding the improvements

PEL planning activities and analysis include:
- Travel characteristics and demands
- Economic development, land use and population
- Natural and manmade environmental resources
- Public involvement and coordination

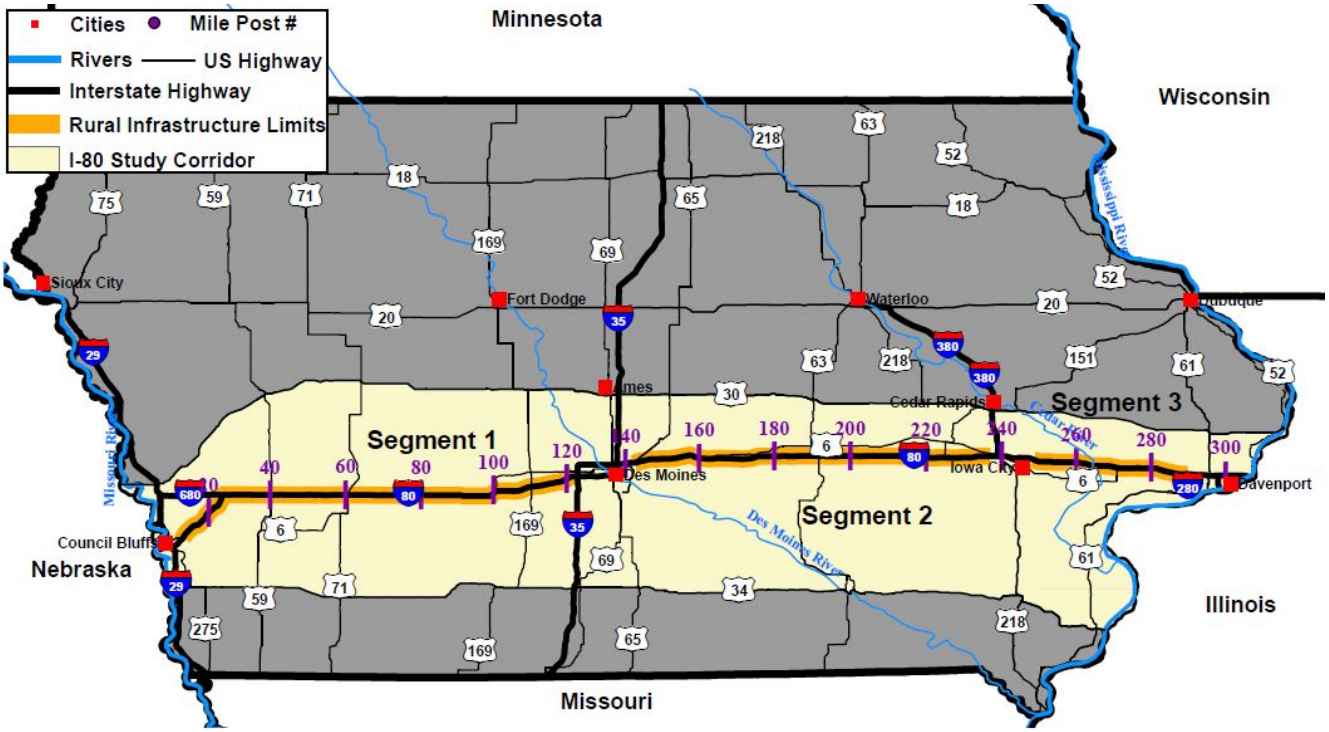
Appendix A – Planning and Environmental Linkages Questionnaire provides a checklist for PEL process questions for the I-80 Planning Study.

Defining the I-80 Corridor

East-west travel in Iowa, including passengers and freight, is currently served by a system of transportation facilities. Including intrastate travel within Iowa, this travel originates from and is destined to widely dispersed locations, such as Chicago, Omaha and other outlying locations. In addition to Iowa's highway system, including I-80, these travel patterns are served by passenger rail services, freight rail lines, commercial and freight air travel services, waterways and other modes of travel. Within this system, I-80 is the primary highway that carries the highest volume of travelers.

As shown in ***Figure 1***, the I-80 Corridor limits are generally defined to encompass the existing transportation network within Iowa that serves east-west travel between Council Bluffs and the Quad Cities. As I-80 is the primary component of this system, the I-80 Corridor limits are centered along I-80, and extends to US 30 to the north and US 34 to the south. This broader study corridor definition allows a system-wide assessment of all travel modes and highways that serve east-west travel and interact with I-80.

Figure 1. STUDY CORRIDOR MAP



Traveling I-80 across Iowa includes both rural and urban areas. Due to the more homogeneous nature of the rural corridor, for the purposes of this study, roadway improvement strategies were evaluated for the rural portions of the I-80 Corridor. Three segments, as shown in ***Table 1***, define the limits of the roadway improvements. These limits exclude the metropolitan areas of Council Bluffs, Des Moines, Iowa City and the Quad Cities. Within these rural segments, the existing I-80 consists of a typical four-lane divided roadway section. The total length of rural I-80 across Iowa is 248 miles.

Table 1. I-80 CORRIDOR SEGMENTS

Segment	From		To		Length (Mi.)
	Interchange	Mile Post	Interchange	Mile Post	
1	US 6	MP 8	Jordan Creek	MP 121	113
2	Co Rd S14	MP 143	Co Rd W52	MP 237	94
3	Co Rd F44	MP 249	I-280	MP 290	41

Within the Corridor's urban areas, which are excluded from the rural I-80 limits, studies have been completed or are planned to assess the needs of I-80. For the implementation of the I-80 Vision, it is assumed that any additional improvements to I-80 within these metro areas would be constructed in coordination with its improvement plan. In these urban areas, coordination will be required with the various metropolitan planning agencies and other planning partners for the corresponding metro area improvements following the Planning Study.

The I-80 Planning Study Process

Integrating the I-80 Vision with Iowa's Statewide Plans

There are many diverse needs, opportunities and competing investment priorities within Iowa's transportation system. Limited funding requires thoughtful foresight by the Iowa DOT to spend its resources in the best interest of the State's residents. Therefore, it's important that project-specific investment decisions fit within the State's overall statewide goals and objectives. Developing a new vision for an Interstate corridor like I-80, which is a significant part of the State's system, needs to be fully integrated into the State's overall planning processes. This will ensure the Vision is aligned with the State's overall direction and aid in important funding prioritization decisions.

Iowa in Motion 2045 is the Iowa DOT's current statewide Long-Range Transportation Plan. This plan, adopted by the Iowa Transportation Commission in 2017, provides a long-range action plan for Iowa by matching specific statewide investment strategies with the needs of the overall system, and identifies a number of strategic actions pertinent to the I-80 Corridor and this planning study. Four principal investment areas relevant to the Planning Study are defined by the plan as a framework for implementing the statewide mission and goals:

Iowa in Motion 2045 provides overall guidance on Iowa's transportation investment decisions.

- **Stewardship** through maintaining a state of good repair.
- **Modification** through rightsizing the system.
- **Optimization** through improving operational efficiency and resiliency.
- **Transformation** through increasing mobility and travel choices.

System Approach for Planning Study Analysis

As travel within the Corridor is currently served by a combination of transportation systems, including highways, rail, waterways, airports and other modes of travel, in addition to improving I-80, an assessment of non-Interstate improvement strategies is needed. A system-wide assessment can identify the interactions between the various modal systems and opportunities for coordination with the planned I-80 improvements. Therefore, the intent of the Planning Study is not to assess how investments in alternative modal strategies could be made in lieu of improvements to I-80, but rather how these modes could complement each other, improve the total system's performance, and be integrated with the I-80 Vision. The Planning Study's goals and objectives and evaluation process were organized on this basis.

Defining the I-80 Vision

The Planning Study process entailed a systems-based planning analysis that identified possible improvement strategies, evaluated them based on the Corridor's goals and objectives, and recommended the best, or preferred improvement strategy – the I-80 Vision. As a system-level study, final details of the recommended strategy are not provided, but rather a general description of the concept and scope of the improvements are presented. The I-80 Vision identifies the strategy's features and areas for more analysis to be performed later. By defining the new I-80 Vision, this study sets the stage for the follow-up studies, including the identification of important environmental issues and processes for the implementation of the improvements. Based on the priorities within the Corridor in fulfilling the identified goals and objectives, as they develop over time and as funding allows, an overall implementation plan is provided.

I-80 Planning Study Guiding Principles

To initiate the I-80 Planning Study, the Iowa DOT developed overall principles to guide the study process. This guidance was developed to align the study with the broader statewide objectives and provide consistency in the study process.

1. Balance access and mobility
2. Design for future needs, considering emerging technologies
3. "Right-size" Interstate 80
4. Consider environmental and social implications
5. Build on past efforts
6. Consider practical transportation modes
7. Engage stakeholders
8. Develop an implementation plan

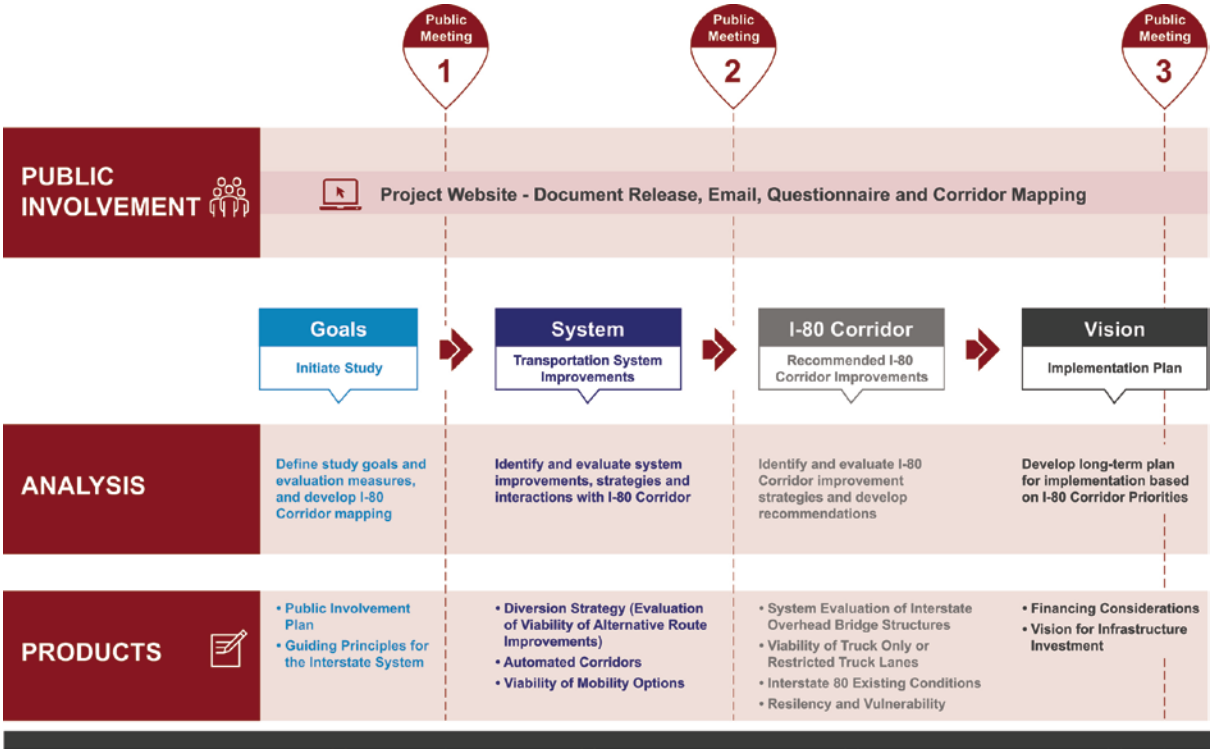
As shown in ***Figure 2***, in accordance with the PEL study process and the study's Guiding Principles, the Planning Study entailed four principal steps: Goals, System, I-80 Corridor and Vision. These steps were performed in succession, building on the findings and conclusions of the previous step. For each of these steps, separate analyses were performed and technical reports were prepared and published on the study's website. For the system evaluation, separate analyses for each of the system-level strategies were performed. The I-80 Corridor evaluation then combined the best elements of the system strategies into a singular plan for the Corridor – the I-80 Vision. Throughout this process, public involvement and input were provided through the study's public website, including email updates, a study questionnaire and public meetings. Products and technical reports performed for each step were published and are available on the project website, including other additional supporting information.

Readers' Guide

This is a summary report of multiple evaluations and Technical Memoranda. These memoranda and related study products were developed and published on the study's website during the course of the study and are available for review.

To aide in the referencing of supporting materials for this report, the following icons are used throughout the report to direct the reader to these collateral materials available on the study website:

Figure 2. I-80 PLANNING STUDY PROCESS



Why Invest in I-80: The Importance of I-80 to Iowa's Economy

While the linkage between the economy and transportation is complex, fundamentally, transportation provides and promotes business and economic opportunities. Through improved access, communities can grow around the mobility it provides. It connects businesses and products to the marketplace, and through improved productivity, businesses can grow and expand. In a competitive global marketplace, it can be a determining factor when a region competes for new businesses and industry. Providing safe, reliable and convenient travel also enhances the quality of life for all residents, thereby saving residents money and influencing where they choose to live. Through all aspects of the economy, transportation is integral to a region's economic vitality and subsistence.

Originally built in the 1950s and 1960s, I-80 has had a significant impact on the population and economic development patterns in Iowa.

The Interstate and the Economy

The role of transportation in serving Iowa's economy is most evident with I-80. As the central artery of Iowa's transportation system, I-80 is the primary highway that serves the State's major population centers. Completed in 1972 as part of the nation's Interstate Highway System, the route for I-80 connects the region's historical commerce and population centers. Historically in Iowa, east-west travel has connected residents and products to waterways and the nation. Long before its completion, trails and early rural roads connected Council Bluffs and Davenport across Iowa. With the completion of US 6 in 1931, this route quickly became the busiest highway in the state. Since then, Iowa's economy and urban landform have continued to grow and develop around this route. Just as in the past, I-80 will continue to be an important economic driver for Iowa in the future.

A key indicator of I-80's importance to the State's current and future economy is its proximity to the State's current and projected population and employment. In 2010, roughly 64 percent of the State's population lived within 50 miles of I-80. With anticipated diversification into services-oriented industries, shifting from a primarily agriculture-based economy, it is projected that by 2040, roughly 67 percent will live near I-80 – outpacing the growth of the State as a whole. Similarly, employment along I-80 is expected to grow from roughly 64 percent of the State's employment in 2010, to 68 percent by 2040. In the future, I-80 will continue its vital role in connecting Iowa's residents and supporting its economy.

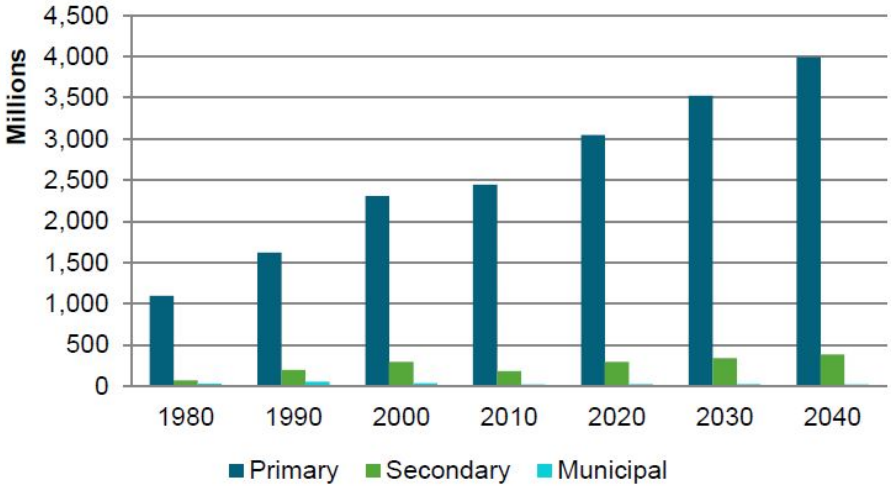
Productivity

Research has shown that a region's economic base is closely related to the quality of its transportation system. Good, dependable transportation service allows businesses to efficiently receive materials and distribute their products to the marketplace. Lower transportation costs improve productivity and allow businesses to expand and grow their operations, which promotes economic growth and development.

Freight usage can be a clear indicator of an economy's reliance on transportation. Usage also provides a relative measure of the system's role in promoting economic productivity. The Iowa DOT recently completed a statewide freight study, entitled *Iowa in Motion: Statewide Freight Plan, 2016*, which highlights this fact. It estimates that annual freight tonnage moved by Iowa's transportation system will grow by 34 percent from 2012 to 2040. Furthermore, this report projects that the movement of freight will further shift to Iowa's highway network. ***Figure 3*** shows that annual large truck traffic vehicle miles of travel on the primary highway system is expected to grow by 66 percent by 2040 – significantly outpacing the State's overall growth of freight.

I-80 carries the highest volumes of trucks in the State. Over half of the State's annual vehicle-miles of Interstate truck traffic occur on I-80.

Figure 3. ANNUAL IOWA LARGE TRUCK VEHICLE-MILES TRAVELED BY HIGHWAY SYSTEM



Source: Iowa in Motion: Statewide Freight Plan, 2016

Competitive Advantage

Every business is looking for a competitive edge. Location and ease of transportation access have long been significant factors in achieving this advantage. In the competitive global marketplace, communities often compete for new business and manufacturing. Businesses have options in where they choose to locate their operations. In the future, as Iowa's economy further diversifies with expected higher growth in the services, health care and government industry sectors, the ability to attract new businesses and the necessary workforce will be critical. As transportation is an underpinning factor in a region's ability to compete, improvements to Iowa's transportation system will be essential for competing in a highly competitive market for new jobs and industry.

Businesses locate where access to transportation enables the transport of their goods and products.

Several studies have looked into the issue of transportation offering a competitive advantage. In a study completed by the Missouri DOT, 61 percent of business respondents stated that for their facility, proximity to a highway is a competitive advantage. Early studies on the economic benefits and impacts of the Interstate System have shown a direct correlation between improved access and higher economic growth, especially employment. Studies have shown higher job growth, and resulting increased land values and ability to attract new businesses for communities with improved access.

Quality of Life

Transportation directly affects the quality of life for all Iowans. It provides residents access to jobs, shopping, recreation and other important and essential services. Iowans have long enjoyed safe, non-congested, accessible, and efficient travel on their roadways, and expect the same quality of service from their busiest Interstate. Iowa's transportation system needs to be reliable and safe, both now and into the future.

As the primary link between Iowa's largest cities, I-80 significantly contributes to the quality of life for Iowans. With the projected population and employment growth of Iowa's cities, this role is expected to expand in the future. Connections provided by I-80 will continue to enable Iowans to enjoy the recreation and entertainment opportunities throughout the State. Furthermore, through reinvestment, I-80's efficient, reliable and safe service will reduce Iowan's transportation costs and attract new residents to support the state's future job growth.

Iowa's transportation system, including I-80, directly affects Iowans' quality of life by providing access to recreational activities and important services.

The I-80 Corridor Goals and Objectives

The goals and objectives for the I-80 improvements provide a framework for identifying and evaluating the various improvement strategies for the Corridor. Based on Iowa's statewide goals and the issues critical to the Corridor, five overarching study goals have been identified. Combined, these goals fulfill Iowa's statewide goals of stewardship, modification, optimization and transformation. The evaluation of these goals is documented in the *Existing Systems Needs Analysis: Today & Tomorrow* technical memorandum .

