APPENDIX

Coordination with Other Planning Activities

This RIP is the Iowa DOT's primary document to support integration of resiliency into the transportation development process. However, it is important to recognize and point to other plans and documents that inform this plan and help guide resiliency efforts within the state. Consistency and alignment with the following plans and documents is an integral part in fully implementing the resiliency efforts identified in this Plan.

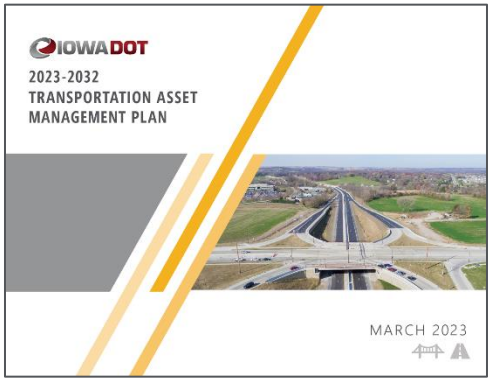
Iowa in Motion 2050

Iowa's State Long Range Transportation Plan (SLRTP) is a multimodal plan that forecasts the demand for transportation infrastructure and services to 2050 based on consideration of social, economic, travel, and technological changes likely to occur during this time. The SLRTP provides the long-range vision, policies, and decision-making framework that will guide investments in Iowa's transportation system over the coming years. The most recent update of the SLRTP included important changes related to transportation resiliency, including integration of a statewide flood resiliency analysis, resiliency rightsizing policy statement, and strategies related to resiliency. The analysis and rightsizing policy were discussed in prior chapters; the two strategy statements are referenced below. This RIP is also being incorporated by reference into the SLRTP.

Resilience Related Strategies

- **Continue advancing resiliency planning at the Iowa DOT**
  - Resiliency is an increasingly important planning area. Proactive analysis and planning efforts, including the work of the Resiliency Working Group should continue to be enhanced, as should disaster response planning. Resiliency considerations should also continue to be integrated into project scoping, prioritization, and design, as well as maintenance and operations, to make assets less susceptible to disruptions.
- **Target investment to address corridors with higher risks from a flood resiliency perspective.**
  - Locations vulnerable to a 100-year flood event were identified by using a resiliency metric that includes robustness, redundancy, and criticality components. For the purposes of the SLRTP, corridors that were one or more standard deviation below the statewide average score were identified as the highest priority corridors from a flood resiliency perspective. These locations should be used to help focus consideration of flood resiliency improvements.

2023-2032 Iowa Transportation Asset Management Plan (TAMP)



Iowa's TAMP is a strategic approach to managing infrastructure. The TAMP provides a systemic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the life cycle of the assets at minimum practicable cost. The most recent update of Iowa's TAMP included enhanced consideration of extreme weather and resilience in life cycle planning and risk management analysis. A key part of Iowa's TAMP is identifying and mitigating transportation asset management risks. Below are the priority risk and mitigation actions related to resiliency identified in the most recent update.

Reslience Related Risks and Responses

Risk Statement	Response Strategies
3. If appropriate protective features are not integrated into projects in locations vulnerable to extreme weather impacts, then assets may be less resilient and response and recovery efforts may be prolonged. *Likelihood: 3.9* *Consequence: 4.0*	**3A**. Adapt to and incorporate evolving protective measures utilizing findings of the Resiliency Working Group. **3B**. Incorporate climate change and extreme weather considerations into design manuals and processes.
4. If Iowa DOT takes advantage of increased discretionary funding programs, then additional funds could be available to implement asset management and resiliency investments. *Likelihood: 4.0* *Consequence: 3.5*	**4A**. As an agency be more strategic in pursuing discretionary grants. **4B**. Monitor local agency applications for discretionary grants. **4C**. Coordinate on what will be the priority applications in order to avoid competing internally for funds. **4D**. Undergo vetting process of options within and across the agency.
9. If flooding becomes more severe and/or frequent then additional labor, funding, and other resources will be diverted from TAM and other activities. *Likelihood: 3.4* *Consequence: 3.6*	**9A**. Improve documentation of flood incidents to maximize reimbursement opportunities for Federal ER funds. **9B**. Fund resiliency investments for critical infrastructure (e.g., U.S. 30 over the Skunk River).

