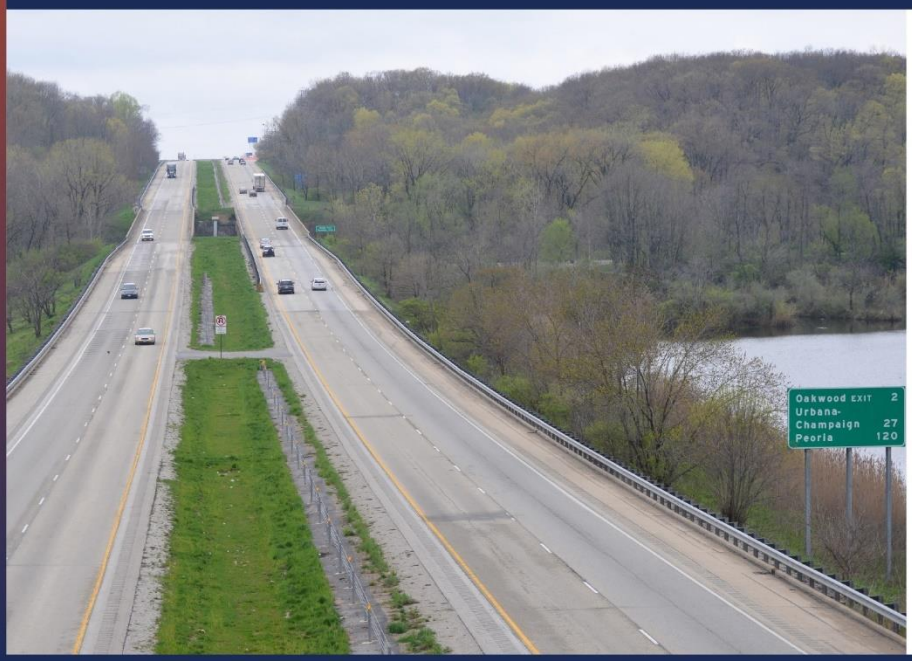
Illinois Department of Transportation

TRANSPORTATION ASSET MANAGEMENT PLAN

January 2023



Moving Forward with TAMP

Printed by authority of the State of Illinois, 01/23, 25

Cover photos:

Top: The Murray Baker Bridge is a cantilever bridge over the Illinois River from downtown Peoria to East Peoria.

Bottom: Interstate 74, approximately 27 miles from Champaign-Urbana.

U.S. Department of Transportation
Federal Highway Administration

Illinois Division

3250 Executive Park Dr.
Springfield, IL 62703
(217) 492-4640
www.fhwa.dot.gov/ildiv

January 24, 2023

In Reply Refer To:
HDA-IL

Mr. Omer Osman
Secretary of Transportation
Illinois Department of Transportation
2300 South Dirksen Parkway
Springfield, IL 62764

Subject: Transportation Asset Management Plan Process Recertification Review

Dear Secretary Osman:

This letter serves as the Federal Highway Administration (FHWA) Illinois Division Office's process recertification decision regarding the Illinois Department of Transportation's (IDOT's) updated Transportation Asset Management Plan (TAMP).

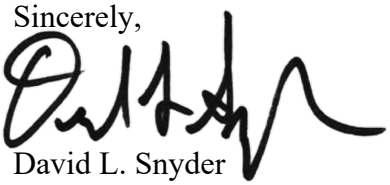
The updated TAMP was received by the Division Office on October 31, 2022. Subsequently, IDOT and the Division Office collaborated on improvements to the updated TAMP, and on January 20, 2023, IDOT submitted the final revised updated TAMP. The processes followed by IDOT to develop the updated TAMP comply with the requirements set forth in 23 U.S.C. 119(e), as amended by the Bipartisan Infrastructure Law that took effect on October 1, 2021, and 23 CFR 515.13(a). Therefore, IDOT's TAMP development processes are recertified.

We look forward to IDOT's implementation of their Enterprise Asset Management System (EAMS), including bridge and pavement management systems as required by 23 CFR 515.17. The necessity for EAMS to be fully functional and operational statewide, including training of IDOT staff, cannot be understated. To implement life-cycle planning, strategies need to be developed with multiple inputs to minimize life-cycle costs while achieving performance targets for asset condition. The current spreadsheet tools limit life-cycle plan strategies resulting in less confidence in condition and performance forecasting.

We commend you and your staff for the broad participation in development and implementation of the updated TAMP, a risked-based asset management plan to achieve and sustain a state of good repair over the life cycle of the assets and to improve or preserve the condition of the National Highway System.

Should you have any questions, please contact Dennis Bachman (dennis.bachman@dot.gov) at 217-492-4283.

Sincerely,



David L. Snyder
Division Administrator

ecc: Mr. Omer Osman, Secretary of Transportation, IDOT
Ms. Kristin Meredith, Office of the Secretary, IDOT
Ms. Georgina Syas, Chief of Staff, IDOT
Ms. Sheleda Doss, Chief Operating Officer, IDOT
Ms. Holly Bieneman, Director, Office of Planning and Programming, IDOT
Ms. Elizabeth Irvin, Deputy Director, Office of Planning and Programming, IDOT
Mr. Stephen Travia, Director, Office of Highways and Project Implementation, IDOT
Mr. Justan Mann, Deputy Director, Office of Highways Project Implementation, IDOT
Mr. Mike Vanderhoof, Bureau of Planning, IDOT
Ms. Tracinda Sisk, Bureau of Programming, IDOT
Ms. LaDonna Rowden, Bureau of Research, IDOT
Mr. George Tapas, Bureau of Local Roads and Streets, IDOT
Mr. Michael Stirk, Bureau of Innovative Project Delivery, IDOT
Mr. Jayme Schiff, Bureau of Bridges and Structures, IDOT
Mr. Jack Elston Bureau of Design & Environment, IDOT
Ms. Cynthia Watters, Bureau of Safety Programs and Engineering, IDOT
Mr. Brian Pfeifer, Bureau of Materials, IDOT
Ms. Amy Eller, Bureau of Operations, IDOT
Ms. Lora Rensing, Bureau of Construction, IDOT
Ms. Laura Mlacnik, Bureau of Land Acquisition, IDOT
Mr. Jose Rios, Region 1 Engineer, IDOT
Mr. Masood Ahmad, Region 2 Engineer, IDOT
Mr. Kensil Garnett, Region 3 Engineer, IDOT
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Mr. Kirk Brown, Region 5 Engineer, IDOT
Ms. Vicky Wilson, Director of Finance & Administration, IDOT
Mr. Matt Magalis, Deputy Director, Office of Finance and Administration, IDOT
Ms. Joanne Woodworth, Office of Finance and Administration, IDOT
Mr. Guy Tridgell, Director, Office of Communications, IDOT
Ms. Bree Hankins, Bureau Chief of Communication Services, IDOT
Mr. Matthew McAnarney, Director, Office of Legislative Affairs, IDOT
Ms. Becky Locker, Deputy Secretary of Communications and Legislative Affairs, IDOT
Mr. Stephen Kirk, Director Office of Internal Audit, IDOT

Illinois Department of Transportation
Office of the Secretary
2300 South Dirksen Parkway / Springfield, Illinois / 62764
Telephone 217/782-6149

October 31, 2022

Mr. David Snyder
Illinois Division Administrator
Federal Highway Administration
3520 Executive Drive
Springfield, Illinois 62703

Dear Mr. Snyder:

This letter serves as a formal request to the Federal Highway Administration for recertification of the Illinois Department of Transportation's asset management plan development processes, which is an evaluation to determine whether the Illinois Department of Transportation (IDOT) has developed a Transportation Asset Management Plan (TAMP) that is consistent with the requirements established by 23 U.S.C. 119 and 23 CFR part 515. The most recent IDOT-approved TAMP is attached, as required by 23 CFR 515.13(a).

If you have any questions or need additional information, please contact Ms. Holly Bieneman, Director, located at 2300 South Dirksen Parkway, Springfield, Illinois 62764, by telephone (217) 557-4145.

Sincerely,

Omer M. Osman, P.E.
Secretary

Enclosure

Executive Summary

OVERVIEW

In 2018 when the first Transportation Asset Management Plan (TAMP) was certified, IDOT was at a crossroads. There were insufficient resources to maintain the existing state-maintained system of roads and bridges at the State of Acceptable Condition. Without additional revenue, asset conditions would have continued to deteriorate, and desired performance objectives would not be met. This situation demanded that future investments in IDOT's highway system be strategic, addressing agency priorities that balance system preservation with external emphasis on quality of life and economic growth.

To ensure that available funds are used as effectively as possible, IDOT introduced several initiatives to enhance its ability to make performance-based, data-driven investment decisions. For example, IDOT has developed a data-driven decisions (DDD) project selection process that evaluates the expected benefits of each potential congestion mitigation and expansion project. Changes to the way IDOT manages its pavements and bridges have been adopted, shifting the agency towards planned, proactive investments in preservation activities that will slow the rate of pavement and bridge deterioration so these assets last as long as possible.

This Transportation Asset Management Plan summarizes the progress made in all asset management areas and details the processes in use and results anticipated from FY 2023 through FY 2032.

ASSET MANAGEMENT OBJECTIVES

IDOT has adopted an asset management strategy that is helping the agency achieve the five objectives listed below for its asset management program:

- Create a culture through training and communication where Transportation Asset Management (TAM) is viewed as a way of doing business.
- Move towards a more performance-based, data-driven approach to TAM decision making, striving to maintain the system in a state of acceptable condition.
- Find a sustainable balance between proactive preservation treatments and rehabilitation/replacement activities that reduce long-term costs to maintain the system.
- Integrate risk management and resilience into the asset management process.
- Improve coordination with National Highway System (NHS) owners outside of IDOT.

The changes IDOT is making to its business processes have been initiated to achieve these asset management objectives. The changes emphasize investments in improvements to existing assets within a transparent project selection and prioritization process that is guided by sound data and performance-based processes. The new investment strategies that IDOT is implementing promote the use of preservation treatments to slow the rate of deterioration and a more strategic approach to project selection that optimizes the use of available funding.

PERFORMANCE MEASURES AND ASSET CONDITION

IDOT uses both internal performance measures and federal performance measures. The measures and targets are presented in detail in Chapter 4, *Performance Measures, Targets, and Trends*. The conditions as of 2021 are summarized here.

Current conditions for pavements and bridges using IDOT's internal measures are presented in Figure ES-1. The full analysis in Chapter 4 indicates that, while there was an initial drop in each system meeting the State of Acceptable Condition criteria from 2018 to 2019 due to limited funding and the ramp-up in the adoption of the increased preservation life cycle model, the condition of the pavements on all systems increased in 2020 and 2021. For NHS bridges, as with pavements, the low point of performance was approximately 2019, the same year the TAMP began to be implemented and the Rebuild Illinois (RBI) capital program was signed.

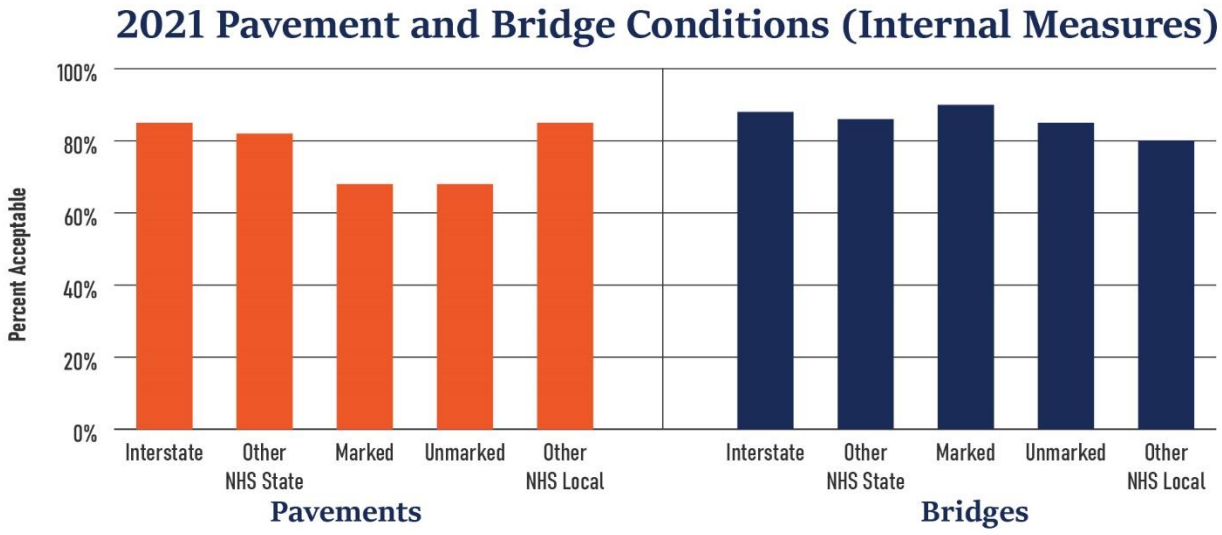


Figure ES-1. 2021 Performance of IDOT's Pavements and Bridges.

Conditions of IDOT's NHS pavements and bridges using the federal measures as of 2021 are shown in Figure ES-2. IDOT has focused on NHS bridges, but it will take several years for the results to be reflected. It takes more time to design, construct, and inspect a bridge project than a pavement project, causing a lag in the performance data. While IDOT focuses on bringing up the condition of NHS bridges, the conditions of Marked and Unmarked Route bridges may decline somewhat. Maintenance treatments will be applied as needed.

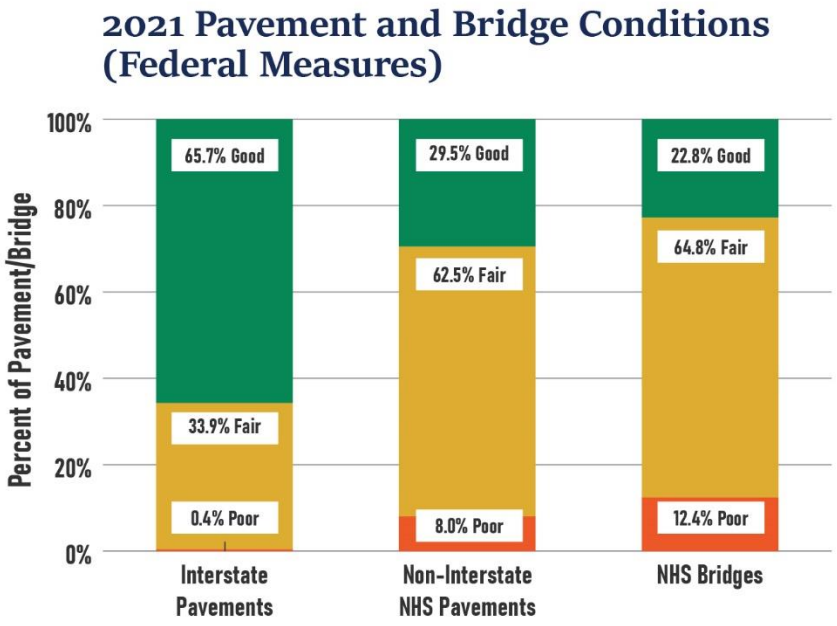


Figure ES-2. 2021 Performance of NHS Pavements and Bridges – Federal Measures.

While the percentage of bridges in *Good* condition has been decreasing, the percentage of bridges in *Poor* condition has also been decreasing, highlighting IDOT's emphasis on reducing the percentage of NHS structurally-deficient bridges. It should be noted that the 2021 data is provisional, as the FHWA will release final data on November 7, 2022.

LIFE-CYCLE PLANNING

Using the investment spreadsheet tool, IDOT analyzed the long-term impact of five different life cycle plan strategies on network conditions. Four strategies are documented in Chapter 5, *Life-Cycle Planning*. Two of them are highlighted here:

- **Strategy 2 – Pre-Rebuild Illinois Funding**: Funding is based on the program amounts available prior to the passage of RBI and Infrastructure Investment and Jobs Act (IIJA). Distribution of funds between pavements and bridges, amongst systems, and amongst work types consistent with the FY23-28 MYP.
- **Strategy 4 - Modified MYP Strategy**: Funding consistent with the 10-year program as defined in Chapter 7. Distribution of funds between pavements and bridges, amongst systems, and amongst work types consistent with the FY23-28 MYP for the first 6 years of the analysis, then varied in years 7 to 10 to minimize life-cycle costs while striving to achieve the condition targets for all systems.

Figure ES-3 below shows the overall State of Acceptable Condition results for all pavements and bridges for the two strategies highlighted here. The additional funding provided by the RBI and IIJA programs, combined with the implementation of preservation practices that began in 2018,

have a profound effect on the anticipated conditions of the roadway network over the next 10 years.

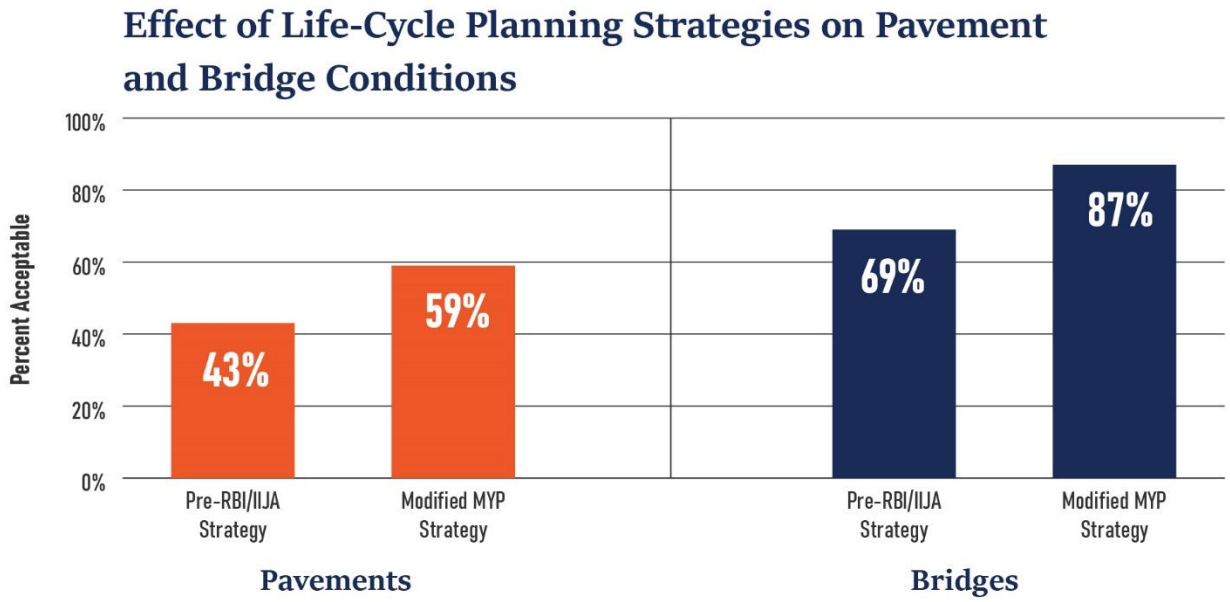


Figure ES-3. Life-Cycle Planning Strategies Effect on Overall Pavement and Bridge Conditions.

Much progress has been made in implementing a more balanced life cycle approach to programming, and the upcoming roll-out of the asset management system will put tools in the districts' hands to allow them to take ownership of sound investment strategies in each district.

RISK MANAGEMENT AND PLANNING FOR RESILIENCE

IDOT faces many uncertainties in managing its transportation system, including fluctuations in available funding, unanticipated weather events, changes in travel demand and patterns, and variability in asset performance due to material properties or traffic loadings. These uncertainties are considered to be risks that can have either a positive or negative impact on IDOT's ability to achieve its asset management objectives. Using a formal enterprise risk management process, IDOT identified and evaluated significant risks that could impact pavement and bridge performance. Going forward, the Bureau of Planning will retain responsibility for reviewing the risk register at least annually. IDOT has risk management strategies already in place for risks such as extreme weather events and seismic activity and plans to update both. As a result of these efforts to evaluate risks, IDOT has a better understanding of the uncertainties associated with its TAMP objectives and the likely outcomes of actions that will be taken to mitigate these risks. A more in-depth discussion may be found in Chapter 6, *Risk Management and Planning for Resilience*.

INVESTMENT STRATEGIES

The fourth life-cycle planning strategy, Modified MYP Strategy, is recommended for implementation. This strategy matches the distributions of funding for initial construction,

maintenance, preservation, rehabilitation, and replacement in the FY23-28 MYP for the first 6 years and increases preservation and rehabilitation funding in the last four years. The split between pavements and bridges matches the FY23-28 MYP for the first 6 years and increases pavement spending in the last four years. Additionally, the split of funding between systems is optimized in the last four years.

The results of the analysis are presented in Tables ES-1 (pavements) and ES-2 (bridges). For pavements, the overall percentage of pavements in a State of Acceptable Condition at the end of year 10 is 59 percent, as opposed to dropping to 43 percent with the pre-RBI and IIJA funding. Interstate pavements are able to achieve the State of Acceptable Condition target, while pavements on the other three systems will decrease in condition.

Table ES-1. Pavement Results for the Modified MYP Strategy.

System	Total Pavement Miles	Number of Acceptable Miles		% Acceptable Miles		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	1,892.54	1,606.22	1,892.54	85	90	☑ 100
Other NHS	5,079.78	4,170.53	3,304.54	82	90	☒ 65
Marked Routes	6,568.97	4,414.31	3,730.97	67	75	☒ 57
Unmarked Routes	2,340.53	1,596.42	491.80	68	50	☒ 21
Statewide Total	**15,881.82**	**11,787.48**	**9,419.85**	**74**		**59**

Table ES-2. Bridge Results for the Modified MYP Strategy.

System	Total Bridge Square Feet	Number of Acceptable Square Feet		% Acceptable Square Feet		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	32,650,129	28,581,785	30,951,855	88	93	☑ 95
Other NHS	27,627,301	23,612,267	25,325,855	85	93	☒ 92
Marked Routes	12,128,031	10,812,460	9,443,852	89	90	☒ 78
Unmarked Routes	14,390,848	12,319,894	9,437,496	86	90	☒ 66
Statewide Total	**86,796,309**	**75,326,406**	**75,159,058**	**87**		**87**

For bridges, the overall percentage of bridge deck area in a State of Acceptable Condition remains stable during the 10-year period, as opposed to dropping to 69 percent with the pre-RBI and IIJA funding. Interstate bridges would exceed their State of Acceptable Condition target, and other NHS bridges would nearly meet their target. The percentage *Poor* using the federal measures would be reduced to 7 percent over the 10-year time period. Marked and unmarked bridges would decrease much less than they would have if the funding levels had not been increased.

The resulting outcomes from the modified MYP strategy are not ideal, however, there are several factors affecting the results. These factors are discussed in detail in Chapter 7, *Financial Plan and 10-Year Investment Strategies*.

PERFORMANCE GAP

In the short term, IDOT's annual programs are high due to the use of bonds issued as part of the RBI program; however, the longer-term outlook shows flat to declining revenues. At the same time, construction and maintenance costs continue to rise, with the annualized inflation rate currently topping 8 percent. These factors present challenges for meeting performance targets over the 10-year analysis period.

Although the investment strategies allow IDOT to maximize pavement and bridge conditions as much as possible, some of the State of Acceptable Condition targets are not anticipated to be met in the next 10 years. An analysis was conducted to determine the additional funding that would be needed to eliminate both the pavement and bridge performance gaps by the year 2032. The analysis used the Optimized Asset Type, System, and Work Type Distributions life-cycle planning strategy presented in Chapter 5. If the funding distributions are changed as indicated in the life-cycle planning analysis, the additional funding needed to address the gaps on all systems for both pavements and bridges will be minimized, as shown in Tables ES-3 and ES-4.

Table ES-3. Change in Funding to Address the State-Maintained Pavement Performance Gap (Millions).

System	Modified MYP Strategy	Optimized Strategy	Change
Interstates	$4,270	$1,820	$(2,450)
Other NHS	$3,820	$6,369	$2,549
Marked Routes	$2,809	$3,899	$1,090
Unmarked Routes	$337	$910	$573
Total	$11,236	$12,998	$1,762

Table ES-4. Change in Funding to Address the State-Maintained Bridge Performance Gap (Millions).

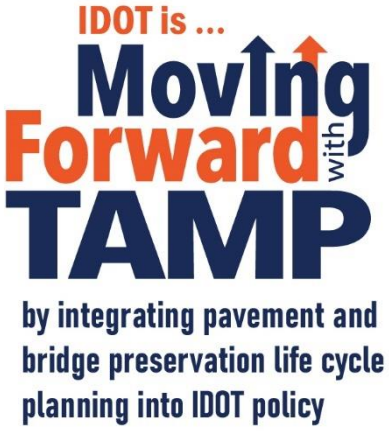
Bridges	Modified MYP Strategy	Optimized Strategy	Change
Interstates	$3,218	$3,119	$(99)
Other NHS	$2,479	$2,426	$(52)
Marked Routes	$1,032	$1,213	$181
Unmarked Routes	$1,407	$1,906	$499
Total	$8,136	$8,665	$529

If funding allocations between asset types (pavements and bridges), systems, and work types were to be optimized immediately, the funding gap to achieve all performance targets would be $2.3 billion.

IMPLEMENTATION, INTEGRATION, AND PLANNED ENHANCEMENTS

Implementation, Integration, and Planned Enhancements are discussed in detail in Chapter 7 and summarized here.

The Pavement Policy Technical Working Group rewrote the Bureau of Design and Environment Chapter 53 – Pavement Preservation and Rehabilitation Strategies to codify the pavement treatment strategies outlined in the 2019 TAMP. The Bridge Technical Working Group completed the *Bridge Preservation Guide* in 2020. The bridge treatment selection guidelines have been incorporated into the Bureau of Programming's Guidelines for an initial approximation of bridge needs.



Much effort has been spent in training the districts and other central bureaus on various aspects of asset management implementation. The state's annual Program Development Meeting has been a great avenue for district training, with presentations in 2019, 2020, and 2022, and an additional TAMP breakout session in 2022.

Five courses related to pavement preservation techniques have been attended by the districts in the last four years. In addition, the Bureau of Programming hosted a FHWA Bridge Management Systems Workshop in August 2022 to give the districts a feel for what goes into, and results from, a bridge management system. The course was well-attended by all 9 Districts, Central Bureau of Bridges & Structures, and Central Bureau of Programming.

IDOT is in the process of implementing an enterprise asset management system (EAMS). Configuration of the system is on-going, with user acceptance testing having been completed in December 2022 and training slated for February 2023. The current deployment plan includes utilizing the EAMS alongside current processes for the development of the FY24-29 MYP and in place of current processes for the development of the FY25-30 MYP.

There are also several on-going and upcoming research projects in support of asset management. These include improved bridge deterioration models; alternate rehabilitation strategies for unmarked and low traffic volume roadways; a project to update the LRTP; the development of a Resilience Improvement Plan (RIP); the development of a Carbon Reduction Plan; a project to harmonize bridge costs used for asset management, project-level decisions, and jurisdictional transfers; and a project to update the seismic vulnerability assessment last performed in the 1990s.

Chapter 1: Introduction

ILLINOIS' TRANSPORTATION SYSTEM

The State of Illinois boasts one of the largest, most effective multimodal transportation systems in the nation. As the home to Chicago and O'Hare International Airport, Illinois also features the second largest public transportation system, the second largest rail system, the third largest interstate system, and the fourth largest highway system in the country. The State's residents, businesses, and visitors rely on this transportation system to provide travel options, to build the state's economy, and to support local communities. The Illinois Department of Transportation (IDOT) has statutory responsibility for the planning, construction, operation, and maintenance of this transportation network, with the exception of the Chicago Skyway, a toll facility owned by the Chicago Department of Transportation and maintained by the Skyway Concession Company, LLC; and facilities constructed, maintained, and operated by the Illinois State Toll Highway Authority (Illinois Tollway). IDOT's facilities include highways and bridges, public transit, airports, and rail freight/passenger systems. IDOT meets its responsibilities in ways that enhance the quality of life, promote economic prosperity, and demonstrate respect for the environment, always keeping in mind its multimodal transportation vision.