			Iowa in Motion 2045 - Statewide Goals			
			Stewardship	Modification	Optimization	Transformation
I-80 Goals and Objectives	Effectively Serve the Traveling Public	Provide efficient, safe and reliable travel service and mobility		✓	✓	✓
	Maintain and Preserve Past Investments	Maintain the infrastructure in a state of good repair and update it to modern standards	✓			
	Adapt to Future Conditions	Accommodate future technologies, effects of weather variability and federal funding policy		✓	✓	✓
	Invest in Iowa Economy	Provide efficient movement of people and freight in support of the State's economy		✓		✓
	Implement Improvements within Affordable Limits	Preserve existing funding and equitably align user costs with funding	✓	✓		

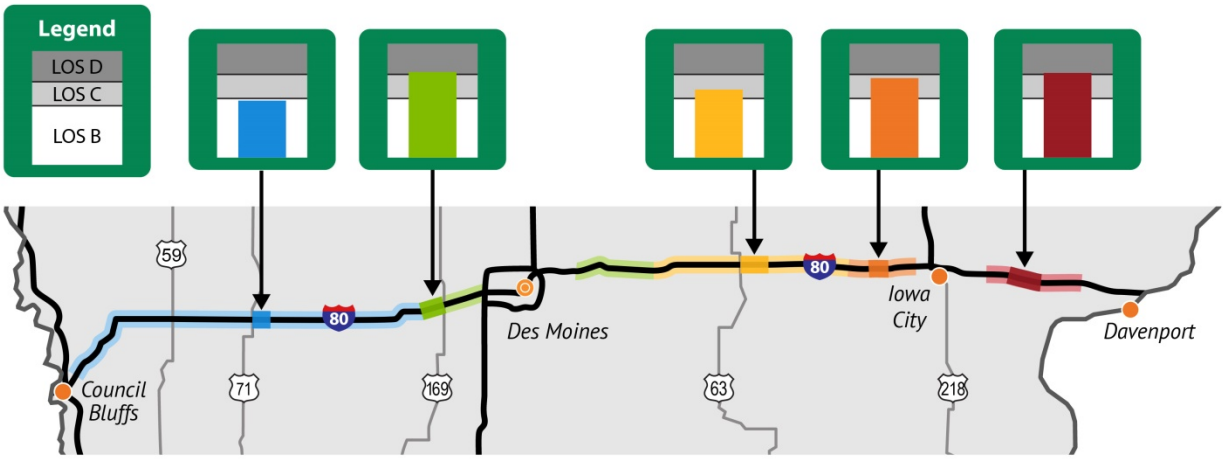
Goal 1 – Effectively Serve the Traveling Public

Mobility

Mobility reflects the efficiency of travel and is measured in a number of ways. It gauges how well a roadway operates compared to its capacity or ability to convey traffic. One of the industry's standard approaches to measuring roadway mobility is Level-of-Service (LOS). A standardized scale is used, ranging from LOS A to LOS F, in descending quality, with LOS A being best. The Iowa DOT has established an operating goal of LOS B or better in 2040 for rural I-80.

As shown on ***Figure 4***, the majority of rural I-80 is projected to not meet this goal by 2040, with the remaining portion approaching an unacceptable service level. This means that by 2040, travel along I-80 can be expected to experience average speeds below free-flow levels, resulting in travel delays and congestion. To meet the State's mobility goal, additional travel lanes and roadway widening are needed along rural I-80.

Figure 4. EXISTING I-80 CORRIDOR 2040 TRAFFIC LEVEL-OF-SERVICE



Safety

Improved safety is a foundational goal for the Iowa DOT. It is emphasized in all of the department's activities and is a cornerstone of the State's statewide vision. The overarching goal is to eliminate accidents, injuries and fatalities on Iowa's roadways. Improving Iowa's roadway safety performance impacts and benefits everyone – both residents and the traveling public.

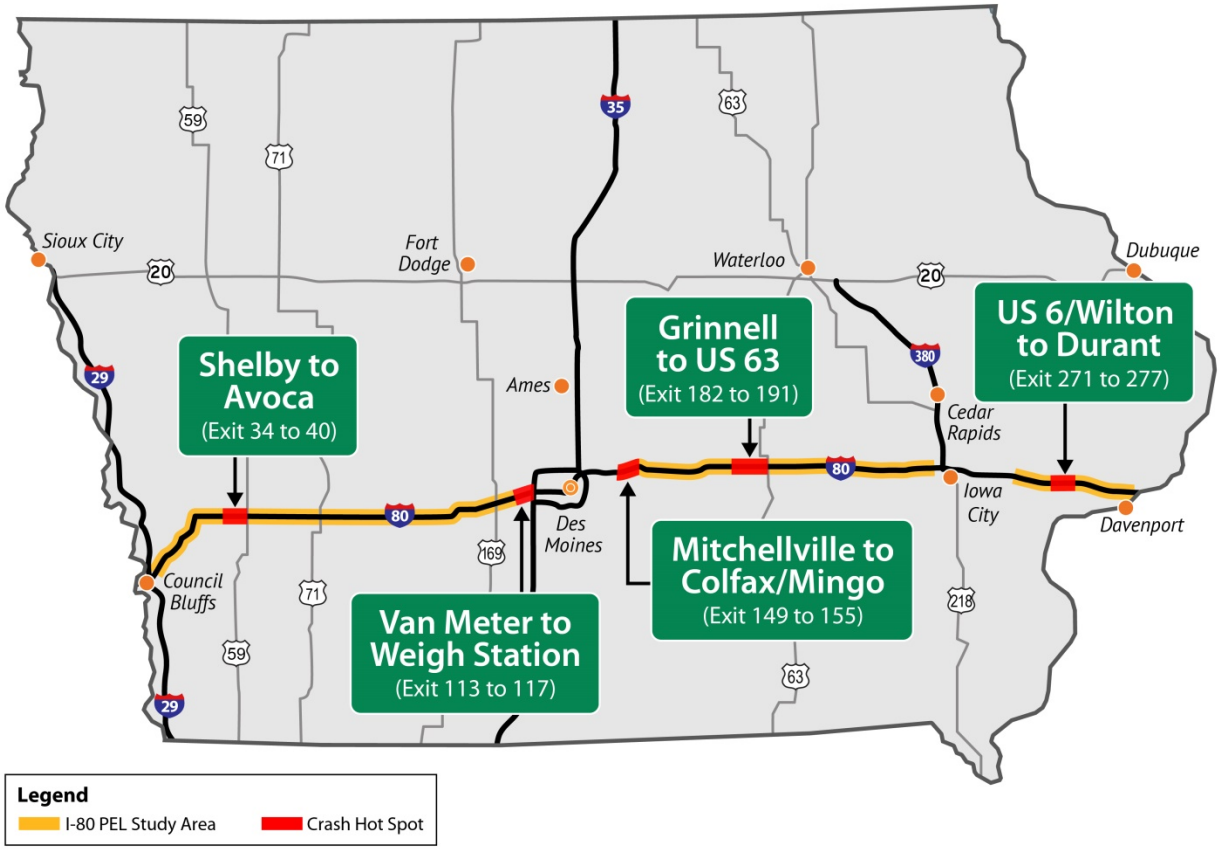
A roadway's safety performance is typically measured by the number and severity of crashes. Over the recent five-year period, between 2012 and 2016, there were a total of 8,636 crashes within the I-80 Corridor. Of these, 63 were fatal and 157 resulted in major injuries. By 2040, due to increases in traffic, it is

Zero Fatalities
A Goal We Can All Live With

Through agressive media outreach, the Iowa DOT's Zero Fatalities campaign has successfully engaged thousands of Iowans on the topic of safety.

predicted, based on the analysis of representative segments, that annual crashes within the Corridor will increase by around 87 percent. Within this increase in total crash frequency, fatal and injury crashes are predicted to increase by 75 percent by 2040. With the State's goal and campaign for zero fatalities, and given the critical public benefit of improved safety, improvements to the Corridor, consisting of a widened and more accommodating roadway, are needed. ***Figure 5*** shows the observed crash hot spot areas within the Corridor.

Figure 5. EXISTING I-80 CORRIDOR CRASH HOT SPOTS



Goal 2 – Maintain and Preserve Past Investments

Maintenance

One of the Iowa DOT's primary functions is to maintain the State's highway system in a state of good repair. Proper and proactive maintenance of the State's roadways and bridges affects traveler safety and saves taxpayers money. As Iowa's major Interstate, effectively maintaining the I-80 infrastructure is critically important.

As shown in ***Figure 6***, the I-80 Corridor's pavement and bridges are generally in good condition. However, I-80 is rapidly reaching the end of its service life in some areas. Due to age and wear-and-tear, over the next several decades, reinvestment in the Corridor's pavement and bridges will be needed to maintain its good condition. It is estimated that it will cost around $4.3 billion between now and 2050 to take care of the existing infrastructure. This includes pavement and bridge maintenance, repair, rehabilitation and in-kind reconstruction. This also includes general maintenance activities, such as snow and ice control and roadside mowing.

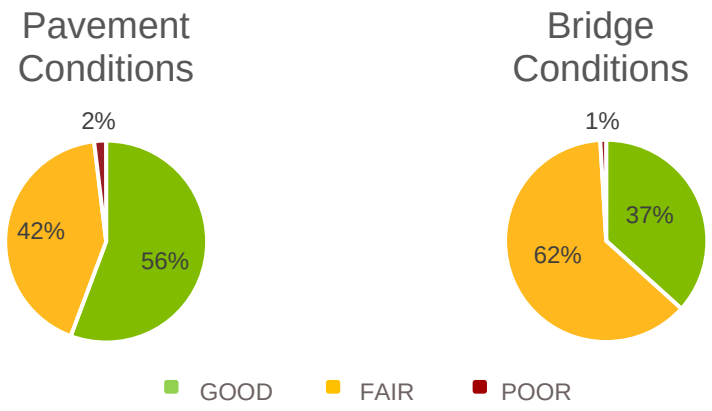
Improving rural I-80 with a new and widened roadway would reduce the need to rehabilitate the existing pavement and bridges due to the new and improved construction within the Corridor.

Maintaining Traffic During I-80 Rehabilitation

A significant issue is the department's ability to maintain traffic for major pavement and bridge rehabilitation or reconstruction. During these activities, traffic lanes are temporarily closed and work is staged to maintain one lane of traffic in each direction – resulting in significant travel delays. Maintaining traffic during these activities significantly impacts travel safety and reliability, and increases the department's maintenance costs.

Widening I-80 will enable maintaining two lanes of traffic in each direction during maintenance activities.

Figure 6. EXISTING I-80 CORRIDOR PAVEMENT AND BRIDGE CONDITIONS

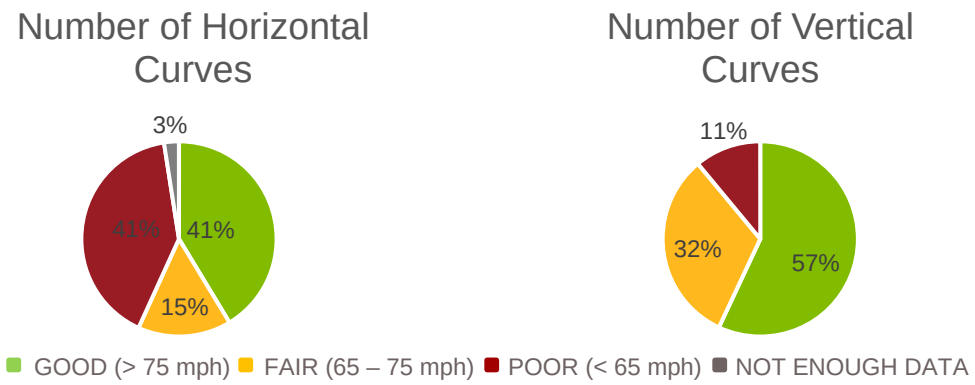


Modernization

Today's modern Interstate design standards are different from I-80's original design. A roadway's design parameters, such as horizontal and vertical curvature, are based on design speed. For today's modern rural Interstates, 75 mph is the typically desired design speed. As I-80 was originally designed and built in the 1950s and 1960s, design speeds and criteria have changed. Based on this modern design goal, as shown in ***Figure 7***, a high percentage of

existing horizontal and vertical curves within the Corridor do not meet modern standards. As shown, 56 percent of existing horizontal curves and 43 percent of the vertical curves do not meet the 75 mph design requirements. Rebuilding I-80 would provide a modern 75 mph design standard fully across the State.

Figure 7. EXISTING I-80 CORRIDOR CURVE COMPLIANCE (75 MPH)



Goal 3 – Adapt to Future Conditions

Emerging AV Technologies

The emergence of automated vehicles (AV) began several years ago with new onboard technologies, such as adaptive cruise control. Today, several major vehicle manufacturers offer automated vehicles that use computers to replace the human driver in some aspect of vehicle operation and control. The ultimate phase of this technological advance is fully autonomous vehicles, which allows operations without any human assistance. While technology advancements are the driving force behind this revolutionary change, the rate of AV penetration within the nation's vehicle fleet will depend on many factors. However, regardless of when and to what degree AV emerges, this new technology is coming. In fact, state DOTs, the FHWA and the US Congress are already preparing the nation for this eventual transition, and automobile manufacturers and suppliers are rapidly advancing the technology to introduce fully automated production vehicles to the American consumer by the middle of the next decade.

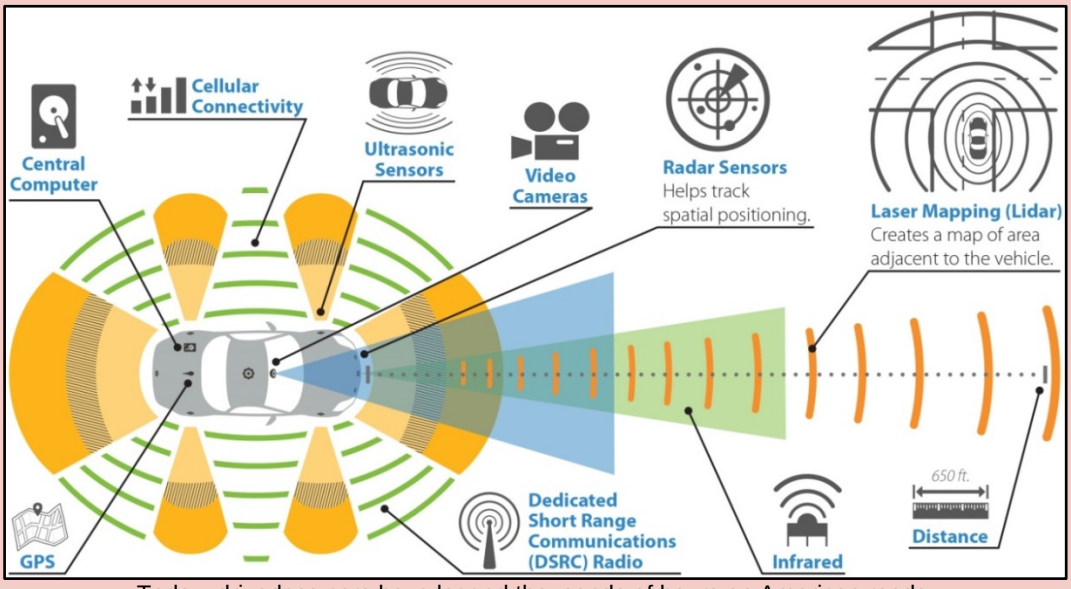
This impending transition to an AV fleet introduces many challenges for transportation officials. Among these is how to incorporate the impacts of changing traveler behavior and accommodate AV technology requirements when planning for long-term transportation investments, such as this Planning Study. Due to the ease of mobility and convenience of AV travel, traveler choices will change in the future. With AV, experts predict there will be more vehicles on the nation's highways in the future. In return, due to the improved vehicle operations AV technologies provide, highways will be able to carry more vehicles, and do so more safely.

In the case of rural I-80, considering an aggressive 85% AV penetration by 2040, and based on the Corridor's traveler characteristics, it is projected that the number of vehicles may grow an additional 19%. As improvements to I-80 are planned, and eventually constructed, these impacts of AV emergence need to be considered, including: the number and timing of lanes

needed and the design details in the roadway section to accommodate AVs. While AV operations emerge within the Corridor, its benefits will need to be regularly assessed and re-evaluated as the Corridor is improved. Rebuilding I-80 across Iowa provides the opportunity to fully consider and incorporate AV technologies, as they develop, into the Corridor's design and operations.

Understanding AV Technologies

An autonomous vehicle uses a number of technologies to operate the vehicle without human interaction. Global Positioning System (GPS) technologies, sensors, onboard computers and real-time communications with other vehicles and the roadside allow the vehicle to safely navigate itself. These technologies provide traffic capacity, safety and reliability benefits to travelers.

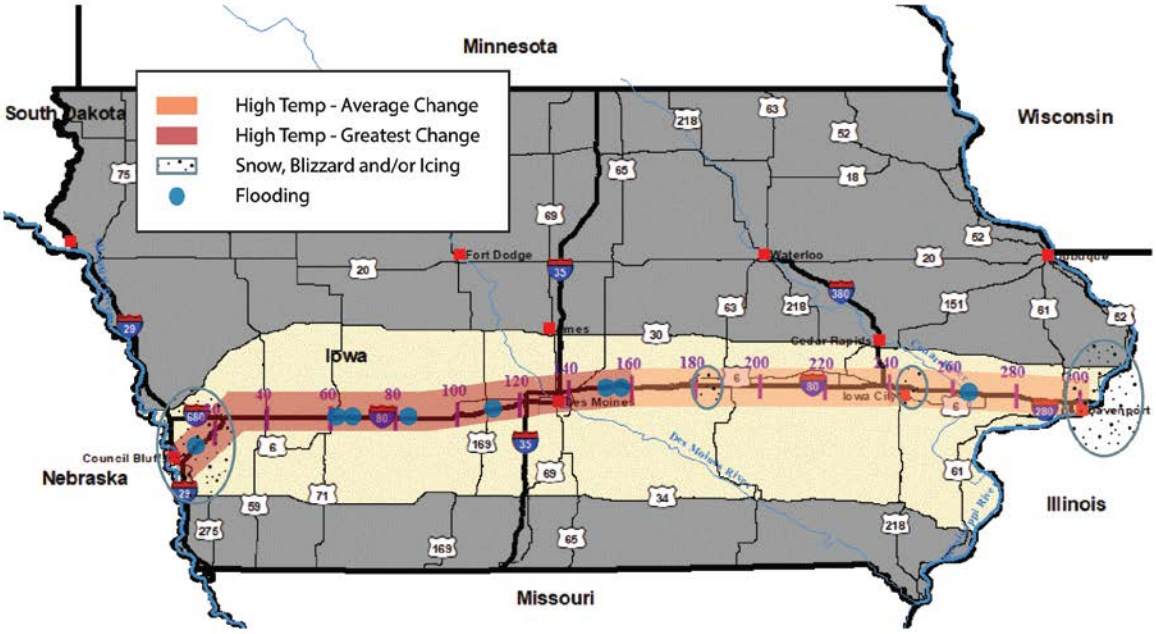


Today, driverless cars have logged thousands of hours on American roads, but are not yet commercially available on a large scale.

Weather Variability

Historic weather data show strong trends in increasing temperature, precipitation, streamflow and flooding throughout the I-80 Corridor. These trends are expected to continue into the future and will impact the I-80 Corridor in various ways. These observed trends indicate an increasing threat of future Interstate closures at vulnerable locations due to extreme weather events. To maintain reliable and safe travel across Iowa, the existing infrastructure's vulnerabilities to changing weather conditions may need to be addressed. As some of the strategies to improve the Corridor's resiliency could include infrastructure reconstruction, such as raising and lengthening existing I-80 bridge crossings over susceptible waterways, these improvements could be included within the overall Corridor-wide improvements. Based on observed weather data, ***Figure 8*** identifies the higher risk areas within the Corridor which are vulnerable to the changing weather conditions, including those waterway crossings more susceptible to flooding.