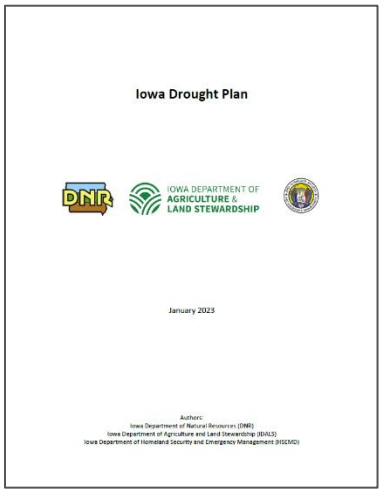
Iowa State Freight Plan

The primary purpose of Iowa's State Freight Plan (SFP) is to document the immediate and long-range freight planning activities and investments in the state. The SFP provides guidance on how to address issues, adapt to emerging trends, invest strategically in the freight system to grow Iowa's economy, strengthen the nation's competitive advantage, and enhance the quality of life for Iowans. The most recent update of Iowa's SFP included an enhanced consideration of resiliency and its impact on freight within the state. As part of that consideration, multiple strategies were identified and the key resiliency strategies are listed below.

Resilience Related Strategies

- **Improve freight transportation system resiliency**
    - A resilient freight transportation system is responsive. It is able to provide reliable service when small disruptions occur and return to service quickly after large disruptions. Reducing the vulnerability of highway infrastructure by investing in improvements such as roadway grade raises and foreslope erosion countermeasures and working with partners to do the same for other modes and supply chains should be a priority. Operational improvements to address small disruptions can also be made by leveraging real-time information from users of the system to support advanced decision making, incidence avoidance, and faster response times, as well as by providing real-time information on system conditions to support the movement of freight.
- **Target investment in Iowa Multimodal Freight Network (IMFN) at a level that reflects the importance of this system for moving freight.**
    - The IMFN consists of priority airports, highways (including Interstate, U.S., and Iowa routes), railroads, and waterways representing the most critical freight corridors in the state. Operational and physical improvements that increase the safety, efficiency, reliability, and resilience of this network, as well as associated first/last mile connections, should be prioritized.

Iowa Drought Plan

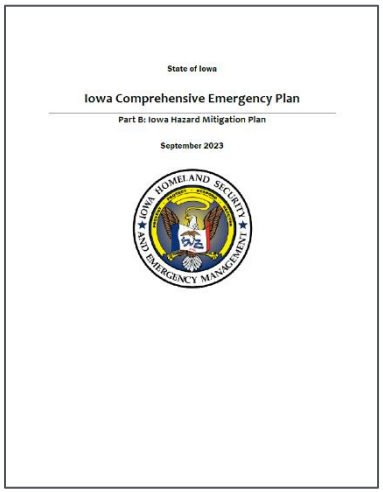


The Iowa Drought Plan was published in 2023 by the Iowa Department of Natural Resources (DNR). The intended purpose of the plan is to provide the state of Iowa with a planned and collaborative approach to plan for, identify, respond to, and recover from drought. To accomplish this purpose the plan establishes drought regions, drought triggers and actions, an assessment of vulnerability and impact, mitigation and response, and implementation steps. Below is a list of the actions identified in the Iowa Drought Plan assigned to the Iowa DOT.

Iowa DOT Actions

- Encourage and implement green infrastructure practices to create healthier urban environments and manage storm water in cities.
- Expand drought-resistant native plantings along highways and local roads.

State Hazard Mitigation Plan



The purpose of hazard mitigation planning is to identify policies and actions that can be implemented over the long term to reduce risk and future losses of life, property, and economic injury. That State of Iowa Hazard Mitigation Plan is an interagency plan that integrates local and state planning efforts through the State Hazard Mitigation Team, a group comprised of representatives of several state, federal and nonprofit agencies and associations, with the lead agency being the Iowa Department of Homeland Security and Emergency Management (HSEMD). The team performed a hazard analysis and risk assessment in which hazards that may affect the state were identified.

Iowa is one of only 11 states and territories that has an Enhanced Mitigation Plan that has been approved by the Federal Emergency Management Agency. Approval of an enhanced plan qualifies state and local governments to receive additional hazard mitigation disaster funding, which is crucial to funding projects to reduce or eliminate hazards and avoid disaster-caused damage associated costs.