Illinois is **third in the nation** in the number of miles of Interstates. The 2,185 miles of the State's Interstate system comprise 1.48 percent of all roads in the State, but carry 31 percent of all traffic.

Illinois is also **third in the nation** in terms of the number of bridges.

In addition to Interstates, the State has

- **166** miles of other freeways
- **5,253** miles of principal arterials
- **8,984** miles of other arterials
- **22,751** miles of collectors
- **107,740** miles of local roads

Illinois Travel Statistics, 2021

This transportation system represents a significant investment of public resources. For that reason, IDOT places a high priority on the preservation and maintenance of the existing infrastructure through ongoing investments to improve the safety and efficiency of the system. At the same time, IDOT also works to adapt the system through capacity improvements, multi-modal projects, and other initiatives to meet the evolving needs of both today's travelers and future generations. IDOT is committed to being accountable to the public for its work and being transparent in the way it operates. IDOT also serves as an advocate and trusted advisor to state, local, and federal governments, and other community agencies and partners in providing transportation access and services for all of Illinois.

To manage the highway network, IDOT divides the state into five transportation regions consisting of nine district offices, as shown in Figure 1-1, with its central headquarters located in Springfield. The central bureaus within the Office of Planning and Programming and the Office of Highways Project Implementation work together to develop, maintain, and operate IDOT's

highway system. These bureaus develop policies, procedures, standards, and guidelines to accomplish the improvement objectives for the network. In addition, the Bureau of Programming is responsible for coordinating the collection, analysis, and management of the asset inventory and condition data. The guidelines provided by the Bureau of Programming include asset priorities that align with the performance objectives set in the TAMP and are used by the district offices to identify and select projects depending on their current pavement and bridge conditions. In addition, the central bureaus monitor the programs administered by the nine districts to ensure statewide uniformity of policy interpretation and compliance, and to ensure program coordination with other stakeholders at the federal, state, and local levels.

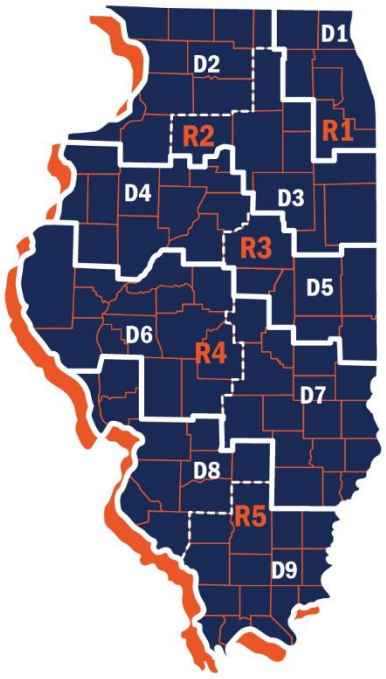


Figure 1-1. IDOT's Transportation Regions and Districts.

IDOT'S FOCUS ON ASSET MANAGEMENT

In 2018 when the first Transportation Asset Management Plan (TAMP) was certified, IDOT was at a crossroads. There were insufficient resources to maintain the existing state-maintained system of roads and bridges at a State of Acceptable Condition. Without additional revenue, asset conditions would have continued to deteriorate, and desired performance objectives would not be met. The FY*18-23 Proposed Highway Improvement Program*[1] *(MYP)* reported that by 2023, 40 percent of the state-maintained highways, and almost 15 percent of state-maintained bridges, would be in unacceptable condition. This situation demanded that future investments in IDOT's highway system be strategic, addressing agency priorities that balance system preservation with long-range focus on quality of life and economic growth.

Moving Forward with TAMP

With Ongoing Enhancements to Support Performance-Based Decisions:

- New project selection process to evaluate the benefits of expansion and congestion mitigation projects
- Acquisition of pavement and bridge analysis tools to evaluate investment options
- Increased investments in pavement and bridge preservation to extend service life

To ensure that available funds are used as effectively as possible, IDOT introduced several initiatives to enhance its ability to make performance-based, data-driven investment decisions. For example, IDOT has developed a data-driven decisions (DDD) project selection process that evaluates the expected benefits of each potential congestion mitigation and expansion project. Changes to the way IDOT manages its pavements

[1] http://www.idot.illinois.gov/Assets/uploads/files/Transportation-System/Reports/OP&P/HIP/2018-2023/Summary.pdf

and bridges have been adopted, shifting the agency towards planned, proactive investments in preservation activities that will slow the rate of pavement and bridge deterioration so these assets last as long as possible.

In addition, IDOT is in the process of implementing new analytical tools that will help prioritize future improvements to existing pavements and bridges. These asset management systems, which are required under the new federal asset management rules, use asset condition data to predict the impact of different improvement strategies on future network conditions. Although the acquisition and implementation of pavement and bridge management software programs as part of an Enterprise Asset Management System (EAMS) has taken much longer than anticipated due to the COVID-19 pandemic and other factors, it is expected to be in place in early 2023 to operate alongside the existing programming process used to develop the FY24-29 MYP.

IDOT's improved use of performance data to drive investment decisions aligns with national initiatives to promote a transportation asset management (TAM) framework at the state level that:

- Supports the use of strategic performance objectives.
- Introduces a systematic process that links investments to performance objectives.
- Emphasizes the use of preservation treatments that extend the life of the highway system at a minimum practicable cost.
- Considers agency risks or exposure in setting investment priorities.
- Uses asset inventory information, asset condition data, and analysis tools to evaluate options for allocating resources and strategically selecting projects.

In June 2019, Governor JB Pritzker signed the Rebuild Illinois (RBI) capital improvement program into law. The law provided $33.3 billion for transportation over six years, with $25.3 billion devoted to roads and bridges. In addition, federal legislators passed the Infrastructure Investment and Jobs Act (IIJA) in September 2021. Because Illinois had the RBI in place, it is poised to be able to maximize the potential available funding from the IIJA. By initiating the changes contained in the 2018 initial and 2019 final TAMPs, IDOT ensured that processes were in place to make the most effective use of both revenue increases.

Figure 1-2. Minimum TAMP Requirements.

TAMP REQUIREMENTS

Current federal legislation requires all state DOTs to develop a risk-based TAMP that describes how the state's roads and bridges on the National Highway System (NHS) "will be managed to achieve system performance effectiveness and state DOT targets for asset condition, while managing the risks in a financially responsible manner, at a minimum practicable cost over the life cycle of its assets." (23 CFR 515.7) The requirement to develop a TAMP was first established in

federal legislation passed in 2012, commonly known as the Moving Ahead for Progress in the 21st Century (MAP-21) Act. The TAMP requirement was retained in the subsequent federal legislation, commonly known as the Fixing America's Surface Transportation (FAST) Act, which also includes requirements for performance-based management. The IIJA, mentioned above, was passed in 2021 and continued the requirement for risk-based TAMPs and added a requirement for states to consider extreme weather and resilience in the life-cycle planning and risk management processes and analyses. The Federal Highway Administration (FHWA) established the rules that govern the processes that must be used to develop the TAMP, the minimum requirements that apply, the penalties for failure to develop and implement a TAMP, and the minimum standards for tools to support the TAMP development.

IDOT's initial TAMP was submitted to FHWA for certification on April 30, 2018 and was certified on November 1, 2018. The certification verified that the processes contained in the TAMP met federal requirements. The final 2019 TAMP, which demonstrated that the processes certified in 2018 were used to conduct the required analyses, along with documentation demonstrating implementation of the asset management plan, was submitted to the FHWA on June 28, 2019 and was certified on August 29, 2019. In addition, documentation demonstrating continued implementation of the certified TAMP was submitted in 2020, 2021, and 2022 and determined to be consistent with the 2019 TAMP by the FHWA each year.

In addition to the federal laws requiring asset management plans, Illinois enacted a similar law in 2021[2]. The Illinois law (20 ILCS 2705/2705-203) reinforces the federal law requiring IDOT to develop an asset management plan in accordance with 23 U.S.C. 119 and 23 CFR Part 515. The Illinois law additionally requires the development and use of a performance-based project selection process to prioritize transportation assets that add capacity. IDOT's certified TAMP satisfying the federal requirement enabled the Department to immediately demonstrate compliance with 20 ILCS 2705/2705-203(c). As noted above, IDOT's development of the DDD project selection process is the first step in complying with 20 ILCS 2705/2705-203(e).

In accordance with the federal rules, the TAMP is required to include the information shown in Figure 1-2. In addition to the minimum requirements for the TAMP, there are several other key requirements outlined in the federal legislation and/or the final rules that impact the way pavements and bridges are managed now and in the future. Several of these requirements are summarized below.

- Minimum standards are established for developing and operating bridge and pavement management systems (23 CFR 515.17).
- Each state DOT is encouraged to conduct periodic self-assessments of the agency's capabilities to conduct asset management, as well as its current efforts in implementing the TAMP (23 CFR 515.19).
- Each state, through its DOT, is required to conduct statewide evaluations to determine if there are reasonable repair or reconstruction alternatives to roads, highways, and bridges that have required repair and reconstruction activities on two or more occasions due to

[2] https://www.ilga.gov/legislation/ilcs/ilcs5_ActID=354&ChapterID=5_:text=2705_2D100.,by the Illinois Aeronautics Act.

emergency events declared by either the President of the United States or the Governor of the state (23 CFR 667.1).

- No more than 5 percent of the interstate system lane miles may be in *Poor* condition, using performance measures established by FHWA, without penalty (23 CFR 490.315).
- No more than 10 percent of the bridge deck area on the NHS may be considered Structurally Deficient, using performance measures established by the FHWA, without penalty (23 CFR 490.411).
- Each state DOT shall develop and utilize a Data Quality Management Program, approved by FHWA, that addresses the quality of all data collected to report pavement condition metrics to the FHWA (23 CFR 490.319). IDOT's Data Quality Management Plan was approved by FHWA in October 2018.

It was noted in the 2019 TAMP that because it typically takes several years for projects to be identified, programmed, and constructed, the results of the wholesale changes IDOT began to make to its planning and programming processes would not be fully realized for three to five years. More immediate changes began to be realized as the agency finalized its updated guidance on treatment selection to support its new preservation-based investment strategies. Three years after the 2019 TAMP was certified, the longer-term improvement in system conditions have begun to materialize.

The completion of this document represents IDOT's best faith effort to meet the requirements for developing a fully-compliant risk-based TAMP. Any changes in processes that occur with the implementation of the EAMS will be documented in a future update to this TAMP and certification will be requested at that time. Subsequent updates to the TAMP will be submitted in accordance with the minimum four-year cycle required under legislation.

TAMP CONTENT

IDOT's TAMP exceeds the FHWA's minimum requirements for developing a TAMP since the agency elected to expand the content beyond just the NHS pavements and bridges to include all state-maintained pavements and bridges. Future TAMPs may expand the number of assets included as information from the EAMS software becomes available.

The processes used to develop a risk-based 10-year investment strategy for pavements and bridges are captured in the following nine chapters.

- **Chapter 1: Introduction** – This chapter introduces the IDOT highway system, explains IDOT's commitment to Transportation Asset Management (TAM), describes the minimum requirements for a TAMP, and introduces the content of this document.
- **Chapter 2: IDOT's Planning Process and Asset Management Objectives** – This section describes IDOT's planning process, introduces IDOT's asset management objectives, and summarizes IDOT's initiatives to support asset management.
- **Chapter 3: Asset Inventory and Condition Assessment Processes** – This chapter summarizes the number and type of pavement and bridge assets that are included in the system and describes the processes used to monitor conditions.

- **Chapter 4: Performance Measures, Targets, and Trends** – The performance chapter describes the internal and federal performance measures in use on all pavements and bridges in Illinois (all NHS and IDOT-owned non-NHS), enumerates the performance targets identified by each owner, and presents the conditions of all pavements and bridges since adoption of the performance measures in 2018.
- **Chapter 5: Life-Cycle Planning** – This section of the TAMP introduces the concept of life-cycle planning and explains its effectiveness at reducing the long-term costs of system preservation. Pavement and bridge treatment rules, treatment unit costs, and pavement and bridge deterioration models are presented as inputs to the life-cycle planning process. Typical life-cycle strategies used by IDOT, the Illinois Tollway, the Chicago Skyway, and local agencies to manage Illinois' pavements and bridges are also discussed in this section. In addition, IDOT's efforts to consider resilience in life-cycle planning are included.
- **Chapter 6: Risk Management and Planning for Resilience** – The risk chapter introduces the concept of risk management, explains how risks are used in setting investment priorities, and summarizes the most significant risks impacting the implementation of this TAMP. This chapter describes IDOT's All-Hazard Asset Vulnerability Assessment and outlines the process that IDOT has implemented for managing assets that are routinely impacted by emergency events. IDOT's efforts to plan for resilience are also described.
- **Chapter 7: Financial Plan and 10-Year Investment Strategies** – This chapter summarizes the expected funding levels over the next 10 years, reports the value of the existing pavements and bridges maintained by IDOT, and the level of investment that will be made in pavement and bridge work activities to achieve performance objectives.
- **Chapter 8: Performance Gap Analysis** – This chapter summarizes IDOT's 10-year anticipated State of Acceptable Condition and the impact the planned 10-year investment strategies will have on achieving these conditions. Gaps between performance targets and anticipated conditions are presented and alternative strategies to close or address the identified gaps are discussed.
- **Chapter 9: TAMP Implementation and Integration** – The final chapter identifies the steps that IDOT is taking to meet the federal requirements and to further strengthen its use of performance-based, data-driven investment decisions.

There are also three appendices. Appendix A provides a summary of the local owners of portions of the NHS network. Appendix B provides a listing of bridges considered to be Major Bridges. Appendix C includes the current treatment selection guidelines for pavements and bridges. Appendix D presents the risk registers with likelihood, consequence, and risk rating for each risk.

Chapter 2: IDOT's Planning Process and Asset Management Objectives

OVERVIEW

Through effective planning, programming, and project development efforts, IDOT strives to look at a full range of transportation options, evaluate how they affect mobility for users, assess the current infrastructure, prioritize needed improvements based on system performance and demographics, and then, with available revenue sources, integrate them into the overall IDOT transportation strategy. This is actualized through a multi-step process, as shown in Figure 2-1 below.

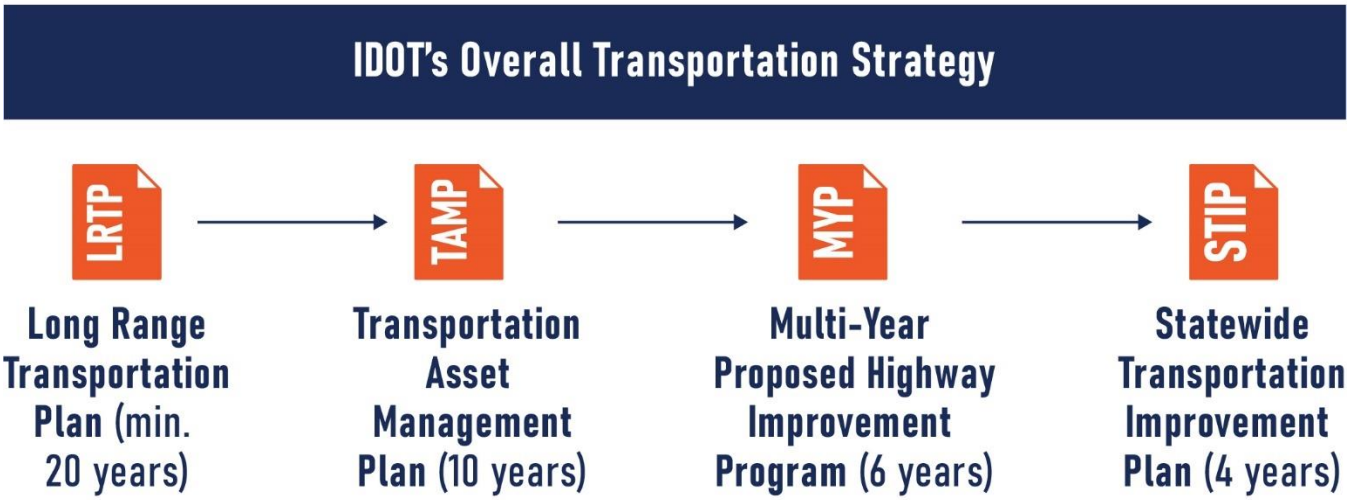


Figure 2-1. Asset Management as Part of the Planning Process.

The first step is the development of a Long Range Transportation Plan (LRTP), which outlines the strategic direction for the development of the Illinois transportation system. The LRTP takes a longer look, for a minimum of 20 years, and must be updated every 5 years. The Transportation Asset Management Plan (TAMP), developed as a result of the MAP-21 and FAST Act legislation and continued under the IIJA legislation, must span a time period of 10 years minimum and be updated at least every 4 years. The Multi-Year Proposed Highway Improvement Program (MYP) lists specific projects that are planned to be accomplished over the next 6-year period and must be updated every year. The final step in the planning process is the creation of the Statewide Transportation Improvement Program (STIP), which is developed once every 3 years, covers the projects programmed over a 4-year time period, and is amended annually based on the current MYP.

The TAMP provides the bridge between the LRTP and the MYP, by providing guidance on how to achieve the strategic objectives of the LRTP through the programming process that results in the

MYP. This chapter outlines the LRTP and the MYP first, then provides an overview of the TAMP objectives in bridging the gap between the LRTP and the MYP.

LRTP, MYP, AND STIP

LRTP

The state-maintained highway system is critical to the growth and development of both state and national economies, providing a crucial link between the east and west coasts, as well as serving as the center of the nation's freight network. To meet the continuing demand on the system, IDOT is committed to making the best use of available funding to support system needs and priorities. However, federal and state revenues have not kept up with the needs of the system. As a result, the LRTP, which establishes the strategic direction for the Illinois transportation system, presents new ways for IDOT to be effective stewards of public funds through the use of asset management planning and the implementation of performance-based project selection tools. These initiatives allow IDOT to best leverage existing funds to provide a transportation system that meets both the state's and the nation's needs.

The LRTP is developed through a collaborative process that includes the input of a variety of stakeholders from throughout the state. The results of the process establish the broad, long-range agency goals that drive the agency's short-term investments, as shown in the call-out box to the right. The LRTP is designed to act as the parent policy umbrella for other relevant policy and mode-specific plans developed by IDOT as a suite of plans. As shown in Figure 2-2, the suite includes interrelated plans such as the Strategic Highway Safety Plan, the Transit Plan, the Rail Plan, the Freight Plan, the Bike Plan, the Marine Plan, the Aviation Plan, the ITS Architecture Plan, and this TAMP.

IDOT's Investment Goals

- **Economy** – Improve Illinois' economy by providing transportation infrastructure that supports the efficient movement of people and goods
- **Livability** – Enhance the quality of life across the state by ensuring that transportation investments advance local goals, provide multimodal options, and preserve the environment
- **Mobility** – Support all modes of transportation to improve accessibility and safety by improving connections between all modes of transportation
- **Resiliency** – Proactively assess, plan, and invest in the state's transportation system to ensure that our infrastructure is prepared to sustain and recover from extreme events and other disruptions
- **Stewardship** – Safeguard existing funding and increase revenues to support system maintenance, modernization, and strategic growth of Illinois' transportation system

The next update to the LRTP is due in 2024. To that end, a vendor was selected for a project to update the LRTP in July 2022. The Bureaus of Planning and Programming will work through this project to align the LRTP and the TAMP more closely.

MYP and STIP

Each year, IDOT develops a MYP that weighs the need to preserve the existing system in a state of good repair with the need to enhance or expand the highway network to address congestion and economic development demands. Before being included in the Highway Program, improvements are evaluated by the Office of Planning and Programming based on

goals, needs, and available resources. IDOT's TAMP provides the link between the LRTP and its shorter-term (6-year) bridge and pavement programs in the MYP.

For the MYP, IDOT uses a mix of federal transportation funds, state motor fuel tax and vehicle registration fees, bonds, and miscellaneous revenue sources to build, operate, and maintain the roads and bridges under its jurisdiction.

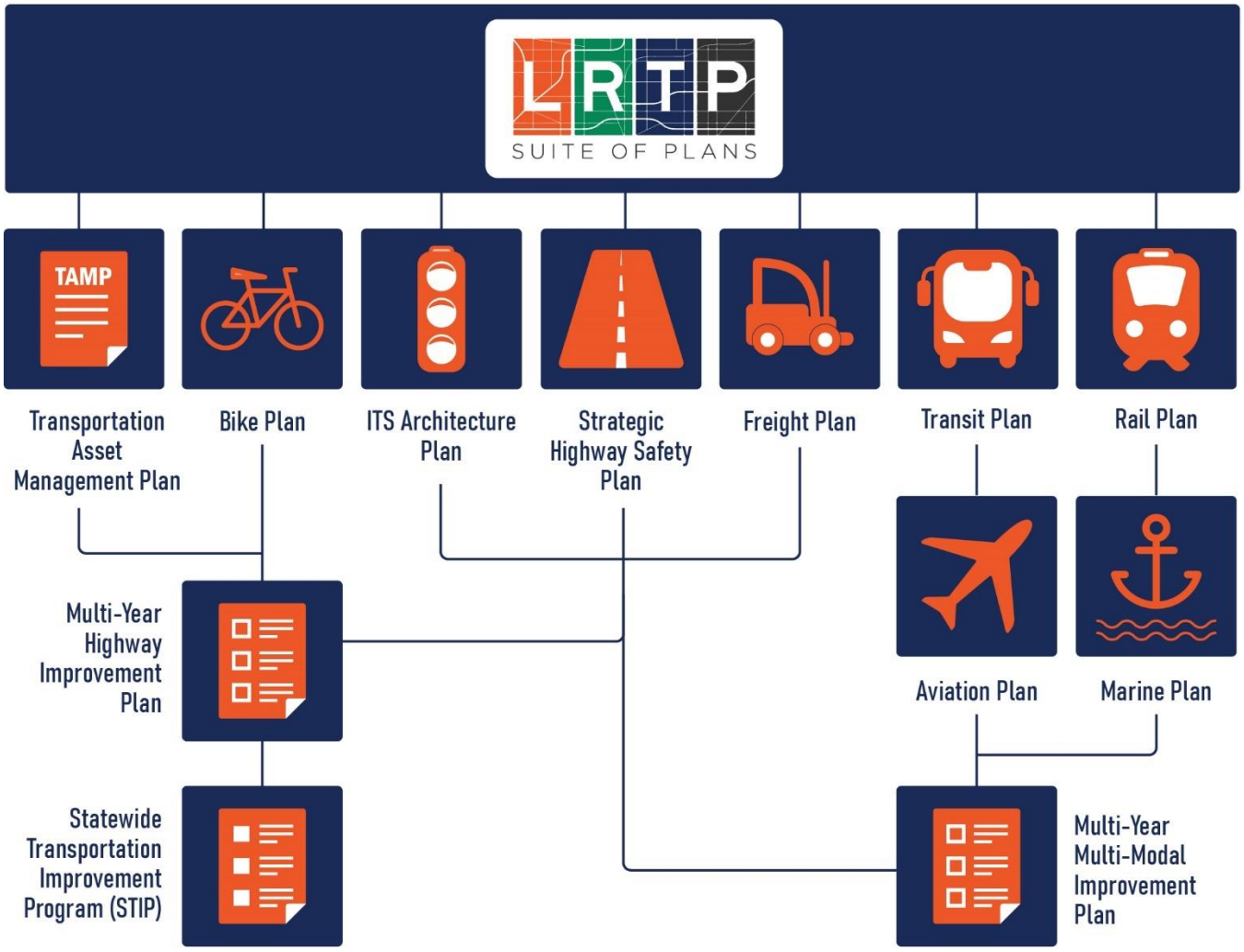


Figure 2-2. Long Range Transportation Suite of Plans.

Once investment levels are established, the Office of Planning and Programming works with the districts to select projects that will enable IDOT to meet its statewide performance objectives. In the absence of pavement and bridge management systems, IDOT has developed a spreadsheet tool that allows the Office of Planning and Programming to evaluate the impacts of different investment options for both pavements and bridges. The tool facilitates the analysis of programming funds for preservation, rehabilitation, and replacement at both the state and district levels using deterioration rates and treatment costs. Once the Office of Planning and

Programming and the districts have agreed to the amount of preservation, rehabilitation, and replacement work that will be done during the multi-year period, the districts use pavement and bridge condition information and established guidelines to select the projects that best match the intended investments. The final list of projects is incorporated into the STIP. The published MYP is presented to the General Assembly and made public each spring.

ASSET MANAGEMENT OBJECTIVES

The current LRTP embraces "adopting asset management planning and performance-based project selection tools in order to best leverage existing funds to meet Illinois' infrastructure needs."[3] In addition, the implementation of this asset management plan is featured as a key to achieving the LRTP's goal of Mobility on the State's highways and bridges[4].

To accomplish the stewardship goal of the LRTP, IDOT has identified several potential strategies for increasing revenues and managing costs. To manage costs, IDOT has adopted an asset management strategy that is helping the agency achieve the five objectives listed below for its asset management program:

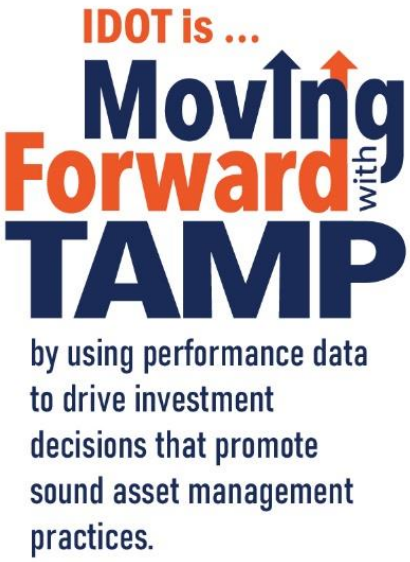
1. Create a culture through training and communication where Transportation Asset Management (TAM) is viewed as a way of doing business.
2. Move towards a more performance-based, data-driven approach to TAM decision making, striving to maintain the system in a state of acceptable condition.
3. Find a sustainable balance between proactive preservation treatments and rehabilitation/replacement activities that reduce long-term costs to maintain the system.
4. Integrate risk management and resilience into the asset management process.
5. Improve coordination with NHS owners outside of IDOT.

The changes IDOT is making to its business processes have been initiated to achieve these asset management objectives. The changes emphasize investments in improvements to existing assets within a transparent project selection and prioritization process that is guided by sound data and performance-based processes. The new investment strategies that IDOT is implementing promote the use of preservation treatments to slow the rate of deterioration and a more strategic approach to project selection that optimizes the use of available funding. These changes are outlined in more detail in the following sections.

Over the last four years, IDOT has engaged in promoting asset management among other NHS owners and industry partners, presenting information on the TAMP and how it is changing the overall project-selection philosophy at conferences, meetings, and other transportation forums. In addition, IDOT made use of social media and other public outreach efforts to promote the advantages of its asset management practices.