Figure 8. I-80 CORRIDOR HIGH RISK AREAS FOR WEATHER IMPACTS



Emerging Federal Funding Policy

Fundamental to the Guiding Principles for the Planning Study, and integral to the selection of the best improvement strategy, is the need for a pragmatic recommendation that is readily implementable and adaptable to existing and future conditions, including future and emerging federal policies for transportation funding. It has been well documented that current federal and state highway funds are limited and insufficient to meet the nation's current and future highway needs. The existing fuel consumption-based tax system is decaying and cannot keep up with the nation's needs. Furthermore, this system conflicts with national goals for improved fuel economies. Consequently, federal leadership has been promoting a shift and transition to a mileage-based revenue policy – a system that better aligns usage with fee for service.

The existing fuel consumption-based tax policy cannot keep up with the needs of the nation. A usage-based fee policy is being promoted as a solution to the nation's future infrastructure needs.

Given the magnitude and importance of improving rural I-80 across Iowa, reinvesting in this Interstate provides an opportunity to explore a mileage-based funding approach that could be integrated into this eventually likely shift in federal funding policy, as it develops and becomes operational in the future.

Goal 4 – Invest in Iowa Economy

Freight

The transport of goods and services is the backbone of Iowa's economy. Efficiently and effectively transporting goods, materials and supplies to manufacturers and end-consumers is essential for Iowa to compete in the ever-increasing competitive global marketplace. As one of the highest-volume links in this supply chain, reinvesting in I-80 across Iowa is a necessity to maintaining the state's economic vitality.

With projected increases in travel along rural I-80, including trucks, it is predicted that the existing four-lane Interstate will experience increased congestion and decreased reliability. This decreased travel efficiency will impact the State's ability to economically distribute and deliver its products. It is estimated that across the State, roughly 52,000 hours of average daily travel delay will occur by 2040 if rural I-80 is not improved, thereby increasing the costs of moving freight by truck. By widening rural I-80 and improving its traffic capacity, future 2040 travel delay would be improved by 25%, saving motor carriers both time and money.

Moving the Nation – Truck Freight Facts

- Trucks carried 65.5 percent of the nation's NAFTA freight in 2016.
- Trucks accounted for $362 billion of the nation's imports (63 percent of the total) and $338 billion of exports (68 percent of the total) in 2016.

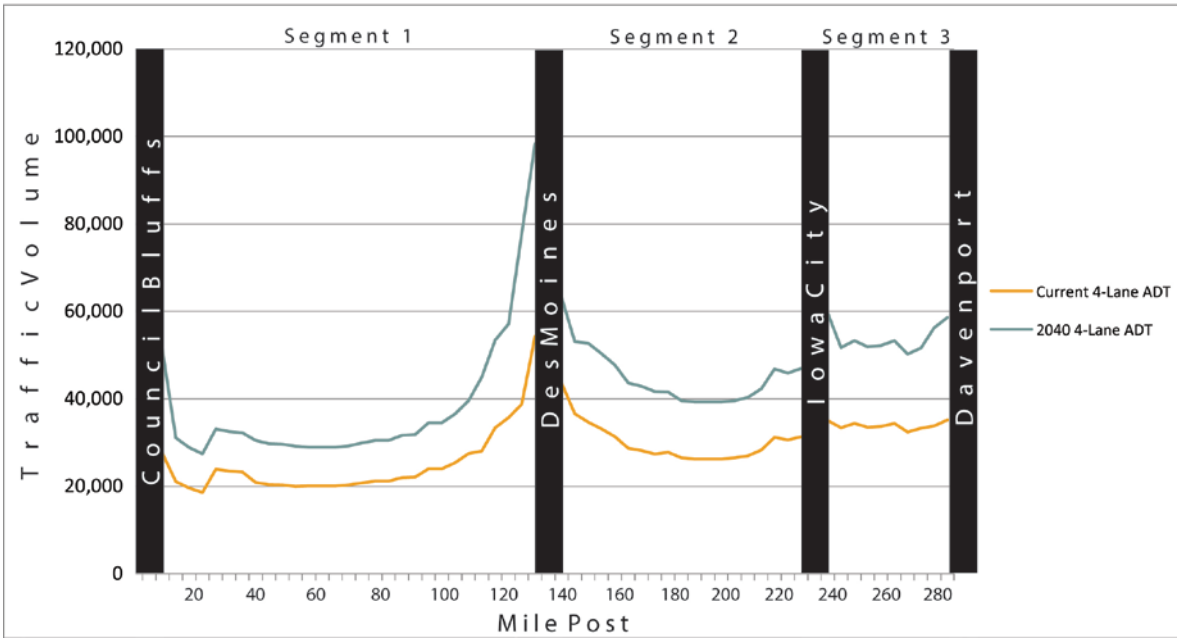
Trucks currently comprise between 28 and 39 percent of the traffic along rural I-80 in Iowa.

Economic Impacts

The efficiency of Iowa's transportation system has a direct impact on the costs of travel for both residents and out-of-state drivers. Efficient and safe travel conditions affect vehicle operating costs, non-productive time expended during travel and exposure to safety hazards, which reflect real costs to the traveling public.

Traffic along rural I-80 is projected to grow significantly in the future (***Figure 9***). Depending on the location along the Corridor, current average daily traffic volumes within the more rural areas range between 20,000 and 35,000 vehicles per day, with higher volumes approaching the urban areas. By 2040, average daily traffic within these areas is projected to grow to roughly 30,000 and 59,000 vehicles per day – more than the existing four travel lanes can efficiently and safely handle. As a result, greater traffic congestion, reduced travel times and decreased reliability of travel can be expected in the future. These conditions will cause higher vehicle operating costs and lost time for I-80 travelers – real dollar impacts to Iowa residents and I-80 travelers. In addition to increased travel delay, due to the higher traffic volumes, it is predicted that total annual crashes along the Corridor will increase by around 56 percent by 2040. This increased safety risk and occurrence of crashes will further impact the cost of travel along I-80. By improving rural I-80, as traffic volumes grow into the future, more efficient and safer travel would result in lower costs to all I-80 travelers.

Figure 9. AVERAGE DAILY TRAFFIC (ADT) ALONG THE I-80 CORRIDOR



Goal 5 – Implement Improvements within Affordable Limits

Preservation of Existing Funding

Iowa has traditionally utilized a pay-as-you-go philosophy in the delivery of its transportation system improvements. These fiscal values are woven into the state's political fabric. Underlying this approach is the desire to preserve existing revenue streams for future uses by avoiding debt financing. Over the years, this approach has served the state well.

However, rebuilding and modernizing I-80 across Iowa will be a significant investment. Current federal and state highway funds are limited and insufficient to meet all of the State's highway needs. As a result, the Iowa DOT must continually balance the competing needs of the State's highway system to prioritize the use of available funding. Prioritizing the I-80 improvements would reduce the availability of funds for other important projects. With a projected construction cost of nearly four billion dollars, considering inflation, it will take approximately three quarters of Iowa DOT's Interstate budget and nearly 20 years to fully implement the I-80 improvements.

To timely deliver the I-80 improvements while preserving existing revenue streams, new revenue sources would be needed. Consequently, new funding opportunities, such as tolling, should be explored. Improving the Corridor provides an opportunity to possibly introduce new funding mechanisms to pay for the improvements, in whole or in part, while fulfilling Iowa's fiscal philosophy and goals.

Equity

The traditional approach to transportation funding generally entails the collection of fuel taxes and vehicle registration fees, and the distribution of these proceeds to state and local agencies by formula. While this approach is administratively efficient, it does not directly tie the use and impact to the system with the fee or cost for the service provided. In the case of Iowa, the Iowa DOT estimates that roughly 20 percent of travel throughout the state is by out-of-state motorists. However, receipts in the state's Roadway Users Trust Fund indicate that only 13 percent of the state's revenue is generated by these same travelers – creating an inequity between use of the system and revenue.

Policy objectives to address this inequity have been expressed by the Governor's Transportation 2020 Commission – an ad hoc committee convened in 2011 to assess Iowa's transportation funding. In its final recommendations, the Commission recommended that new revenue-generating methods be fair and equitable across all users, and that new revenue sources bring equity and stability to road funding. As a significant and major investment for the state, improving I-80 across Iowa provides an opportunity to explore new funding sources to improve the equity of Iowa's transportation funding.

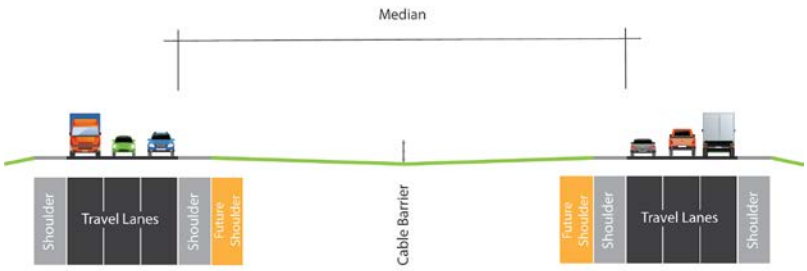
2. IMPROVEMENT STRATEGIES

System Improvement Strategies

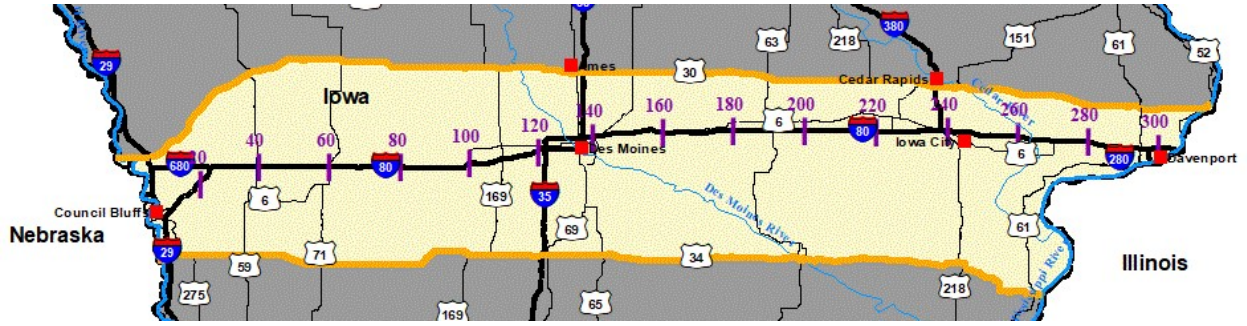
Travel across Iowa, between Council Bluffs and the Quad Cities, is currently served by a system of transportation facilities. These facilities, including highways, rail lines, waterways and airports, provide an interconnected network of services to move both passengers and freight across Iowa. These modes of travel, and associated facilities, interact with each other to jointly serve Iowa's transportation needs. Each travel mode plays an important role.

To assess the overall system's ability to meet the needs of the I-80 Corridor, a number of system-related improvements concepts, or strategies, were identified and evaluated. Each strategy was considered independently, at a conceptual level, as a possible stand-alone transportation solution. Features or elements of the strategy that could benefit and improve travel across Iowa along I-80 were then identified for possible inclusion in the I-80 Vision. These system strategies include:

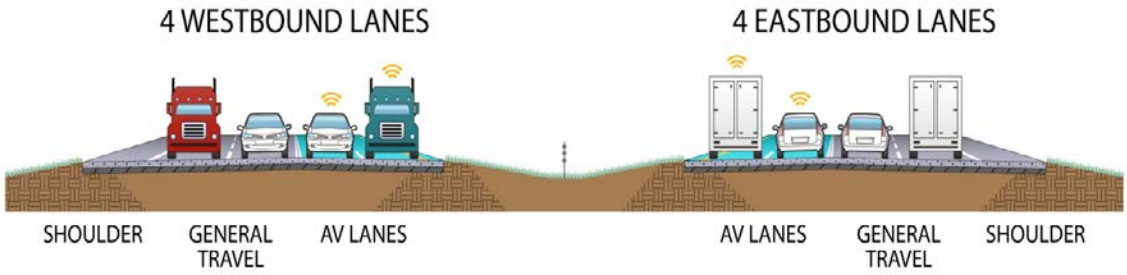
System Strategy	Evaluation Reference Material – Source and Title
General Roadway Widening	Appendix B - General Roadway Widening Traffic and Safety Analysis
Truck-Only Lanes Widening	Viability of Truck Only or Restricted Truck Lanes
Diversion (Alternative Routes)	Diversion Strategy (Evaluation of Alternate Routes)
Automated Corridors	Automated Corridors
Modal Improvements	Viability of Modal Options

General Roadway Widening Strategy	
	
Description	**Features**
Widen and improve the existing rural I-80 roadway along its current alignment. Additional general purpose travel lanes would be provided to meet future traffic demands. The new roadway would be configured to provide a more modern and safer roadway section, while maintaining all existing travel lanes during construction. Localized adjustments to the existing alignment would be provided to meet modern geometric design standards, improve resiliency, and as necessary, to avoid impacts to sensitive resources.	• Six general purpose travel lanes built as needed. • Modern 75 mph design standard providing gentler horizontal and vertical curves. • Modern roadway section with wide depressed median, wider shoulders and expanded roadside. • Adaptability for future expansion of the roadway within the median. • Median cable barrier for cross-median crash protection in some locations, as warranted. • Communications infrastructure for active traffic management.

Truck-Only Lanes Widening Strategy	
	
Description	**Features**
Widen and improve the existing rural I-80 roadway along its current alignment with a new roadway configuration providing exclusive truck lanes. Truck-only lanes in each direction would be located in the middle, separated by a safety barrier. General purpose travel lanes would be provided in each direction outside of the truck lanes. The new roadway would be configured to provide a more modern and safer roadway section, while maintaining all existing travel lanes during construction. Localized adjustments to the existing alignment would be provided to meet modern geometric design standards, improve resiliency, and as necessary, to avoid impacts to sensitive resources.	• Four truck-only lanes, allowing heavier load limits and longer combination vehicles. • Six general purpose travel lanes. • Truck-only slip ramps at strategic locations. • Direct connection truck-only ramps at major interchange locations. • Modern 75 mph design standard providing gentler horizontal and vertical curves. • Modern roadway section with wider shoulders and expanded roadside. • Crash safety barrier for separation of truck-only lanes and general purpose lanes. • Expanded and reconfigured truck rest areas, weigh stations and breakdown sites. • Communications infrastructure for active traffic management.

Diversion (Alternative Routes) Strategy


Description	**Features**
In lieu of improvements to rural I-80, improve either or both US 30 and US 34 fully across Iowa. Improvements would entail widening existing two-lane sections along the alternative routes to provide a continuous four-lane roadway section across the state.	• Continuous four-lane roadway across Iowa along US 30 and/or US 34. • Maintain rural I-80 in its existing four-lane configuration.

Automated Corridors Strategy


Description	**Features**
Develop the I-80 Corridor as a Smart Corridor to maximize the future benefits of autonomous vehicles. Instead of widening rural I-80 to address capacity and safety needs, utilize AV technologies to manage the traffic flow and operations, as traffic grows in the future and as compatible vehicles emerge within the nation's automobile fleet. The timing and extent of AV benefits are dependent upon the advancement of AV technologies by automobile manufacturers and the emersion of AV-compatible vehicles travelling along I-80.	Infrastructure-related AV features could include: • **Roadway Section** – Narrower lane width for AV-only lanes and narrower inside shoulder width. • **Roadside Communications** – Installation of Global Positioning System reference markers, machine-readable signs, and roadside communications equipment to monitor local traffic operating conditions and provide real-time safety information to AVs. • **Pavement Design** – Redesign of pavement thickness and construction methods specific to the AV traveling characteristics, such as lane centering and zero lane wandering. • **Expandability** – Expansion of the roadway section through the repurposing of the inside lane and shoulder for expanded traffic-carrying capacity.

Modal Improvements Strategy

Description	Features
Expand and improve the Corridor's multimodal system to meet future mobility needs. These modal improvements would include: • Intercity Passenger Rail/High Speed Rail • Commuter Rail • Over-the-Road Bus • River Freight • Air Freight • Rail Freight • Park and Ride Facilities • Paratransit • Trails • Special Generator Services • Passenger Air Service	• Implement the proposed Chicago-Quad Cities-Iowa City-Des Moines-Council Bluffs/Omaha intercity passenger rail project. • Provide new commuter rail passenger service within the state's future rail network. • Enhance existing regional bus service with more frequent and expanded service. • Invest in Iowa's waterways for expanded capacity and facilities. • Expand freight aviation services and facilities. • Expand the privately-owned rail network. • Enhance and increase park and ride facilities. • Expand paratransit services in the state. • Improve and expand the state's trail system. • Utilize special transit services for events. • Expand air facilities and passenger services.

Overall System Evaluation

Each of the alternative improvement strategies was evaluated on its ability to fulfill the Corridor's goals and objectives. For each of the individual objectives, a grading scale of good, moderate and poor was utilized to rate each strategy. This evaluation provides an overall assessment of each strategy's projected performance. Based on this assessment, each strategy was identified as either a potential reasonable solution, worthy of further evaluation, or unreasonable and not considered further. For those strategies that would fulfill in part the Corridor's goals, elements of the strategy relating to I-80 were identified for further evaluation for possible inclusion in the I-80 Vision. While improvement strategies that wouldn't effectively solve the Corridor's needs were eliminated from further consideration, each may be further evaluated independent of the I-80 improvements and this study, based on the Iowa DOT's future priorities and as funding allows.

Figure 10 provides an overall summary of the system strategies.

Figure 10. SUMMARY EVALUATION OF SYSTEM STRATEGIES

System Improvement Strategy	Corridor Goals and Objectives										Recommendation
	Goal 1		Goal 2		Goal 3			Goal 4		Goal 5	
	Mobility	Safety	Maintenance	Modernize	AV Technologies	Weather Changes	Federal Policy	Freight	Economic Benefits	Preservation	Equity	
General Roadway Widening	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Reasonable - Include
Truck-Only Lanes Widening	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	Unreasonable - Include elements
Diversion (Alternative Routes)	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	Unreasonable - Eliminate
Automated Corridors	✗	✗	✗	✗	✓	✗	✓	✗	✗	✓	✗	Unreasonable - Include elements
Modal Improvements	✗	✗	✗	✗	✗	✗	✓	✗	✗	✓	✗	Unreasonable - Include elements

Legend	
✓	Good
✓	Moderate
✗	Poor

System Evaluation Summary	Strategy Elements for Further Evaluation
General Roadway Widening Strategy	
Rebuilding rural I-80 with a widened and modern roadway, using an improved typical standard section, would effectively fulfill, in varying degrees, all of the Corridor's goals and objectives. With the reconfiguration of the roadway section with additional lanes, overall traffic operations would be improved, including travel speeds, safety, and the efficient movement of truck freight. These improved operations would result in overall enhanced travel efficiencies – saving travelers both operating and travel time costs. With the full reconstruction of the existing I-80 infrastructure, modern design features meeting future traveler needs would be implemented and future maintenance and rehabilitation costs would be saved. This strategy also provides an opportunity to incorporate AV infrastructure as part of the reconstruction. Finally, reinvesting directly in the Corridor provides an opportunity to deploy direct pricing strategies consistent with possible future federal funding policies, as they emerge, resulting in improved equity of user costs and impacts.	Design elements to be further evaluated as part of the I-80 Vision include: • Application of the new typical standard roadway section. • Localized alignment adjustments, both horizontally and vertically, to address existing alignment design deficiencies and provide a modern 75 mph design. • Resiliency risk analysis at vulnerable locations, including the consideration of localized alignment adjustments. • Localized alignment adjustments or non-standard section for constrained areas due to adjacent manmade or environmental resources. • Interchange improvements. • Assessment of local, low volume crossroad bridges for potential removal as part of the Corridor reconstruction. • Rest area improvements.