Included in Iowa's State Hazard Mitigation plan is a summary table of mitigation-related programs in Iowa. Below is a listing of programs for which the Iowa DOT is the sponsoring agency.

Iowa DOT Sponsored Programs

Flooding

- **Bridge Watch**
  - A web-based monitoring software solution that empowers bridge owners to predict, identify, prepare for, manage, and record potentially destructive environmental events. Proactively monitors, in real time, road overtopping and bridge infrastructure to better protect against hazardous, costly, and potentially catastrophic events. Iowa DOT personnel are now able to examine those bridges that are at risk, rather than blanketing an area of the state where flooding may be occurring.
- **Roadside vegetation grants**
  - Three percent of REAP funds are available through the Iowa DOT's Living Roadway Trust Fund (LRTF) for integrated roadside vegetation management (IRVM) activities, including the establishment of native prairie vegetation in rights-of-way. Low-maintenance prairie roadsides reduce erosion, slow runoff, trap sediment, and provide habitat.

Hazardous Materials

- **Cargo Tank Program**
  - Similar to the hazardous materials awareness for First on the Scene Program. This is both education about hazardous materials and instructions on regulations.
- **Distribution of Emergency Response Guidebook to first responders**
  - Through a joint effort of the Iowa DOT Motor Vehicle Enforcement Bureau, the DNR, and HSEMD the guidebook is distributed to fire departments, law enforcement agencies, emergency medical services, and other emergency responders. This includes all state, local, EMS responders, and DOT groups.
- **Hazardous materials awareness for First on the Scene Program**
  - The training program is to educate members of the motor carrier industry, agricultural dealers of chemicals, petroleum marketers, and propane gas associations on hazardous materials awareness and regulations.

Infrastructure Failure – Transportation Incident

- **Federal-Aid Rail/Highway Crossing Safety Program**
  - The Crossing Safety Program participates in the cost of safety improvements at rail/highway crossings. It is funded by the Federal Highway Trust Fund. These funds are used to install new crossing signal devices, to upgrade existing signals, to improve crossing surfaces, and to provide low-cost improvements, such as increased sight distance, widened crossings, increased signal lens size, or crossing closures.
- **Rail Revolving Loan and Grant (RRLG) Program**
  - The RRLG Program provides funding to improve rail facilities that will spur economic development and job growth and provide assistance to railroads for the preservation and improvement of the railroad transportation system.
- **State Grade Crossing Surface Repair Program**
  - Provides annual appropriation from the Road Use Tax Fund to assist railroad companies and highway jurisdictions repair rail/highway grade crossings. The Grade Crossing Surface Repair Fund will pay 60% of the cost of repairs, with the responsible roadway jurisdiction and the railroad company each paying 20%.
- **Traffic Safety Improvement Program**
  - Traffic safety improvements or studies on public roads under county, city, or state jurisdiction.

Radiological

- **Highway Route Controlled Quantities**
  - This is a program to train officers to inspect trucks carrying radioactive waste (spent fuels).

Referenced Works

Anne Choate, Brenda Dix, Beth Rodehorst, Angela Wong, Wendy Jaglom (ICF); Jake Keller, Justin Lennon, Chris Dorney, Ravi Kuchibhotla, Jagannath Mallela, Suriyanarayanan Sadasivam (WSP) Scott Douglass (South Coast Engineers). FHWA. 2017. Synthesis of Approaches for Addressing Resilience in Project Development. Available at: https://rosap.ntl.bts.gov/view/dot/50862

Brian Zelenko, P.E., Erik Loehr, Ph.D., P.E., Andy Boeckmann, P.E., Chris Dorney, AICP, and Elizabeth Godfrey, P.E. FHWA. 2023. Geohazards, Extreme Weather Events, and Climate Change Resilience Manual. Available at: https://www.fhwa.dot.gov/engineering/geotech/pubs/hif23008.pdf

Bruneau, M., Chang, S. E., Eguchi, R. T., Lee, G. C., O'Rourke, T. D., Reinhorn, A. M., Shinozuka, M., Tierney, K., Wallace, W. A., & von Winterfeldt, D. (2003). A Framework to Quantitatively Assess and Enhance the Seismic Resilience of Communities. Earthquake Spectra, 19(4), 733–752.