[3] https://idot.illinois.gov/Assets/uploads/files/About-IDOT/Misc/Planning/IDOT_LRTP_1_Introduction4119df.pdf
[4] https://idot.illinois.gov/Assets/uploads/files/About-IDOT/Misc/Planning/IDOT_LRTP_4_Mobility_Final.pdf

Asset Management Organizational Model



In support of the first objective, IDOT created an asset management organizational model that spans across the agency to foster the asset management mindset becoming part of the fabric of IDOT. IDOT's Asset Management program is coordinated by the Asset Management Engineer in the Bureau of Programming within the Office of Planning and Programming. It is championed by the Secretary of Transportation, directed by a Steering Committee, and supported by an Asset Management Project Management Team and Technical Working Groups. Table 2-1 outlines the various committees and their membership.

IDOT's implementation of asset management practices is guided by a Steering Committee made up of representatives at the executive management level. The Steering Committee is expected to remain active as IDOT continues to implement the asset management processes presented in this TAMP. IDOT considers the next few years to be critical in terms of adopting the new strategy and the support provided at the executive level is critically important to the agency's success at making this transition. The Asset Management Project Management Team reports to the Steering Committee on a regular basis and provides updates on actual versus planned progress towards the enhancements described later in this chapter.

The Project Management Team and the various Technical Working Groups that were created to support the development of the TAMP are expected to remain in place, although they may occasionally be dormant until they are needed to address activities identified by the Steering Committee. Membership in these groups is expected to change to account for job changes that may occur over the next few years.

The development and updating of the TAMP are coordinated by the Asset Management Engineer.

Table 2-1. Asset Management Committees.

Committee	Membership
Asset Management Steering Committee – Executive Staff, champion the TAMP throughout the organization	Deputy Secretary over Office of Planning and Programming Director Office of Planning and Programming Director Office of Highways Project Implementation Deputy Director of Highways Project Implementation Bureau Chief Bridges and Structures Bureau Chief Design and Environment Bureau Chief Local Roads and Streets Bureau Chief Materials Bureau Chief Planning Bureau Chief Programming Bureau Chief Operations Bureau Chief Research Bureau Chief Safety Programs and Engineering Regional Engineer Asset Management Engineer Program Development Section Chief Federal Highway Administration, Illinois Division Administrator
Project Management Team – mid-level management, approves policies and processes developed by the technical working groups, reports to the Steering Committee	Bureau of Bridges and Structures Bureau of Budget and Fiscal Management Bureau of Communications Bureau of Construction Bureau of Design and Environment Bureau of Information Processing Bureau of Local Roads Bureau of Materials Bureau of Operations Bureau of Planning Bureau of Programming Bureau of Research Bureau of Safety Programs and Engineering District Programming Engineer District Operations Engineer Federal Highway Administration, Illinois Division Staff
Technical Working Groups – support the development of TAMP policies and processes, reports to the Project Management Team	Bridge Group Data Policy Group Financial Group Local Agency Group Pavement Policy Group Performance Measures Group Risk Management Group

Performance-Based, Data-Driven Investment Strategies

The 2019 TAMP described how IDOT viewed pavement and bridge needs and programmed through a "worst-first" strategy prior to adopting asset management principles. As IDOT moved forward with asset management, constrained performance goals were established that better estimate the pavement and bridge conditions that can actually be achieved with the funding available. The current focus is on achieving a *State* of *Acceptable Condition* with the funding levels available. In addition, two- and four-year performance targets for pavements and bridges

on the NHS were established on October 1, 2018 to meet federal requirements. New targets were set in December 2022 for the next 4-year performance period. These changes support the second asset management objective.

As part of the stewardship initiatives outlined in the LRTP, IDOT established a performance-based project selection process for expansion projects included in the MYP. The process, and the supporting analysis tool, identify projects that provide the state with the highest return on investment after consideration of economic development, livability, mobility, and other benefits to each project (a data-driven process).

In support of the third asset management objective, the TAMP outlines IDOT's strategies to shift towards a more data-driven decision process that supports the use of analysis tools and life cycle strategies to reduce the rate of system deterioration as cost-effectively as possible. IDOT has made a commitment to increased expenditures in pavement and bridge preservation to slow the rate of deterioration and postpone the need for more expensive treatments.

Risk and Resilience

IDOT has long considered risk and resilience in aspects of planning and programming. For example, seismic risk has been considered as part of the bridge programming process since the 1990s. In addition, IDOT has implemented a process to document and evaluate projects that have been damaged more than once by a declared emergency event. These and other initiatives are documented more fully later in this TAMP, in support of the fourth asset management objective.

Other NHS Owners

It is recognized that portions of the NHS included in the TAMP are owned and operated by agencies other than the state DOT. 23 CFR 515.7(f) recognizes that the state DOT may collect information from other NHS owners "in a collaborative and coordinated effort." IDOT has coordinated with the Illinois Tollway to determine the most effective means to share information related to Illinois Tollway assets and how they are managed. Since the Illinois Tollway prepares extensive asset management documentation under its Trust Indenture, reporting on those portions of the NHS is limited in this narrative but can be referenced in the Illinois State Toll Highway Authority's Official Statement[5]. IDOT established a similar collaborative and coordinated effort with the Chicago Skyway.

IDOT currently collects pavement and bridge condition information on the entire NHS in Illinois, regardless of whether the assets are managed by the state or by local partners. Recently IDOT has taken steps to improve collaboration with its local and regional partners to help ensure that federal funds are used as effectively as possible. Because nearly all NHS pavements and bridges are located in areas that have Metropolitan Planning Organizations (MPOs), IDOT has specifically increased collaboration with MPOs regarding asset management activities by the MPOs themselves and the local agencies they represent. Earlier in 2022, a survey was sent to all the

5 https://www.illinoistollway.com/documents/20184/1175114/Series+2021A+Official+Statement.pdf/88eec7f1-c667-5b45-d778-71277d154a9c?version=1.3&t=1639406134846&download=true

MPOs that are also transportation management areas (TMAs) to ascertain the level of asset management implementation. Responses to the survey were received from the following MPOs:

- Chicago Metropolitan Agency for Planning (CMAP)
- East-West Gateway Council of Governments (East-West Gateway), St. Louis area
- Rockford Metropolitan Agency for Planning (RMAP)
- Bi-State Regional Commission, Quad Cities area of northwestern Illinois/eastern Iowa
- Champaign/Urbana Urbanized Area Transportation Study (CUUATS)

The results of this survey are discussed in further detail in each relevant section of the TAMP.

Chapter 3: Asset Inventory and Condition Assessment Processes

OVERVIEW

IDOT maintains a large highway system that represents the nation's third-largest interstate system and the fourth-largest highway system. According to IDOT's *2017 Freight Plan*, 1.23 billion tons of freight at a value of $3 trillion were moved to, from, or within Illinois, with approximately 54 percent of that tonnage using the state's highways[6]. Managing a network of this size and importance requires a good understanding of system conditions and needs. As the basis for this understanding, IDOT collects and maintains inventory and condition information on its pavements, bridges, and some ancillary assets to estimate needs. This chapter summarizes IDOT's pavement and bridge inventory and its condition assessment processes.

HIGHWAY SYSTEM AND OWNERS

Systems

For reporting and managing system conditions and needs, IDOT classifies its pavements and bridges using the definitions listed below.

- **National Highway System (NHS)** – On a national level, certain highways are designated as part of the NHS, making them eligible for federal funding under the National Highway Performance Program (NHPP). All interstate and some non-interstate U.S. and state highways, regardless of ownership, are included on the NHS based on their importance to the nation's economy, defense, and mobility. IDOT is required to provide certain types of information to the FHWA related to the NHS on a regular basis.
- **Interstate Highways** – These are highways designated by the U.S. Secretary of Transportation and designed to national standards as limited-access expressways. All interstate highways are included in the NHS. Interstate highways are further divided by ownership, as described below.
  - State-maintained – Highways operated and managed by IDOT.
  - Toll Roads – Highways operated and managed by the Illinois Tollway and the Skyway.
- **Other NHS Routes** – This classification includes non-interstate highways that are included on the NHS. Most pavements and bridges in this classification are managed by IDOT, but a portion of the system is maintained by the Illinois Tollway and local agencies. The Elgin-O'Hare Expressway (IL 390) is included in the Illinois Tollway mileage on the non-interstate system, even though it is designed to interstate standards. The Illinois Tollway Non-Interstate NHS also includes 0.39 miles of IL 56 leading to I-88. Because the Skyway is

[6] http://www.idot.illinois.gov/Assets/uploads/files/Transportation-System/Reports/OP&P/ILFreightPlan_FINAL.pdf

included as an interstate highway, it is not included in this mileage even though a local agency has jurisdiction.

- **Non-NHS Routes** – The remainder of the state-maintained system is classified as non-NHS routes, which includes both U.S. and state highways. This category is further broken down into the following two subcategories:
  - Marked routes –This category includes non-NHS highways that are signed as U.S. or state marked routes.
  - Unmarked routes – This category includes any supplemental highways that are included in the jurisdictional responsibility of the state.

Owner Roles and Responsibilities

There are nearly 150,000 centerline miles of roads in Illinois. IDOT is responsible for nearly 16,000 of those miles. The roads under IDOT's jurisdiction are comprised of interstates, U.S. highways, marked state routes, and unmarked routes on the state system. The remaining miles are managed by the Illinois Tollway, the Chicago Skyway, or local agencies within the state. In addition to the responsibility of maintaining the road surface, transportation agencies are responsible for managing the bridges, tunnels, culverts, guardrail, signs, signals, and other appurtenances required for safety and mobility.

IDOT's Responsibilities

IDOT is responsible for maintaining 1,893 of the 2,185 centerline miles of interstate highway pavement in the state as well as 1,857 structures totaling 32.7 million square feet carrying interstates. In addition to the interstate highways, which are part of the NHS, IDOT is responsible for maintaining most of the other NHS routes (5,080 of 5,569 pavement miles and 27.6 million of 45.1 million structure square feet of deck area), as well as most marked routes in the state. This includes 15,904 centerline miles of pavement, 7,870 bridges totaling 86.8 million square feet, and three tunnels.

Illinois Tollway's Responsibilities

The Illinois legislature created The Illinois State Toll Highway Commission in 1953. On April 1, 1968, all duties, obligations, functions, and powers of The Illinois State Toll Highway Commission, together with all property, rights, privileges, interest and any and all other assets of the Commission, were transferred to The Illinois State Toll Highway Authority per the Toll Highway Act in 1967. This legislation created the Illinois Tollway "to promote the public welfare and to facilitate vehicular traffic by providing convenient, safe, modern, and limited access highways." Under the direction of the Illinois Tollway Board of Directors, the Illinois Tollway builds, operates, and maintains the roads under its jurisdiction. The Illinois Tollway is authorized to issue bonds to expand and make capital improvements to its system and to collect tolls to fund its operations and to repay bonds. The Illinois Tollway is required by the Amended Trust Indenture to maintain the system in good repair. As an agency, the Illinois Tollway receives consistently high ratings with Fitch, Moody's, and Standards & Poor's due to the strong debt to

service coverage, which extensively relates to the ability to manage and invest in Illinois Tollway assets in a responsible manner for the long term. The Illinois Tollway is responsible for 295 miles of pavement and 447 bridges representing 8.2 million square feet of bridge deck, the majority of which are located in the Chicago metropolitan area.

Chicago Skyway's Responsibilities

The Chicago Skyway was constructed by the City of Chicago in 1958. In 2005, the Skyway Concession Company, LLC. began operating the Skyway under a 99-year lease. The Skyway is nearly 8 miles long, about a third of which (60 bridges or approximately 1.3 million square feet) is bridge deck.

Local Agencies' Responsibilities

Collectively, the counties, townships, and municipalities in Illinois are responsible for the operation and maintenance of over 130,000 miles of roads[7] and the associated structures and appurtenances. Locally-maintained networks include some of the U.S. highways in urban areas and all of the local roads within their jurisdiction. These local agencies use a mix of federal transportation funds, state motor fuel tax funds, and locally-generated funds to address the needs of the roads and bridges under their jurisdictions. IDOT partners with local agencies in a number of ways, including the establishment of highway design standards; policies and procedures for the distribution and expenditure of funds; as well as assistance in planning, financing, designing, constructing, and maintaining local agency programs and projects.

The locally-maintained NHS consists of 479 miles of pavement and 5.3 million square feet of bridges by deck area. Table 3-1 shows the distribution of non-IDOT NHS pavements by number of local agencies and the total number of miles. Table 3-2 shows the distribution of non-IDOT NHS bridges by number of local agencies and bridge deck area. In total, 12 MPOs are represented. A more detailed list showing the number of miles and bridge deck area by agency is provided in Appendix A.

Table 3-1. Local Agency NHS Pavement Inventory by Owner.*

Roads		
Owner	Number of Agencies	Number of Miles
Counties	13	265.67
Municipalities	69	209.18
Townships	5	2.11
Other (Private/Other State)	3	2.01
Total Roads	**90**	**478.97**

* Skyway numbers not included in municipalities

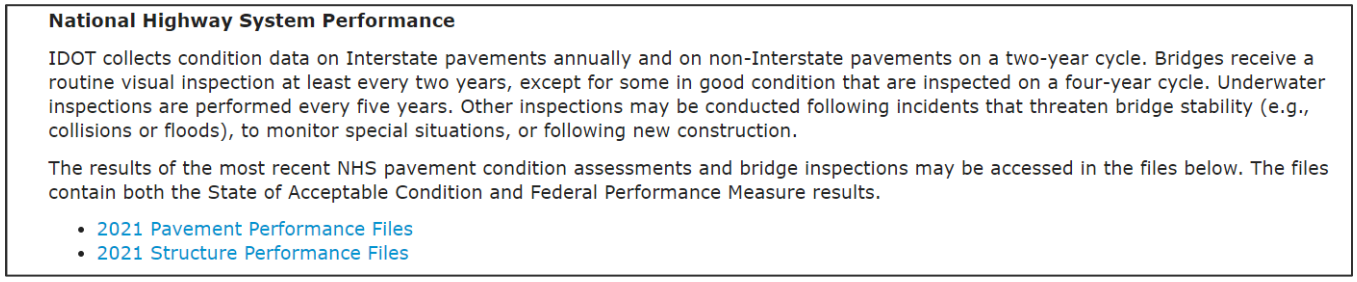
[7] Illinois Travel Statistics 2021, Table C-1, April 2022.

Table 3-2. Local Agency NHS Bridge Inventory by Owner.*

Bridges			
Owner	Number of Agencies	Number of Bridges	Square Feet (in thousands)
Counties	9	80	837
Municipalities	21	155	4,361
Townships	0	0	0
Other (Private/Other State)	3	3	107
Total Bridges	**33**	**238**	**5,305**

* Skyway numbers not included in municipalities

Under the current asset management requirements, IDOT is required to report on the condition of the total NHS, regardless of who maintains it. IDOT has assumed responsibility for collecting the pavement condition information for all NHS pavements, regardless of jurisdiction. The local agencies are required to conduct their own NHS bridge inspections and share the results with IDOT. IDOT annually publishes all NHS pavement and bridge performance data, including those under local jurisdiction, to its website as seen in Figure 3-1[8].



National Highway System Performance

IDOT collects condition data on Interstate pavements annually and on non-Interstate pavements on a two-year cycle. Bridges receive a routine visual inspection at least every two years, except for some in good condition that are inspected on a four-year cycle. Underwater inspections are performed every five years. Other inspections may be conducted following incidents that threaten bridge stability (e.g., collisions or floods), to monitor special situations, or following new construction.

The results of the most recent NHS pavement condition assessments and bridge inspections may be accessed in the files below. The files contain both the State of Acceptable Condition and Federal Performance Measure results.

- 2021 Pavement Performance Files
- 2021 Structure Performance Files

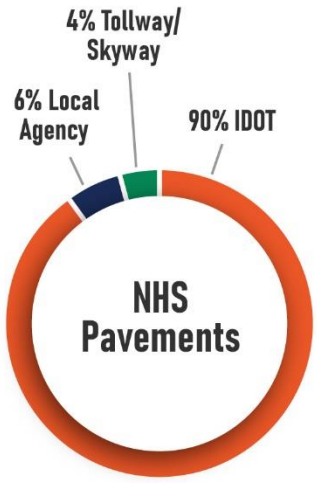
Figure 3-1. NHS Performance Files on IDOT's Website.

Before the passage of the IIJA, IDOT had not set specific requirements on how federal funding provided to the local agencies should be utilized beyond federal requirements. Due to passage of the IIJA, IDOT is reevaluating the makeup of funds provided to local agencies, such as bridge funding and carbon reduction funds, and the constraints related to such funding. IDOT has asked that all agencies follow the guidelines in the TAMP for their NHS pavements and bridges. IDOT has established a Local Agency Technical Working Group within the asset management framework to ensure strong coordination with the local agencies on their NHS pavements and bridges.

IDOT is working to ensure all local agencies are aware of the requirements under the federal regulations regarding asset management, as well as providing them with data on the condition of those NHS assets under their jurisdiction. This is accomplished primarily through the Local Agency Working Group, the IDOT website, and presentations at various meetings throughout the

[8] https://idot.illinois.gov/transportation-system/transportation-management/planning/tamp

state (including Illinois Municipal League, Illinois Association of County Engineers, and MPO meetings). This includes education on the allocation of federal funding for use on the NHS.



ASSET INVENTORY

Pavements

Inventory

Using the highway classifications defined earlier, Table 3-3 summarizes the centerline miles of pavement in each category from the 2021 year-end file. It is important to note that IDOT reports pavement inventory in terms of centerline miles. The actual number of lane miles maintained is much higher. For example, a one-mile stretch of highway with two lanes in each direction would count as one centerline mile, but four lane miles.

Table 3-3 Pavement Inventory by System.

	System	Jurisdiction	Total Centerline Miles	Totals (Centerline Miles)	Total State-Maintained Centerline Miles
NHS	Interstates	IDOT	1,892.97	7,756.50	6,977.16
		Illinois Tollway	284.84		
		Chicago Skyway	7.66		
	Non-Interstate NHS	IDOT	5,084.19		
		Illinois Tollway	10.07		
		Local	476.77		
Non-NHS	Marked Routes	IDOT	6,570.18	8,927.34	8,927.34
	Unmarked Routes	IDOT	2,357.16		
	NHS and Non-NHS Pavements			16,683.84	15,904.50

Age

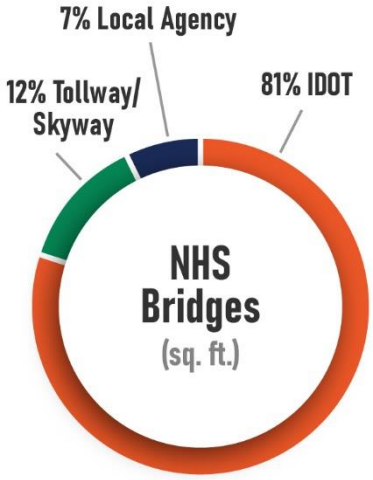
Although programming according to asset management principles and life-cycle planning began in 2019, it will be many years before pavement replacement projects are designed, constructed, and updated in the inventory. These projects generally include geometrics changes, Americans with Disabilities (ADA) ramps, utility relocations, etc., which all add time to the design and construction processes. Because of this, the system continues to age faster than it is being replaced. On a system-wide basis, the statistics indicate that nearly 92 percent of the state-maintained network is more than 40 years old, based on the original construction year, up from nearly 91 percent in 2019. This far exceeds the typical pavement's service life of 30 years. The statewide pavement age statistics are summarized in Table 3-4.

Table 3-4. Age of State-Maintained Pavements (as of 2021).[9]

Age Category	% of NHS Interstate Miles	% of Non-Interstate NHS Miles	% of Non-NHS Marked Routes	% of Non-NHS Unmarked Routes	Total Percentage
New	0.0	0.0	0.0	0.0	0.0
1 - 10 years	1.6	1.3	0.2	0.5	0.7
11 - 20 years	2.7	1.9	0.6	0.4	1.2
21 - 40 years	15.1	8.0	2.3	4.7	6.0
>40 years	80.5	88.5	96.8	92.9	91.7
Unknown	0.1	0.3	0.1	1.5	0.4
Total	100.0	100.0	100.0	100.0	100.0

Bridges

Inventory



A summary of the number and size of bridges maintained by IDOT, the Illinois Tollway, the Skyway, and local agencies is presented in Table 3-5, based on the 2021 year-end file. In addition to bridges, the inventory includes large culverts (those greater than 20 feet in length). The summary contains bridges included in IDOT's 2021 National Bridge Inventory (NBI) submittal as well as new bridges that are open to traffic but whose initial inspections were not included in the 2021 NBI submittal.

IDOT also has a number of other structures it is responsible for, including railroad bridges over highways, pedestrian/bicycle crossings, tunnels, small bridges and culverts, and pipeline structures. These structures are not included in the TAMP.

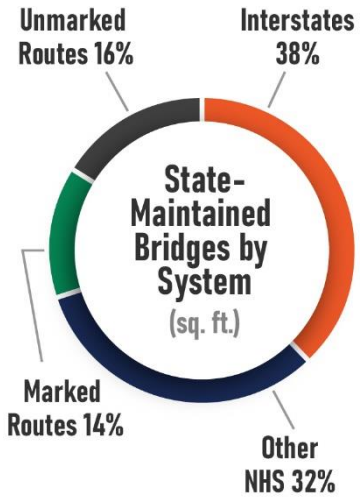
[9] Data provided by the Bureau of Programming, Planning & Systems Section, June 2022.

Table 3-5. Number and Square Feet of Bridges by System (as of 2021).[10]

	System	Jurisdiction	Total Number of Bridges	Total Deck Area (sq ft in thousands)	Totals (sq ft in thousands)	State-Maintained Totals (sq ft in thousands)
NHS	Interstates	IDOT	1,857	32,650	4,829 bridges 75,025 sq ft	4,084 bridges 60,277 sq ft
		Illinois Tollway	399	7,380		
		Chicago Skyway	60	1,290		
	Non-Interstate NHS	IDOT	2,227	27,627		
		Illinois Tollway	48	773		
		Local	238	5,305		
Non-NHS	Marked Routes	IDOT	2,203	12,128	3,786 bridges 26,519 sq ft	3,786 bridges 26,519 sq ft
	Unmarked Routes	IDOT	1,583	14,391		
	NHS and Non-NHS Structures				8,615 bridges 101,544 sq ft	7,870 bridges 86,796 sq ft

Border Bridges

Included in the bridge inventory are several border bridges that begin in Illinois but cross over major rivers and end in other states. The management of these bridges is shared with Iowa, Missouri, Kentucky, or Indiana, depending on the location of the bridge. This shared responsibility requires a close partnership with the neighboring states and coordination in terms of the timing and cost sharing of improvements, increasing the overall complexity required to manage them effectively.



There are 41 bridges that fall into this category, crossing the three major rivers that make up 71 percent of the State's boundaries – the Mississippi, the Ohio, and the Wabash.

Major Bridges

There are many Major Bridges for which IDOT has the sole, primary, or secondary maintenance responsibility. This category includes 183 bridges with a total length greater than or equal to 1,000 feet (some of which are also Border Bridges). In addition, 55 structures were added to this classification due to their complexity and high cost for maintenance, repair, and replacement. While the combined total of 238 bridges considered to be Major Bridges represents only 3 percent of the total number of state-maintained structures, the bridge deck area of 24.2 million square feet, represents 27.9 percent of total state-maintained bridge deck area. Because of the size and complexity of these bridges, their

[10] Data provided by the Bureau of Programming, Planning & Systems Section, May 2022.

rehabilitation and replacement consume a significant portion of the available budget and have an out-sized effect on the performance metrics presented in the next chapter. Appendix B includes additional background information on Major Bridges.

Age

As with pavements, it takes many years for bridge projects, and in particular replacement projects, to be designed, constructed, and updated in the inventory. The aging of the state-maintained bridge inventory is reflected in Figure 3-2. It shows that approximately 20 percent of IDOT's bridges still in service are more than 60 years old and another 26 percent are between 50 and 60 years old, representing a significant level of deferred investment.

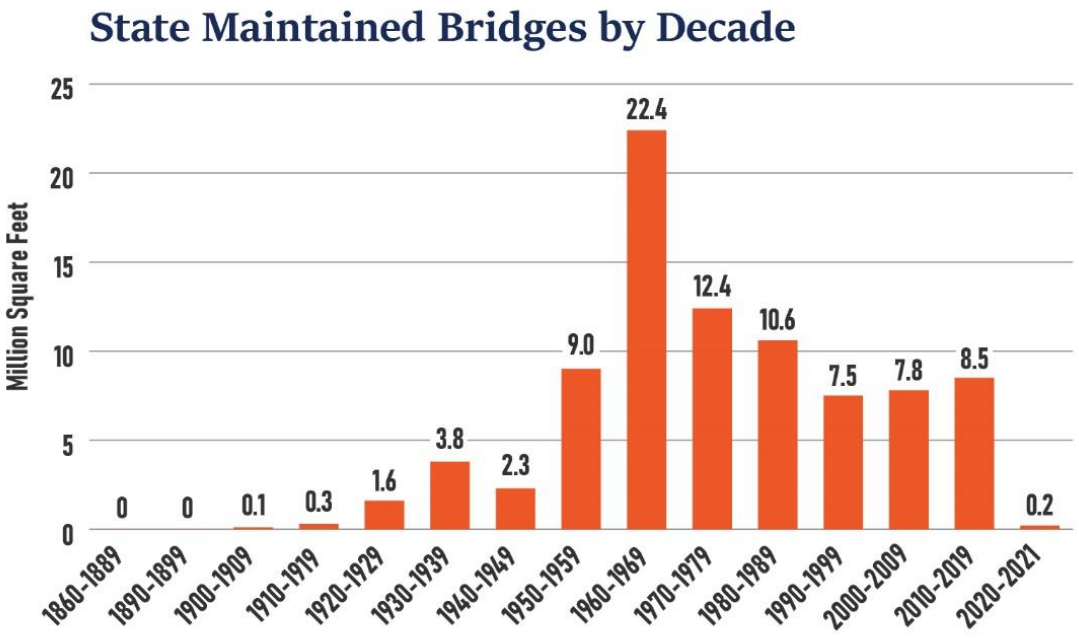


Figure 3-2. Millions of Square Feet of State-Maintained Bridges Built, by Decade.

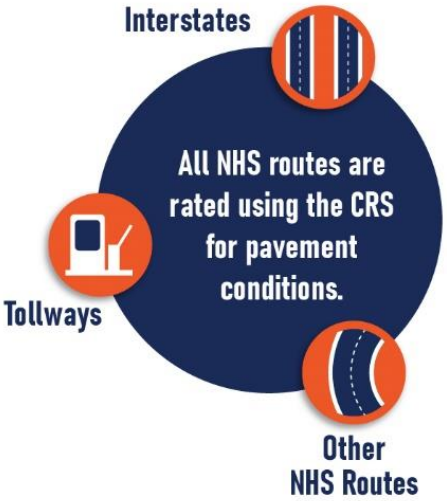
MONITORING AND REPORTING ASSET CONDITIONS

Pavement Condition Assessment

IDOT collects condition data on interstate pavements annually and collects data on non-interstate pavements on a two-year cycle. The data is collected and processed by a vendor using an automated data collection vehicle, such as the vehicle shown in Figure 3-3.

Figure 3-3. Automated Data Collection Vehicle.

Pavement condition surveys are performed in each travel direction on divided highways and in one direction on all other routes. Forward-facing cameras and a laser crack measurement system are used to record pavement condition information and panoramic cameras provide visual references that are useful when viewing the images. In addition, lasers are used to collect sensor data to determine rutting, roughness, and faulting measurements. Personnel from each of the districts along with the Bureaus of Programming, Design and Environment, and Research, view the digital images of the pavement surface at workstations to identify predominant distresses, based on distress type, amount, and severity. The sensor data and distress data are combined to determine a Condition Rating Survey (CRS) value ranging from 1.0 to 9.0, with a 9.0 representing a newly constructed or resurfaced pavement and a 1.0 representing a failed pavement. In addition to collecting CRS ratings on the state-maintained system, IDOT also collects images and rates any locally-maintained roadways on the NHS on a two-year cycle.