System Evaluation Summary	Strategy Elements for Further Evaluation
Truck-Only Lanes Widening Strategy	
While this strategy could be beneficial and further improve the Corridor's overall traffic and safety performance, the high construction costs would be exorbitant and beyond the financial resources of the State. It is estimated it would take over 65 years to construct this strategy. Furthermore, this strategy would need to be constructed in its entirety, including across the metro areas, to fully realize its operational benefits. Due to these funding and implementation prohibitions, this strategy is an unreasonable solution for the Corridor.	While this improvement strategy is not a reasonable standalone solution for the Corridor, there are opportunities to improve overall truck and traffic operations within the I-80 Vision that may be affordable and beneficial. These could include: • **Lane Restrictions for Trucks** – As congestion increases the operational benefits of lane restrictions also increase. Restricting truck traffic from the inside lane is a potential consideration for the future. • **Speed Restrictions for Trucks** – Governing maximum allowable truck speeds is a potential consideration for the future. • **Truck Facility Improvements** – Improve intermodal and truck support facilities.

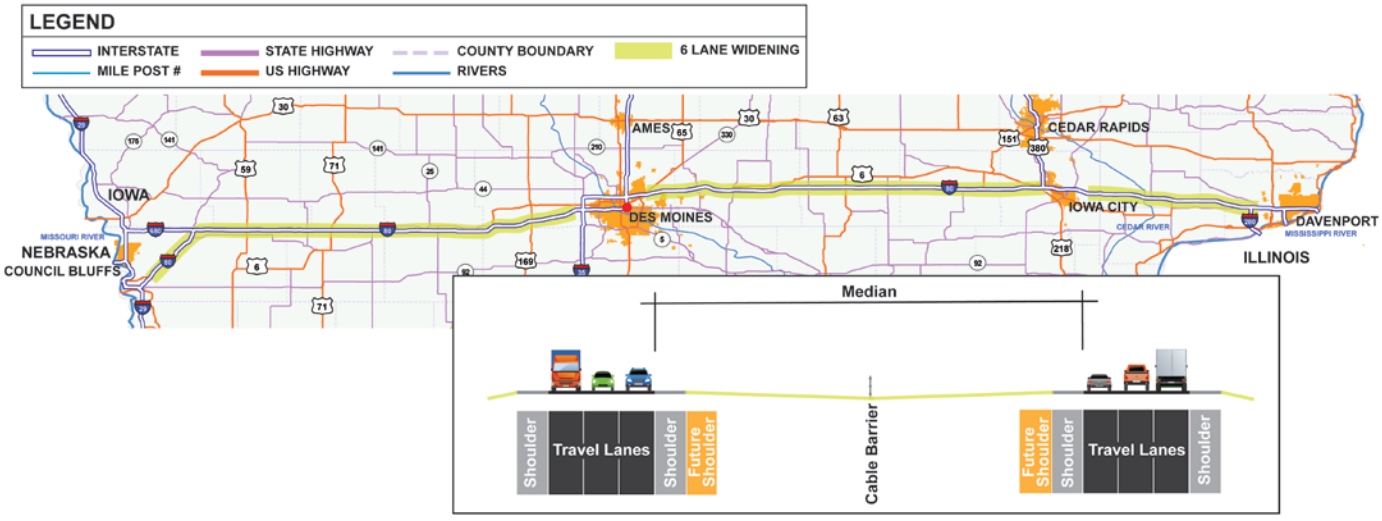
System Evaluation Summary	Strategy Elements for Further Evaluation
Diversion (Alternative Routes) Strategy	
The intent of this strategy was not to determine whether or not local improvements to US 30 and US 34 are needed, but rather how system wide improvements to these routes may benefit I-80. As the majority of existing and future travel is served by I-80, improving these alternative routes would not significantly attract traffic away from or reduce the need to improve I-80. Improving US 30 and/or US 34 statewide would not be a reasonable and effective alternative solution to improving I-80.	While capacity improvements are needed on I-80 independent of US 30 and US 34, systematic improvements to these alternative routes should continue to be evaluated based on their individual needs, including local improvements, as funding and statewide priorities allow. Possible future improvements to these alternate routes would be planned and programmed as needed independent of the I-80 Vision.

System Evaluation Summary	Strategy Elements for Further Evaluation
Automated Corridors Strategy	
The effectiveness of AV technologies is directly tied to the rate and extent of its emergence. While AV is predicted to improve the overall traffic and safety operations along I-80 in the long term, it is not projected that this strategy alone would address the nearer term needs of the Corridor. Even with rapid penetration and advancement of AV technologies, widening and expansion of portions of I-80 would still be necessary. However, this strategy could reduce additional expansion needs in the long-term future as traffic continues to grow within the Corridor. Therefore, this strategy should be incorporated into the I-80 Vision to address long-term needs and future adaptability.	While this improvement strategy is not a reasonable standalone solution in the near term, provisions for AV operations should be incorporated into the I-80 Vision for future deployment. These provisions could include: • Routine reassessment and monitoring of AV operational benefits and influences on capacity improvement needs as the Vision is implemented. • Roadway section that is adaptable for repurposing for exclusive AV lanes. • Support of communications infrastructure to accommodate future roadside AV communication requirements. • A new pavement design to accommodate future AV roadway lane reconfigurations and operations.

System Evaluation Summary	Strategy Elements for Further Evaluation
Modal Improvements Strategy	
The assessment of this strategy was not intended to determine how investments in alternative modal systems could be made in lieu of improvements to I-80, but rather how these modes could complement each other, improve the total system's performance, and be integrated with the future vision of the I-80 improvements. Improving and expanding modal system facilities and services, individually and collectively, would not measurably impact the need to improve I-80. Modal improvement strategies would not fulfill the Corridor's goals and objectives. However, while capacity improvements are needed along I-80 independent of other modes, multi-modal improvements should continue to be evaluated based on their individual needs as funding and statewide priorities allow.	While the modal improvements strategy is not a reasonable standalone solution for the Corridor, there are opportunities to improve the overall system's interactions with I-80. These opportunities that may be affordable, beneficial and considered within the I-80 Vision could include: • Evaluate the proposed intercity passenger rail service for project crossings of I-80 for potential opportunities to jointly develop and coordinate the rail and I-80 improvements at the crossing locations. • Evaluate new park and ride facility opportunities, as included in the statewide plan, as part of the rural I-80 improvement planning. • Coordinate future improvements to rural I-80 with local planning partners for impacts to existing and planned trail improvements at crossing locations.

The I-80 Vision – General Roadway Widening

THE I-80 VISION



The I-80 Vision entails the reinvestment in the existing rural I-80 infrastructure with a new and improved roadway section. Generally, this will require the reconstruction of the existing I-80 roadway and bridge infrastructure, over time as funding and priorities allow, providing a new modern section across the Corridor. The new standard section ultimately includes six 12-foot wide general purpose travel lanes, full-width shoulders, and a wide depressed grassed median with improved outside roadside areas. Space for additional expansion of the section is provided within the median if needed in the future, depending on timing, the degree of AV penetration and traffic growth. A cable safety barrier would be provided within the median in some locations,

as warranted, to protect opposing traffic from cross-median crashes. As configured, the Vision provides an ultimate and expandable roadway section across Iowa with flexibility to be implemented in stages and phases based on local needs and funding. It will be built over time as the long-term benefits of AV technologies and operations become evident in the future.

While the ultimate typical roadway section accommodates the benefits of future AV operations, the timing and extent of these benefits are uncertain at this time. Therefore, as the Vision is implemented, the Iowa DOT will continue to assess the capacity needs and monitor the changes in traffic operations as AVs penetrate the Corridor's travel. Without AV considerations, there are portions of the existing four-lane Corridor in western Iowa projected to approach, but not exceed, the operational goals for the Corridor (LOS B) in 2040. For these areas, to the extent practicable, capacity improvements should be delayed until nearer the need so the potential traffic capacity gains from technology and operational improvements can be better gaged with greater certainty. Similarly, portions of central and eastern Iowa with the six-lane improvements are also projected to exceed traffic operational goals by around 2040. The Iowa DOT will similarly assess the AV operational benefits before further expanding the Corridor in these areas.

In general, with this new section, all existing I-80 bridges over local roads, waterways or railroads, and all crossroad bridges over the Interstate, would be impacted. Similarly, with the widened roadway section, all existing interchanges would be impacted and reconstructed, including the possible improvement and expansion of the interchange. Existing crossroad drainage culverts would require either replacement or extension to accommodate the wider roadway section. New roadside safety barriers would be provided as needed, based on local conditions, and new signage would be installed across the Corridor. As appropriate and based on case-by-case evaluations, localized improvements needed in advance of the Vision's full implementation will be based on the ultimate typical section, to the extent practicable.

Design Standards

The Vision would be designed and constructed according to a new and modern design standard. Corridor-wide design criteria and standards will need to be defined and further detailed before the development of the Vision's design. Key features included in the new standard include:

- **Design Speed** – 75 mph
- **Vertical Clearance** – 16.5 feet over roadways
- **Typical Roadway Section** – The Vision's roadway typical section includes an open median with sufficient space for the ultimately planned number of travel lanes – six lanes or in some instances, potentially eight lanes. In some cases, depending on timing and location within the Corridor, initial construction could entail four lanes based on an ultimate six-lane roadway section. In other instances, the initial or near-term construction could entail six lanes based on an ultimate eight-lane roadway section. Factoring into the ultimate configuration requirements are the potential future operational benefits and influences of AV technologies. The emergence of AV operations could delay the timing of the need for capacity improvements and/or the need for additional lanes beyond the

six-lane Vision. As it implements the Vision, the Iowa DOT will continue to assess and monitor the benefits of AV operations and reassess the number and timing of needed roadway lanes and the configuration of the ultimate roadway section.

- **Median Width** – In sections of the Corridor where it is likely that an ultimate eight-lane roadway will be required within the design life of the bridge structures and where it is desirable to maintain an open median, a 98-foot median width with the six-lane reconstruction would be preferred to provide adequate median drainage and a full-width inside shoulder in the future. This preference differs somewhat from the original guiding principles and is based on recent design work within portions of the Corridor. Within constrained areas, or other sensitive or unique areas where avoidance of impacts or a variance in design is necessary, adjustment of this width may be necessary.

- **Drainage Design** – Assess the recent and recorded flood discharges for waterway crossings to develop an updated I-80 drainage design criteria. These criteria would include the Interstate flood design year, freeboard requirements and new design flow methodologies to account for recent trends in changing weather conditions. Similarly, the corridor-wide roadside drainage design requirements will need to be assessed and defined.

- **Interchange Design** – Develop typical desired and minimum traffic operational criteria for crossroad ramp terminal intersection operations.

Typical Construction Staging

One of the significant challenges for the Iowa DOT is maintaining traffic along I-80 while performing rehabilitation and reconstruction activities. Due to the adverse impacts of reducing existing traffic lanes during these activities, it is desirable that two travel lanes in each direction be maintained during the Corridor's reconstruction. As a result, this requirement directly affects the Vision's recommended ultimate roadway configuration. With the Vision's wider median, the roadway can be reconstructed and improved in fulfillment of this requirement.

The typical construction of the Vision would be staged to maintain two lanes of traffic in each direction during construction. There are several options for staging, depending on the ultimate desired median width for the improved roadway, the circumstances causing the need for the reconstruction and the surrounding constraints and potential impacts. For one option, the new travel lanes and shoulders, in one direction or the other, would be constructed adjacent to the existing roadway. Upon completion, traffic would be moved and the opposing direction's full roadway section would be constructed, thereby completing the new roadway section. In the final stage, traffic would be moved to the completed and new section and final roadside grading would be provided. As a result of this staging option, the new centerline alignment would shift to the north or south of the existing I-80 centerline. In some instances, however, another staging option may be preferred. For some circumstances, it may be advantageous to build the new roadway on both sides of the existing lanes, thereby generally maintaining the existing centerline. This option could likely require more temporary traffic barriers during construction, but would more easily allow for keeping existing interchanges or overhead bridges in operation during mainline reconstruction.

I-80 Interchanges

With the full reconstruction and widening of the I-80 roadway section, it is likely that each of the Corridor's existing interchanges and overhead bridges would be impacted. As a consequence, each of these interchanges and overhead bridges will need to be reconstructed. During the design development phase, each interchange will need to be assessed, analyzed and designed for improved traffic operations, safety and access management, per the Corridor's design criteria and standards. With the full reconstruction, the Vision provides an opportunity to improve access management near the ramp terminals for improved traffic operations along the crossroad as adjacent land development and activity grows in the future.

There are 59 existing interchanges within the I-80 Corridor, including the I-80/I-680 Interchange, 19 interchanges with US or State routes, and 39 local road interchanges.

I-80 Rest Areas

The *Iowa Statewide Rest Area Management Plan (Initial Report), April 2013*, and *Iowa Rest Area Management Plan (Implementation Report), April 2018*, completed by the Iowa DOT, provide a statewide plan for maintaining and improving the State's roadside rest and parking areas. This plan provides a series of recommendations specific to rural I-80. The Vision provides an opportunity to implement these recommendations. The Vision would include the reconstruction and expansion of all existing full service rest facilities to meet the future demands of the Corridor, including additional parking. Rest area reconstruction would occur based on the remaining service life and rehabilitation needs of the existing facilities. These improvements would complement the department's recently launched initiative to implement a truck parking information management system along the I-80 Corridor.

The I-80 Vision includes reconstruction and expansion of existing rest areas as the existing facilities reach the end of their service life.

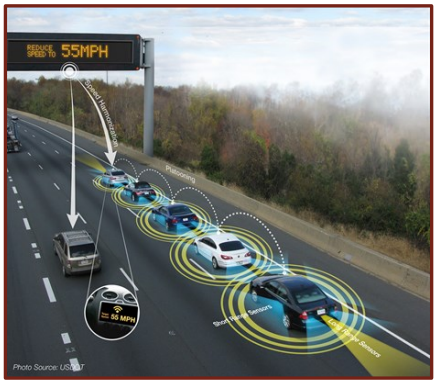
Truck Accommodations

At some point in the future, as truck traffic volumes continue to increase, the I-80 Vision could include further assessment of operational strategies to improve truck operations, thereby improving the overall traffic operations within the Corridor, if needed. If performed, these assessments, and resulting recommendations, would include coordination with the motor carriers and other key stakeholders. The truck-related accommodations, to be considered in the future, if needed, could include:

- **Lane Restrictions for Trucks** – Perform a study to assess the benefits of restricting truck traffic from the inside lane to improve overall traffic operations, including the identification of any required policies and authorizations.

- **Speed Restrictions for Trucks** – Assess and analyze the benefits of regulating truck speed limits to improve overall traffic operations and safety. Recommendations would include any required policies and authorizations necessary to implement this strategy.

Automated Vehicle Accommodations



The I-80 Vision accommodates the future conversion of the roadway section for Automated Vehicles.

The I-80 Vision is adaptable to future AV technologies as they emerge in the future. However, given the uncertainties of AV adoption, its recommended roadway section is based on current and conventional parameters – three 12-foot wide travel lanes and full width shoulders in each direction. This configuration provides a total directional pavement width of 60 feet. As AVs become more prevalent within the Corridor, their traffic capacity and operational benefits could impact the need and timing of additional conventional lane widening. If the AV penetration is sufficient, it may be beneficial to provide AV-only lanes to maximize the overall traffic-carrying capacity of the Corridor. Because of their automated operations, AVs provide higher lane capacities than vehicles operated by humans. Under this condition, in the future, the Vision's pavement width provides the necessary flexibility for the potential repurposing of the inside travel lane and shoulder into two AV-only travel lanes. Alternatively, again depending on the rate of AV penetration, any additional capacity needs could be accomplished by converting the inside shoulder and adding an AV-only lane to the inside, thereby providing two AV-only lanes and three general purpose lanes in each direction. The ultimate typical section provides sufficient space for either of these scenarios. The Iowa DOT will continue to reassess and re-evaluate the AV benefits, as they develop over time, as the Vision is implemented. In addition, sufficient space is provided in the wide median for the construction of the necessary future communications backbone infrastructure.

While the Vision provides the space for future AV adoption, other design and construction details for AV compatibility need to be further assessed and developed. These details include both the AV-supportive pavement and communications infrastructure designs. The Vision therefore includes a more detailed study of these features, considering both compatibility with the future AV operations and the initial additional costs and return on investment.

Modal Improvements

The Vision includes several modal-related features where existing or potentially planned non-Interstate facilities interact with the I-80 infrastructure. Each of these features provides an opportunity to jointly develop the modal improvements with the I-80 improvements, in coordination with each other, for the mutual benefit of the facility's sponsors and the Iowa DOT. For each case, and as appropriate, coordination with the mode's sponsoring agencies would be performed in the Vision's engineering and environmental studies. Development of joint funding agreements would depend on this coordination and the availability of funding, as determined through the more detailed studies.

The Vision's joint development opportunities include:

- **Passenger Rail** – The full build-out plan for the Midwest Regional Rail Initiative (MWRRI), providing passenger rail services between Omaha and Chicago, includes three future potential crossings of the I-80 Corridor. Future potential phases of the MWRRI, currently in the feasibility study phase, assume the joint use, expansion and improvement of several existing rail lines across Iowa, including the Iowa Interstate Railroad. If and when funding is identified for the cross-Iowa phase of the MWRRI, as appropriate, the department would coordinate the potential I-80 crossings with the passenger rail project sponsors. For each crossing location, more detailed study would be performed to determine what, if any, space provisions and coordination may be provided for the potential future MWRRI improvements. These locations include the following, from west to east:

    - **Location 1** – Milepost 76, Adair County, rail crossing is under I-80
    - **Location 2** – Milepost 100, Dallas County, rail crossing is over I-80
    - **Location 3** – Milepost 164, Jasper County, rail crossing is under I-80

- **Park and Ride Facilities** – In 2014, the Iowa DOT completed a statewide assessment of its park and ride facilities, documented in a report entitled *Iowa Park and Ride System Plan*. This plan provides recommendations specific to the I-80 Corridor, which are included in the I-80 Vision. Currently, the I-80 Corridor includes four park and ride facilities, all located within Segment 1. In addition to maintaining these existing facilities, the Vision includes two new facilities: one located in Segment 2 near Newton and another in Segment 3 near Rochester at State Route 38. These new facilities would be constructed as funding is available.

The I-80 Vision includes maintaining existing and adding two additional park and ride facilities within the I-80 Corridor.

- **Trails** – There are several existing trails located within the Study Corridor that are adjacent to or near the I-80 right-of-way. During the Vision's more detailed engineering and environmental studies, to the extent necessary and appropriate, coordination with the sponsoring agencies for these trails would be performed to identify joint development opportunities. These existing trails include the following, from west to east:

    - **Rock Island Old Stone Arch Trail** – Located near Shelby (MP 34) in Pottawattamie County, this trail parallels the I-80 right-of-way to the north.

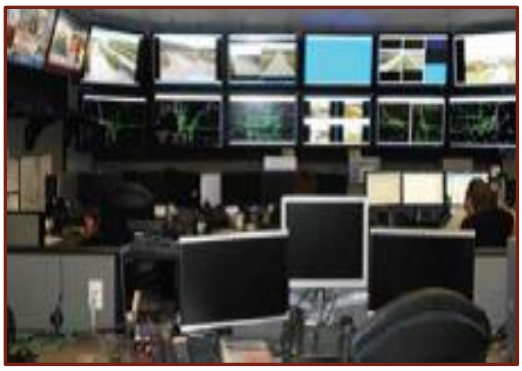
    - **T-Bone Trail** – Located between Audubon and Atlantic along US 71, this 21-mile long asphalt trail crosses I-80 at the I-80/US 71 Interchange (MP 60).