Bruneau, M., & Reinhorn, A. (2006). Overview of the Resilience Concept.

Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR Social Vulnerability Index 2020 Database Iowa. https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html

Colorado DOT. 2020. Statewide Transportation Plan: Appendix L Resilience. Available at: https://www.codot.gov/programs/yourtransportationpriorities/statewide-plan

Dix, Brenda;Zgoda, Beth;Vargo, Amanda;Heitsch, Samantha;Gestwick, Taylor FHWA. 2018. Integrating Resilience into the Transportation Planning Process: White Paper on Literature Review Findings. Available at: https://rosap.ntl.bts.gov/view/dot/67124

FEMA. May 2021. Meeting the Criteria for Accrediting Levee Systems on Flood Insurance Rate Maps. Available at: https://www.fema.gov/sites/default/files/documents/fema_meeting-criteria-accrediting.pdf

FHWA. 2011. Assessing Criticality in Transportation Adaptation Planning. Available at: https://www.fhwa.dot.gov/environment/sustainability/resilience/tools/criticality_guidance/criticality_guidance.pdf

FHWA. 2012. Climate Change and Extreme Weather Vulnerability Assessment Framework. Available at: https://rosap.ntl.bts.gov/view/dot/27118

Iowa Geospatial Data. 2023. Iowa Dams and Drainage Districts. Available at: https://geodata.iowa.gov/

Iowa Hospital Association. 2023. Hospital and EMS Locations. Available at: https://www.ihaonline.org/

MDOT. 2014. Michigan DOT Climate Vulnerability Assessment Pilot Project. Available at: https://www.fhwa.dot.gov/environment/sustainability/resilience/pilots/2013-2015_pilots/michigan/final_report/index.cfm

MDOT.2020. Transportation Resilience: Current Practices and Opportunities for MNDOT. Available at: https://www.dot.state.mn.us/sustainability/resilience.html

National Levee Database. 2023. Available at: https://levees.sec.usace.army.mil/#/

NOAA. 2023. Geophysical Fluid Dynamics Laboratory (GFDL). Climate Modeling. Available at: https://www.gfdl.noaa.gov/climate-modeling/

NOAA. 2023. National Centers for Environmental information, Climate at a Glance: Statewide Time Series, published December 2023, retrieved on January 4, 2024 from https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/time-series

NOAA. 2023. National Centers for Environmental Information: Storm Events Database. Available at: https://www.ncdc.noaa.gov/stormevents/

NOAA. 2023. North American Drought Monitor (NADM). Available at: https://www.ncei.noaa.gov/access/monitoring/nadm/

NOAA. 2023. The Enhanced Fujita Scale (EF Scale). Available at: https://www.weather.gov/oun/efscale

O'Shea, P.S., Vegrzyn, J.C., and Barnes, K.K., 2021, Flood of June 30–July 1, 2018, in the Fourmile Creek Basin, near Ankeny, Iowa: U.S. Geological Survey Open-File Report 2021–1044, 18 p., https://doi.org/10.3133/ofr20211044

Steve Muench, Tom Van Dam, Prashant Ram, Kurt Smith. FHWA. 2023. Pavement Resilience: State of the Practice. Available at https://www.fhwa.dot.gov/pavement/concrete/pubs/hif23006.pdf

Tara Cullison, Sarah Gardner, and Gena McCullough. 2020. Quad Cities Iowa/Illinois MPO Extreme Weather and Transportation Resilience Report. Available at: https://bistateonline.org/documents/transportation/4006-quad-cities-iowa-illinois-mpo-extreme-weather-and-transportation-resilience-report-september-2020/file

USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. https://doi.org/10.7930/NCA4.2018

USGS. 2023. Landslide Hazards Program: Database. Available at: https://www.usgs.gov/programs/landslide-hazards

Weilant, S., A. Strong, B. Miller. 2019. "Incorporating Resilience into Transportation Planning and Assessment." RR-3038-TRB. RAND Corporation. Retrieved June 30, 2020 from DOI: https://doi.org/10.7249/RR303

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