The Illinois Tollway also uses the CRS procedure to rate the condition of its pavement network. The Illinois Tollway contracts with a vendor to conduct CRS inspections annually. The Illinois Tollway utilizes this information as supporting documentation for a comprehensive Pavement Management Plan that is used to program pavement maintenance,

rehabilitation, repair, and replacement programs. The Pavement Management Plan is updated biennially to incorporate inspection results and construction projects.

IDOT is required to report pavement condition information to the FHWA on the NHS each year as part of the FHWA's Highway Performance Monitoring System (HPMS). IDOT recognizes that not all local units of government have the resources to collect and report the federally-required NHS pavement performance metrics. With this in mind, IDOT has assumed the responsibility for collecting the federal performance metrics on all NHS pavements, regardless of jurisdiction.

The pavement condition information required by the FHWA differs from the CRS procedure in terms of the types of distress rated and the way the information is used to report pavement conditions. Fortunately, IDOT's automated data collection process provides sufficient information to allow the Department to extract the HPMS data in addition to the CRS ratings. IDOT is currently working with the vendor to improve methods for processing the data in accordance with the HPMS data format for the required submittals.

Bridge Condition Assessment

To enable IDOT to manage the nearly 90,000,000 square feet of bridges on the state highway system, the agency conducts Safety and Element Level bridge inspections on a regular cycle in accordance with the National Bridge Inspection Standards (NBIS), the American Association of State Highway and Transportation Officials (AASHTO) Manual for Bridge Evaluation (MBE) and the AASHTO Manual for Bridge Element Inspections (MBEI). NBIS inspections are conducted to ensure the safety of the public and to catalog accurate data reflecting each bridge's physical attributes and current conditions. The standards outline the requirements for inspection procedures, frequency, and inspector qualifications for all bridges (and structures) with a total span length greater than 20 feet. The inspections are performed by a combination of state, local, and consultant personnel, all of whom have been trained in accordance with the NBIS procedures. In general, IDOT's district bridge inspectors inspect state-maintained bridges, with the exception of major river bridges, which are inspected by Bureau of Bridges and Structures' inspection crews. Local agencies or consultants inspect locally-maintained bridges.

During the inspections, each of the major bridge components is evaluated, including decks (consisting of the deck wearing surface, joints, and parapets), superstructures (consisting of beams, diaphragms, stiffeners, and bearings), substructures (consisting of piers, abutments, foundations, slopes, crash walls, and piling), and culverts using the NBI rating scale that ranges from 0 for a failed structural element to 9 for a structural element in excellent condition. A description of each NBI rating is provided in Table 3-6. A primary NBI rating is assigned to the bridge equal to the lowest rating from the deck, superstructure, and substructure individual ratings.

Table 3-6. NBI Bridge Condition Rating Descriptions.

Code	Description
N	Not applicable.
9	Excellent condition.
8	Very good condition—no problems noted.
7	Good condition—some minor problems.
6	Satisfactory condition—structural elements show some minor deterioration.
5	Fair condition—all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
4	Poor condition—advanced section loss, deterioration, spalling, or scour.
3	Serious condition—loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	Critical condition—advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support.
1	"Imminent" failure condition—major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement is affecting structure stability. (Bridge is closed to traffic, but may be put back in service with corrective action).
0	Failed condition—out of service—beyond corrective action.

In addition, element level inspections, conducted according to the IDOT Bridge Element Inspection Manual, assign quantities of deterioration to one of four condition states for each bridge element using a more detailed breakdown of elements within a bridge. This element level inspection information will form the basis of a Bridge Management System (BMS). Currently the Department is evaluating the AASHTOWare BrM bridge management software. It is anticipated that the output of the BMS will help shape the funding program by identifying structures that need maintenance and repair.

Bridges throughout the system receive a routine visual inspection at least every two years, except for some in good condition that are inspected on a four-year cycle. Underwater inspections are performed every five years. Other inspections may be conducted following incidents that threaten bridge stability (e.g., collisions or floods), to monitor special situations, or following new construction.

The Illinois Tollway conducts routine bridge inspections every two years and the resulting "Structure Inspection Field Reports" are reviewed by the Illinois Tollway's Consulting Engineer. Culverts that meet the FHWA classification of bridges (greater than 20 ft) are also inspected every two years at a minimum as part of the bridge inspections and are assigned a condition rating similar to that of the bridges. As part of the inspection of bridges and culverts, an NBI rating of 0 to 9 is assigned to the structure using the same process that IDOT follows. These ratings are used to document the condition of the deck, superstructure, and substructure. The

inspection data is submitted to IDOT for submittal to the FHWA. As described in the next section, the Illinois Tollway also uses the inspection results to determine an overall Health Index.

ENSURING DATA COLLECTION QUALITY

IDOT has instituted several processes to ensure the quality of the asset condition data used to support its programming activities. As required under the FHWA Transportation Performance Management Rule, the Department has developed a Data Quality Management Plan (DQMP) that was approved by FHWA in October 2018. The DQMP outlines the quality control steps in place for pavement data collection to ensure the quality of the condition information used by the Department. For pavements, the data collection vendor is required to have a Data Quality Control Plan in place that identifies the steps the contractor will take to ensure quality data prior to the start of data collection, as the data is being collected, and during the processing of the data. Pavement distress data is assessed by IDOT raters who have participated in both classroom and field instruction.

For bridges, all inspection personnel receive rigorous training and are qualified as bridge inspectors. Only qualified personnel can inspect bridges in Illinois and the Illinois Structures Information System will not allow the entry of inspection results from a non-qualified inspector. After inspections are completed, the reports are reviewed for accuracy and approved by the responsible Program Manager. Random quality assurance reviews are also conducted in the field and in the office on state and local bridge inspection results to ensure high quality inspections are being performed. Manuals and guidelines are provided to all inspection personnel to aid them during the rating activities.

For both pavements and bridges, the condition information is compared to prior years' data as a reasonableness check. Any pavement sections or bridges with unusual rates of deterioration are flagged for further review.

FACTORS IMPACTING ASSET PERFORMANCE

The age of the pavement and bridge networks is a key factor influencing performance. As pavements and bridges age, they typically require more frequent, and expensive, maintenance and rehabilitation in order to continue to provide acceptable levels of performance. In addition, pavement and bridge conditions are influenced by many other factors.

Factors Impacting Both Pavements and Bridges

There are a number of factors that influence the performance of both pavements and bridges, including:

- Available funding.
- Increased traffic volumes and weights.
- Increased truck percentages.
- The age of the current system.
- Changes in demographics.

- Weather, including the frequency and duration of freeze-thaw cycles, increased flooding due to storm intensity, etc.
- The availability of maintenance personnel and funding to perform preservation work when it is most effective.
- The addition of new traffic lanes or bridges to the system without a corresponding increase in maintenance funding.
- Changes in design specifications that exceed the standards that were in place when many of the pavements and bridges were originally designed.
- Approximately 10 percent of NHS pavements and 19 percent of NHS bridges are outside of IDOT's control, with limited opportunities to influence the treatments used.

Additional Factors Impacting Pavement Performance

In addition to the factors that impact both pavements and bridges, pavement conditions are also influenced by the following:

- The condition of underlying layers.
- Material properties.
- Premature failures due to inadequate drainage.
- Moisture infiltration into the underlying pavement layers.
- Funding limitations that have led to resurfacing as the predominant repair – over time, each resurfacing has a shorter service life than the one before it. This is an unsustainable solution.

Additional Factors Impacting Bridge Performance

There are also several factors that have a significant impact on bridge conditions, as listed below.

- Lack of maintenance funding to prevent premature deterioration.
- IDOT's heavy use of de-icing chemicals has led to premature deterioration.
- IDOT's inability to fully control the timing of repairs for bridges shared with other states.

Chapter 4: Performance Measures, Targets, and Trends

OVERVIEW

To manage its program and monitor progress, IDOT uses two sets of performance targets. For the statewide pavement and bridge networks, IDOT is using performance targets based on its new performance measure of State of Acceptable Condition for tracking and reporting progress, both internally and to outside stakeholders. State of Acceptable Condition targets are also driving investment decisions, supporting IDOT's increased use of preservation treatments to slow the rate of pavement and bridge deterioration.

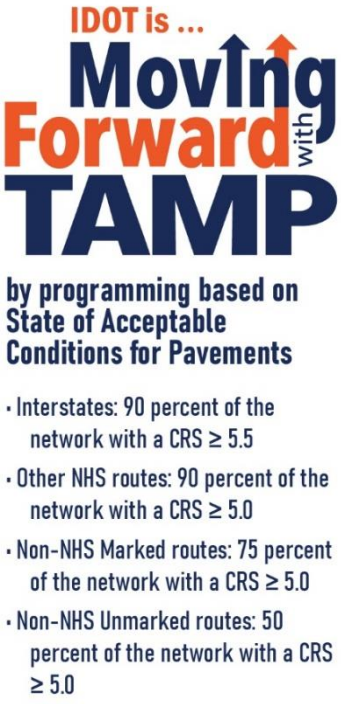
In addition to its internal targets, IDOT is required to set two- and four-year performance targets for pavements and bridges on the NHS using performance measures established by the FHWA. This chapter provides background on both sets of performance measures and their respective targets.

INTERNAL PERFORMANCE MEASURES AND TARGETS

IDOT's internal targets are used primarily to drive pavement and bridge investment decisions on a statewide basis. The pavement measures are based on the CRS metric, which has been in use in Illinois since 1974. The bridge measures are based on NBI ratings. Both measures are discussed in more detail below.

When the initial TAMP was under development, IDOT determined that the use of "State of Acceptable Condition" was a better description of the condition of its assets than the "State of Good Repair" used by FHWA. Guidance for development of asset management plans required that realistic goals, that could be achieved, be used. At that point in time with funding levels and the approach to project selection, the goals IDOT could set did not rise to a level equal to a State of Good Repair but rather a state of acceptable condition as described below.

If conditions improve as asset management principles are implemented and additional funding is programmed consistent with sound life-cycle planning strategies, IDOT may be able to increase the targets set in the 2018 TAMP. That would enable IDOT to move from a State of Acceptable Condition to a State of Good Repair.



IDOT's Pavement Performance Measures

The CRS process has widespread acceptance throughout the Department and has been a vital tool used in programming for decades. Because of this history, the decision was made to maintain CRS as the foundation of the pavement management process.

With the implementation of the TAMP certified by the FHWA in 2018, IDOT initiated changes to its pavement performance metrics that shifted the focus from a worst-first methodology to a more proactive approach that recognizes the importance of preservation activities before pavements deteriorate to an unacceptable condition. This approach uses CRS values to determine the percentage of the highway system that is in a "State of Acceptable Condition," representing a CRS value of 5.5 or higher for interstates and 5.0 for other NHS and non-NHS routes. These CRS values were selected because they represent the lowest condition at which proactive maintenance and preservation treatments are considered viable. The State of Acceptable Condition targets for pavements are based on CRS scores[11].

Using current and predicted CRS values in conjunction with anticipated funding levels, IDOT set performance targets at 90 percent of the centerline miles on interstate and other NHS routes, 75 percent of the centerline miles on marked routes, and 50 percent of the centerline miles on unmarked routes equal to or above the State of Acceptable Condition, as shown in Figure 4-1 below. The State of Acceptable Condition levels for all of the pavements are based on system hierarchy in the following order: Interstate and other NHS routes (non-interstate), non-NHS marked routes, and non-NHS unmarked routes. Moving forward, IDOT's emphasis will continue to focus on preserving the NHS, which tends to be of regional significance and carries higher traffic volumes.

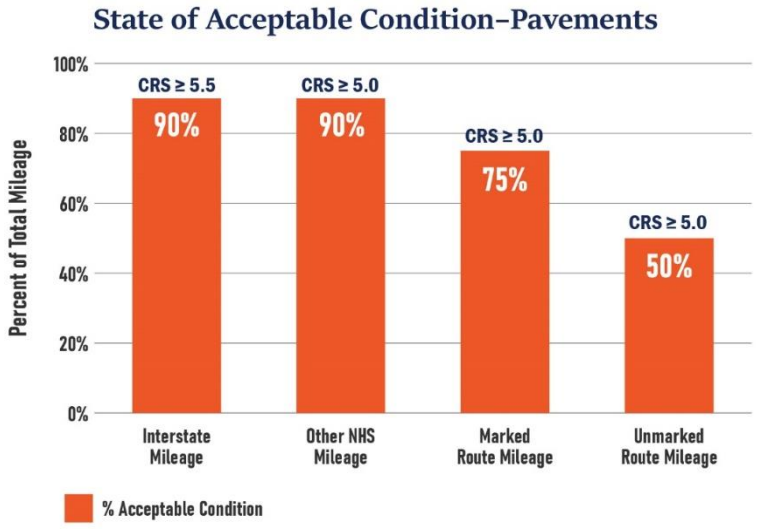


Figure 4-1. State of Acceptable Condition Targets for Pavements.

[11] The CRS procedures are described in Chapter 3.

Illinois Tollway's Pavement Performance Measures

The Illinois Tollway classifies its roadway conditions using slightly different performance measures, as shown in Table 4-1.

These performance metrics are used to report pavement conditions and in turn influence the type and timing of maintenance, preservation, and rehabilitation activities.

Table 4-1. Summary of Pavement Condition Criteria for the Illinois Tollway.

Condition Rating Survey (CRS)	Pavement Condition Category
7.5–9.0	Excellent
6.6–7.4	Good
6.0–6.5	Transitional
4.5–5.9	Fair
1.0–4.4	Poor

Chicago Skyway's Pavement Performance Measures

The Chicago Skyway classifies its pavement condition similar to the Illinois Tollway, as shown in Table 4-2. Repair recommendations are categorized as High, Medium, and Low priority following annual inspections using the metrics.

Table 4-2. Summary of Pavement Condition Criteria for the Chicago Skyway.

Condition Rating	Pavement Condition
5	Excellent
4	Good
3	Fair
2	Poor
1	Failed

Bridge Performance Measures and Targets

IDOT's Bridge Performance Measures

With the implementation of the 2018 TAMP, IDOT established new targets for bridges. This approach uses primary NBI bridge condition ratings to determine the percentage of the square feet of bridge deck area that is in a "State of Acceptable Condition," representing a primary NBI value of 5 or greater for all systems. This primary NBI value was selected because it represents the lowest condition at which proactive maintenance and preservation treatments are

considered viable. The State of Acceptable Condition targets were established based on current and projected conditions, as well as anticipated levels of bridge funding. The performance targets for bridges are set at 93 percent of the NHS bridge deck area and 90 percent of the non-NHS bridge deck area at or above acceptable conditions. These performance targets for bridges are shown in Figure 4-2.

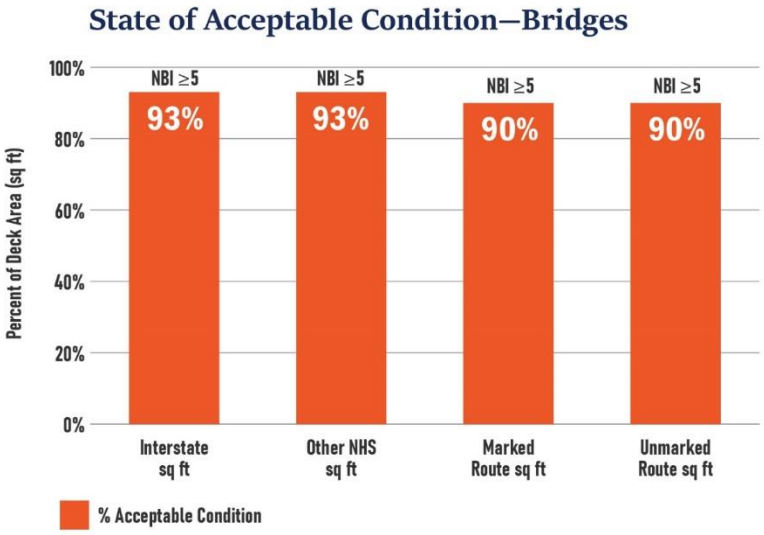


Figure 4-2. State of Acceptable Condition Targets for Bridges[12].

IDOT has increased its focus on programming a range of treatments over a bridge's life span, detailed in IDOT's *Bridge Preservation Guide*, which focuses on meeting targets for State of Acceptable Condition, rather than focusing exclusively on the bridges in the worst condition[13].

Illinois Tollway Bridge Performance Measures

In addition to the NBI rating, the Illinois Tollway calculates a Health Index for each bridge based on a weighting of the deck, superstructure, and substructure ratings from the inspection. The Health Index is intended to provide an overall indication of the structural integrity of a bridge, with a higher weight placed on the deck since it tends to deteriorate faster than the other bridge components. The Health Index is a number on a 0 to 100 scale, with 100 being the best rating, as shown in Table 4-3.

[12] The NBI inspection procedures are described in Chapter 3.
[13] https://idot.illinois.gov/Assets/uploads/files/Doing-Business/Specialty-Lists/Highways/Bridges/Bridge Preservation Guide.pdf

Table 4-3. Illinois Tollway's Bridge Health Index Number Descriptions.

Bridge Health Index	Description
≥90	No problems or some minor problems noted. No action required.
80–89	Some areas of minor deterioration. Minor repairs would prevent or delay additional deterioration.
70–79	Structural elements are sound but exhibit minor section loss or deterioration. Repair contract likely needed within 5 years.
60–69	Advanced section loss. Repair Contract should be initiated within 2 years.
< 60	Advanced loss of section and deterioration. Local failures possible. Immediate attention needed.

Chicago Skyway Bridge Performance Measures

The Chicago Skyway also uses the NBI rating scale to evaluate its bridges. Additionally, repair recommendations are categorized as High, Medium, and Low priority following annual inspections. Higher risk elements (fracture critical bridge elements, for example) are typically more highly prioritized.

FEDERAL PERFORMANCE MEASURES

Federal performance measures have been established to assess performance/condition in carrying out performance-based Federal-aid highway programs[14]. Performance measures have been developed in the following three areas:

- Safety
- Infrastructure
- System Performance

Note that system performance includes measures to address national goals of congestion reduction, system reliability, freight movement and economic vitality, and environmental sustainability. IDOT submitted its Performance Management Form on October 1, 2018, which includes targets for the infrastructure and system performance measures. Additionally, IDOT issued a Performance Measures Report dated March 29, 2019 that documents IDOT's work in all three areas, including what each performance measure does, why it is important, the timeline for reporting targets to FHWA or other agencies, and the targets that were established in response to the measures set by the FHWA[15]. The report also outlined the steps IDOT is taking to improve performance in each area. A new Greenhouse Gas Emissions Measure is currently in the comment phase of the rulemaking process; performance targets for greenhouse gas emissions

[14] https://www.fhwa.dot.gov/tpm/about/how.cfm
[15] http://www.idot.illinois.gov/Assets/uploads/files/About-IDOT/Misc/Planning/LRTP Appendix_F_TPM_Report.pdf

will be set as determined by the final rule. The information contained here focuses on the Infrastructure component of the performance measures, as required in 23 CFR part 515.9(d)(2).

Pavement Performance Measures

FHWA requires state DOTs to report the following performance measures for pavements:

- Percentage of interstate pavements in *Good* condition.
- Percentage of interstate pavements in *Poor* condition.
- Percentage of non-interstate NHS pavements in *Good* condition.
- Percentage of non-interstate NHS pavements in *Poor* condition.

To ensure consistency in how performance is reported by the states, the rules established the performance criteria shown in Table 4-4 for evaluating pavement conditions.

Table 4-4. Federal Pavement Condition Thresholds.

Rating	Good	Fair	Poor
International Roughness Index (IRI) (inches/mile)	< 95	95–170	> 170
Present serviceability rating (PSR) (only for route with posted speed limit < 40 mph)	≥ 4.0	2.0–4.0	≤ 2.0
Cracking (%)*	< 5	CRCP: 5–10 Jointed: 5–15 Asphalt: 5–20	> 10 > 15 > 20
Rutting (inches) (HMA only)	< 0.20	0.20–0.40	> 0.40
Faulting (inches) (PCC only)	< 0.10	0.10–0.15	> 0.15

* Prior to 2017, the cracking percent was not calculated using the same automated tools used for IRI, rutting, and faulting; FHWA Final Rules amended wheel path width used to calculate cracking percent. Therefore, a comparison of cracking percentages from years prior to 2017 with years since 2017 is not comparing similar data and impacts the ability to model a trend.

Pavement ratings are assigned to sections 0.1-mile in length. A pavement is classified as being in *Good* condition if all of the metrics shown in Table 4-5 are *Good*. A pavement is classified in *Poor* condition if two or more metrics are evaluated as *Poor*. All other pavement sections are classified as being in *Fair* condition.

Bridge Performance Measures

FHWA requires the following performance measures for reporting bridge conditions:

- Percentage of NHS bridges classified in *Good* condition.
- Percentage of NHS bridges classified in *Poor* condition.

For bridges, performance is evaluated using the same National Bridge Inspection Standards used by IDOT to assess the condition of the deck, superstructure, and substructure. The FHWA rules define the bridge performance thresholds shown in Table 4-5 for classifying bridge components in *Good*, *Fair*, and *Poor* condition.

Bridges are classified in *Good*, *Fair*, or *Poor* condition based on the most severe NBI component condition. For example, a bridge with a Deck and Superstructure rated in *Fair* condition, but a Substructure in *Poor* condition, would be rated *Poor*.

Table 4-5. Federal Bridge Component Performance Thresholds.

NBI Rating Scale	Good	Fair	Poor
Deck (Item 58)	≥ 7	5 or 6	≤ 4
Superstructure (Item 59)	≥ 7	5 or 6	≤ 4
Substructure (Item 60)	≥ 7	5 or 6	≤ 4
Culvert (Item 62)	≥ 7	5 or 6	≤ 4

FEDERAL PERFORMANCE TARGETS

IDOT's current internal targets, in terms of State of Acceptable Condition, and its two-and four-year federal targets are provided here. While the internal targets are used primarily to drive pavement and bridge investment decisions on a statewide basis, the federal targets play an important role in prioritizing investments on the NHS.

IDOT's Targets

IDOT submitted its Full Performance Period Progress Report on December 16, 2022, including the performance data presented in the section below entitled *Performance Trends*. IDOT submitted its 2022 Baseline Performance Period Report to FHWA with the two- and four-year targets (2024 and 2026) at the same time. The targets presented in Table 4-6 (pavements) and 4-7 (bridges) below have been established by IDOT's executive leadership for inclusion in the 2022 Baseline Performance Period Report. These targets apply to all NHS pavements and bridges, regardless of jurisdiction, although MPOs may set their own targets, as described below.

Table 4-6. IDOT's 2- and 4-year Pavement Targets for Federal Reporting.

Performance Measure	2022 Baseline (%)	2024 Target (%)	2026 Target (%)
Percent Interstate Pavement in Good Condition	65.7	65.0	66.0
Percent Interstate Pavement in Poor Condition	0.4	1.0	0.7
Percent Non-Interstate NHS Pavement in Good Condition	29.5	29.0	30.0
Percent Non-Interstate NHS Pavement in Poor Condition	8.0	8.9	8.5

Table 4-7. IDOT's 2- and 4-year Bridge Targets for Federal Reporting.

Performance Measure	2022 Baseline (%)	2024 Target (%)	2026 Target (%)
Percent NHS Bridges in Good Condition	22.8	18.5	15.8
Percent NHS Bridges in Poor Condition	12.4	12.4	12.0

IDOT currently uses the historical trends approach to establish targets for the federal pavement and bridge performance measures. Because the asset management system is not yet operational and the federal measures have only been in use for four years, IDOT decided this approach was the most informative at this time. IDOT also considered the number of miles of pavements and square feet of bridges in the program that will have been constructed and inspected in time for the 2024 and 2026 reporting. Note that the data reported in 2024 will be based on conditions evaluated in 2023 and therefore projects initiated not later than 2022, the current year.

A primary reason for setting more conservative targets for 2024 was the delay in construction projects in Northern Illinois due to the International Union of Operating Engineers strike. The strike affected production in quarries for seven weeks, ending July 25, 2022. While the projects that were delayed will get constructed, they may not be completed in time to be inspected in 2023 and therefore reported in 2024. The percentage of *Good* and *Poor* interstate and non-interstate NHS pavements, as well as the percentage of *Poor* NHS bridges, are predicted to improve from 2024 to 2026.

The percentage of *Good* bridges is only improved by replacing bridges. Because replacing bridges is very costly and has such a long lead time from programming through design, construction, and final inspection, it may be years before that metric begins to improve in Illinois. It is anticipated the rate of decrease of percentage of bridges in *Good* condition will be slowed by the increased preservation strategies that IDOT has implemented.

MPO Targets

Because MPOs are not required to set their targets until 180 days after the State DOT sets its targets, the 2018 targets are discussed here. Two of the MPOs in Illinois chose not to adopt IDOT's targets in 2018 and instead developed their own for both pavements and bridges. The pavement targets developed by the East-West Gateway are shown in Table 4-8. The East-West Gateway bridge targets are shown in Table 4-9.

Table 4-8. East-West Gateway's 2- and 4-year Pavement Targets for Federal Reporting.

Performance Measure	Baseline (%)	2020 Target (%)	2022 Target (%)
Percent Interstate Pavement in Good condition	54.94	Not required in 2018	56.00
Percent Interstate Pavement in Poor condition	0.40	Not required in 2018	1.00
Percent Non-Interstate NHS Pavement in Good condition	49.31	48.00	46.00
Percent Non-Interstate NHS Pavement in Poor condition	0.56	1.00	2.00

Table 4-9. East-West Gateway's 2- and 4-year Bridge Targets for Federal Reporting.

Performance Measure	Baseline (%)	2020 Target (%)	2022 Target (%)
Percent NHS Bridges in Good condition	39.62	40.0	40.0
Percent NHS Bridges in Poor condition	10.87	9.00	8.00

The Chicago Metropolitan Agency for Planning (CMAP) developed its targets earlier than the federal requirement. Their four-year targets were set in 2017, making their four-year target year 2021 instead of 2022. They chose not to set two-year targets, as they were not required. In March of 2021, CMAP chose to align their four-year pavement targets to IDOT's adjusted four-year pavement targets. In October 2022, CMAP established new 4-year targets for 2025, but again did not set 2-year targets as they are not required. The pavement targets developed by CMAP in 2022 are included in Table 4-10. The CMAP bridge targets are shown in Table 4-11.

Table 4-10. CMAP's 4-year Pavement Targets for Federal Reporting.

Performance Measure	Baseline Value (%)	2025 Target (%)
Percent Interstate Pavement in Good condition	61.3	70.0
Percent Interstate Pavement in Poor condition	0.9	0.5
Percent Non-Interstate NHS Pavement in Good condition	19.2	25.0
Percent Non-Interstate NHS Pavement in Poor condition	10.5	5.0

Table 4-11. CMAP's 4-year Bridge Targets for Federal Reporting.