- **South Newton Hike and Bike Trail** – Located in Newton (MP 164 – 168) on the north side and parallel to I-80, this trail extends between US 6 and West 4th Street.

- **Clear Creek Trail** – Located in Tiffin (MP 237), this trail is located on the north side of I-80 along the north side of Clear Creek.

- **Hoover Nature Trail** – Located to the north of I-80 with a southern terminus in West Branch (MP 254), this existing trail is a segment of a larger trail system between Cedar Rapids and Burlington.

Traffic System Management and Operations



The Iowa DOT Traffic Management Center provides round-the-clock, real time traffic coordination and management activities throughout the state.

Across the State of Iowa, the recent growth of travel has exceeded the State's ability to expand its highways to relieve the resulting traffic congestion. With its limited resources, while some of this growth can be directly met through targeted system expansion, such as for high priority corridors like I-80, the State cannot fully build its way out of congestion. In response, the department has implemented a system-wide approach to optimize the existing infrastructure and preserve current system capacities. This approach entails realizing the system's full capacity, reliability and safety through active traffic incident management, traveler information and work zone management. This approach, called Traffic System Management and Operations (TSMO), focuses on performance-based tactics to improve both the system's traffic operations and the department's business strategies for improved organizational coordination. TSMO investments and improvements complement the State's targeted highway expansions, such as the I-80 Vision, to improve the overall performance of the system.

Because TSMO deals directly with the root causes of non-recurring congestion and unreliable travel, such as incidents, weather, work zones, and special events, combined with the Vision, it offers additional benefits for the I-80 travelers. With the expansion of the Corridor, TSMO measures would provide enhanced travel time reliability and further help I-80 travelers reach their destinations safely, efficiently and conveniently. In coordination with statewide TSMO improvement strategies, plans, tactics and I-80 measures already installed, a specific TSMO plan would be developed for the Vision. This plan would likely include the following infrastructure-related items, in addition to statewide programmatic TSMO measures, such as a traffic management center, traveler information, traffic incident management and others:

- **ITS and Communications** – Fixed and mobile traffic sensors, non-enforcement traffic cameras, dynamic message signs, highway advisory radio transmitters, and supporting communications infrastructure. This infrastructure will need to be coordinated with the future requirements of the Vision's AV accommodations.

- **Traveler Information** –Traveler information tools that communicate planned and prevailing traffic conditions, such as Iowa 511 and various social media.

- **Work Zone Management** –The planning and deployment of various strategies and temporary signage to maintain traffic flow and safety through highway work zones.

- **Active Transportation and Demand Management** – Innovative strategies to maximize available capacity of roadways, such as ramp metering, variable speed limits, lane control signing, active signal control, and time-of-day shoulder use. The strategies are typically deployed and are most effective in urban areas with high peak hour travel characteristics.

Local Road Bridge Crossings

As part of the Planning Study, a needs assessment for all low volume rural county crossroad bridges located within the I-80 Corridor was performed. Overhead structures that are part of an interchange location and all overhead structures within urban boundaries were excluded from evaluation due to increased access needs and heavier traffic volumes. The assessment's methodologies and findings are documented in a technical memorandum entitled, *Evaluation of Overhead Structures* .

The purpose of this assessment was to determine which existing low volume overhead bridges, if any, should be considered for removal due to their limited local use. Based on the assessment's findings, the Vision identified 47 existing bridge crossings that should be considered for closure. ***Table 2*** identifies these existing crossings. Considering the low traffic volumes and minimal out-of-distance travel (to adjacent structures) for vehicles utilizing these structures, it seemed questionable that these crossings still served the purpose for which they were initially envisioned and constructed over 60 years ago. The department realizes that although these structures are not likely justified from a regional or statewide traffic perspective, they could serve a localized travel need. Rather than simply recommend closure, the department has opted to incentivize their removal from the local system if the county agrees. The amount of incentive would be 100% of the cost of a typical replacement structure ($1.5M per crossing location) which would be offered by means of credit to the county's balance of County Bridge Program funds for the construction, reconstruction or rehabilitation of other bridges on the county road system when these crossings are permanently removed. With this in mind, there were a total of 47 structures (at 41 crossing locations) which ranked 3, 4 and 5 as shown below that would be eligible for reimbursement.

Employing this incentive approach offers the following advantages:

- It retains asset management considerations in the planning and programming of overhead structures in the I-80 Corridor.

- When exercised, it offers benefits to both the state and the respective county – to the state in the form of avoided maintenance and lifecycle costs that may be reinvested in projects prioritized in future programs, and to the county in the form of increased funding that can be applied to higher priority needs on the county system.

- It retains control of the decision to continue or discontinue the overhead structure at the local level, where decision-makers are most accountable to the needs of local users.

Accordingly, the potential removal of each of these crossings would be studied in more detail, considering each independently as well as a group, and coordinated with the local agencies to avoid unintended impacts to local travel if adjacent crossings would be impacted.

Table 2. LOCAL ROAD BRIDGE CROSSINGS WITH REPLACEMENT INCENTIVES

County	MP	Local Road	County	MP	Local Road
Replacement Score = 3 "Average Priority to Replace"			**Replacement Score = 4 or 5 "Low to Lowest Priority to Replace"**		
Pottawattamie	11.7	Hanie Ave	Pottawattamie	42.7	470th Street
Pottawattamie	13.1	Idlewood Road	Pottawattamie	42.7	470th Street
Pottawattamie	13.1	Idlewood Road	Pottawattamie	44.7	490th Street
Pottawattamie	22.0	290th Street	Cass	52.6	570th Street
Pottawattamie	32.8	370th Street	Cass	52.6	570th Street
Pottawattamie	48.7	530th Street	Cass	66.3	710th Street
Cass	56.6	Buck Creek Road	Cass	69.3	740th Street
Cass	56.6	Buck Creek Road	Cass	72.1	770th Street
Adair	90.3	Riverside Avenue	Cass	72.2	770th Street
Adair	92.3	Trenton Avenue	Adair	79.4	Gibbon Avenue
Madison	96.2	Creamery Road	Adair	80.4	Fontanelle Road
Dallas	99.5	Durango Way	Adair	96.2	York Avenue
Polk	146.9	NE 96th Street	Jasper	149.9	NE 120th Street
Jasper	152.4	West 128th St.	Jasper	149.9	NE 120th Street
Jasper	161	West 62nd St.	Jasper	171.3	East 84th Street
Jasper	162.3	West 52nd St.	Jasper	174.5	12th Avenue E
Poweshiek	187.7	County Road T58	Poweshiek	194.2	145th Street
Poweshiek	189.9	100th Street	Poweshiek	203.8	240th Street
Iowa	213.9	J Avenue	Poweshiek	207.8	D Avenue
Iowa	221.9	R Avenue	Cedar	262	Inca Avenue
Johnson	250.6	Wapsi Avenue SE	Scott	278.1	Scott Cedar Road
Johnson	252.9	Lower West Br. Rd.			
Cedar	256.7	Delta Avenue			
Cedar	268.9	Pine Road			
Cedar	275.1	Vermont Avenue			
Scott	282.6	220th Street			

Weather Vulnerability Areas

In a report entitled *Evaluation of I-80 Resiliency and Vulnerability*, conducted in support of the Planning Study, an assessment of the vulnerabilities of the I-80 Corridor to changing weather conditions was performed. In addition to management strategies to continue to monitor changing weather conditions, this report specifically identified several stream crossings vulnerable to increasing flood levels and frequencies. The Vision includes more detailed study and risk analyses for each of these crossings to be performed in the subsequent engineering and environmental studies, as identified in ***Table 3***.

The I-80 Vision includes risk analyses at several stream crossings with increased susceptibility to flooding and road closure due to changing weather conditions.

Table 3. STREAM CROSSINGS VULNERABLE TO CHANGING WEATHER

I-80 Corridor Stream Crossing	Location (Milepost)	I-80 Vision Recommendation
Mosquito Creek	MP 10 – 27 (Floodplain)	Increased flooding risk – conduct risk analysis
East Nishnabotna River	MP 61.1	Increased flooding risk – conduct risk analysis
Crooked Creek	MP 68.7	Increased flooding risk – conduct risk analysis
Middle River	MP 84.8	Increased flooding risk – conduct risk analysis
North Raccoon River	MP 112.4	Increased flooding risk – conduct risk analysis
South Skunk River	MP 152.6	Increased flooding risk – conduct risk analysis
Indian Creek	MP 157.8	Increased flooding risk – conduct risk analysis
Cedar River	MP 265.8	Increased flooding risk – conduct risk analysis

Construction Costs

Based on current bid tabulations and unit-cost information, the current (2017) estimated construction cost for reconstructing I-80 with a new six-lane section is $2.99 billion. This estimate includes all construction costs for new concrete pavement and base material, removal of existing pavement and bridges, new bridges, drainage structures and roadside ditches, signage, communications infrastructure, embankment and roadside grading, environmental mitigation and right-of-way. A planning-level cost contingency is included in the estimate. This estimate does not include engineering design and environmental studies.

Areas for Further Study

The I-80 Vision defines the general concept and scope, including associated features, for reinvesting in the I-80 Corridor and sets the stage for the subsequent engineering design and environmental studies. As infrastructure needs and funding are identified, and based on the department's statewide priorities, these additional studies would be performed to further define and detail the improvements and secure the necessary National Environmental Policy Act (NEPA) and permit approvals. Areas for further study and analysis include the improved roadway alignment for the typical roadway widening configuration and non-typical areas, due to existing substandard geometry and locally constrained areas. Subsequent design and

environmental studies would determine the Preferred Design Alternative for the Vision. Upon securing the necessary NEPA approvals, as funding and priorities allow, final engineering design, right-of-way acquisition and construction can proceed.

I-80 Vision Future NEPA Decisions Preferred Design Alternative

Design Alternatives:
• Alignment
  o Typical Areas – Widening options
  o Localized Non-typical Areas
  ▪ Vertical grade and curve improvements
  ▪ Horizontal curve improvements
  ▪ Constrained areas due to manmade and environmental resources
  ▪ Weather-related resiliency risk analysis
• Interchanges/Crossroads
  o Interchange improvements
  o Local road bridge crossing removal
• Rest Area Improvements
Analyses:
• Roadway alternatives analysis (as necessary)
• Preliminary roadway/bridge design
• NEPA evaluation and documentation

The I-80 Vision – Transportation Impacts

Implementing the I-80 Vision would improve the future overall transportation performance of the Corridor. These traffic-related operational benefits, or impacts, would include improved traffic capacity, enhanced safety and better reliability. To measure these benefits, the Vision's projected 2040 traffic and safety performance was compared to the condition if widening improvements were not provided – the No-Build Strategy. The No-Build Strategy, as a basis of comparison, would entail maintaining and rehabilitating the existing four-lane I-80 infrastructure in-kind, without roadway widening. For the purposes of this analysis, it was assumed that six-lane widening would be implemented across the full Corridor by 2040. The traffic analysis for the General Roadway Widening Strategy (i.e., The Vision) is included in *Appendix B – General Roadway Widening Traffic and Safety Analysis* .

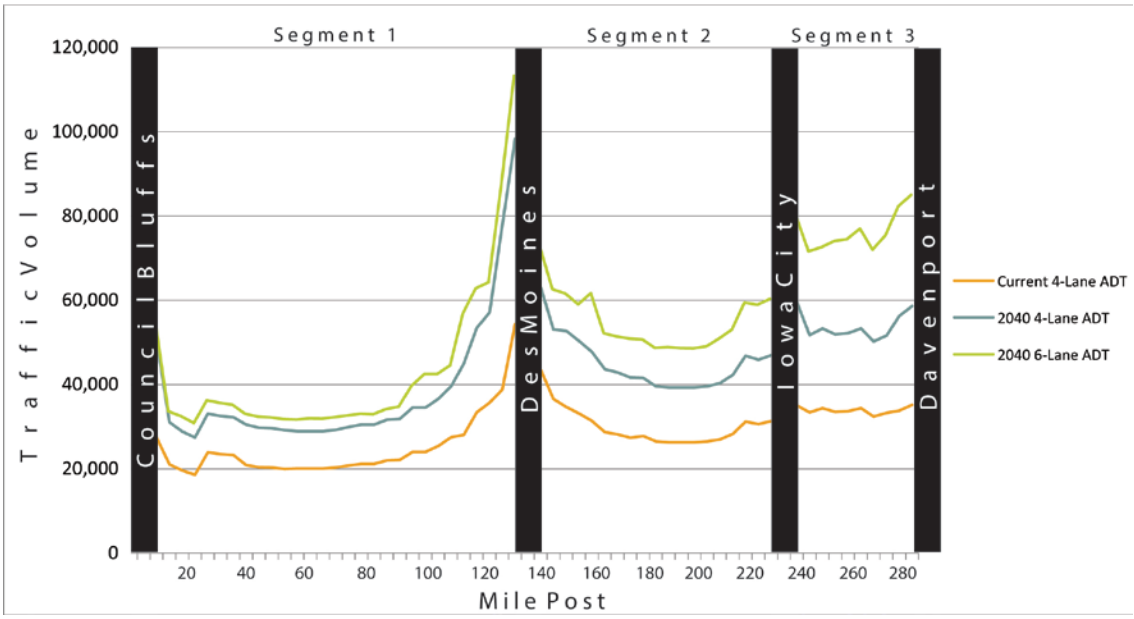
I-80 Corridor Traffic Volumes

Efficiently serving the current and projected growth of travel within the Corridor is one of the primary purposes of the Vision. As shown in ***Figure 11***, average daily traffic volumes along the Corridor are projected to grow considerably through 2040, and beyond. As shown, current traffic volumes are generally uniform within the rural areas of the three segments, with Segment 3 (Iowa City to the Quad Cities) having the highest volumes. Higher daily traffic volumes occur just outside of the metropolitan areas of Council Bluffs and Des Moines due to commuter travel and other metro area influences. In 2040, without the six-lane widening, the projected growth of traffic is generally uniform within each segment, with higher traffic growth projected on the eastern side of the Corridor. In general, outside of the metro area influences, the current to 2040 projected traffic growth is around 44 percent in Segment 1, 50 percent in Segment 2 and 55 percent in Segment 3. These higher rates of traffic growth on the eastern side of the Corridor reflect, in part, the higher projected population growth in these areas.

With an improved six-lane section, the growth of traffic across the Corridor is expected to be higher. This is due to the increased roadway capacity provided by the six-lane widening attracting travel away from other parallel routes. The projected growth of traffic between now and 2040 with a six-lane section is generally around 58 percent in Segment 1, 83 percent in Segment 2 and 121 percent in Segment 3 – measurably higher than without the widening.

Furthermore, the shifting of travel to I-80 away from parallel routes is especially noticeable on the fringes of the metropolitan areas, as the metro area influences extend farther out along the Corridor.

Figure 11. I-80 VISION 2040 AVERAGE DAILY TRAFFIC



Traffic Capacity (Mobility) Analysis

The I-80 Vision would improve the overall traffic mobility within the Corridor. Utilizing a Level-of-Service (LOS) analysis methodology, which measures mobility according to prevailing travel speed and degree of congestion based on a grading scale from LOS A to LOS F, the Vision would improve the Corridor's traffic operations. LOS B is the 2040 performance objective. As shown in ***Figure 12***, five representative LOS analysis zones were identified to compare the Vision with the No-Build Strategy. For each zone, the Vision would improve the Corridor's 2040 LOS performance. This improvement is evident in the LOS grading scale shown in the figure for the Vision compared with the No-Build Strategy.

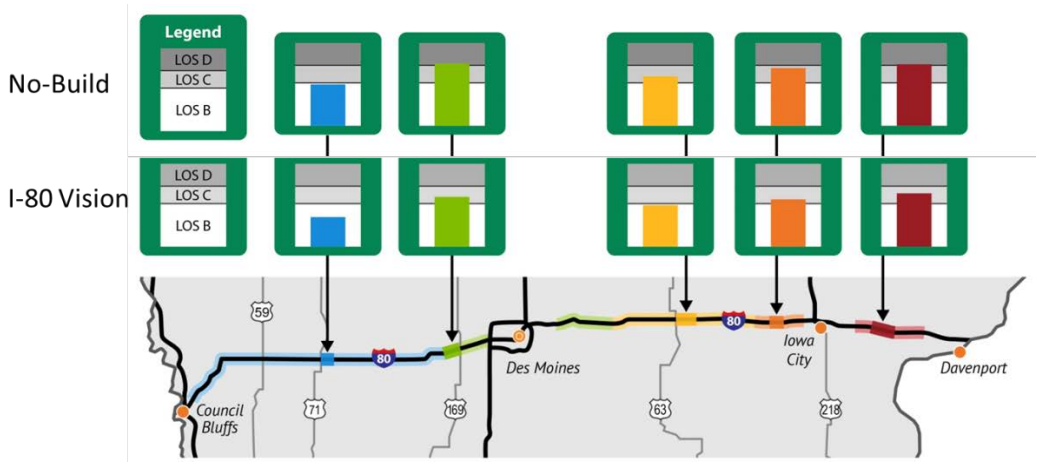
Ultimately, the improvements provide a continuous and modern six-lane roadway section across Iowa. However, these improvements should be tailored and timed with the Corridor's capacity needs, in addition to other needs, as they develop. Based on existing and projected traffic volumes, it is anticipated that the areas near Des Moines, which have the highest volumes, would have a higher priority. From a corridor-wide perspective, Segment 3 has the highest overall traffic volumes, and resulting priority, followed by Segment 2.

As shown, portions of the Corridor in western Iowa will not need six lanes until sometime after 2040. By this time, the potential benefits of AV operations should be more clearly evident, which could extend the need for widening in these areas. The Iowa DOT will reassess the benefits of AV operations before implementing widening improvements in these areas, as appropriate.

In addition, while the Vision does improve the Corridor's overall mobility performance compared to the No-Build Strategy, it does not fully meet the LOS B objective in 2040. This is evident in the central and eastern portions of the Corridor. With the projected expansion of the Des Moines, Iowa City and Quad Cities metropolitan areas, combined with the additional travel attraction caused by the Vision, I-80 is not projected to fully meet this LOS objective within these expanded metro fringe areas. In these areas, the six-lane widening would fulfill the LOS B objective up to a point in time near 2040. In the future, before 2040, as travel grows and the metro areas continue to expand, the prevailing travel characteristics within these areas would reflect more urban-oriented travel. As such, the operating performance expectations would likely shift from a more rural to urban setting. This is especially the case for Segment 3, between Iowa City and the Quad Cities, as this sub-corridor becomes more of a commuter route.

In addition to potentially redefining the LOS objective in the future for these areas, by 2040, the capacity benefits of AV operations should become more evident. Before additional capacity improvements in these areas are implemented, beyond the Vision's six-lane widening, the Iowa DOT will reassess and re-evaluate the AV operations and will plan the improvements accordingly. Depending on the AV penetration at that time, additional capacity considerations could include: delaying the need for additional capacity; repurposing the inside lane and shoulder to provide two AV-only lanes and two general purpose lanes; or repurposing the inside shoulder to an AV-only lane and adding an additional AV-only lane to the inside to provide two AV-only lanes and three general purpose lanes. The Vision accommodates each of these scenarios.

Figure 12. I-80 VISION 2040 TRAFFIC LEVEL-OF-SERVICE (LOS)



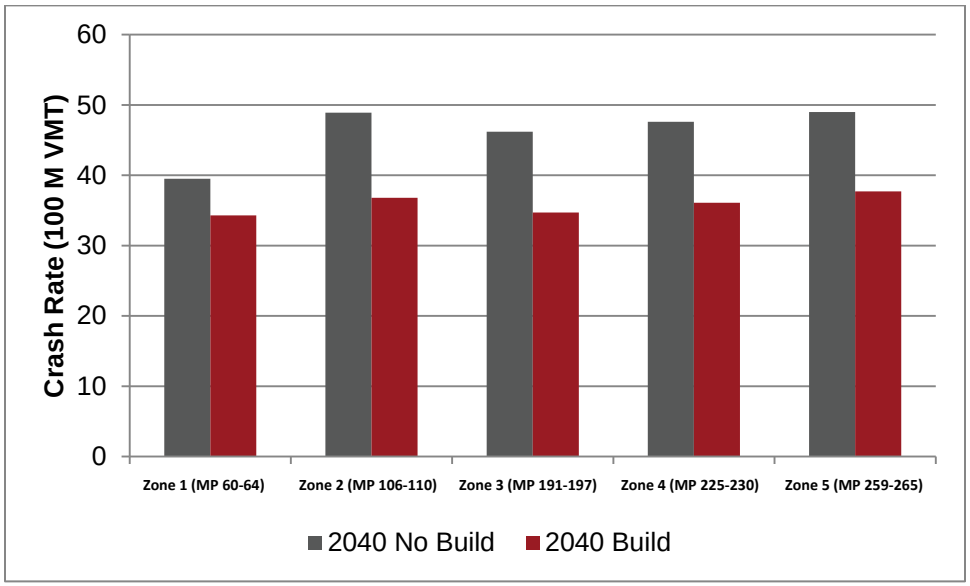
In the future, as travel continues to grow, coordination with the department's planning partners in the Corridor's metro areas will be necessary to study and plan additional capacity and operational improvements within these metro fringe areas. These studies would assess the changing travel characteristics and operational standards for these areas. Additional metro area improvement strategies, beyond the Vision, would address the changing, more urban-like travel characteristics, and given the passage of time and likely emergence of AV technologies, could include direct deployment of AV strategies. Any additional capacity improvements in these areas beyond the Vision will include the re-evaluation of the benefits of AV operations.

Travel Safety Analysis

In accordance with the department's Zero Fatalities campaign, improved roadway safety is a primary objective. As a roadway's safety performance is typically measured by the number, frequency and severity of crashes, the predicted crash performance of the Corridor, with and without the Vision, was assessed accordingly.

With the wider and improved roadway section, the Vision is predicted to improve the frequency of crashes, expressed as the total number of crashes per 100 million miles of travel, within the Corridor. As shown in ***Figure 13***, for each of the representative analysis zones, it would measurably lower the crash rates across the Corridor, as compared to the No-Build Strategy. With the improvements, I-80's predicted crash rates would be 14 to 26 percent lower. The Vision's predicted crash rates would also be below the statewide average for rural Interstate facilities. However, while the Vision would reduce the crash risks, due to its higher traffic volumes attracted from other parallel routes, the predicted number of crashes within the Corridor in 2040 would be roughly the same. In 2040, it is projected that the improvements would reduce approximately 92 crashes along the I-80 Corridor. From a system-wide standpoint, however, because it shifts traffic away from other parallel and less safe routes, the total number of crashes within the State would be expected to be considerably lower than the No-Build Strategy. If the full statewide system is considered, in 2040, the Vision would reduce traffic crashes by around 1,392 – saving lives, injuries and accident-related costs.

Figure 13. I-80 VISION 2040 CRASH RATES



Travel Efficiency Analysis

In addition to traffic capacity and level-of-service, efficiency of travel is another means of measuring the benefits of investments in the transportation system. Travel efficiency is measured at a system level based on changes in projected hours and miles of travel. As with capacity and safety, the improved overall travel efficiency is measured by comparing the Vision

with the No-Build Strategy to quantify the impacts of the improvements. Dividing the annual miles travelled by the hours of travel provides the average traveling speed for the system.

Utilizing the department's statewide travel demand forecasting model, projected traffic performance with the Vision was developed for 2040 for the statewide system, in comparison with the No-Build Strategy. For this analysis, it was assumed the six-lane improvements would be provided by 2040 across the Corridor. Due to the attraction of traffic to the I-80 Corridor from other lower speed parallel routes, the projected system miles of travel is projected to increase. In 2040, it is estimated that an additional 291,000,000 miles of travel would occur statewide with the Vision. However, due to higher travel speeds, it would reduce the 2040 annual hours of travel by roughly 20,000,000 hours – saving travel time for travelers across the state. As a result, in 2040, the average travel speeds on the rural highway system would be around 55.5 mph – 2.5 mph faster than the No-Build Strategy.

3. ENVIRONMENTAL IMPACTS

Impact Evaluation Methodology

Implementation of the I-80 Vision would entail more detailed engineering design and environmental studies to further define and detail the Vision and secure the necessary National Environmental Policy Act (NEPA) and permit approvals. These NEPA studies would more definitively identify the existing environmental resources potentially impacted, including field surveys and investigations. Design details for the Vision would be developed to avoid, minimize and mitigate any potential impacts, to the extent practicable.

To characterize the likelihood and extent of potential impacts and provide initial guidance for the subsequent NEPA studies, a high-level assessment of all known and previously recorded environmental resources within the Study Corridor was performed to support the Planning Study's recommendations. Existing environmental resources located within a 0.5 mile wide study area along the Corridor were identified using currently available databases and documented in the *Existing Systems Needs Analysis: Today & Tomorrow* technical memorandum .

I-80 Vision
Environmental Resources
Potential Impact Assessment

"Yellow Flag" Resources – Critical resources prudent to reasonably avoid and requiring alternatives analysis if impacted:

- Cultural Resources
- Regulated Materials
- Streams
- Threatened and Endangered Species
- Conservation Lands
- Parks and Trails
- Wetlands
- Cemeteries

Resources Identified but Not Included as "Yellow Flag" Resources – Resources not requiring avoidance analysis, but reasonable measures to avoid and minimize imacts:

- Ungrazed Grasslands
- Planted Grasslands
- Unique Landforms
- Religious Places
- Businesses
- Farmland

Based on these findings, a potential impact assessment of these identified resources by the Vision was performed. This analysis identified any potentially unavoidable impacts to critical

resources, called "yellow flag" resources, and identified areas along I-80 with high concentrations of these resources. These areas may require non-typical applications of the roadway section and/or alternative alignment analyses in the subsequent engineering and NEPA studies to avoid and minimize impacts. This assessment provides a basis for the scoping of the NEPA studies, per the Vision's implementation plan. This assessment was based on a 1,000 foot wide study area, centered along the existing I-80 alignment. The Vision's environmental impact assessment is included in *Appendix C – I-80 Vision Environmental Resources Impacts* .

Environmental Resources

Table 4 presents the Vision's potential impact analysis for known environmental resources. As shown, for each "yellow flag" resource, the potential for impacts and the next steps in the impact evaluation, to be performed in the subsequent NEPA studies, are identified. This assessment is based on previously recorded and known environmental resources and provides a conceptual, high-level analysis of the Vision's likely impacts. In the subsequent engineering and NEPA studies, field studies would be performed to confirm and locate environmental resources potentially impacted. As field studies are completed and as the Vision's design is further developed, potential impacts would be reevaluated and could change from this assessment.

Table 4. SUMMARY OF I-80 VISION ENVIRONMENTAL IMPACTS

Resource	Data Source	Present? / Impact Potential?	Next Steps
Cultural Resources	Iowa DOT Cultural Resources Data	Yes/Yes	• Conduct a full field survey. • Obtain agreement from State Historic Preservation Office (SHPO) on the Area of Potential Effects. • Determine effects and submit to SHPO for concurrence. • If adverse effects, work with SHPO to resolve mitigation through a Memorandum of Agreement. • Perform Section 106 consultation.
Regulated Materials	Iowa DOT Regulated Materials Data	Yes/Yes	• Prepare Phase I Environmental Site Assessment. • As needed, prepare Phase II Environmental Site Assessment on identified problematic sites. • As needed, prepare Phase III Environmental Site Assessment to estabish remediation or mitigation.
Streams	Iowa DOT Stream Data	Yes/Yes	• Conduct wetland and water resources assessment. • Prepare a wetland and water resources delineation report and full impact assessment. • Examine practicable alternatives to avoid or minimize wetland and water resources impacts. • Coordinate with U.S. Army Corps of Engineers (USACE). • Obtain permits from USACE, where applicable.

Resource	Data Source	Present? / Impact Potential?	Next Steps
Threatened and Endangered Species	Iowa DOT Threatened and Endangered Species Data	Yes/Yes	• Conduct habitat and species survey, as needed. • Prepare full impact and biological assessment. • Coordinate with U.S. Fish and Wildife Service (USFWS) and Iowa Department of Natural Resources (IaDNR). • Enter into Section 7 consultation, if needed.
Conservation Lands	Iowa DOT Conservation Lands Data	Yes/Yes	• Map conservation lands and determine impacts. • Coordinate with respective organization in charge of impacted land.
Parks and Trails	Iowa DOT Imagery Service and Trail Data	Yes/Yes	• Map parks and trails and determine if any impacts. • Identify feasible and prudent avoidance alternatives, if necessary. • Determine Section 4(f) requirements. • Coordinate with FHWA to finalize Section 4(f) evaluation, as required.
Wetlands	Iowa DOT Wetlands Data	Yes/Yes	• See Next Steps for Streams
Cemeteries	IaDNR Cemeteries Data	Yes/No	• Map existing cemeteries. • Iowa DOT will avoid impacts on both public and private cemeteries. • Develop practicable alternatives to avoid cemeteries.

Areas of High Resource Concentration

In addition to reviewing the individual resources potentially impacted by the Vision, the "yellow flag" resources were reviewed collectively to identify areas of high concentrations of these resources. While the concentration of a particular resource may not be higher than the study area as a whole, it's location in proximity to other "yellow flag" resources may make the area more challenging for impact avoidance, minimization of impacts and permitting. Five areas of noticeably high resource concentrations were identified. For each of these areas, the subsequent NEPA studies would likely need to consider alternative analyses to identify the Preferred Design Alternative. While woodland resources are not considered a "yellow flag" resource on its own, for this analysis, it has been paired with wetlands as an indicator of the potential presence of threatened and endangered species habitat. These five high-concentration areas include the following:

- **Council Bluffs to Neola Resource Concentration Area** – MP 8 to 19
- **Minden Resource Concentration Area** – MP 28 to 30
- **Van Meter Resource Concentration Area** – MP 111 to 114
- **Colfax Resource Concentration Area** – MP 156 to 160
- **Williamsburg Resource Concentration Area** – MP 219 to 221

4. PUBLIC INVOLVEMENT

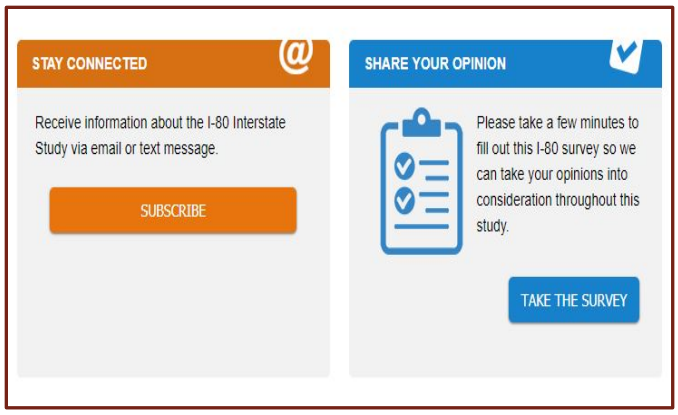
Public Involvement Plan

At the outset of the Planning Study, the Public Involvement Plan was developed to identify opportunities for the public to provide ideas and comments regarding the development of the I-80 Vision. This plan was captured in a technical memorandum to guide the public involvement process for the study. The purpose of the public involvement process was to inform and raise awareness of the study, generate interest from the general public and stakeholders, and solicit feedback. This plan is available on the study's website.

Pursuant with the PEL study process, throughout the Planning Study, multiple meetings were held with the FHWA to coordinate the study's process, findings and recommendations.

Online Information

Due to the length of the I-80 Corridor and large population base surrounding I-80 (nearly one-third of Iowa's population), online information was made available to effectively reach and engage the general public potentially interested in and affected by the study. A project website was created and updated throughout the study to display information for consistent public messaging and study communications (https://iowadot.gov/interstatestudy/home).



The study website allows residents and other interested parties to participate in the study process, including email announcements and an opinion survey.

On the project website are a series of technical memorandum that make up the analysis for the Planning Study. These memos focus on a different topic or issue related to I-80 at a system level. Also included is a study area map, project schedule, links to the online public meetings, a place to subscribe to project updates, a public opinion survey, and an area for comments.

Public Meetings

Three online public meetings were held during the course of the study. A fourth in-person meeting was held near the conclusion of the study, corresponding with the release of the study's final report. Each online meeting is posted on the project website, including videos and opportunities for participants to provide comment. Announcements for the meetings were provided through the study email distribution, newspaper advertising and other media releases. ***Table 5*** provides a summary of the study's public meetings, including the meeting logistics and topics presented.

Table 5. SUMMARY OF PUBLIC MEETINGS

Public Meeting	Topics
Website/Study Kickoff Available January 19, 2016	• Introduction to the Planning Study and website
Meeting 1 Available July 15, 2016	• History of I-80 • Traffic projections • Study Corridor • Guiding Principles
Meeting 2 Available July 24, 2017	• Analysis of local bridge crossings • Analysis of alternative routes (US 30 and US 34) • Analysis of Automated Vehicles and accommodations of future technologies
Meeting 3 Available February 21, 2018	• Existing Conditions and Operations Evaluation • Resiliency and Vulnerability • Evaluation of Modal Options • Tolling Considerations
Meeting 4 In-Person July 24, 2018	• Vision for Infrastructure Investment (Draft)

Stakeholder Group Meetings

Over the course of the study, several specific stakeholder meetings were held with interested parties and agencies. These meetings were conducted to review and discuss particular issues and topics relevant to the study and its findings. These events provided all parties the opportunity for open discussion and input regarding the study's proceedings. Agencies and associations met with during the study included:

- Iowa DOT Freight Advisory Council
- Iowa Motor Truck Association
- Petroleum Marketers and Convenience Stores of Iowa

Public Feedback

Over 150 comments have been received through the project website since January 2016. Public comments received to date are included in *Appendix D – Public Comments on the I-80 Planning Study*. Also included is a summary of the in-person public meeting held on July 24, 2018.

Many similar comments were received from multiple individuals and have been grouped together into common themes. These themes are listed, as follows, in order from most to least common:

- Desire for expansion of I-80 to 6 lanes
- Enforcement of speed limits and slower traffic in the right lane would increase safety
- Davenport urban area improvements needed
- Des Moines urban area improvements needed
- Passenger rail would reduce trips and provide alternative transportation
- Do not toll I-80
- Keep trucks in the right lane(s)
- Provide truck only lanes
- Further evaluation is needed for the analysis of local bridges across I-80
- I-380/Iowa City area improvements needed
- Toll I-80
- Expand US 30 and US 34 to reduce traffic on I-80
- Fix exit and entrance ramps and extend ramp acceleration and deceleration lanes
- Add to curb appeal/natural environment along I-80 as part of project
- Concerns about ability for emergency response to effectively get where they need to go
- Better signage is needed along I-80
- Rest areas that are in need of repair or closure
- Noise issues need to be addressed in certain areas
- Pedestrian/Bicycle path along and/or across I-80
- Trucks should be limited
- Bus and ride share options need to be expanded
- Consider accommodating needs far into the future to avoid future reconstruction

Public Survey Results

A public opinion survey was conducted as part of the public input process for the I-80 Planning Study. This survey was accessed through the study's website in the form of a questionnaire. Over 5,500 completed questionnaire responses were received. The results of the survey provide insights on the Corridor's usage, traveler experience and values important to the formation of the Vision. The following summarizes the major findings of the survey:

- **Use of I-80** – Travel along I-80 is fairly routine. Of those responding to the survey, roughly 60 percent travel I-80 five or more days a week (31 percent) or once or twice a week (29 percent). Those traveling once or twice a month were slightly less (26 percent) and considerably fewer only travel I-80 a few times a year. The most frequent purpose for traveling I-80 is pleasure-weekend trips at nearly half of respondents. Commuting and driving for work being nearly equal to make up the other half of drivers on I-80. Over 40 percent of respondents drive more than 50 miles per week on I-80.

- **I-80 Condition** – Approximately 44 percent of respondents feel that traffic on I-80 is high but acceptable, where 31 percent feel the traffic is moderate and 20 percent feel that the traffic is high and unacceptable. When considering the satisfaction of drivers on I-80, the highest percentage of respondents are somewhat dissatisfied with the flow of traffic, amount of truck traffic, number of travel lanes and level of safety. When it comes to road conditions, however, the highest percentage of respondents are somewhat satisfied.

- **Future Travel Experience** – Over the next 10 years, the majority of respondents expect that traffic congestion on I-80 will get a lot worse. Around 27 percent expect that traffic congestion will get a little worse. When respondents rated different factors in terms of importance, the flow of traffic ranked highest, with the current level of safety ranking second highest. Lowest on the list of importance is the amount of road construction. The majority of respondents indicated they would choose an alternate route to I-80 if they felt that a change in road conditions were to make I-80 unsafe.

- **Need for Improvement** – Over 43 percent of respondents felt that adding lanes to I-80 was very important, while 31 percent feel that it is somewhat important. When asked to rank objectives for I-80, respondents assigned the most points to increasing capacity with improving safety a close second. Of least importance was protecting the environment and expanding travel options. It was most important to respondents that the Interstate system work effectively more than 20 years into the future. Most respondents considered two lanes of travel in each direction to be a moderate problem.

- **Improvement Options** – Respondents were asked about their support for different statements. The first asked about support for reducing infrastructure such as roads and bridges connecting to the Interstate. The highest numbers of respondents were somewhat opposed or not sure of this statement. The second statement asked about tolling as a way to help pay for the Interstate. The majority of respondents were strongly opposed, with those somewhat opposed or somewhat supporting the idea a similar but much lower percentage. The third statement asked about restricted lanes for trucks. Most respondents were either somewhat supportive or strongly in support of this statement. The last statement asked about removing county road bridges with low traffic volumes over the Interstate system. About 37 percent of respondents weren't sure or had no opinion. Around 23 percent of respondents felt strongly opposed and the same amount somewhat opposed to this statement.

- **Funding** – About 43 percent of respondents would rate the Interstate system in Iowa with a B grade, while 34 percent would give it a C grade. When asked whether they agreed that the State of Iowa has enough revenue to keep the transportation system safe, about 33 percent somewhat agreed and around 28 percent weren't sure. When asked if respondents felt the State of Iowa has enough revenue to keep the transportation properly maintained, 33 percent somewhat agreed. Lastly the survey asked if respondents felt that the State of Iowa has enough revenue to meet its needs. Around 29 percent were not sure and 27 percent somewhat agreed.