Performance Measure	Baseline (%)	2025 Target (%)
Percent NHS Bridges in Good condition	36.6	37.1
Percent NHS Bridges in Poor condition	8.6	8.0

Correlation of CRS to Federal Pavement Performance Measures

As noted above, specific pavement performance measures have been established by the FHWA for reporting each state's pavement conditions on the NHS. The federally-mandated performance measures are key to preserving federal funding distributions to IDOT and maintaining flexibility in how those funds can be used. Historically, IDOT has used CRS to manage its pavement network and the information provided by the CRS surveys provides the backbone to the pavement project and treatment selection processes developed as part of implementing asset management; however, the distress data considered in calculating the CRS differ from what is required for federal reporting on the NHS. IDOT has now been collecting both CRS data and the metrics required for federal reporting since 2018. The life-cycle planning strategies and investment strategies provided in Chapters 4 and 6, respectively, are optimized based on CRS.

Because the CRS is calculated from IRI, rutting, and faulting (as appropriate for pavement type) and several different cracking measures, the initial assumption in 2018 was that CRS would correlate fairly well to the federal pavement performance measures. A review of the 2021 NHS pavement data bears this out. Table 4-12 below contains the average CRS value for each category of the overall federal measures: *Good*, *Fair*, and *Poor* on the NHS pavements. CRS values equal to 9.0 were excluded from the calculation, because that value is a default entered when a construction project on that section enters the annual year. The average CRS for pavements in the *Good* federal measure category correlates to the CRS category of Acceptable (No Work). *Fair* pavements correlate to a CRS value in the center of the preservation range. The *Poor* category correlates to a CRS at the top of the rehabilitation range. This value is high primarily because of the skew in pavement data at the lower CRS values, as seen in Figure 4-3. Of the 1,800 centerline miles of pavement below a CRS value of 5.5, fully half of them are above a CRS of 4.6. There are many more miles at the higher CRS values in the *Poor* federal category than there are at the lower CRS values.

As more data is collected during the next 4-year performance period, additional efforts will be undertaken to better correlate CRS and the federal pavement performance measures. Additionally, research will be undertaken to develop condition prediction models for the federal pavement measures.

Table 4-12. Average CRS and Total Miles of NHS Pavement in Federal Reporting Categories.

Federal Measure Category	Weighted Average CRS	Sum of Length
Good	7.5	2,925.85
Fair	6.0	3,846.76
Poor	5.0	405.11

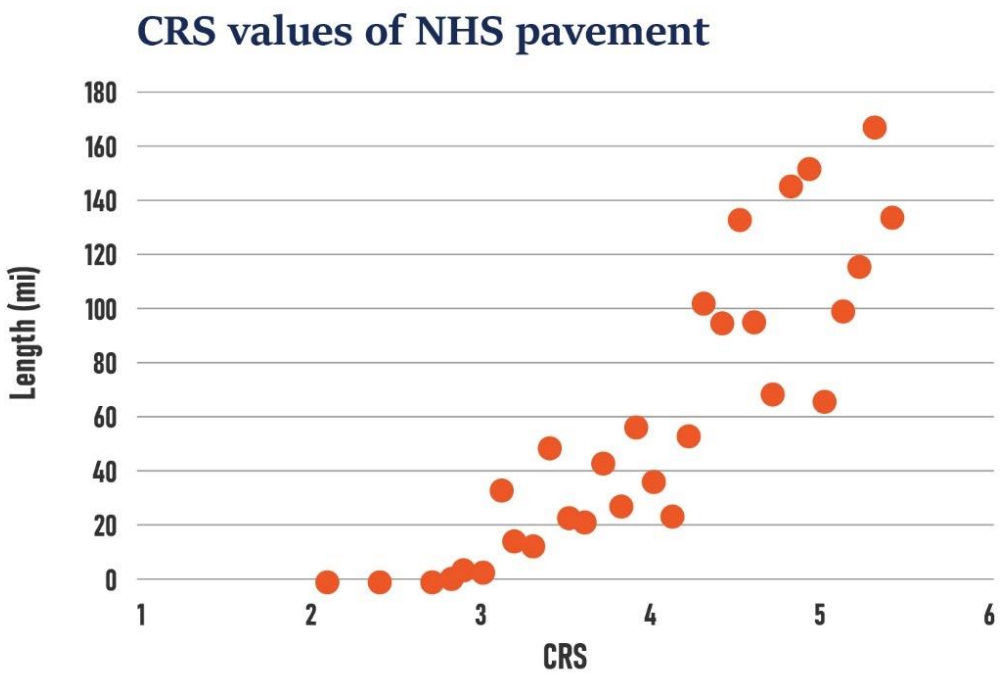


Figure 4-3. Miles of NHS Pavement at Each CRS Value Below 5.5 Based on 2021 Year-End Data.

PERFORMANCE TRENDS

Pavements

IDOT's Pavement Conditions (Internal Measures)

Each MYP, published annually by IDOT, includes projects programmed for the next 6 years. Implementation of the asset management philosophy and the initial 2018 TAMP began in FY 2019. The six-year MYP published in 2019 therefore contained only one year of projects that had never been included in a previous MYP, prior to TAMP implementation. This concept is shown in Figure 4-4 below. Because each MYP is published and available to the public, the projects included in the earliest years of the programming cycle were not able to be modified significantly. As each subsequent programming cycle occurs, the number of projects programmed according to the TAMP guidelines increases. For the FY23-28 MYP, for example, the last five years were developed according to the TAMP, with adjustments made in earlier years, if possible. The FY24-29 MYP will be the first program in which TAMP was fully implemented. In spite of the constraints in changing which projects were included in earlier years of the MYPs published since TAMP implementation, the scope of each project was aligned with treatment guidelines outlined in the TAMP.

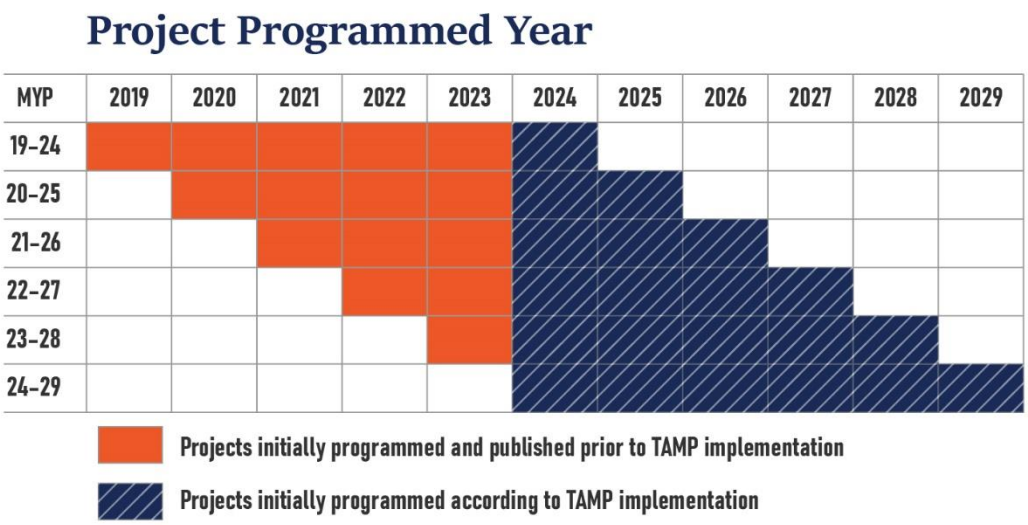


Figure 4-4. TAMP Implementation into the Multi-Year Program.

The effect of this stepwise adoption of TAMP can be seen in the performance data presented in Figures 4-5 and 4-6. While there was an initial drop in each system meeting the State of Acceptable Condition criteria from 2018 to 2019 due to limited funding and the ramp-up in the adoption of the increased preservation life cycle model, the condition of the pavements on all systems increased in 2020 and 2021.

When the initial 2018 TAMP and final 2019 TAMP were written, the State was facing a significant gap between the amount of funding available for maintaining its pavements and bridges and the amount required to meet the targets. In June 2019, the Rebuild Illinois capital program was executed, which increased the funding available for maintaining existing pavements and bridges. Between the adoption of the TAMP and the increased revenue, actual conditions are considerably better now than they were projected to be in the 2019 TAMP.

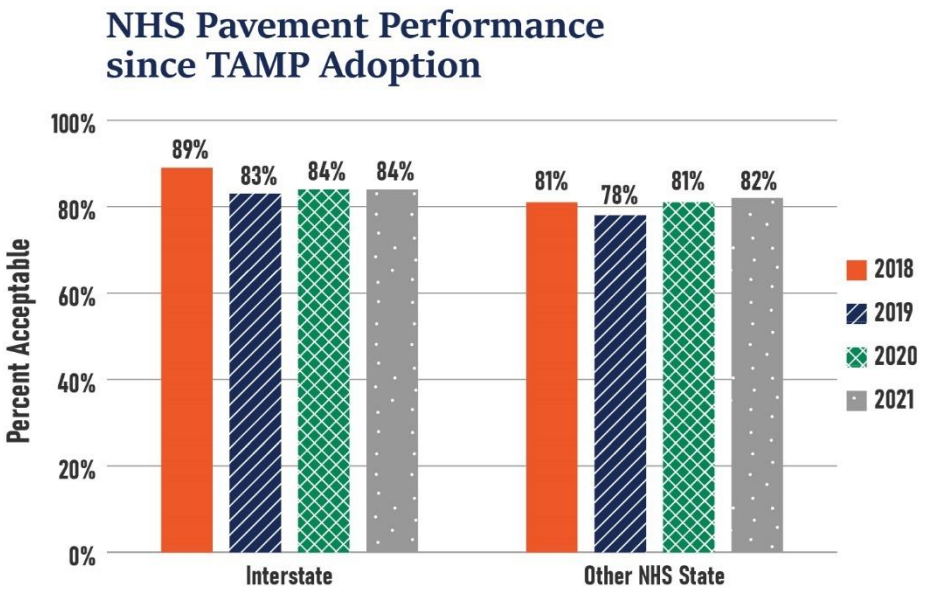


Figure 4-5. Performance of IDOT's NHS Pavements since TAMP Adoption.

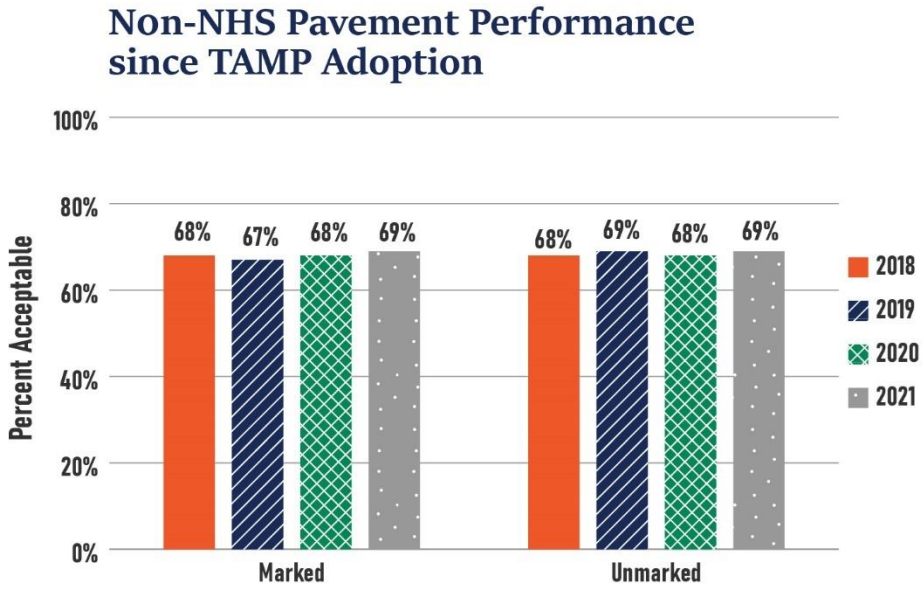


Figure 4-6. Performance of IDOT's Non-NHS Pavements since TAMP Adoption.

Illinois Tollway Pavement Conditions

A summary of system conditions and planned investments is published annually in the Illinois Tollway's Consultant Engineer's report[16]. The 2021 report indicated that no miles were in Poor condition, and only 2.6 percent were in Fair condition. The remainder of the Tollway system was in transitional or better condition or was not rated due to construction activities at the time of condition rating.

The Illinois Tollway has developed its own performance models to predict pavement conditions as part of a 2013 study. The Illinois Tollway models also predict CRS over time, but incorporate additional data, such as traffic volumes, pavement thickness, and construction history.

Chicago Skyway Pavement Conditions

As of the 2021 inspection, 90 percent of the Skyway's pavements are in better than Fair condition, and 100 percent are in better than Poor condition, using the metrics described earlier.

Local Agencies' Pavement Conditions

As noted earlier in this chapter, IDOT determines the CRS values for all local NHS miles of pavement and reports them to the local agencies. The performance trends for the local NHS system are included in Figure 4-7. Coordination with local agencies regarding managing the NHS has been increasing, and expectations are that the local NHS pavement conditions will begin to improve.

Because the condition of the locally-owned NHS pavements has been steady since tracking began in 2018, IDOT has not felt the need to mandate how the NHS is managed by local agencies. In the future, it may be necessary for IDOT to require the local agencies to comply with meeting statewide NHS goals. This could be accomplished by restricting the use of some funding. Currently, IDOT gives local agencies Surface Transportation Program (STP) funds instead of a combination of STP and NHPP funds[17]. A potential approach could reduce STP funding to agencies with deficient NHS assets and replace the funding with NHPP funds. Since NHPP funding has certain requirements associated with it, this change would require NHPP funds to be used to address NHS roads and bridges.

[16] https://www.illinoistollway.com/documents/20184/785974/Consulting+Engineers+2021+Annual+Report.pdf/bd37393f-45a9-7228-7059-7e5e6cef9117?t=1647444628141

[17] STP funds are provided through the Surface Transportation Program and NHPP funds are provided through the National Highway Performance Program. These programs are described in more detail in Chapter 6, *Financial Plan and 10-Year Investment Strategies*.

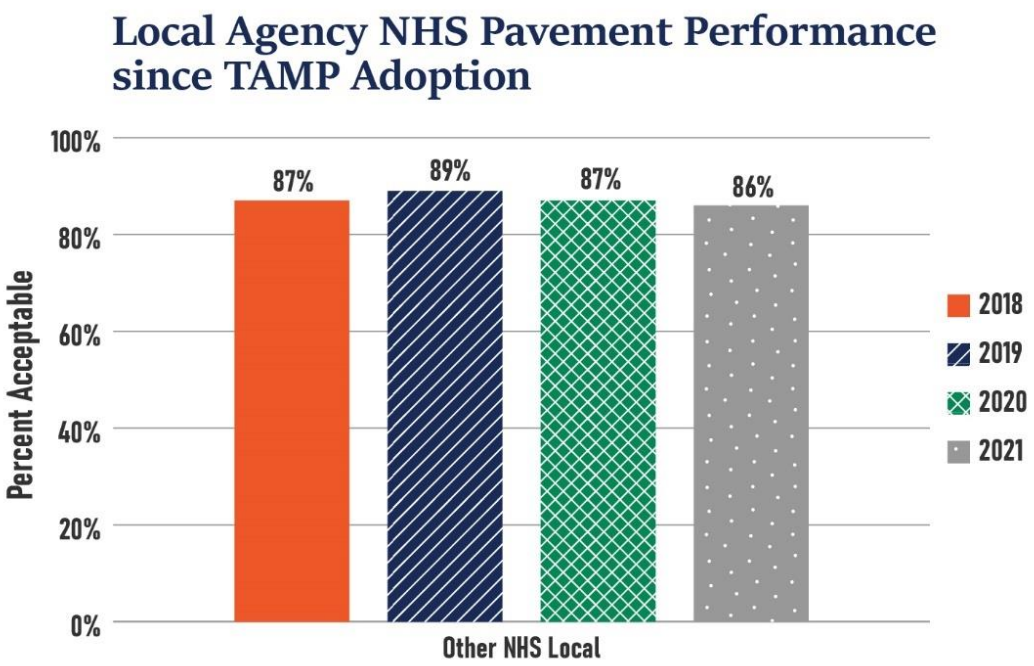


Figure 4-7. Illinois Local Agencies' NHS Pavement Conditions.

These changes will be considered as IDOT monitors the condition of the NHS over the next several years. IDOT will continue to provide the local agencies with updated condition information to make more informed decisions about where their local federal funds should be utilized. In addition, IDOT will periodically evaluate whether portions of the NHS should be removed and/or if it makes better sense for the state to maintain this portion of the system. This exercise is currently underway and only minor changes are anticipated.

Federal Measures

Every year, IDOT submits pavement condition data using the federal metrics to the HPMS system. Figure 4-8 shows the performance results for the interstate system for the first four-year performance period. Figure 4-9 shows the performance of non-interstate NHS pavements for the first four-year performance period. The Illinois Tollway, Chicago Skyway, and local NHS performance is not split from IDOT's NHS performance because they are all reported together to satisfy the federal reporting requirement.

Following the same trends as IDOT's internal measures, the interstate percent *Poor* was highest in 2019 and has dropped the following two years. For the non-interstate NHS pavements (Other NHS), the percent *Poor* was highest in 2020 but dropped more than a full percentage point between 2020 and 2021.

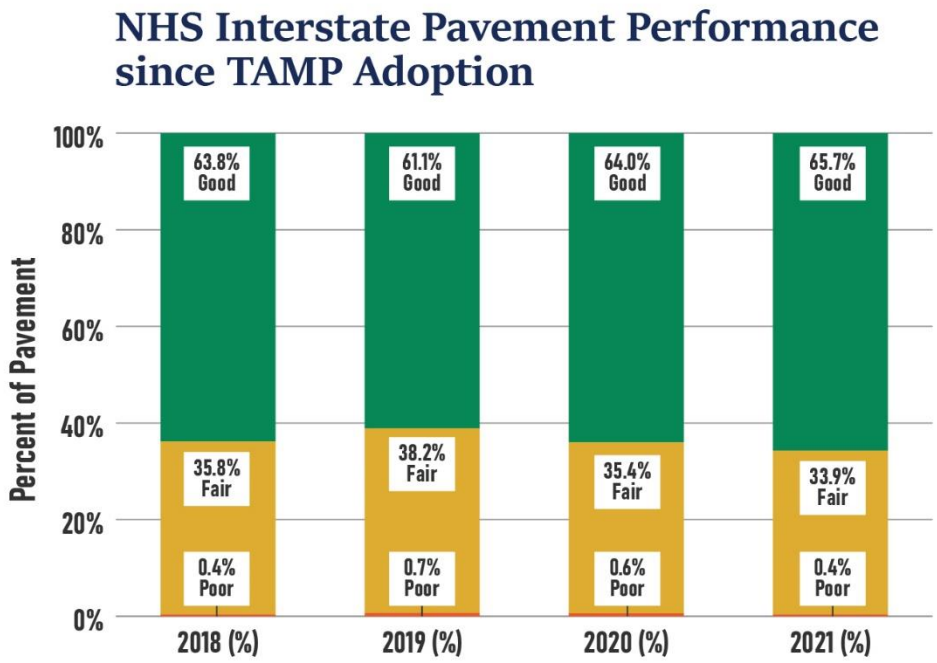


Figure 4-8. Performance of NHS Interstate Pavements since TAMP Adoption – Federal Measures.

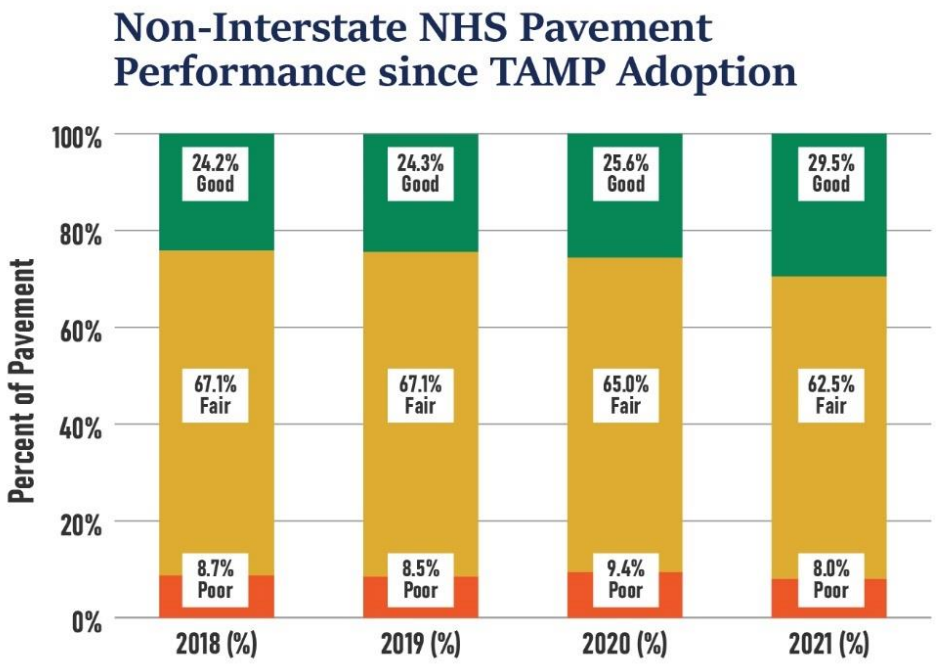


Figure 4-9. Performance of Non-Interstate NHS Pavements since TAMP Adoption – Federal Measures.

IDOT's Bridge Conditions (Internal Measures)

For the FY19-24 MYP, the performance metric for bridges was also changed and the definition for State of Acceptable Condition was set at an NBI rating of 5 or better, representing a bridge that could be preserved using maintenance or preservation treatments. Using this metric, system conditions are presented in Figures 4-10 and 4-11 using the 2021 year-end data. Figure 4-10 shows the percentage of total NHS bridge deck area in the State of Acceptable Condition, while Figure 4-11 shows the same for the non-NHS bridges. As with pavements, the low point of bridge performance for NHS bridges was approximately 2019, the same year the TAMP began to be implemented and the RBI capital program was signed. IDOT has focused on NHS bridges, but it will take several years for the results to be reflected. It takes more time to design, construct, and inspect a bridge project than a pavement project, causing a lag in the performance data.

While IDOT focuses on bringing up the condition of NHS bridges, the conditions of Marked and Unmarked Route bridges may decline somewhat. Maintenance treatments will be applied as needed to keep them at an acceptable level.

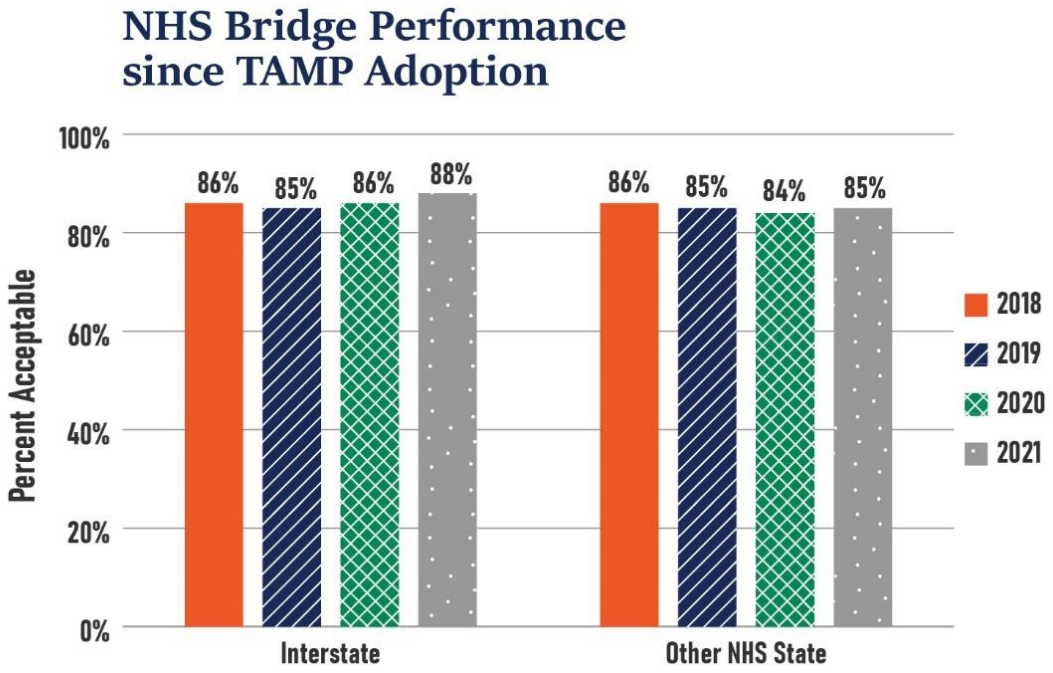


Figure 4-10. Performance of IDOT's NHS Bridges since TAMP Adoption.

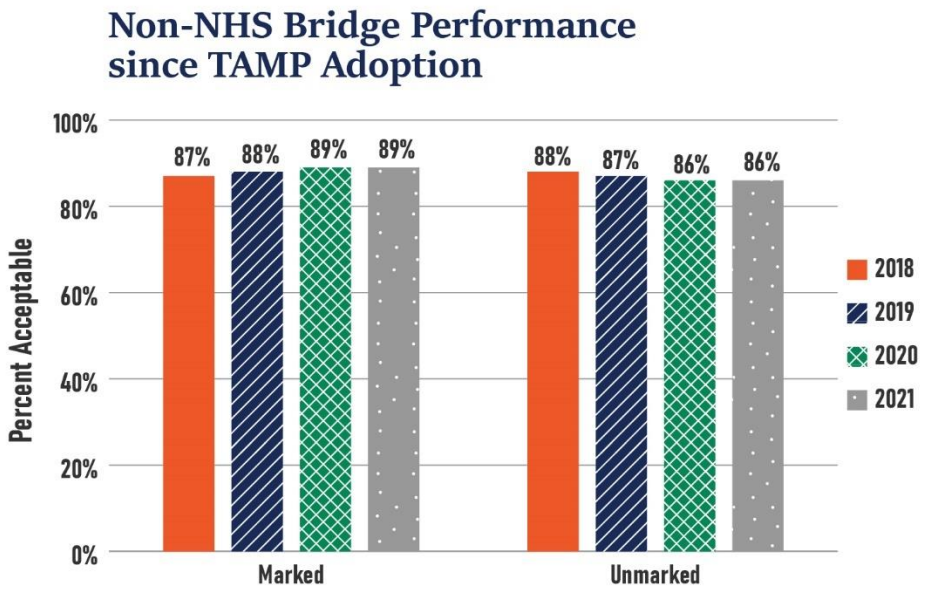


Figure 4-11. Performance of IDOT's Non-NHS Bridges since TAMP Adoption.

Illinois Tollway Bridge Conditions

The Illinois Tollway rates the condition of all bridges on a two-year cycle. The 2021 Illinois Tollway Consulting Engineers report referenced in the Pavement Condition section indicated that no bridges in the 2020-2021 rating cycle had a health index less than 60 using the 0 to 100 scale.

The Illinois Tollway has established models to predict bridge deterioration rates. The Illinois Tollway models look up tables of life cycle based on bridge type for the general bridge component (such as joint, deck, and substructure).

Chicago Skyway Bridge Conditions

As of the 2021 inspection, 90 percent of bridges maintained by the Chicago Skyway are in better than Fair condition and 100 percent are better than Poor condition, using the NBI rating scale defined in the section above entitled Chicago Skyway Bridge Performance Measures (page 32).

Local Agencies Bridge conditions

As noted earlier in this chapter, local agencies typically use consultants to inspect their bridges, then report the inspection results to IDOT. The performance trends for the local NHS system bridges are included in Figure 4-12. Also noted earlier, coordination with the local agencies is improving, and expectations are that conditions will improve as well.

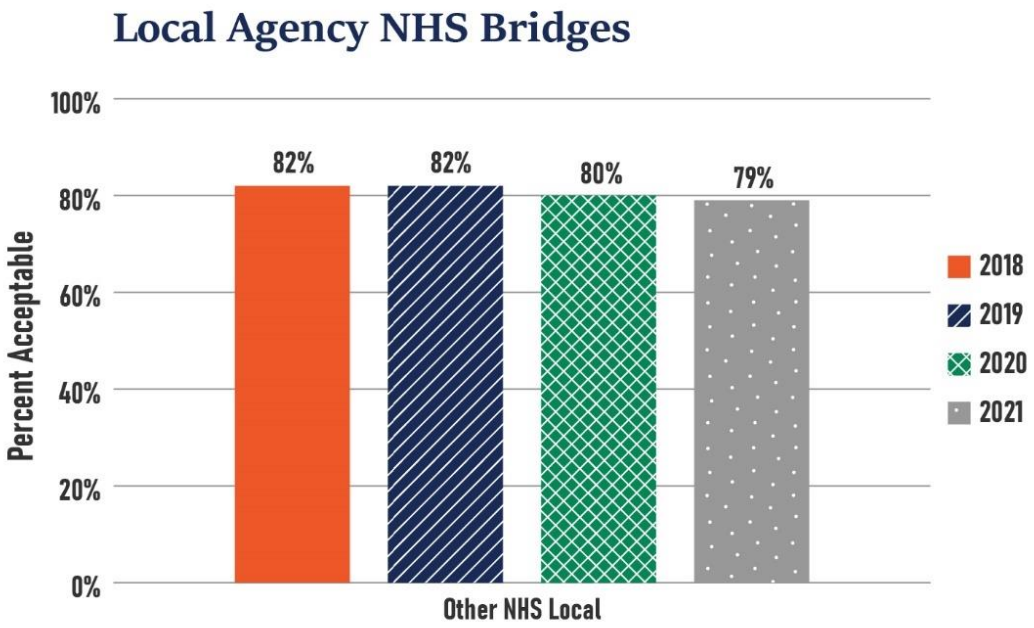


Figure 4-12. Illinois Local Agencies' NHS Bridge Conditions.

The decrease in condition of the locally-owned NHS bridges is concerning. If the downward trend continues, IDOT will consider the measures described above in the Local Agencies Pavement Conditions section.

Federal Measures

Every year, IDOT submits bridge condition data using the federal metrics to the HPMS system. Figure 4-13 shows the performance results for the NHS for the first four-year performance period. The federal measures for bridges do not distinguish between interstate and non-interstate NHS. The Illinois Tollway, Chicago Skyway, and local NHS performance is not split from IDOT's NHS performance because they are all reported together to satisfy the federal reporting requirement.

While the percentage of bridges in *Good* condition has been decreasing, the percentage of bridges in *Poor* condition has also been decreasing, highlighting IDOT's emphasis on reducing the percentage of NHS structurally-deficient bridges. This will be discussed in more detail in Chapter 5, *Life-Cycle Planning*.

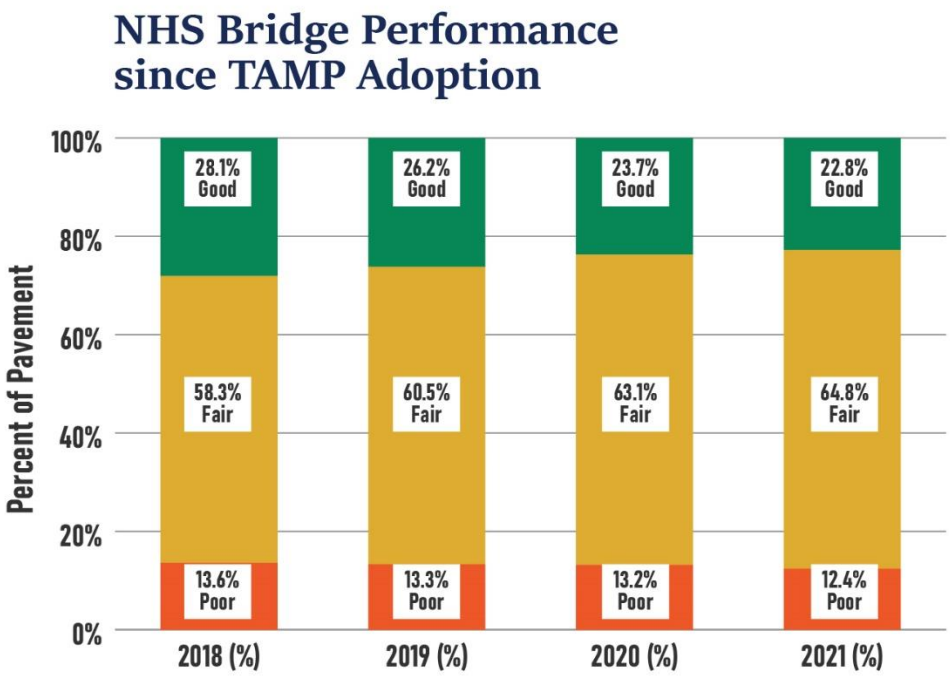


Figure 4-13. Performance of NHS Bridges since TAMP Adoption – Federal Measures.

Chapter 5: Life-Cycle Planning

OVERVIEW

Many factors impact the condition of infrastructure assets, including traffic loads, weather conditions, and material properties. IDOT uses a variety of maintenance and rehabilitation treatments to preserve system performance and to keep the system operating as efficiently as possible. These activities help to offset the factors that lead to system deterioration. Through a planned, strategic approach to managing its assets effectively over their life cycle, IDOT can delay the need for costly repairs and keep the system in a State of Acceptable Condition for as long as possible.

MANAGING THE ASSET LIFE CYCLE

Managing transportation assets is similar to taking care of a home or car. By conducting routine maintenance activities, such as changing the oil or rotating tires, for example, car owners can keep their cars in good condition and avoid the costly repairs associated with engine failure or leaks (see Figure 5-1). Pavements and bridges require similar preventive strategies to keep them operating in the best possible condition for as long as possible. Through regular, ongoing investments in low-cost treatments such as crack sealing a pavement or washing a bridge, these assets can achieve their expected design life and help reduce the likelihood that unexpected, more costly repairs will be needed due to accelerated deterioration.

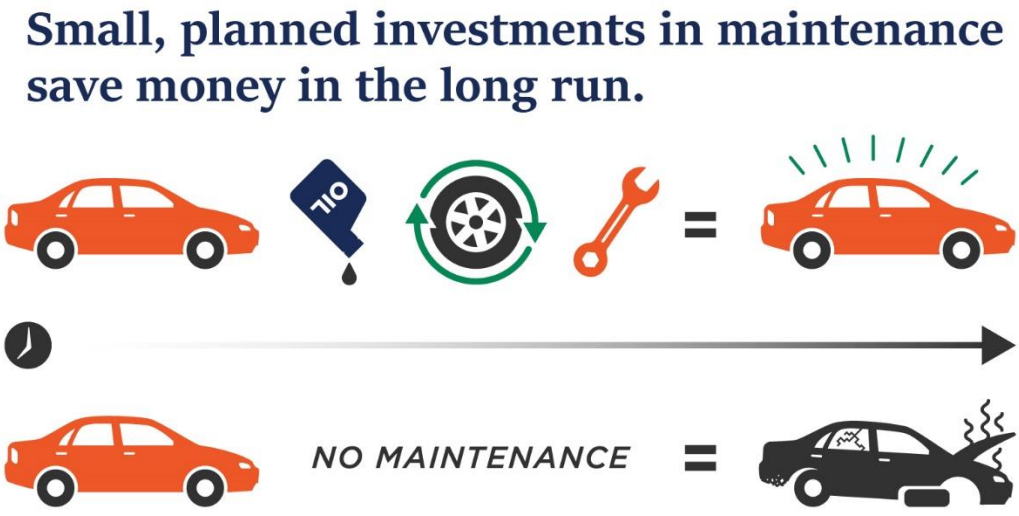


Figure 5-1. Importance of Maintenance to Keep Assets Operational.

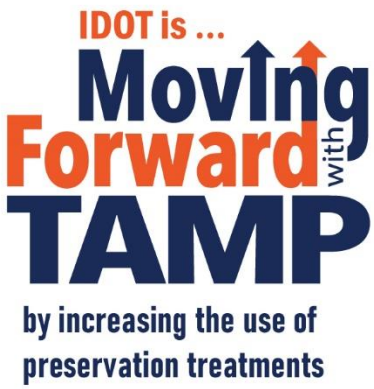
It is not easy to apply these concepts to the transportation system because a) funding levels are not constant and are only known for a small percentage of a pavement's or bridge's expected life, b) needs are greater than available funding, so short-term fixes are often used to keep assets operational, c) there are unexpected events (risks) that impact performance, and d) there are

many competing demands for the same funding, forcing IDOT to choose between investments that preserve system conditions and those that reduce congestion or improve safety. Even so, IDOT recognizes the benefits of applying treatments that preserve system conditions and has included investment strategies in this TAMP that increase the spending on these types of treatments. In addition, IDOT is continuing to enhance business processes that will help to ensure that the districts adopt the system preservation activities outlined in the TAMP. Chapter 9, *Implementation and Integration*, includes training on pavement preservation techniques that have been attended by the districts.

The strategies outlined in this TAMP continue efforts to shift planned investments toward the use of preservation techniques on pavements and bridges before significant deterioration occurs. Over time, these strategies are expected to reduce the overall cost of preserving IDOT's pavements and bridges and slow the overall rate of network deterioration.

Picking the Right Treatment at the Right Time

The key to managing assets over their life is knowing the condition and the rate at which the assets are deteriorating so the right treatments can be identified on a timely basis. Different treatments address different types of deterioration, so knowing the cause and severity of distress is important. As shown in Figure 5-2, there are different categories of work that are applied throughout an asset's life cycle. By applying preservation treatments when assets are still in a State of Acceptable Condition, the useful life of the assets is extended and system conditions are preserved very cost-effectively. Agencies that defer needed maintenance often find that their pavements and bridges don't last as long as expected, which results in higher funding needs than originally planned. IDOT has developed pavement and bridge treatment selection matrices that encourage the timely application of preservation treatments, which have been incorporated into its policies.



The previous chapter described the pavement survey and bridge inspection data that IDOT uses as the basis for determining the types of defects present and the types of repairs that are appropriate. IDOT has also established deterioration models for managing its pavements and bridges that enable the agency to predict the future conditions of these assets so that appropriate treatments can be anticipated and planned. Research is on-going to develop element-level deterioration models for all bridge types and climatic conditions to further improve the Department's ability to manage these important assets as part of the EAMS implementation.

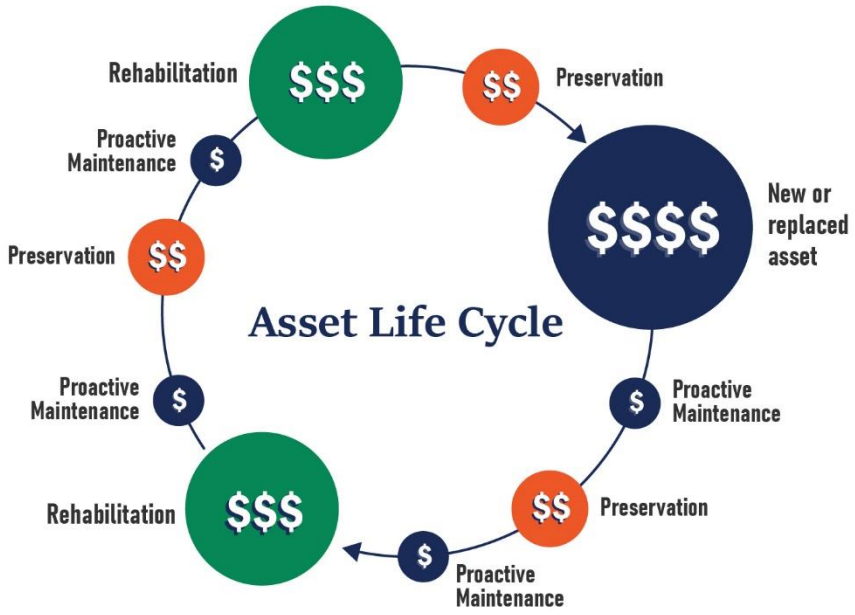


Figure 5-2. Typical Asset Life-Cycle Treatment Needs and Relative Costs.

Types of Pavement Improvements

Depending on the condition of the pavement, type of deterioration present, type of road, and typical traffic levels, one of the following types of improvements may be programmed. Improvement costs increase based on the amount of deterioration present, as shown in the graphic. All costs listed below are statewide averages based on the FY23-28 MYP and include both direct and indirect costs. These costs are defined more completely in the section entitled Treatment Costs.

- **Initial Construction** – This category involves building a new facility or adding new lanes to an existing facility. Treatments in this category average $17.2 million per centerline mile for interstate projects and $4.4 million per centerline mile for non-interstate projects.
- **Maintenance** – Maintenance includes treatments such as crack and joint filling/sealing, cold/micro-milling, and diamond grinding/grooving. These treatments generally cost between $25,000 to $50,000 per centerline mile.
- **Preservation** – These are lower-cost treatments than the next two categories and are designed to be applied to pavements in Good or Fair condition to slow the rate of deterioration. This category includes a variety of treatments, including Surface Maintenance at the Right Time (SMART) overlays of 1.5 to 1.75 inches, hot-in-place recycling, load transfer restoration, and various types of surface treatments. Treatments in this category typically cost between $0.2 million to $1.3 million per centerline mile.
- **Minor and Major Rehabilitation** – Structural overlays (both asphalt and concrete), standard asphalt overlays, bonded concrete overlays, and structural cold-in-place recycling fall in this category. Treatments in this category typically cost between $0.8 million per centerline mile for non-interstate projects to $3.4 million per centerline mile for interstate projects.
- **Replacement** – This category involves total replacement of the pavement, including the base layers. This category also includes unbonded concrete overlays and new pavement over

rubblized concrete. Treatments in this category cost between $2.7 million per centerline mile for non-interstates and $17.2 million per centerline mile for interstates. Full replacement is significantly more expensive than unbonded concrete overlays and rubblization with new pavement, but those treatments are not always feasible.

For interstate pavements, proactive maintenance and preservation treatments are applied to pavements with CRS values between 7.5 and 5.5, minor and major rehabilitation are recommended for pavements with CRS values between 5.4 and 4.0, and replacement is recommended for pavements with CRS values lower than 4.0. Similar types of treatment guidelines were also developed for the other NHS and non-NHS pavements, for consideration in life-cycle planning.

Types of Bridge Improvements

Depending on the type of bridge, condition of the bridge, type of deterioration present, and typical traffic levels, one of the following types of improvements may be programmed. Improvement costs increase based on the amount of deterioration present, as shown in the graphic to the left. All costs listed below are statewide averages that include both pre-construction and construction items.

- **Initial Construction** – This category involves building a new bridge on new alignment. Construction averaged $540 per square foot of deck area in the FY23-28 MYP.
- **Maintenance** – Maintenance includes planned activities to a specific bridge component, such as steel repair, concrete repair, and deck patching. The average cost of these maintenance treatments is $30 per square foot of deck area.
- **Preservation** – This category includes low-cost treatments applied to bridges in relatively good condition to slow their rate of deterioration, including washing, deck sealing, and concrete substructure sealing. Higher cost preservation treatments such as deck overlays, expansion joint replacements, and painting are also included in this category. Preservation treatments generally cost between $0.50 (deck sealing) to $50 (deck overlay) per square foot of deck area.
- **Rehabilitation** – This category includes rehabilitation to, or replacement of, one or more of the major bridge elements, such as deck replacement, superstructure replacement, or substructure rehabilitation. Treatments in this category typically range in price from $270 to $360 per square foot of deck area.
- **Replacement** – This category involves complete replacement of a bridge. Replacement averaged $540 per square foot of deck area in the FY23-28 MYP.

Planned Activities to Improve Life-Cycle Planning

IDOT is in the final stages of configuring new pavement and bridge management software. The software will allow the agency to use deterioration models and network policies to analyze different investment scenarios to improve life-cycle planning. The new software will enable

IDOT to better anticipate its needs, evaluate different investment options, and convey the long-term consequences of different investment strategies. IDOT anticipates training to begin on the software in November 2022 or soon after.

IDOT LIFE-CYCLE PLANNING

In the current absence of asset management systems capable of analyzing various life-cycle scenarios, IDOT has developed a spreadsheet tool to evaluate changes in network conditions associated with different levels of investment. The spreadsheet tool, which was used for both the 2018 and 2019 TAMPs, enables IDOT to:

- Link CRS or NBI ratings to an associated type of treatment based on desired practices. A range of treatments are considered, including maintenance, preservation, rehabilitation, and replacement.
- Establish costs for different levels of repair.
- Define the inventory in terms of the current condition based on the results of the most recent CRS surveys and NBI inspections. For example, the pavement and bridge inventories were defined in terms of interstate, other NHS, marked routes, and unmarked routes. For each system, CRS condition ratings and NBI ratings were defined for each type of repair. The number of miles (for pavements) and square feet (for bridges) at each condition rating were then linked to a level of repair, as discussed earlier.
- Establish deterioration rates for each system and condition category based on the number of years a pavement or bridge was expected to stay in that category without additional treatment. The models were then used to predict changes in condition over the 10-year analysis period.
- Set acceptable condition levels in terms of the percent of the network reaching targeted condition levels. For instance, the State of Acceptable Condition for interstate pavements is 90 percent with a CRS value of 5.5 or higher, and for interstate bridges, the State of Acceptable Condition is 93 percent of the bridge deck area with an NBI rating of 5 or higher.
- Enter expected funding levels over a 10-year analysis period.
- Set funding distributions for pavements and bridges based on the expected funding levels.
- Distribute the available funding by work type. For instance, one scenario could be run with 50 percent of all available funding going to replacement and 50 percent to rehabilitation while an alternate scenario could distribute 20 percent of the funding to maintenance, 20 percent to preservation, 30 percent to rehabilitation, and 30 percent to replacement.
- Generate outputs showing the resulting impact on system conditions after 10 years of spending in accordance with each scenario. The resulting outputs summarized the amount of work conducted in each category, the total amount spent, and the actual percent of the system that satisfies the acceptable condition targets.

Pavement and bridge treatment rules, treatment costs, and deterioration models are discussed more fully in the next section, *Inputs to Life-Cycle Planning Analysis*. This analysis tool was used for both life-cycle planning and developing the investment strategies for the 10-year financial plan in Chapter 7, *Financial Plan and 10-Year Investment Strategies*. To support the implementation of these investment strategies, IDOT provided the districts with enhanced asset data and TAMP treatment selection criteria for identifying projects. This tool is expected to be replaced with pavement and

bridge management software tools in the next several years, as outlined in Chapter 9, *TAMP Implementation and Integration*.

Inputs to Life-Cycle Planning Analysis

Pavement and Bridge Treatment Rules

Pavement Treatment Rules

Appendix C in the 2019 TAMP contained Pavement and Bridge Treatment selection criteria. The Pavement Policy Group worked to implement the treatment decision criteria into the Bureau of Design and Environment Manual, Chapter 53 – Pavement Preservation and Rehabilitation Strategies (BDE Chapter 53) [18]. Therefore, the pavement treatment selection criteria are not included here. In addition, the group has nearly completed the Pavement Management and Evaluation Manual, which outlines the components of pavement life-cycle planning in more detail than the BDE Manual does, and also presents the pavement investigation method for districts to use to ensure the proper life-cycle strategy is employed at the right time. The results of the pavement investigation take precedence over the treatment guidelines contained in BDE Chapter 53. The group meets at least annually to determine if changes are needed to the pavement treatment rules.

Bridge Treatment Rules

The TAMP Bridge Treatment Selection Guidelines are contained in Appendix C. These guidelines are reviewed by the Bridge Working Group on a frequent basis, at least annually. The guidelines were developed from IDOT's *Bridge Preservation Guide*. As stated in the guidelines, bridge replacement commonly occurs under the following conditions:

- Bridge deck or superstructure and the substructure ratings are less than or equal to 4.
- Bridge deck or superstructure ratings are less than or equal to 4 and *the bridge is at least 60 years old*.
- Culvert rating is less than or equal to 4.

Approximately 19 percent of IDOT's bridges are more than 60 years old and another 26 percent are between 50 and 60 years old, causing the second criteria to come into play frequently. The use of the 60-year criteria is currently under review and will likely be replaced with more informative criteria, such as scour rating, insufficient width for the traffic level, troublesome details such as the use of pin and link assemblies, and substructure movement or settlement.

The bridge treatment selection guidelines are intended as a high-level programming tool for evaluation of funding needs or as a general guide or starting point for programming structure work. The tables are included in the Bureau of Programming's Programming Guidelines for the districts to use in initially assessing a bridge's needs.

[18] https://idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Design-and-Environment/Design and Environment Manual, Bureau of.pdf

Once a bridge is initially programmed, a structure's unique condition and characteristics are considered so that individual needs, such as seismic retrofitting to reduce risk, can be considered in the project scope. If a Bridge Condition Report (BCR) is required, then the BCR recommendation takes precedence over the TAMP table when determining final scope, similar to the pavement investigation for pavements. The high percentage of aged bridges is driving a high occurrence of replacement, consistent with the second scenario listed above. The life-cycle planning analysis below and the investment strategies in Chapter 7 take into consideration this programming process for bridges.

It is anticipated that a tipping point will be reached when a sufficient number of aged bridges have been replaced that the life-cycle planning strategies may be able to increase the percentage of preservation and rehabilitation and decrease the percentage of replacement. The life-cycle planning analysis will be revisited frequently to ensure the ability to pivot to more preservation and rehabilitation projects is identified in a timely manner.

Treatment Costs

As part of the preparation to implement the EAMS, IDOT had many discussions about the best cost data to use in the current spreadsheet tool and the EAMS. Costs associated with improving a pavement or bridge consist of three components:

- Direct treatment costs: Cost of the treatment itself. This component includes just the pay items required to complete the treatment, such as the hot-mix asphalt in a HMA overlay, or the concrete and reinforcement needed to construct a replacement concrete pavement.
- Direct project costs: Costs incurred as part of the construction project. These costs include traffic control, mobilization, ancillary features such as traffic signals and guardrail, etc.
- Indirect costs: Costs in advance of the project. This component includes Phase I studies, Phase II plan development, as well as any environmental investigations that may be needed. Also included in this component are utility relocations and land acquisition, and possibly costs associated with railroads.

Because all three cost components are included together in the program appropriations provided annually, which will be discussed in more detail in Chapter 7, the decision was made to include all three components in the unit costs in the spreadsheet tool and the EAMS. Advantages to this method include not overestimating the amount of construction that can be accomplished for a given program amount and also being able to determine how many miles or square feet can be accomplished with increased (or decreased) funding, from preliminary engineering through final construction.

Every year, the MYP is analyzed to quantify the cost and amount of each type of treatment that is planned to be constructed in the upcoming six years. This includes both the direct and indirect costs. The total direct costs per mile or square foot for each treatment type are calculated for construction projects in the MYP. The indirect cost per mile or square foot are calculated based on the advance projects in the MYP. The direct and indirect costs per mile are added together to arrive at the total treatment cost.

Pavement and Bridge Deterioration Models

IDOT Pavement Deterioration Models

As the state highway system continues to age, it has become increasingly important to develop a proactive and predictive approach to plan highway investments. IDOT uses pavement performance models to support the analyses needed to implement this approach. IDOT's models used to predict CRS are based on the historical performance of individual pavement sections over time. The average rate of change in condition over the life of a pavement section is calculated and combined with data from other pavement sections that have similar construction (which are referred to as a "family"). The average rate of change for the entire family is used to predict the future condition of all pavement sections that meet the family criteria. IDOT has refined its models over the years, with the most recent update having taken place in 2018. The pavement performance models are expected to be incorporated into the EAMS.

IDOT currently uses the historical trends approach to establish targets for the federal pavement performance measures. Once the EAMS is in use and the federal measures have been in use longer, research will be conducted to develop a more mature method for predicting performance based on the federal measures and also to better correlate the state's CRS metric with the federal measures.

Factors Impacting the Weight of Pavement Deterioration Prediction Rates

IDOT Bridge Deterioration Models

Because the State bridge metrics are the same as the federal metrics, only one set of deterioration models are needed to predict conditions for use with both metrics. In 2018, deterioration curves were developed for deck, superstructure, substructure, and culverts based on 20 years of historical inspection data to predict future conditions that are currently in use with IDOT's spreadsheet tool and will support IDOT's Bridge Management System. A research project was recently completed with the Illinois Center for Transportation to revise the component-level deterioration models[19]. The research generally validated the current component deterioration models; therefore, no changes have been made to the models as a result of the research. A second research project is ongoing to develop element-level deterioration models for bridges and is expected to be completed in early 2024[20].

Life-Cycle Plan Analysis

Using the investment spreadsheet tool, IDOT analyzed the long-term impact of five different life-cycle plan strategies on network conditions. The strategies considered are documented here:

[19] https://apps.ict.illinois.edu/projects/getfile.asp?id=9841
[20] https://ict.illinois.edu/research/projects. R27-238 Developing Deterioration Curves for Bridge Elements

- **Strategy 1 – FY23-28 MYP-Based 10-Year Program**: Funding consistent with the 10-year program as defined in Chapter 7. Distribution of funds between pavements and bridges, amongst systems, and amongst work types consistent with the FY23-28 MYP.
- **Strategy 2 – Pre-Rebuild Illinois Funding**: Funding is based on the program amounts available prior to the passage of RBI and IIJA. Distribution of funds between pavements and bridges, amongst systems, and amongst work types consistent with the FY23-28 MYP.
- **Strategy 3 - Optimized Asset Type, System, and Work Type Distributions**: Funding consistent with the 10-year program as defined in Chapter 7. Distribution of funds between pavements and bridges, amongst systems, and amongst work types varied to minimize life-cycle costs while striving to achieve the condition targets for all systems.
- **Strategy 3A - Optimized Asset Type, System, and Work Type Distributions with Additional Funding**: Funding increased across the 10-year program to meet the targets on all systems. Distribution of funds between pavements and bridges, amongst systems, and amongst work types varied to minimize life-cycle costs
- **Strategy 4 - Modified MYP Strategy**: Funding consistent with the 10-year program as defined in Chapter 7. Distribution of funds between pavements and bridges, amongst systems, and amongst work types consistent with the FY23-28 MYP for the first 6 years of the analysis, then varied in years 7 to 10 to minimize life-cycle costs while striving to achieve the condition targets for all systems.

The fifth strategy looked at the funding needed to close all gaps. The choice was made to not present the results of that strategy until the EAMS can be used to validate the expected conditions resulting from the first four strategies.

Strategy 1 – FY23-28 MYP-Based 10-Year Program

The first strategy evaluated using the spreadsheet tool analyzed the effect of matching the distribution of funding in the FY23-28 MYP but extending it for the full ten-year analysis period. Under this strategy, funds were distributed between each of the systems and treatment categories as shown in Tables 5-1 (pavements) and 5-2 (bridges). Funding averaged $1.94 billion per year. The funding is higher for the first six years and lower for the last four, as the RBI program tapers off. In this scenario, 51 percent of the funding was devoted to pavements and 49 percent went to bridges.

Table 5-1. Funding Distribution for Pavements under the FY23-28 MYP-Based 10-Year Program.

System	% Budget by System	Percent System Budget by Pavement Treatment Category				
		Low Preservation	High Preservation	Minor Rehab	Major Rehab	Replacement
Interstates	38.0	0	2	13	31	54
Other NHS	34.0	2	9	16	31	42
Marked Routes	25.0	0	2	18	50	30
Unmarked Routes	3.0	0	8	35	38	19

Table 5-2. Funding Distribution for Bridges under the FY23-28 MYP-Based 10-Year Program.