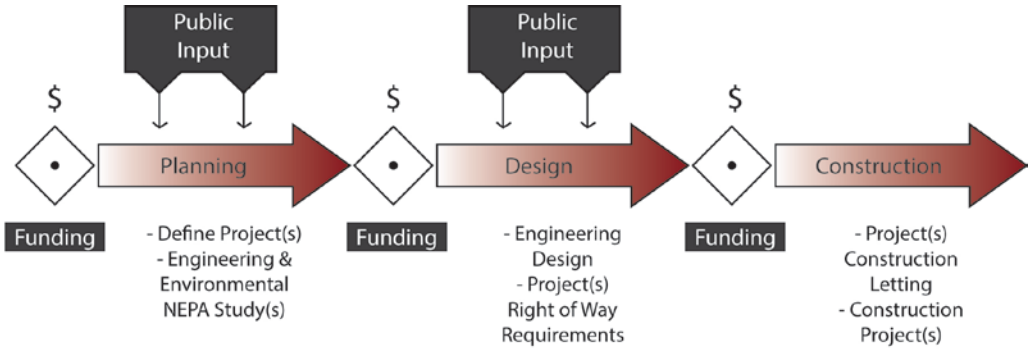
5. IMPLEMENTING THE I-80 VISION

I-80 Vision Implementation Process

The I-80 Vision provides a road map for improving I-80 across Iowa. It defines the Corridor's overall improvement strategy and features, upon which subsequent engineering and environmental studies will be based. The Vision's Implementation Plan provides an overall framework for the Iowa DOT's advancement of the Corridor's improvements. As shown in ***Figure 14***, utilizing the department's standard project development processes, implementing the

improvements will entail more detailed planning, followed by final engineering design and construction.

Figure 14. I-80 VISION PROJECT DEVELOPMENT PROCESS



The identification and programming of funding will initiate the Vision's implementation process. This entails the department's continued and ongoing assessment of the Corridor's conditions, as part of its regular annual Interstate operational and condition reviews. As funding is identified, based on the needs of the Corridor, the department will identify specific sections, or projects, within the Corridor to advance into more detailed planning and design, leading to construction. Full completion of the Vision will be accomplished over time, as individual projects are completed, based on the availability of funding and the Corridor's needs.

Coordinating the I-80 Vision

Engagement and coordination with the public and other stakeholders will continue to be integral to the Vision. This Planning Study is not the final opportunity for the public to provide input. It is the first step in a series of engagement activities.

During the planning phase, each identified project within the Vision will be studied in accordance with the department's location study and NEPA requirements. Based on the Vision, these studies will include engineering and environmental analyses to further define the details of the individual projects. Public and stakeholder input, through public meetings and other outreach efforts, will inform these studies to determine the best layout for the I-80 improvements. In general, in coordination with the public, stakeholders and potentially affected landowners, these studies will determine the preferred and recommended roadway widening alignment and design details.

The I-80 Vision will include additional public information meetings as part of the NEPA planning studies and design activities.

Following each project's NEPA approval, which then allows the Iowa DOT to procced with the project's design and construction using federal funds, the public and affected landowners will be

engaged further through the department's standard design and construction processes, which include public involvement.

Planning for the I-80 Vision

The Vision includes a number of details and features to be studied further through the planning phase (see Chapter 2 – Improvement Strategies). Over time, as funding and Corridor needs are identified, individual projects will be defined based on the priority guidance within the Vision's implementation plan. The limits of each project, or proposed action, will be established at the outset of the more detailed planning study. Individual project limits will be based on the following guidance:

- **Purpose and Need** – Based on the Corridor's goals and objectives, each project will be defined to address the local purpose and need for the improvements. For example, the purpose of the project, and its defined limits, could be based on an identified and localized safety issue within the Corridor.

- **Logical and Independent Utility** – Each section of the Corridor to be studied further, defined by the project's limits, needs to have independent utility and service. For example, a project's limits could extend between I-80 interchanges, thereby serving the growth of traffic that is the source of the project's purpose and need. In addition, each project should logically connect to previously completed projects to avoid a disjointed sequencing of roadway widening across the State, as projects are constructed.

- **Range of Alternatives** – The limits of the project need to encompass the range of alignment alternatives that could be considered to address the project's purpose and need. This is particularly relevant to the constrained areas within the Corridor.

- **Environmental Resource Impacts** – Based on the existing environmental resources along the I-80 Corridor and adjacent to I-80, each project's limits need to be defined to avoid the potential bifurcation of resource impact considerations. In addition, the limits need to consider the secondary implications of potentially impacting known resources in adjoining future sections or projects.

Based on this guidance, and in coordination with the FHWA Iowa Division, the department will determine the appropriate type of NEPA study and documentation for each individual project. Upon completion, and securing the necessary FHWA and resource agency approvals for each project, the department may then proceed with the project's final engineering design.

The I-80 Vision's planning phase will include more detailed environmental surveys and site investigations to identify and avoid, wherever reasonably possible, existing environmental resources.

Building the I-80 Vision – Corridor Priorities and Staging

The emerging needs and priorities within the Corridor will determine how the department sequences the Vision's construction phasing and staging. The intent is to effectively sequence the Vision's implementation, in logical and connected sections, based on the highest needs within the Corridor and based on projected available funding. The Corridor's goals and objectives provide the framework for assessing the project priorities.

I-80 Vision Implementation Plan Project Priority Triggers

- **Traffic Capacity** – Traffic operations not meeting Corridor objective of LOS B or better.
- **Traffic Safety** – High priority areas with crash rates higher than I-80 Corridor average.
- **Infrastructure Rehabilitation** – End of pavement and bridge service life requiring full replacement to maintain state of good repair.

As funding is identified and available, individual projects will be identified based on three primary priority triggers: traffic capacity, traffic safety and infrastructure rehabilitation. The degree and priority of the need depend on timing, as traffic continues to grow over time and as full reconstruction of the existing infrastructure is needed to maintain the Interstate in a state of good repair. Traffic safety needs are a high priority, but need to be addressed comprehensively in consideration of all project selection factors. Other factors affecting the construction project sequencing include logical connections or end points for each project and continuity of adjoining projects.

Based on projections of the implementation triggers in fulfilling the Corridor's goals and objectives, the Vision will be implemented by individual projects within three generalized time horizons: Near-Term (2018-2033), Mid-Term (2034-2040), and Long-Term (Beyond 2040). These projects, completed over these time horizons, comprise the full and complete implementation of the Vision. As the Vision is a long-term strategic plan, extending beyond 2040, it provides an ultimate, expandable six-lane roadway template across Iowa that is adaptable to the timing of needs and constructible in stages. By staging its implementation, the Vision can adjust to; 1) the availability of funding and changing priorities, 2) the timing of needs, and 3) changes in traffic operations due to the emergence of AV technologies. As it is built across Iowa, especially in the later years, the department will continue to assess the impacts of AV technologies and operations, as they emerge, and will adjust accordingly.

Paying for the I-80 Vision

The Vision will be constructed as funding is available. Given the limitations of current federal and State funding and the magnitude of the Vision's construction costs, it will take a number of years to fully implement the Vision. As a result, the Vision will be constructed in sections, or individual projects. On this pay-as-you-go basis, if the Vision was to be completed by around 2040, roughly three quarters of the department's Interstate funding would need to be dedicated to I-80 in the future.

While the Vision's Implementation Plan is based on the priority triggers, other factors or circumstances could affect the overall implementation schedule. The plan is intended to provide framing guidance to assist the department with its statewide and Corridor construction program planning. It is not a guarantee when a project will be constructed. Other factors could impact the implementation. These include the availability of additional funds beyond what is currently projected, other state priorities taking precedence, or coordination with other projects directly affecting rural I-80.

The I-80 Vision Implementation Plan

The I-80 Vision Implementation Plan is presented in ***Figure 15***. Based on the assessment of future traffic capacity, safety and rehabilitation needs, for each of these triggers, the projected timing of the implementation is shown based on the three planning horizons. The recommended Vision Implementation Plan is the composite of these three triggers.

While each of the implementation triggers could initiate the Vision's implementation within a particular area, the resulting project could be an initial, intermediate or final stage of the ultimate improvement. The Vision is to be built in phases and stages over time based on the timing of the Corridor's needs. When a need is identified, the Iowa DOT will assess the phasing and staging options, including the availability of funding, to determine the scope and limits of each project. In some cases, it may be more cost-effective to fully implement the Vision. In others, it may be advantageous to provide an initial stage of the Vision. The individual circumstances for each project will determine how the improvements are built over time.

Based on the three priority triggers, the following will be considered for each individual project within the Vision:

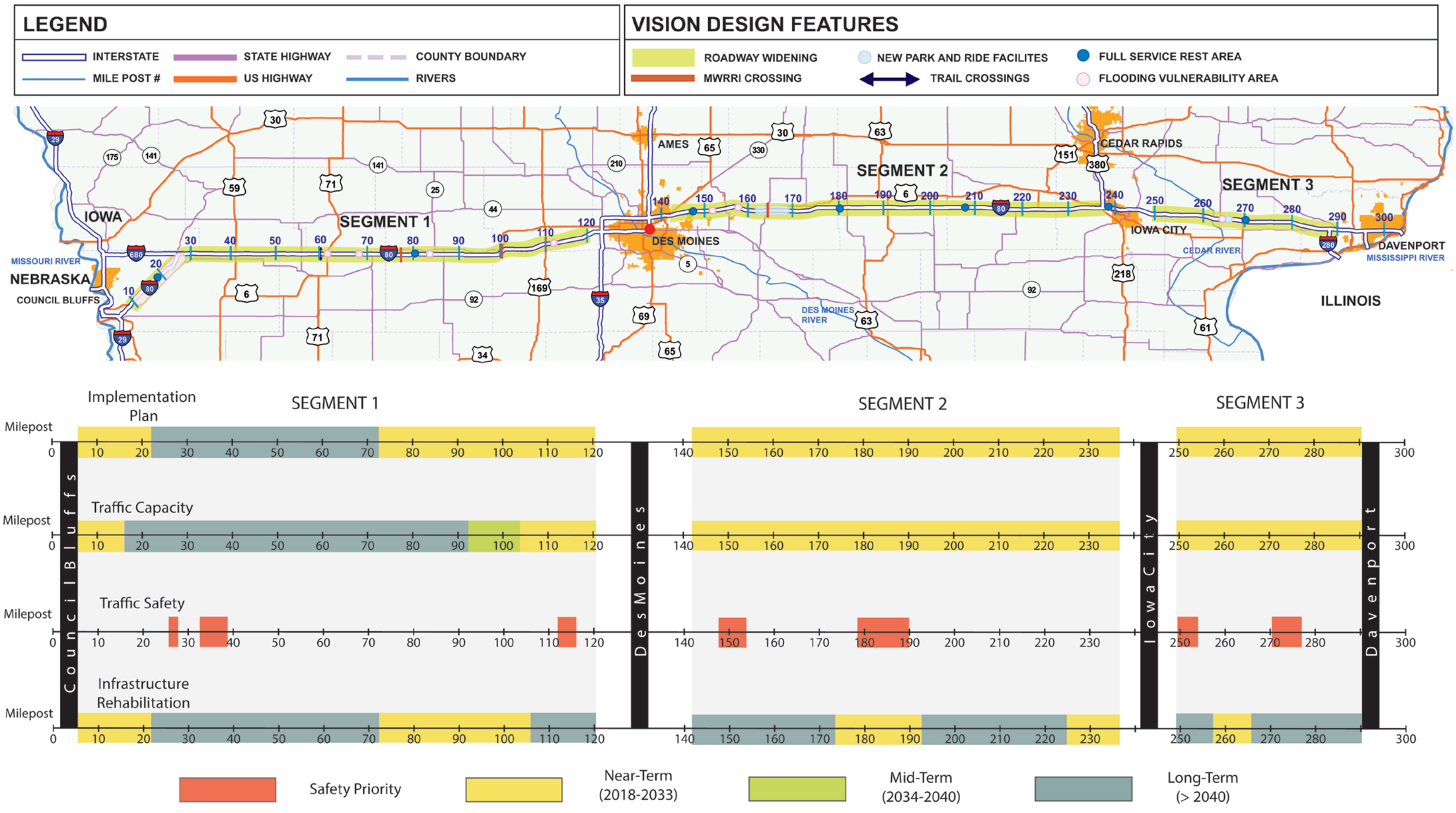
- **Traffic Capacity** – This need is triggered by unacceptable traffic operations based on LOS. The Vision Implementation Plan identifies when six lanes are projected to be needed for each planning horizon. As shown, all of Segment 2 and Segment 3 require six-lane widening in the near term. For Segment 1, six-lane widening is needed on the outskirts of Council Bluffs and Des Moines in the near-term, and farther outside of Des Moines in the mid-term. The rural portions of Segment 1 will not likely require six lanes until after 2040. For this area, the department will reassess the AV operational benefits before planning and constructing the ultimate six-lane widening. Additionally, in the future following the Vision, as unacceptable traffic operations may develop by 2040 within portions of Segment 1 and 2 in the vicinity of Des Moines and Iowa City, and throughout Segment 3, the department will similarly consider AV operational benefits before adding additional capacity. Within these metro areas, possible additional capacity improvements will be coordinated with the respective metro area planning agencies and partners.

- **Traffic Safety** – The department will assess the identified high crash rate areas for possible short-term safety improvement measures that may be beneficial. Staged or full implementation of the Vision within these areas will be addressed comprehensively in consideration of all project selection factors.

- **Infrastructure Rehabilitation** – Several pavement areas within the Corridor are projected to reach the end of their service life within the near-term. For these areas, infrastructure rehabilitation could be the trigger for implementing the Vision. If it is determined that full pavement replacement is the most cost-effective rehabilitation option, an initial or final stage of the improvements could be implemented, depending on the traffic capacity trigger. For those areas not yet requiring six lanes, an initial four-lane stage could be implemented. Other options could include continued major maintenance and rehabilitation until such time that six lanes are needed. Similarly, existing bridges necessitating full reconstruction due to age or other factors could be rebuilt as an initial

stage or based on the final configuration. As with pavement, another option could entail the continued maintenance and major rehabilitation of the bridge until such time as the full implementation is needed.

Figure 15. I-80 VISION IMPLEMENTATION PLAN



This Vision Implementation Plan, as shown, provides a framework for its construction without regard to the availability of funding. However, on a pay-as-you-go basis, given the department's limited funding, the Vision's implementation will likely be constrained by the availability of funding. As a consequence, the implementation may not be based solely on the timing of the need. The availability of funding will likely affect the execution of this plan.

To illustrate the effects of funding availability on the Vision's implementation, ***Table 6*** presents the unconstrained implementation, if funding was not a limiting factor, compared to being constrained by currently projected funding. Projections of available funding assumed around 75 percent of the department's future Interstate funds would be directed to the Vision and considers currently planned funding for other projects. Utilizing 75 percent of the available interstate funding is extremely aggressive and likely untenable long term, in consideration of all Interstate needs, but was assumed as a benchmark for comparison.

Table 6. VISION IMPLEMENTATION PLAN TIMING BASED ON NEED AND AVAILABLE FUNDING

Vision Implementation Plan Time Horizon	Unconstrained by Funding (Based on Timing of Need)		Constrained by Available Funding (75% of Interstate Funds)	
	Total Miles	% of Corridor	Total Miles	% of Corridor
Near-Term (2018-2033)	197	79%	146	59%
Mid-Term (2034-2040)	0	0%	76	31%
Long-Term (>2040)	51	21%	26	10%
Total	248	100%	248	100%

A Funding Option – Interstate Tolling

I-80 Corridor Tolling Concept

Given the current limitations of federal and State highway funding, the Iowa DOT must continually balance the competing needs of the State's highway system to prioritize the use of available funding. With a current (2017) construction cost of nearly three billion dollars, implementing the Vision will be a significant investment for the State. Consequently, other funding opportunities, such as tolling, were explored by the department as an option to pay for the implementation.

The first step in evaluating tolling as a possible funding solution for the Vision is to determine what potential funding it could offer. To answer this initial question, the Iowa DOT conducted a planning-level toll study, entitled *Interstate 80 Planning*

The I-80 Vision Tolling Concept

Implementing the Vision using tolls would entail an "open road" toll collection concept. Eleven or so tolling points, strategically located across the State, would collect tolls on all six I-80 travel lanes. Tolls would be collected at each point using Electronic Toll Collection technologies – in-vehicle transponders and video tolling. These technologies would allow free-flow toll collections. Typical and conventional Interstate toll rates, for both autos and trucks, would be used.

Electronic Toll Collection entails a transponder sticker applied inside the vehicle windshield. Source: E-470 Public Highway Authority

Study: Toll Financing Study. This study, in short, determined the Vision's ability to pay for itself through tolling. Utilizing projections of gross toll revenues generated by the project, minus the costs of financing and operating and maintaining I-80, the analyses determined the toll revenue bond financing capacity, as compared to the Vision's construction costs.

Financial Feasibility of Tolling

Utilizing tolls to fund and finance the Vision is a financially feasible option. Within the range of confidence of the conceptual toll study, projected toll revenues would likely be sufficient to finance the six-lane widening and modernization of rural I-80 across Iowa, if all lanes were tolled. Using typical rural Interstate toll rates and public financing terms, toll revenues could likely pay for and finance the I-80 improvements, as well as fund its continued operations and maintenance into the future. No additional public funding would likely be required. If tolling advances into more detailed studies, full (100 percent) financial feasibility would be determined through further refinements of the tolling concept.

Table 7 provides a summary of the toll financing analysis for the Vision with all lanes tolled.

Table 7. SUMMARY OF THE VISION'S TOLL FINANCIAL FEASIBILITY

Item	Description
Toll Project Description	Widen and reconstruct rural I-80 across Iowa (248 miles) with a modern and future adaptable six-lane roadway section with all lanes being tolled
Construction Schedule	5-year construction period from 2022 to 2026
Program Costs	• $3.62 billion – Total Design and Construction Cost (Expenditure Year) • $3.86 billion – Total Program Cost (Expenditure Year) • Annual operations and maintenance costs to be paid from toll revenue
Toll Pricing and Revenue	• Open toll system configuration with eleven I-80 tolling stations across Iowa • Opening toll rate: $0.08/mile for autos and $0.24/mile for trucks • Annual 2% increases in toll rates to account for inflation
Financing Terms	• Sources of Financing: Toll revenue bonds and US DOT TIFIA loan • Repayment Sources: Net toll revenues with no State of Iowa funding • Debt-Service Coverage: Set at level intended to obtain 'A' rating • Final Maturity: 35 years
Financial Feasibility	• 76% to 93% of total program cost could be paid by toll financing • Full (100%) financial feasibility would be determined through refinements in toll program costs, toll pricing, revenue and/or financing terms

The Benefits and Impacts of Tolling

Utilizing tolling for major transportation projects is not a new concept. Today, in other regions of the country, tolling is a common means of funding and financing highway improvements that could not otherwise be constructed with traditional funding. It is commonly purported that tolls have paid for roughly half of all new highway lanes constructed in the nation over the last two decades. However, as tolling would be new for the State of Iowa, enacting tolling would be a significant change in transportation public policy. Therefore, possibly enacting tolls with the Vision requires careful and systematic consideration.

Tolling would provide a new revenue source for implementing the Vision, thereby enabling it to be implemented unconstrained by the availability of funding. However, tolling would introduce a new type of user fee for I-80 travelers. This would impact the State differently than a pay-as-you-go approach using existing funding, as it's available. ***Table 8*** provides a summary of the benefits and impacts of using tolls to fund the implementation.

Table 8. SUMMARY OF THE BENEFITS AND IMPACTS OF TOLLING

Advantages of Tolling	Disadvantages of Tolling
• **Dedicated Revenue** – Provides a new revenue source dedicated 100% to the Vision for financing of upfront construction. • **Sustained Operations and Maintenance** – Provides a new long-term revenue source for sustained I-80 operations and maintenance. • **Accelerated Construction** – Improvements would be completed sooner, offsetting inflationary escalations of costs. • **Equity of Payment and Use** – Only users of the project, regardless of in-state or out-of-state residency, pay for the project. • **Service Reliability** – As traffic increases, provides a funding source to pay for additional projects and infrastructure rehabilitation.	• **Debt Financing** – Interest costs would be incurred for financing**.** • **Traffic Diversion** – Some traffic would divert to other highways to avoid paying a toll, potentially affecting the overall highway system**.** • **Public/Stakeholder Acceptance** – Some travelers may not be supportive of paying tolls for an improved I-80, in addition to current fuel taxes. • **Authorization** – Authority to enact tolls would require federal approvals and new state enabling legislation. • **Administration Costs** – Collecting tolls is not as cost efficient as fuel taxes.