System	% Budget by System	Percent System Budget by Bridge Treatment Category			
		Low Preservation	High Preservation	Rehabilitation	Replacement
Interstates	39.6	5	23	5	67
Other NHS	30.4	6	11	27	56
Marked Routes	12.7	0	8	13	79
Unmarked Routes	17.3	4	4	37	55

This strategy reflects the increased amount of preservation IDOT has incorporated into its program for both pavements and bridges. However, the percentage of replacement is higher than both the pavement conditions and bridge conditions would seem to indicate. The basis for this for bridges was discussed above in the section entitled *Bridge Treatment Rules*. For pavements, there are two primary factors contributing to this:

- The RBI program allowed an increase in the amount of capacity improvements on the interstate and other NHS systems, mostly in the form of added lanes. As described in Chapter 3, more than 80 percent of interstate pavements and nearly 90 percent of other NHS pavements are more than 40 years old, significantly exceeding their anticipated service life. Because of this, the decision was made to replace those pavements in conjunction with the capacity improvements.
- Both IDOT's internal and the federal performance measures are limited in the ability to accurately reflect potential structural failures below the surface of the pavement. Many of IDOT's older composite pavements are now experiencing durability cracking (D-cracking) in the underlying concrete. This type of cracking may be patched and resurfaced, skewing the performance metrics higher than the structural capacity of the pavement would indicate. The implementation of the 2019 TAMP created the impetus for IDOT to initiate methods to accurately identify where in the life cycle a particular pavement was. Because of these methods, pavements with structural issues are coming to light and are now being properly programmed for replacement. The increase in funding from both the RBI program and federal formula funds due to IIJA are allowing the funding of more replacement projects.

The results of the analysis are presented in Tables 5-3 (pavements) and 5-4 (bridges). For pavements, the overall percentage of pavements in a State of Acceptable Condition at the end of the 10-year period decreases from 74 percent to 51 percent. The interstate system is able to achieve its State of Acceptable Condition target, however, the other three systems are not.

For bridges, the overall percentage of bridge deck area in a State of Acceptable Condition decreases only slightly, from 87 percent to 86 percent. Currently, IDOT is in penalty for having more than 10 percent of NHS bridges in *Poor* condition. With this strategy, the percentage *Poor* will be reduced to 5 percent. The marked and unmarked systems decrease in condition, as

anticipated by the strong emphasis placed on NHS bridge conditions, reflected in the funding distributions in Table 5-2 above.

Table 5-3. Pavement Results for the FY23-28 MYP-Based 10-Year Program.

System	Total Pavement Miles	Number of Acceptable Miles		% Acceptable Miles		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	1,892.54	1,606.22	1,892.54	85	90	☑ 100
Other NHS	5,079.78	4,170.53	2,841.85	82	90	☒ 56
Marked Routes	6,568.97	4,414.31	2,906.40	67	75	☒ 44
Unmarked Routes	2,340.53	1,596.42	437.75	68	50	☒ 19
Statewide Total	**15,881.82**	**11,787.48**	**8,078.54**	**74**		**51**

Table 5-4. Bridge Results for the FY23-28 MYP-Based 10-Year Program.

System	Total Bridge Square Feet	Number of Acceptable Square Feet		% Acceptable Square Feet		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	32,650,129	28,581,785	32,650,129	88	93	☑ 100
Other NHS	27,627,301	23,612,267	24,567,156	85	93	☒ 89
Marked Routes	12,128,031	10,812,460	8,913,910	89	90	☒ 73
Unmarked Routes	14,390,848	12,319,894	8,276,617	86	90	☒ 58
Statewide Total	**86,796,309**	**75,326,406**	**74,407,812**	**87**		**86**

Strategy 2 – Pre-Rebuild Illinois Funding

The second strategy looked back to the funding that was available for sustaining IDOT's pavements and bridges prior to the passage of the Rebuild Illinois and IIJA programs. This funding level averaged out to $1.03 billion per year, as opposed to $1.94 billion per year as currently projected with RBI and IIJA funding. In this scenario, funding distributions to the asset types, systems, and work types matched the distributions in the first scenario. The anticipated conditions after 10 years of this limited funding is demonstrated in Tables 5-5 and 5-6, for pavements and bridges, respectively.

Table 5-5. Ten-Year Pavement Condition Projections Based on Pre-RBI/IIJA Funding.

System	Total Pavement Miles	Number of Acceptable Miles		% Acceptable Miles		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	1,892.54	1,606.22	1,532.86	85	90	☒ 81
Other NHS	5,079.78	4,170.53	2,268.30	82	90	☒ 45
Marked Routes	6,568.97	4,414.31	2,279.45	67	75	☒ 35
Unmarked Routes	2,340.53	1,596.42	347.81	68	50	☒ 15
Statewide Total	**15,881.82**	**11,787.48**	**6,840.58**	**74**		**43**

Table 5-6. Ten-Year Bridge Condition Projections Based on Pre-RBI/IIJA Funding.

System	Total Bridge Square Feet	Number of Acceptable Square Feet		% Acceptable Square Feet		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	32,650,129	28,581,785	22,732,468	88	93	☒ 70
Other NHS	27,627,301	23,612,267	22,073,631	85	93	☒ 80
Marked Routes	12,128,031	10,812,460	7,739,226	89	90	☒ 64
Unmarked Routes	14,390,848	12,319,894	7,544,005	86	90	☒ 52
Statewide Total	**86,796,309**	**75,326,406**	**60,089,330**	**87**		**69**

It should be noted that the initial conditions are based on the 2021 year-end conditions, which are better than they would have been had the RBI not been enacted in 2019. As noted in the 2019 TAMP, the funding levels available were inadequate to achieve a State of Acceptable Condition on any of the asset types or systems within a 10-year analysis period. With the Pre-Rebuild Illinois strategy, overall pavement conditions would have been 43 percent, as opposed to 51 percent based on the FY23-28 MYP strategy described above. Without the RBI and IIJA funding, bridge conditions would have been 69 percent overall using IDOT's State of Acceptable Condition metric, with the percentage *Poor* using the federal metric at 26 percent.

Strategy 3 – Optimized Asset Type, System, and Work Type Distributions

A third strategy was evaluated using the spreadsheet tool to analyze the effect of modifying the distribution of funding in the FY23-28 MYP to optimize the spending between asset types (pavements and bridges); systems (interstates, other NHS, marked and unmarked); and work types (preservation, rehabilitation, and replacement). This strategy reflects the ideal mix of projects with the currently available funding. It does not account for projects already committed in the FY23-28 MYP, many of which work to fulfill the RBI program. It also does not account for the need for additional replacement of pavements and bridges as discussed in Strategy 1.

However, it is useful to identify the direction IDOT should take once the RBI program has been delivered and sufficient aged pavements and bridges have been replaced.

Under this strategy, funds were distributed between each of the treatment categories as shown in Tables 5-7 (pavements) and 5-8 (bridges). It should also be noted that the total funding was maintained from Strategy 1; however, 60 percent of the funding was allocated to pavements and 40 percent was allocated to bridges, as repeated runs of the tool showed that split to best meet the goals of both asset types.

Table 5-7. Funding Distribution for Pavements under the Optimized Strategy.

System	% Budget by System	Percent System Budget by Pavement Treatment Category				
		Low Preservation	High Preservation	Minor Rehab	Major Rehab	Replacement
Interstates	14.0	7	15	33	35	10
Other NHS	49.0	10	33	30	17	10
Marked Routes	30.0	9	34	30	17	10
Unmarked Routes	7.0	8	32	30	20	10

Table 5-8. Funding Distribution for Bridges under the Optimized Strategy.

System	% Budget by System	Percent System Budget by Bridge Treatment Category			
		Low Preservation	High Preservation	Rehabilitation	Replacement
Interstates	36.0	5	25	35	35
Other NHS	28.0	5	20	30	45
Marked Routes	14.0	10	25	30	35
Unmarked Routes	22.0	15	35	30	20

This strategy further increases the amount of preservation for both pavements and bridges. In addition, the percentage of replacement is reduced and rehabilitation is increased, as is expected upon the completion of the RBI program. The objective of the strategy is to demonstrate how the performance gaps may be closed by varying the overall life-cycle planning model.

The results of the analysis are presented in Tables 5-9 (pavements) and 5-10 (bridges). For pavements, the change in the overall percentage of pavements in a State of Acceptable Condition is negligible, decreasing from 74 percent to 72 percent for the same level of funding used in the FY23-28 MYP strategy. Interstates would meet the State of Acceptable Condition target, other NHS pavements would maintain their condition, marked routes would improve slightly and unmarked routes would see less of a decrease than predicted by the first strategy.

In spite of shifting funding from pavements to bridges, the overall percentage of bridge deck area in a State of Acceptable Condition improves from 85 percent to 91 percent by changing the allocation of funding for the work types. All bridge systems would be at or above 90 percent acceptable, with the other NHS system meeting its State of Acceptable Condition target of 93 percent. The percentage *Poor* using the federal metrics would be reduced to 9 percent.

Table 5-9. Pavement Results for the Optimized Strategy.

System	Total Pavement Miles	Number of Acceptable Miles		% Acceptable Miles		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	1,892.54	1,606.22	1,723.61	85	90	☑ 91
Other NHS	5,079.78	4,170.53	4,112.36	82	90	☒ 81
Marked Routes	6,568.97	4,414.31	4,611.29	67	75	☒ 70
Unmarked Routes	2,340.53	1,596.42	921.82	68	50	☒ 39
Statewide Total	**15,881.82**	**11,787.48**	**11,369.08**	**74**		**72**

Table 5-10. Bridge Results for the Optimized Strategy.

System	Total Bridge Square Feet	Number of Acceptable Square Feet		% Acceptable Square Feet		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	32,650,129	28,581,785	29,376,243	88	93	☒ 90
Other NHS	27,627,301	23,612,267	25,713,088	85	93	☑ 93
Marked Routes	12,128,031	10,812,460	11,212,663	89	90	☑ 92
Unmarked Routes	14,390,848	12,319,894	13,074,124	86	90	☑ 91
Statewide Total	**86,796,309**	**75,326,406**	**79,376,118**	**87**		**91**

Strategy 3A – Optimized Asset Type, System, and Work Type Distributions with Additional Funding

A modification of the third strategy was evaluated using the spreadsheet tool to analyze the effect of increased funding utilizing the same funding distributions shown in Strategy 3. Under this strategy, funds were distributed between each of the treatment categories as shown in Tables 5-7 (pavements) and 5-8 (bridges) above. Funding averaged $2.17 billion per year, increased from $1.94 billion in the previous analysis. In this scenario, 60 percent of the funding was devoted to pavements and 40 percent went to bridges, consistent with Strategy 3.

The results of the analysis are presented in Tables 5-11 (pavements) and 5-12 (bridges). For pavements, the overall percentage of pavements in a State of Acceptable Condition increases from an initial condition of 74 percent to 78 percent. The overall percentage of bridge deck area in a State of Acceptable Condition improves from an initial condition of 87 percent to a final

condition of 96 percent. The percentage *Poor* using the federal metrics would be reduced to 9 percent.

Table 5-11. Pavement Results for the Optimized with Additional Funding Strategy.

System	Total Pavement Miles	Number of Acceptable Miles		% Acceptable Miles		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	1,892.54	1,606.22	1770.9	85	90	☑ 94
Other NHS	5,079.78	4,170.53	4583.8	82	90	☑ 90
Marked Routes	6,568.97	4,414.31	4904.5	67	75	☑ 75
Unmarked Routes	2,340.53	1,596.42	1173.6	68	50	☑ 50
Statewide Total	**15,881.82**	**11,787.48**	**12,443.8**	**74**		**78**

Table 5-12. Bridge Results for the Optimized with Additional Funding Strategy.

System	Total Bridge Square Feet	Number of Acceptable Square Feet		% Acceptable Square Feet		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	32,650,129	28,581,785	30,834,052	88	93	☑ 94
Other NHS	27,627,301	23,612,267	26,630,413	85	93	☑ 96
Marked Routes	12,128,031	10,812,460	11,788,810	89	90	☑ 97
Unmarked Routes	14,390,848	12,319,894	13,867,159	86	90	☑ 96
Statewide Total	**86,796,309**	**75,326,406**	**83,282,199**	**87**		**96**

Strategy 4 – Modified MYP Strategy

The fourth strategy evaluated using the spreadsheet tool analyzed the effect of maintaining the distribution of funding in the FY23-28 MYP through FY 2028 and increasing preservation and rehabilitation for FY 2029 through FY 2032. The goal of this strategy is to model a life-cycle strategy that could most easily be implemented by IDOT, considering the projects that are already committed in the first 6 years of the 10-year analysis period. Under this strategy, funds for the first 6 years were distributed according to the distributions presented under Strategy 1, in Tables 5-1 and 5-2. For the last 4 years of the 10-year analysis period, the distribution between each of the systems and treatment categories is the same as that in Strategy 3, shown in Tables 5-7 (pavements) and 5-8 (bridges). The split between asset types was 58 percent pavements and 42 percent bridges for the entire 10-year analysis period.

The results of the analysis are presented in Tables 5-13 (pavements) and 5-14 (bridges). For pavements, the overall percentage of pavements in a State of Acceptable Condition at the end of year 10 is 59 percent, as opposed to 51 percent if the FY23-28 MYP funding distributions are

maintained for all 10 years. Interstates are able to achieve the State of Acceptable Condition target, while the other three systems will decrease in condition.

For bridges, the overall percentage of bridge deck area in a State of Acceptable Condition remains stable during the 10-year period. Interstate bridges would exceed their State of Acceptable Condition target, and other NHS bridges would nearly meet their target. The percentage *Poor* would be reduced to 7 percent over the 10-year time period. This is higher than the percentage *Poor* for the FY23-28 MYP strategy because funding becomes more balanced between interstates and other NHS bridges. Marked and unmarked bridges would decrease less than they would have if the MYP strategy were maintained through the 10-year analysis period.

Table 5-13. Pavement Results for the Modified MYP Strategy.

System	Total Pavement Miles	Number of Acceptable Miles		% Acceptable Miles		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	1,892.54	1,606.22	1,892.54	85	90	☑ 100
Other NHS	5,079.78	4,170.53	3,304.54	82	90	☒ 65
Marked Routes	6,568.97	4,414.31	3,730.97	67	75	☒ 57
Unmarked Routes	2,340.53	1,596.42	491.80	68	50	☒ 21
Statewide Total	**15,881.82**	**11,787.48**	**9,419.85**	**74**		**59**

Table 5-14. Bridge Results for the Modified MYP Strategy.

System	Total Bridge Square Feet	Number of Acceptable Square Feet		% Acceptable Square Feet		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	32,650,129	28,581,785	30,951,855	88	93	☑ 95
Other NHS	27,627,301	23,612,267	25,325,855	85	93	☒ 92
Marked Routes	12,128,031	10,812,460	9,443,852	89	90	☒ 78
Unmarked Routes	14,390,848	12,319,894	9,437,496	86	90	☒ 66
Statewide Total	**86,796,309**	**75,326,406**	**75,159,058**	**87**		**87**

The above resulting outcomes are not ideal, however, there are several factors affecting the results. As discussed in the first strategy, based on the FY23-28 MYP, the additional funding provided through the RBI program has allowed some of the capacity issues IDOT currently faces to be addressed. Based on freight needs and previously-identified bottlenecks, key locations throughout the state were identified and projects were added to the program. Addressing capacity issues on a roadway also requires that the existing pavement be reconstructed which has increased the dollar value going towards interstates. There are also several new federal grant programs that may be leveraged for funding of these projects. IDOT is pursuing many of

these grants. If the grants are received, funding allocated for those projects may be diverted to close some of the gaps on non-interstate routes.

Although bridge conditions on the non-interstate systems decrease over the 10-year analysis period, the chosen ratio of funding for pavements as compared to bridges best balances the needs of pavements and bridges. This life-cycle planning strategy also allows Illinois to achieve an acceptable NHS bridge deck area above 90 percent, or less than 10 percent structurally deficient, as required by 23 CFR part 490.413.

The spreadsheet tool used to analyze the life-cycle planning strategies has limitations in its ability to handle the complexities of programming. Many of these limitations will be rectified by implementing the EAMS. Once the new system is in production, the life-cycle planning strategies will be rerun and adjustments will be made to spending if necessary.

Recommended Life-Cycle Planning Strategy

The results of the life-cycle planning analyses are useful in demonstrating the effect of various funding levels as well as continuing to increase the proactive preservation program to improve the overall condition of the pavement and bridge networks. Figure 5-3 below shows the overall State of Acceptable Condition results for pavements for four of the strategies analyzed above and Figure 5-4 presents the same results for the bridges. Note that the increased funding strategy is not shown in the figures. That strategy is discussed in more detail in Chapter 8, *Performance Gap Analysis*.

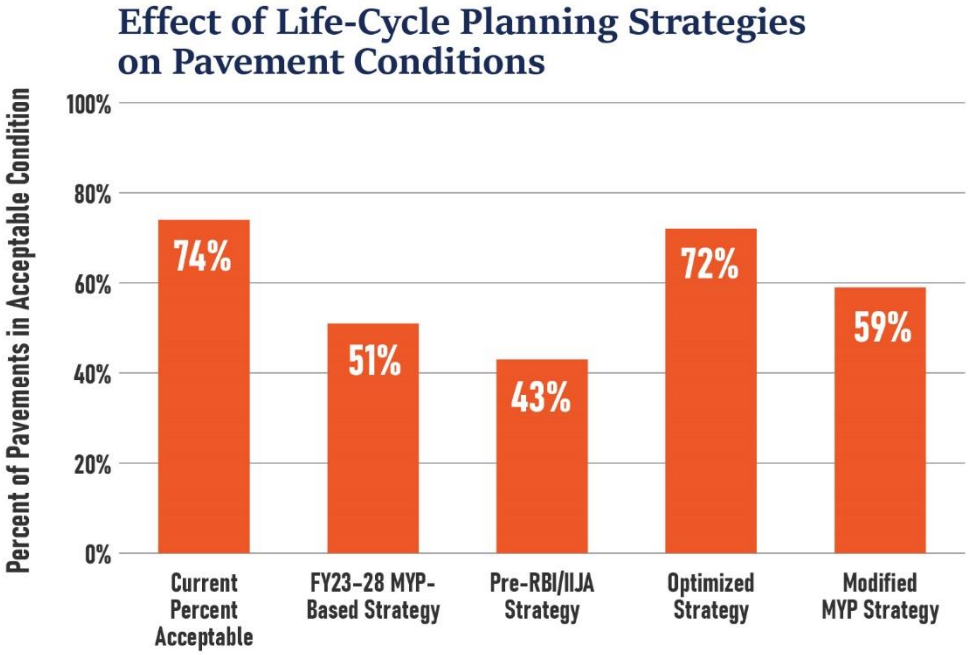


Figure 5-3. Life-Cycle Planning Strategies Effect on Pavement Conditions.

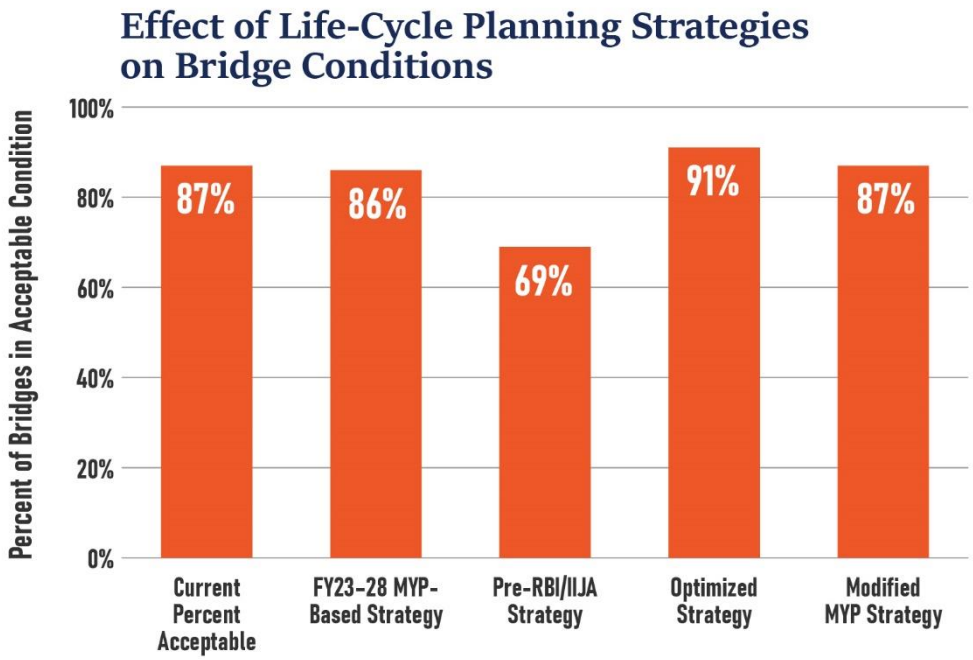
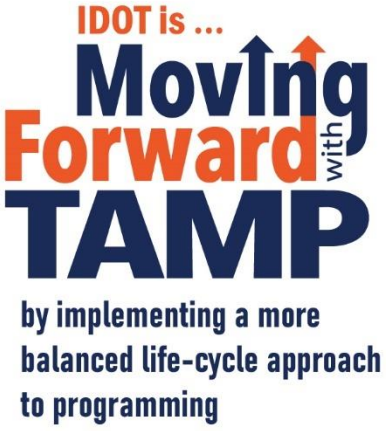


Figure 5-4. Life-Cycle Planning Strategies Effect on Bridge Conditions.

In an ideal world, the optimized strategy presented as Strategy 3 would be adopted for the entire 10-year analysis period. However, as noted above, a portion of the available funding has been allocated to certain projects to fulfill the RBI program. In addition, the percentage of replacement of both pavements and bridges will continue to be higher than conditions would seem to indicate, as described in Strategy 1. Once the RBI program has been delivered, and as a sufficient percentage of aged pavements and bridges have been replaced, the funding allocations will be modified to better align with the Optimized strategy.

Although the Optimized Asset Type, System, and Work Type Distributions strategy would give the best overall conditions, the Modified MYP strategy is the most implementable given the constraints noted in the last paragraph. Therefore, the Modified MYP strategy was recommended for consideration in developing the planned 10-year investments in Chapter 7, *Financial Plan and 10-Year Investment Strategies*. Much progress has been made in implementing a more balanced life cycle approach to programming, and the upcoming roll-out of the asset management system will put tools in the districts' hands to allow them to take ownership of sound investment strategies in each district.



Resilience in Life-Cycle Planning

The life-cycle planning process must include future changes in demand, information on current and future environmental conditions including extreme weather events, climate change, and seismic activity; and other factors that could impact whole of life costs of assets. While IDOT's life-cycle planning process

does not explicitly consider those effects, they are considered implicitly throughout the asset management process. For example:

- Changes in demand may be a localized phenomenon, such as when a new manufacturing facility is constructed, however, the annual vehicle miles of travel have been level in Illinois dating back to the early 2000's[21]. The Illinois Travel Statistics report is updated annually, and any upward trends will be identified through that effort.
- Extreme weather, climate change, and seismic activity are actively managed risks and are discussed in more detail in *Chapter 6, Risk Management and Planning for Resilience*. Seismic activity specifically is considered through the programming process for bridges in the seismic zones in southern Illinois. Changes in climate also affect life-cycle planning through deterioration modeling.
- IDOT is always striving to reduce whole of life costs of assets. One example is a current research project, "Optimized Hot-Mix Asphalt (HMA) Lift Configuration for Performance." Another project currently in progress is "Optimal Approach for Addressing Reinforcement Corrosion for Concrete Bridge Decks in Illinois" [22].

ILLINOIS TOLLWAY LIFE-CYCLE PLANNING

The Illinois Tollway has a detailed asset management system in order to adhere to the Amended and Restated Trust Indenture, the Illinois State Toll Highway Authority to the First National Bank of Chicago, as Trustee, Effective March 31, 1999 (Trust Indenture). Section 712 of the Trust Indenture states: "The Authority shall at all times operate or cause to be operated the Tollway System properly and in a sound and economical manner and shall maintain, preserve, reconstruct and keep the same or cause the same to be so maintained, preserved, reconstructed and kept, with the appurtenances and every part and parcel thereof, in good repair, working order and condition, and shall from time to time make, or cause to be made, all necessary and proper repairs, replacements and renewals so that at all times the operation of the Tollway System may be properly and advantageously conducted."

The asset management system begins with planning maintenance, preservation, rehabilitation, and replacement activities of all the pavement. This 50-year plan was developed to economically maintain the pavement systemwide. Considering the Illinois Tollway has a fee-based funding system, a priority is made to minimize impact to its customers. Subsequently, preservation cycles for bridges, walls, tolling equipment etc. are aligned with the pavement activities, when feasible. Additional consideration includes projected revenue, industry capacity, and risk.

The result of this analysis is the basis for the renewal and replacement deposit, which reserves sufficient funds necessary to maintain the assets of the Illinois Tollway in a state of good repair. System expansion and other enhancements are funded separately in conjunction with a Capital Program.

[21] https://idot.illinois.gov/Assets/uploads/files/Transportation-System/Reports/OP&P/Travel-Stats/2021-travel-stats/Travel%20History.pdf
[22] https://ict.illinois.edu/research/projects, Projects R27-204 and R27-SP52

CHICAGO SKYWAY LIFE-CYCLE PLANNING

The Skyway goal is early intervention with preservation and maintenance to extend the life of major elements as much as possible. This is facilitated by the Skyway's aggressive goal of maintaining pavement and bridges above Fair ratings.

For both pavements and bridges, the overall life-cycle strategy is to spend 60 percent of the annual budget on construction, replacement, and rehabilitation activities along with 20 percent on maintenance and 20 percent on preservation. If there are no pavements or bridges with a condition indicating higher level treatments, a greater percentage of the annual budget will be devoted to lower-level treatments such as preservation.

LOCAL AGENCIES' LIFE-CYCLE PLANNING

As described in Chapter 3, *Asset Inventory and Performance*, there are almost 90 local agencies in addition to IDOT, Illinois Tollway, and Chicago Skyway, that are owners of pavements or bridges on the NHS system. Over 75 percent of these pavements and bridges are located in the Chicago area and therefore fall in the CMAP region. CMAP has developed a comprehensive plan, *On to 2050*, which incorporates asset management concepts.[23] CMAP encourages the local agencies in their region to adopt transportation asset management, of which life-cycle planning is a part.

To promote the use of asset management practices by local agencies, IDOT has presented on asset management principles, including life-cycle planning, at several meetings and conferences targeted to local agencies and MPOs. IDOT continues to coordinate with local agencies and MPOs regarding management of the NHS and to encourage them all to incorporate sound life-cycle planning into their management practices. In addition, the IDOT's Bureau of Local Roads and Streets Manual includes Chapter 45, *Local Agency Pavement Preservation*, which details life-cycle planning concepts including the use of pavement preservation to extend the life of pavements at reduced cost[24].

Finally, IDOT is also conducting a research project to evaluate performance of pavements using quarry by-product fines in the subbase layers. Previous studies identified viable applications for use of quarry by-product fines in pavement support layers and developed specifications for road construction. These specifications promote sustainable construction practices and reduce total energy consumption and greenhouse gas emissions per ton of aggregate production. With the new research project, IDOT will evaluate performance of cross-sections using these environmentally sustainable layers under chip seals and thin hot-mix asphalt surfaced pavements. Additionally, a life-cycle assessment (LCA) will be conducted using the FHWA LCA Pave Tool on each of the constructed sections by incorporating data from field construction project data, life-cycle inventories from FHWA LCA Commons Database, and dolomite aggregate sources from Environmental Product Declarations (EPDs) from quarries. The goal of this study is

[23] https://www.cmap.illinois.gov/2050/mobility/transportation-programming
[24] https://idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Local-Roads-and-Streets/Local Roads and Streets Manual.pdf

to (1) reduce material quantities entering the waste stream, (2) reduce greenhouse gas emissions from aggregate production, and (3) reduce life-cycle costs of local pavements.