The State of Iowa does not currently have authority to enact tolls on I-80. As an Interstate, authorization would need to be granted by the FHWA through an existing pilot program – the Interstate System Reconstruction and Rehabilitation Pilot Program. In addition, new enabling state legislation would be required. This legislation would need to grant the State of Iowa the authority to enact and collect tolls, issue toll revenue bonds, enforce toll collection, and include other key toll-related provisions.

Summary Evaluation of I-80 Vision Funding Options

Based on potential funding strategies and availability of funds, two funding options have been conceptualized for the Vision – Existing (Pay-As-You-Go) Funding and Toll Funding. Based on the Vision Implementation Plan, its construction phasing, sequencing and schedule would depend, in great part, on the availability of funds. As conceptual generalizations, these two funding options vary considerably on the sources and timing of funding, as follows:

- **Existing (Pay-As-You-Go) Funding Option** – Deliver the Vision using existing funds, on a pay-as-you-go basis, to fully construct the improvements by 2040. In general, this funding option assumes existing funding would be available to enable Segment 3 (Iowa City to Quad Cities) to be constructed by 2029, Segment 2 (Des Moines to Iowa City) by 2034 and Segment 1 (Council Bluffs to Des Moines) by 2040. This option is a general representation, in concept, of the Vision Implementation Plan for the purposes of evaluating the impacts of funding availability. It is a simplified representation of the Plan. Based on current funding limitations, these assumptions are likely untenable in the long term but provide a basis of comparison for the analysis of funding options.

- **Toll Funding Option** – Deliver the Vision using toll funding and financing, providing a new source of revenue, to accelerate its full construction by 2027. This option is a general representation, in concept, of using toll funding and financing to accelerate the construction. It is an assumed accelerated schedule to provide a conceptual comparison of the benefits of completing the improvements sooner, in contrast with the other option.

The I-80 Vision's Economic Benefits

Each of these implementation options fully delivers the Vision, but over different time frames and from different funding sources. The toll funding option enables it to be completed sooner. As a result, the overall benefits would accrue to Iowa residents and travelers sooner. The realization of these benefits requires the investment and completion of the improvements.

The Vision's improved traffic operations and travel efficiencies create real dollar savings to travelers. Reduced and more reliable travel times means less lost productive time for motorists and truck deliveries. Improved safety performance reduces the risks of crashes and the occurrence of crash-related costs for travelers. As the improvements attract travel from other parallel routes within the State's highway system, these benefits would be realized throughout the State, not only the I-80 Corridor. In addition, as the Corridor is reconstructed and improved, the Vision would reduce the required maintenance and rehabilitation costs for the Interstate.

These travel-related and rehabilitation benefits can then be monetized, using typical dollar values for time, vehicle operations, crashes and typical rehabilitation costs, to estimate the economic benefits. These benefits can be annualized and accrued to contrast the Vision with the No-Build Strategy – the strategy that maintains and rehabilitates existing I-80 in-kind without roadway widening. In addition, the accelerated benefit accrual of the toll funding option can be compared with the option of using existing pay-as-you-go funding. For the purposes of this analysis, the low diversion scenario for tolling was utilized, as described in the *Interstate 80 Planning Study: Toll Financing Study* technical memorandum. This analysis provides a relative indication of the potential benefits of accelerated construction with tolling. The travel efficiency benefits of tolling would be subject to more detailed study based on a specific toll pricing strategy and resulting traffic redistribution. A summary of the economic benefits analysis is included in *Appendix E – I-80 Vision Economic Impacts*.

Table 9 summarizes the net present value (2017) of the direct (net) economic benefits of the Vision for improved statewide travel efficiencies and reduced I-80 Corridor maintenance and rehabilitation costs. These benefits would be the result of the investment and completion of the Vision. As shown, the benefits depend on the timing of the construction, the distribution of traffic within the highway system and the sources of funding for the Corridor's upkeep. For either funding option, due to the additional traffic attracted to I-80, the total system miles of travel would increase, resulting in a dis-benefit. However, the improved travel times and overall safety within the system would provide between $3.1 billion and $3.2 billion of direct travel-related benefits, depending on the funding option. While the travel efficiency benefits would be realized sooner with the Toll Funding Option, because tolling would divert some of the I-80 traffic back to the adjoining highway network, the net effect is similar to the Existing Funding Option. However, because tolling introduces a new source of funding for the ongoing future maintenance of the I-80 Corridor, the total direct benefits of tolling would be higher than paying for the improvements using existing funding ($4.8 billion compared to $3.7 billion).

Table 9. SUMMARY OF THE VISION'S DIRECT ECONOMIC BENEFITS (2018 TO 2050)

Vision Funding Option	Net Present Value (2017) of Benefit ($000) with Vision Investment					
	Travel Efficiency Benefits				Maintain and Rehab	Total
	VHT*	VMT*	Safety	Subtotal		
Existing Funding	$3,663,715	-$1,215,340	$679,510	$3,127,885	$605,811	$3,733,696
Toll Funding	$4,166,254	-$1,518,965	$531,203	$3,178,492	$1,639,650	$4,818,142

* VHT = Vehicle Hours of Travel and VMT = Vehicle Miles of Travel

Summary of I-80 Corridor Goals and Objectives

Table 10 summarizes the fulfillment of the Corridor's goals and objectives by the Vision compared to the No-Build Strategy. Each of the implementation options is presented to contrast the benefits of accelerating the construction using toll funding and financing.

Table 10. SUMMARY OF I-80 CORRIDOR GOALS AND OBJECTIVES

Objective	Performance Measure	Improvement Strategy		
		No-Build	Vision (Exist. Funding)	Vision (Toll Funding) *
Goal 1 - Effectively Serve the Traveling Public				
Mobility	% of I-80 Corridor Meeting LOS B or Better in 2040	34%	38%	> 38%
Safety	Reduction in Total/Fatal Crashes (2018 – 2050)	NA	24,442 / 180	24,030 / 130
Goal 2 - Maintain and Preserve Past Investments				
Maintenance	NPV of I-80 Maintenance and Rehab Savings (2018 – 2050)	NA	$0.61 billion	$1.64 billion
Modernize	% of Corridor Meeting 75 mph Design Standard	Horz. Curves 41% Vert. Curves 57%	Horz. Curves100% Vert. Curves 100%	Horz. Curves100% Vert. Curves 100%
Goal 3 - Adapt to Future Conditions				
Emerging AV Technologies	Compatibility with Future AV Deployment	Fair	Good	Good
Changing Weather	Ability to Address Risks and Vulnerabilities	Fair	Good	Good
Emerging Federal Policy	Ease of Integration with Future Federal Policies	Poor	Poor	Good
Goal 4 - Invest in Iowa Economy				
Freight	Reduction in Total Hours of Travel Delay (2018 – 2050)	NA	475,000,000	482,000,000
Economic Benefits	NPV of Travel-Related Cost Benefits (2018 – 2050)	NA	$3.1 billion	$3.2 billion
Goal 5 - Implement Improvements within Affordable Limits				
Preservation	% of Existing Funding Dedicated (2018 – 2040)	NA	75%	0%
Equity	% of Out-of-State I-80 Travel and % Funding Contribution	24% / 13%	24% / 13%	24% / 24%

* Assumes the Low Diversion Toll Scenario, as described in the *Interstate 80 Planning Study: Toll Financing Study.*

Goal 1 – Effectively Serve the Traveling Public

- **Mobility** – While the Vision improves the overall traffic operations within the I-80 Corridor, due to the additional traffic attracted to the Corridor by the improvements, the percentage of the Corridor operating at or better than LOS B would be roughly similar to the No-Build Strategy in 2040. At or around 2040, additional improvements to the Corridor, such as additional lanes and/or deployment of AV technologies, would need to be considered between Iowa City and the Quad Cities (i.e., Segment 3) and in the fringe areas of the Des Moines and Iowa City Metropolitan Areas to fully meet the LOS B objective. Because the toll funding option diverts some of the I-80 traffic back to other parallel routes, the overall system mobility may not be as effective as the Existing Funding Option, though I-80 would have a better overall LOS.

- **Safety** – With the improved roadway section and the shifting of travel away from less safe parallel routes, it is estimated that through 2050, the Vision (Existing Funding Option) would eliminate a total of 24,442 crashes and 180 fatal crashes statewide. With the Toll Funding Option, while travel along the I-80 Corridor would be safer sooner due to the accelerated construction, because some I-80 traffic would divert to other less safe routes to avoid the tolls, the improvements would eliminate a total of 24,030 crashes and 130 fatal crashes. These results are similar due the accruing of safety benefits created by the tolling option's accelerated construction. Overall, in the long-term, the Existing Funding Option would provide superior overall system safety.

Goal 2 – Maintain and Preserve Past Investments

- **Maintenance** – For the No-Build Strategy, in addition to general roadside maintenance, the department would need to provide in-kind rehabilitation of the existing pavement and bridges to maintain the Corridor in a state of good repair. With the reinvestment in the existing I-80 infrastructure, the Vision would reduce the required amount and timing of these rehabilitation efforts, thereby saving costs. For the Existing Funding Option, up to the completion of the improvements by 2040, rehabilitation of the existing infrastructure would be required as the construction is completed. With the Toll Funding Option, due to the accelerated construction, less rehabilitation of the existing infrastructure would be required. In addition, upon the completion and opening of the Vision, all roadside maintenance and long-term rehabilitation would be paid from toll revenues. As a result, the Existing Funding Option would save the department around $0.61 billion, between 2018 and 2050 (i.e., Net Present Value of annual savings). The Toll Funding Option is estimated to save the department an additional $1.03 billion (a total of $1.64 billion savings) over the same period. In either case, these savings require the investment in the Corridor's reconstruction and improvement.

- **Modernize** – 60 percent of the Corridor's horizontal curves and 43 percent of its vertical curves do not meet a 75 mph design standard. Upon the completion of the Vision, the Corridor would fully meet a modern roadway design standard, including a roadway section with wider shoulders and median.

Goal 3 – Adapt to Future Conditions

- **Emerging AV Technologies** – Accommodating future AV Technologies entails having sufficient space to add or repurpose travel lanes for exclusive AV use, adding communications infrastructure along the roadside and redesigning the pavement section for the unique lane centering and load requirements of AV operations. While the existing I-80 pavement and roadside infrastructure could be retrofitted to accommodate these requirements as it is rehabilitated over time with the No-Build Strategy, the Vision provides the opportunity to fully integrate these future requirements into the Corridor's full reconstruction.

- **Changing Weather** – The existing I-80 infrastructure and Corridor operations are vulnerable to increasing flooding hazards at multiple waterway crossings across the state. Risk analyses at these locations are needed to assess if and how improvements to these bridge crossings are necessary, such as realigning, lengthening and raising the bridges. With the Vision, these improvements can be better integrated into the overall Corridor's reconstruction, thereby potentially decreasing the incremental additional costs of these improvements.

- **Emerging Federal Funding Policy** – Future federal funding policy will likely entail a transition from the nation's fuel consumption based funding system to a mileage-based system. While this anticipated future transition would be applied to the existing transportation system, implementing the Vision with the Toll Funding Option provides the opportunity to advance its application to the Corridor and accelerate the transition's benefits of providing new and additional funding to implement the improvements.

Goal 4 – Invest in Iowa Economy

- **Freight** – The Vision would improve the overall travel efficiencies of the State's highway system, resulting in saved travel times and higher operating speeds. More efficient truck travel would result in lower operating costs for the motor carriers, and reduced costs for the end consumer. With the Toll Funding Option, the improved travel efficiencies would be realized sooner due to the accelerated construction, but not at the same levels as the Existing Funding Option due to the effects of traffic division to avoid the tolls. However, considering the advantages of earlier completion, the net effect of improved travel times would be similar.

- **Economic Benefits** – Improving the overall efficiencies of the State's transportation system by reinvesting in the I-80 Corridor would provide real monetary benefits to the travelling public. Considering the costs of travel, including miles, hours and safety risks, the improvements would save the travelling public between $3.1 billion and $3.2 billion (Net Present Value between now and 2050), depending on how the Vision is implemented. With the Toll Funding Option, because the travel benefits would be realized sooner, and considering the diversion of traffic, this option could provide similar travel-related benefits to funding the improvements with existing funds. This finding ultimately depends on the toll pricing strategy and the amount of traffic diversion. If the toll pricing strategy would increase the amount of traffic diversion from that assumed, the travel-related benefits for the Toll Funding Option would be lower. More study of the

potential travel benefits of tolling would be needed based on a more specific toll pricing strategy if tolling is to be considered further by the department and the State of Iowa.

Goal 5 – Implement Improvements within Affordable Limits

- **Preservation** – Based on projections of existing federal Interstate and matching state funds, it is estimate that roughly 75 percent of available funding would need to be dedicated to the Vision, on a pay-as-you-go basis, to complete it by around 2040. While this would preserve existing funding sources by avoiding debt financing, a significant percentage of the State's construction program would need to be allocated to the Corridor in the future. This would reduce the department's ability to address other important needs across the State. However, fully completing the Vision by around 2040 may not be necessary, as future AV technologies and operations may delay the need for six lanes in western Iowa well beyond 2040. In addition, staging the construction may further defray the cost, thereby providing some relief for addressing other needs in the State. In contrast, with the Toll Funding Option, which provides a new and additional funding source dedicated specifically to the Corridor, existing funding would be both preserved and expanded. Because the Vision would be constructed with new funds outside of existing revenue sources, existing funds would no longer be required for the construction, thereby expanding the State's ability to address needs outside of the I-80 Corridor. With the Toll Funding Option, future toll revenues would be capitalized for the construction and no existing funding, or security by the State, would likely be required.

- **Equity** – It is estimated that roughly 24 percent of travel along the I-80 Corridor is by out-of-state travelers. However, the State estimates that out-of-state travelers only contributed around 13 percent to the State's highway funding through fuel taxes. Because tolls provide a direct relationship between the use and cost of services on a per-mile basis, the Toll Funding Option would directly correlate these factors for I-80 travelers. As a result, this option is fully equitable for travel along the Corridor and would improve the State's current travel and funding inequities.

Next Steps

A new long-term plan for I-80 across Iowa has been identified – The I-80 Vision. Entailing the reinvestment in the existing rural I-80 infrastructure with a widened and modernized roadway, it will serve Iowans well into the 21st Century. The Vision provides an implementation framework and plan for the Corridor that can be constructed over time as funding is available. This enables the department to maintain the existing infrastructure and program, plan and construct projects based on the Vision for long-term compatibility and cost efficiency.

- **I-80 Operations and Maintenance** – The department's ongoing operations, maintenance and rehabilitation of the existing rural roadway and bridges will continue as the Vision is implemented. As part of its normal annual Interstate condition assessments and maintenance programming, based on life-cycle considerations, major roadway and bridge rehabilitation activities will be coordinated with its implementation as future phases of the Vision are identified and programmed. As the need for reconstruction of the existing infrastructure is identified, on a case-by-case basis, the Iowa DOT will

assess how best to address the need as a phase or stage of the Vision's overall implementation.

- **Coordination of Statewide Projects** – Based on the Vision, statewide improvement programs, such as rest areas and park and ride facilities, will be coordinated to accommodate the Vision's implementation.

- **Additional I-80 Studies** – For corridor-wide applications, additional studies will be performed to further define common design standards, operational measures and infrastructure requirements. These include the drainage design criteria and AV design details for pavement and communications infrastructure requirements. Other studies to be performed could include truck operations lane/speed restrictions and a TSMO Corridor Plan, as needed in the future.

- **Project Programming** – As part of the department's regular planning and construction programming activities, based on the Corridor's needs and in accordance with Vision Implementation Plan and project guidance, projects will be identified and programmed. Accordingly, coordination with the FHWA and others, as necessary, will be performed to identify the limits of each project and the necessary NEPA documentation. Local projects affecting I-80 will be coordinated with the Vision.

- **Funding Options** – The department will continue to assess alternative funding options for the Vision, including the possibility of tolling. While utilizing tolls to fund and finance the improvements is not currently planned, it may become an option worthy of consideration as State funding priorities change or if new federal funding opportunities or incentives become available. As an important potential policy issue for Iowa, a decision regarding tolls would entail a series of decision steps, in ascending level of detail, including considerable additional study and coordination with the state's policymakers and the public. In addition to more detailed technical study, state leaders will need to determine if the concept is a viable option and worthy of considering legislative action to grant the necessary authorization. Further technical assessment of tolling would include more detailed study to more definitively layout the toll concept, evaluate traffic impacts to the state's system, and determine financial feasibility. Other steps, in parallel, could include initial discussions with the FHWA regarding possible application for the Interstate System Reconstruction and Rehabilitation Pilot Program; introductory and exploratory concept-level discussions with state policymakers and transportation leadership; and engagement with the public and key stakeholders.

Outstanding Issues

The I-80 Planning Study was conducted in accordance with the FHWA Planning Environmental Linkages (PEL) requirements. Through an assessment of the Corridor's travel characteristics, system improvement strategies, potential impacts to the environment, and public input, a recommended overall improvement concept and scope have been identified – The I-80 Vision. While the Vision provides an overall plan for improving rural I-80, which will be streamlined into the subsequent NEPA studies for the Vision's implementation, there are many outstanding design details that will need to be determined in the Corridor's follow-up planning studies and engineering design. These outstanding issues include:

- **Roadway Alignment** – For typical areas, analyses will be performed to determine whether to widen the roadway to the north or south of the existing alignment, or as appropriate, whether to generally maintain the existing centerline. In non-typical areas, due to locally constrained areas, areas with substandard vertical or horizontal geometry, or in weather-related resiliency risk areas, where risk analyses are needed, alternative alignment configurations may need to be evaluated.

- **Interchanges and Crossroads** – With the widening of the I-80 roadway, interchanges within the Corridor will be analyzed, in accordance with the corridor-wide design criteria, for improved traffic operation and interchange layout improvements. For low traffic volume crossroad bridges, as identified by the Vision, additional assessment and coordination with local agencies and the potentially affected public will be performed.

- **Environmental Impacts** – Preliminary engineering and NEPA studies will identify the existing manmade and natural environmental resources potentially impacted by the Vision. Environmental field surveys will be performed. In accordance with department's location study and NEPA requirements and state and federal environmental regulations and procedures, preliminary engineering designs for the Vision will avoid and minimize impacts to known resources to the extent reasonably possible. Unavoidable impacts will be mitigated in coordination with the appropriate approving resource agencies and adopted department procedures.

- **Future Roadway Improvements** – The Vision provides a foundation for the continued safe and efficient traffic operations across Iowa for the foreseeable future, while accommodating the long-term future. Continued growth of traffic along the east end of the Corridor could result in reduced traffic operations, at or near 2040, thereby potentially necessitating additional lanes or other capacity improvements. The Vision can accommodate additional lane expansion within the wide median. In the future, at the appropriate time, the department will plan and coordinate any needed expansion of I-80 in these high traffic growth areas. In addition, by that point in time, it is anticipated that AV technologies and operations will have further advanced, with some AV-compatible vehicles being present within the Corridor. In the future, as AV technologies become more prevalent, the department will further assess the benefits of AV operations and begin deploying AV infrastructure, as appropriate.

- **Metropolitan Areas Coordination** – In the future, as the Vision is constructed and traffic across the state continues to grow, complementary improvements to I-80 and surrounding routes through and within the Corridor's metropolitan areas will need to be assessed and planned accordingly. These future studies and potential improvements will be coordinated with the respective planning agencies and partners within the metropolitan areas and will depend on available funding and priorities across the State.

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