Chapter 6: Risk Management and Planning for Resilience

OVERVIEW

IDOT faces many uncertainties in managing its transportation system, including fluctuations in available funding, unanticipated weather events, changes in travel demand and patterns, and variability in asset performance due to material properties or traffic loadings. These uncertainties are considered to be risks that can have either a positive or negative impact on IDOT's ability to achieve its asset management objectives. Using a formal enterprise risk management process, IDOT identified and evaluated significant risks that could impact pavement and bridge performance. IDOT has risk management strategies already in place for risks such as extreme weather events and seismic activity and plans to update both. As a result of these efforts to evaluate risks, IDOT has a better understanding of the uncertainties associated with its TAMP objectives and the likely outcomes of actions that will be taken to mitigate these risks.

This chapter describes the risk management process that IDOT followed to identify and analyze risks that could impact the Department's ability to achieve its performance objectives. The chapter presents the results of the enterprise risk analysis and the mitigation steps that IDOT has incorporated into the 10-year investment strategies outlined in this TAMP. In addition, the chapter summarizes the activities conducted during the Department's All-Hazard Vulnerability Assessment and describes the way the results can be used in the future. Finally, this chapter lays out a process for addressing federal requirements for monitoring assets on the NHS that are frequently damaged during federally- or state-declared emergencies.

ENTERPRISE RISK MANAGEMENT PROCESS

To identify and evaluate enterprise risks, IDOT followed the risk management framework developed by the International Organization for Standardization. This framework, which is presented in Figure 6-1, has also been included in risk management guidance developed by both FHWA and AASHTO. A brief explanation of the activities involved in each part of the process is provided.

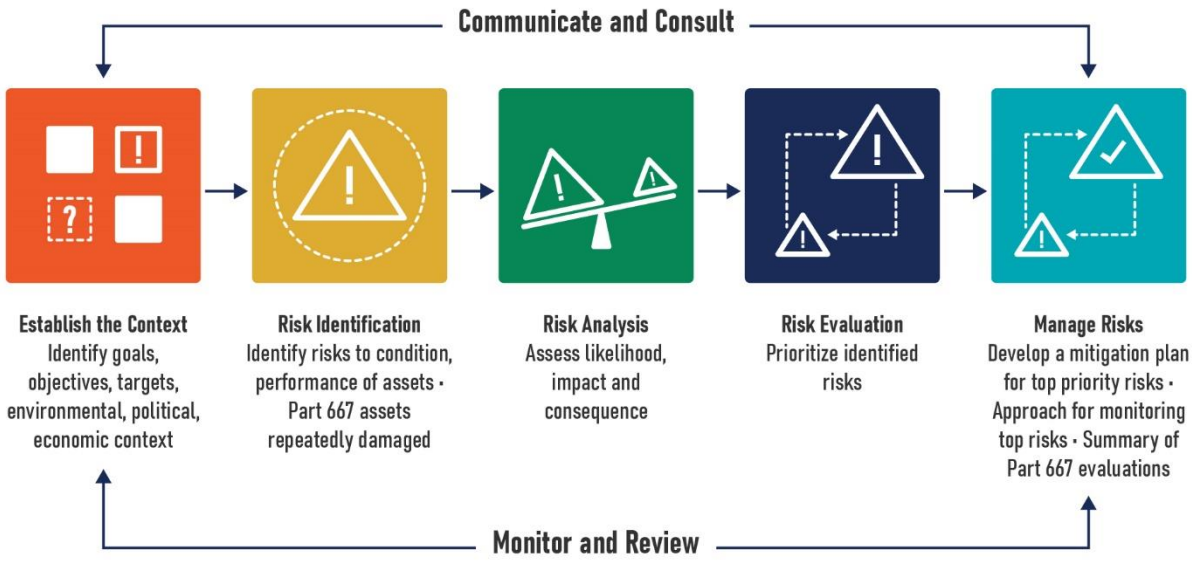


Figure 6-1. The Risk Management Process.

Establish the Context

Prior to the development of the initial TAMP in 2019, IDOT had considered risks informally as part of the project development process. At the project level, the risk assessment was focused on each individual construction project, accounting for localized characteristics unique to that situation. The focus on one construction project at a time enabled IDOT to consider uncertainties such as climate, traffic patterns, and asset deterioration patterns in the selection and design of the appropriate fix. Additional risks that occur during the construction of the selected treatment could also be managed, such as weather delays that impact the construction schedule or unexpected soil properties that could lead to design revisions and cost overruns.

With the implementation of the initial 2018 TAMP and final 2019 TAMP, IDOT began to actively consider risks beyond the project level. The All-Hazards Asset Vulnerability Study and the process developed to evaluate locations damaged more than once by declared emergency events, as described below, were necessary first steps. As preparations began to update the TAMP in 2022, IDOT recognized an opportunity to take the next steps of assigning risk owners and developing realistic mitigation strategies.

Therefore, the Risk Technical Working Group (TWG) began meeting biweekly to perform a comprehensive review of the existing risk register, add new risks as needed, and assign owners to be responsible for developing monitoring strategies, with the following bureaus represented:

- Planning
- Bridges and Structures
- Design and Environment
- Finance and Administration
- Local Roads and Streets
- Programming
- Operations
- Safety Programs and Engineering

The likelihood and consequence rating scales that were developed for the initial 2018 TAMP have been retained. The likelihood rating scale is presented in Table 6-1, shown in order from a low rating to a high rating. The consequence rating scale is presented in Table 6-2, also shown in order from a low rating to a high rating.

Table 6-1. Risk Likelihood Ratings.

Likelihood Ratings	
Rating	**Description**
Rare	Less than 5 percent chance
Unlikely	5 to 20 percent chance
Possible	Greater than 20 to 80 percent chance
Likely	Greater than 80 to 95 percent chance
Almost Certain	Greater than 95 percent chance

Table 6-2. Risk Consequence Ratings.

Consequence Ratings	
Rating	**Description**
Negligible	Won't impact objectives
Minor	Will meet objectives with slight difficulty
Major	Will barely meet objectives with significant difficulty
Critical	Will not adequately meet objectives
Catastrophic	Will prevent IDOT from achieving objectives

Identify Risks

At a separate workshop, the Risk TWG conducted a brainstorming session in which participants identified risks that had the potential to impact IDOT's ability to achieve its pavement and bridge performance objectives. Both short- and long-term risks were enumerated during this process. For each of the risks listed, primary impacts were enumerated and the information was put into a risk matrix. The impacts provided the team with an assessment of who would be affected by the event and how the program objectives would be impacted. This additional information was

used during a later step when the Risk TWG identified and prioritized possible mitigation strategies.

The risks identified during this step were organized into the following categories:

- **Asset performance risks,** such as unexpected increases in oversized/overweight vehicles and preservation activities not performed in accordance with IDOT's life-cycle planning policy.
- **External threats,** such as extreme weather events and seismic activity.
- **Highway safety risks,** such as an increase in vehicle crashes and pedestrian/vehicle collisions.
- **Programmatic shifts**, such as unanticipated changes in regulatory laws by the Federal Highway Administration and other governmental agencies.
- **Financial risks,** such as changes in federal or state funding or unanticipated inflation rates.
- **Information and decision-making risks,** such as failure to maintain current technologies or to implement emerging technologies.
- **Business operations risks,** such as failure to retain staff or hire new staff. This risk category is best managed outside of the asset management framework.

The identification of locations repeatedly damaged by declared emergency events (part 667 locations) was conducted separately from the Enterprise Risk Management process and is described fully later in this chapter.

Analyze and Evaluate Risks

Over the course of several meetings, the Risk TWG assigned ratings to both the likelihood and potential consequence of each risk using the criteria presented earlier in Tables 6-1 and 6-2. The results were incorporated into a risk register and an overall risk rating was assigned using the heat map presented in Figure 6-3. The overall risk rating was assigned based on the combination of likelihood and consequence for each risk. As shown in the Figure, the overall risk rating increases as both the likelihood that the risk will occur and the resulting consequence increase. In Figure 6-3, cells shaded in green represent low risk and minimal consequences while the darkest orange and black cells indicate the highest risk and the most significant consequences.

Likelihood	Consequence				
	Negligible	Minor	Major	Critical	Catastrophic
Rare	Low	Low	Low	Low	Low
Unlikely	Low	Low	Low	Medium	Medium
Possible	Low	Low	Medium	High	High
Likely	Low	Medium	High	High	Critical
Almost Certain	Medium	Medium	High	Critical	Critical

Figure 6-3. IDOT Risk Matrix.

In the meetings, the Risk TWG members were asked to review the ratings for both likelihood and consequence or assign new ratings for risks that had not been identified in the 2019 TAMP.

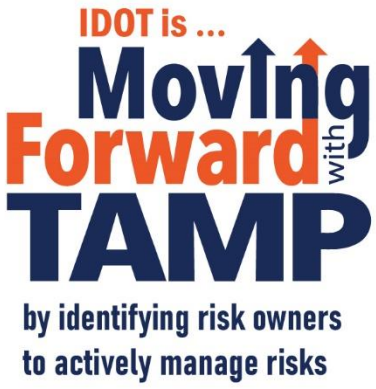
Manage Risks

The Risk TWG assigned mitigation strategies to each of the risks that received a "critical," "high," or "medium" rating. The group considered five different mitigation strategies for each risk, including treat, tolerate, terminate, transfer, or take advantage of. The mitigation strategies are defined in Table 6-2. In addition to identifying mitigation strategies, each mitigation strategy that required action was assigned to an office to oversee its implementation.

Table 6-3. Types of Risk Mitigation Strategies.

Strategy	Definition
Treat	Seek to reduce the risk probability or impact by taking early action to reduce the occurrence of the risk to a feasible level. This enables the activity to continue, but with controls in place to maintain the risk at a tolerable level.
Tolerate	Take no additional steps other than the normal controls in the current business processes.
Terminate	Change the project plan to eliminate the risk or to protect the project objectives from its impact. Stop the activity, process, or program.
Transfer	Move the consequence of a risk together with ownership of the response to a third party. Pass the risk to an insurer, outsource it, or transfer to another entity. Transferring the risk does not eliminate it.
Take Advantage of	Seek an opportunity to exploit a positive impact.

An additional step was taken this year to further IDOT's active management of high priority risks. The Risk TWG assigned a "risk owner", or owners, i.e., the group within IDOT most able to direct the mitigation strategies, to each risk. Moving forward, the risk owner(s) will develop realistic monitoring and mitigation strategies for each risk that received a mitigation strategy type of treat, terminate, or transfer. The TWG has committed to continue meeting to take IDOT to the next level of risk management.



Monitor and Review

Going forward, the Bureau of Planning will retain responsibility for reviewing the risk register at least annually. As part of the review process, asset managers or other stakeholders will be consulted to determine changes that have taken place in the prior year to help determine whether risk priorities have changed, whether there are new risks that need to be added to the risk register or the overall risk rating has lessened in severity due to changes in conditions and/or actions taken by IDOT. A more formal risk review, which involves repeating the process outlined in this section of the TAMP, will be undertaken at least every four years as part of the TAMP update process.

ENTERPRISE RISK ANALYSIS RESULTS

The results of the risk assessment were documented in a comprehensive risk register that is managed by the Office of Planning and Programming. The portion of the risk register related to high priority risks is presented in Table 6-4. The table presents the risk category, risk event, primary impacts, potential mitigation strategies, and risk owner(s). The table is organized by risk categories most able to be addressed by asset management related activities to those least likely to be addressed by asset management activities. Appendix D contains the same risk registers, but includes the likelihood, impact, and risk rating. A few of the risks from the 2019 risk registers were determined to have been mitigated or were assigned a lesser risk rating than it had in 2019. Those risks are retained in the Appendix but have been removed from Table 6-4.

Table 6-4. Risk Register for High Priority Agency Risks.

Risk Cat.	Risk Event	Primary Impacts	Mitigation Strategies	Risk Owner (Bureau/ District)
Asset Performance	Preservation activities are not performed on a timely basis	• The expected service life of an asset is not achieved • Repair costs increase due to a lack of maintenance • May impede the ability to meet the performance targets	Treat – Review and enhance guidance on preservation; increase investment in preservation	Programming Research Districts
	Increases in illegal or oversized/ overweight vehicles	• The rate of pavement and bridge deterioration increases, leading to the need for more frequent treatments or repairs • The expected life of an asset is not achieved, increasing the overall cost of preserving the system • May impede the ability to meet the performance targets	Transfer – Increase enforcement Treat – Identify priority corridors for oversized/overweight vehicles; increase permit fees	Operations Bridges & Structures
	Increase in maximum legal loads	• The rate of pavement and bridge deterioration increases, leading to the need for more frequent treatments or repairs • The expected life of an asset is not achieved, increasing the overall cost of preserving the system • May impede the ability to meet the performance targets • Increased number of structures restricted to less than legal loads (new legal loads), with possible adverse effects on the movement of goods through the state.	Terminate - Oppose legislation to increase legal weigh limits Treat – Identify structures likely to be load restricted under new legal load limits and prioritize for rehabilitation/replacement	Operations Bridges & Structures

Risk Cat.	Risk Event	Primary Impacts	Mitigation Strategies	Risk Owner (Bureau/ District)
External Threats	Extreme weather and climate change risks: Flooding, Extreme heat, Increased freeze/ thaw cycles	• Complete loss of asset • Temporary closure of main evacuation route • Loss of life • More frequent maintenance and mitigation strategies	Treat – Use PROTECT funds as recommended in upcoming Resilience Improvement Plan; utilize "reserve for emergencies and other highway needs" funds; explore more resilient materials and construction practices	Planning Programming Operations Materials Research
	Geologic risks: Seismic Activity, Mine Subsidence, Sinkholes	• Complete loss of asset • Temporary closure of main evacuation route • Loss of life • More frequent maintenance and mitigation strategies	Tolerate – For existing assets Treat – Perform regular inspections; enact recommendations from upcoming seismic vulnerability assessment	Bridges & Structures Programming
Highway Safety	Highway Crash Rates increase Vulnerable road user crash rates increase	• Driver safety • Loss of life • Federal funding penalties	Treat - Screening for safety tier crash locations; safety benefits/cost evaluations; safety program evaluations	Safety Programs & Engineering
Programmatic Shifts	Inability to demonstrate consistency with TAMP investment strategies and goals	• Federal reimbursement levels will be reduced, resulting in a smaller program • May decrease ability to meet performance targets	Treat – Prioritize programming consistent with TAMP investment strategies and allocate the required resources	Programming Districts
	Unplanned changes in regulatory laws by FHWA or other government agencies	• Shifts how funds are distributed, which can potentially impact funding • Adds additional requirements without associated funding • May have an effect on IDOT's ability to meet performance targets • May require additional reporting resulting in additional work without additional staff	Tolerate	
	The federal focus on the NHS will impact IDOT's ability to achieve non-NHS pavement and bridge targets	• The Level of Service (LOS) for non-NHS assets could deteriorate further • Political pressure for project selection could increase • The focus on the NHS increases the ability to meet the NHS pavement and bridge and system performance targets (except total emission and non-SOV travel targets)	Tolerate/Take Advantage – Use the opportunity to prioritize life-cycle planning strategies to external partners. Improve NHS bridge conditions, maintain interstate pavement conditions, thereby, enhancing freight movement	Programming

Risk Cat.	Risk Event	Primary Impacts	Mitigation Strategies	Risk Owner (Bureau/ District)
Financial	Decrease or increase in the level of federal funding	• Limits IDOT's ability to invest sufficiently to meet performance targets (safety, pavement and bridge condition, system performance) • Reduces the asset LOS • Unable to match with state funds if federal funding increases significantly over a short period of time	Tolerate – Adjust programs in line with the TAMP's investment strategies	
	Decrease or increase in the level of state revenue available	• Limits IDOT's ability to invest sufficiently to meet performance targets • Time required to get projects ready to go may limit the program; lag time spending additional funds • Reduces the asset LOS and the program size • Difficulty in meeting federal match • Lack of correlation between CPI increase on MFT and rate of inflationary costs	Tolerate – Adjust programs in line with the TAMP's investment strategies	
	Inflation in project costs (from project inception)	• Effectively reduces available funds agency-wide. • Requires districts to push back projects or remove from their programs to cover costs. • Limits IDOT's ability to invest sufficiently to meet performance targets, TAMP goals.	Tolerate/Treat – Prioritize projects and streamline to fit within available budget; develop consistent method across districts to program for inflation	Programming Districts
	Failure to meet regulatory standards and performance measures	• Reduced flexibility with federal funding	Treat - Focus funding to increase compliance by reviewing internal program eligibility	Planning Programming
	Increased transition to hybrid/ electric vehicles	• Reduced MFT revenues, which impacts total program size (state and local); increased cost to provide charging infrastructure	Tolerate/Treat – Study funding alternative	Planning

Risk Cat.	Risk Event	Primary Impacts	Mitigation Strategies	Risk Owner (Bureau/ District)
Information and Decision-Making	Opportunities provided by emerging technologies (and materials) are not utilized and current technologies are not maintained	• Productivity and organizational advancement are limited • May impede the ability to meet performance targets	Treat – Educate management on ability to implement new technologies; act timely on new products; enhance and streamline IT processes to allow for innovative development/ purchases; include training and/or support in any emerging technology	Materials Research Information Processing
	Asset management software (EAMS) not available or not maintained	• Limits IDOT's ability to assess needs and optimize life-cycle costs through life-cycle planning analyses • Limits IDOT's ability to determine cost-effective investment strategies	Treat – Implement EAMS; work cooperatively across bureaus to make sure system stays current	Programming Information Processing
Business Operations	Decreased staffing due to impending retirements or staffing losses	• The agency loses institutional knowledge that can decrease the ability to manage assets • May impede the ability to meet performance targets • Staffing levels are not adequate to move projects forward so projects fall behind and impact asset LOS	Treat – Cross train; increase headcount; incentivize staying within section/bureau; make non-union positions attractive to union members	Managed outside of TAMP
	Employee salaries and benefits do not keep pace with industry	• Productivity and quality suffer, errors increase • May impede the ability to meet performance targets • Unable to attract new talent	Treat – Conduct compensation study and implement; consider cost to the agency if not implemented; make non-union positions attractive to union members	Managed outside of TAMP

CONSIDERATION OF RESILIENCE TO EXTREME WEATHER EVENTS AND GEOLOGIC RISKS

Consideration of resilience to extreme weather event/climate change and seismic activity is an on-going activity within IDOT. IDOT's past and continuing efforts to consider resilience are described below.

All-Hazard Asset Vulnerability Assessment

In 2017, IDOT completed a 3-year study to evaluate the vulnerability of the transportation system to a variety of manmade events (such as explosions and cyber-attacks) and naturally-occurring extreme events caused by:

- Precipitation.
- Temperature.
- Wind.
- Geologic factors.

The assets included in the study centered on assets primarily maintained by IDOT (such as highways and bridges) that contribute significantly to regional and/or national public transportation, including transportation corridors and hubs (such as stations and ports).

Vulnerabilities were evaluated by measuring the interaction between how:

- Critical an asset is to the transportation network.
- Exposed an asset would be to a defined hazard.
- Sensitive an asset is to each hazard.

The measurements of criticality, exposure, and sensitivity were used to generate a Vulnerability Index for each asset. Risks were also assessed to identify threats that could produce immediate and permanent harm to the infrastructure. Together, the assessment of criticality, risks, and vulnerability provided IDOT with the first comprehensive assessment of the statewide resources managed by IDOT. The methodology established in the study provides a foundation for future studies and the results serve as an important consideration to assist IDOT and other transportation agencies in prioritizing transportation system investments. The work also produced a large asset database and an interactive map to help give visualization to the work. More information on the assessment can be found in the All-Hazards Executive Summary[25].

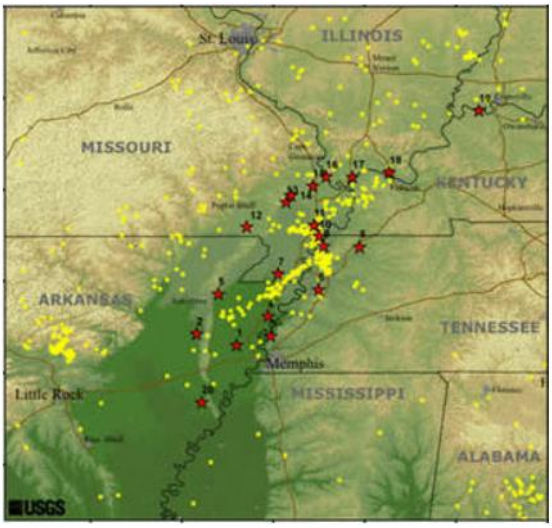
The asset database has been added to the EAMS so that resilience will be considered in prioritizing projects during the development of each MYP. A new study has been funded to complete a Resilience Improvement Plan (RIP), which will include an update to the vulnerability assessment completed in 2017. It is anticipated these results will be included in the EAMS as well.

Seismic Risks

IDOT has a long history of planning for resilience due to seismic risks. The New Madrid Seismic Zone stretches from New Madrid, Missouri up into southern Illinois.[26] In the 1990s, the design specifications changed with regard to seismic design. Since the early 1990s, new and replacement structures have been designed for seismic loads. Also in the 1990s, a seismic vulnerability study was completed, which led to a number of seismic retrofitting projects. Those projects addressed the most critical seismic vulnerabilities. For instance, a number of bridges on I-57 in Alexander and Pulaski Counties and also in the Poplar Street complex in East St. Louis were retrofit. In the 2000s, a series of Illinois Center for Transportation (ICT) projects were completed which evaluated and informed IDOT's philosophy regarding seismic design.

[25]http://www.idot.illinois.gov/Assets/uploads/files/Transportation-System/Reports/OP&P/All%20Hazards_Executive%20Summary_HiRes.pdf
[26] https://www.usgs.gov/programs/earthquake-hazards/new-madrid-seismic-zone

Currently, for new and replacement bridges, seismic considerations are a part of the design process. For structures where the proposed scope is deck replacement or superstructure replacement, a seismic evaluation is done at the BCR phase, where the scope of work is confirmed. The evaluation is based on FHWA seismic retrofitting guidelines. If retrofitting is required and economical, compared to total replacement, the retrofitting work is included as part of the project.



The understanding of and design for seismic loads has changed over the past 25 to 30 years and many of the bridges in the 1990s study have been rehabilitated or replaced. As a result, a new seismic vulnerability study has been funded to begin in 2023. The study would include approximately 1,600 state-maintained, multi-span bridges which are potentially in Seismic Zone 2 or higher, which could include bridges in IDOT's Districts 3 through 9, depending on the soil type at the location of the bridge. This study will inform the need for additional bridge replacement or retrofit projects.

In addition to the work to retrofit or replace bridges that were identified as seismically vulnerable, IDOT has generated an Earthquake Preparedness and Response Plan. The opening of the emergency routes listed in the Plan will be the first priority assignment should an earthquake occur.

Additional Geologic Resilience Measures

IDOT takes several additional measures routinely to increase resilience to weather-related effects. As shown in the Bridge Treatment Decision Guidelines in Appendix C, both scour mitigation and drainage items are encouraged as part of the bridge preservation program. Scour is also a consideration in the design of new and reconstructed bridges. Slope protection systems, including slopewalls and the use of riprap, are detailed in IDOT's Bridge Manual[27].

Pavement Resilience to Climate Change

Many of IDOT's practices related to pavement design and materials have evolved over the years to increase resilience to weather-related issues. For example, freeze-thaw testing of aggregate has been conducted for decades to address premature failures in concrete pavement due to durability cracking (D-cracking), a freeze-thaw related distress. Recently, the University of Illinois at Urbana-Champaign developed, and IDOT implemented, the use of the I-FIT test to address premature cracking in hot-mix asphalt pavements. Additionally, because Illinois is such a long state, IDOT specifies the selection of the performance-graded asphalt used in full-depth asphalt pavements based on geographic location. IDOT has engaged in conversations with the Illinois Division of the Federal Highway Administration regarding whether the maintenance of

[27] https://idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Bridges/Bridge Manual 2012.pdf

pipe underdrains adjacent to pavements could or should be considered pavement preservation, as removing excess water from pavements enhances their resilience to increased rainfall. IDOT will continue to explore design, construction, and maintenance methods to increase pavement resilience to extreme weather events and climate change.

SPECIAL REQUIREMENTS FOR PERIODIC EVALUATION OF FACILITIES REPEATEDLY REQUIRING REPAIR AND RECONSTRUCTION DUE TO EMERGENCY EVENTS

One of the requirements under 23 CFR Part 667, *Periodic Evaluation of Facilities Repeatedly Requiring Repair and Reconstruction Due to Emergency Events*, involves a periodic statewide evaluation of the state's existing roads, highways, and bridges that have required repair or reconstruction on two or more occasions from emergency events declared by the Governor or the President of the United States. The requirements instruct state DOTs to complete an evaluation of any repair and reconstruction events to pavements and bridges that have occurred due to emergency events since January 1, 1997. In addition, the rules require that a process be established to continue the periodic reviews into the future.

Identification of Locations Previously Damaged Due to Emergency Events

The process used to assemble the data needed for the evaluation of locations damaged by emergency events between January 1, 1997 and June 28, 2019 was communicated in the 2019 TAMP. The end result of the data collection process was the generation of a map in ArcGIS that includes all locations damaged by a declared emergency event at least once since 1997, as shown in Figure 6-4. All of the NHS routes are identified in blue, while non-NHS routes are red. Any isolated location or roadway segment damaged more than once is highlighted in yellow. Each of IDOT's districts has access to the map and is required to check the map in the development of their pavement and bridge programs.

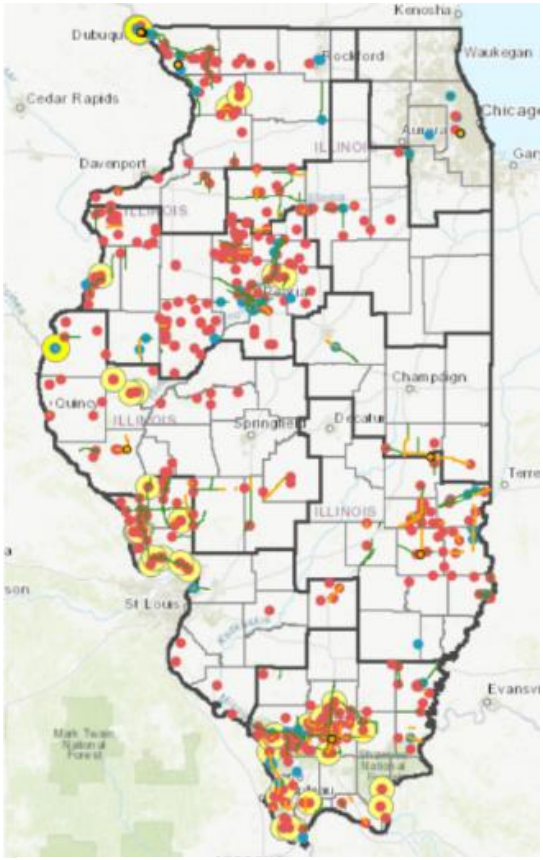


Figure 6-4. Illinois Locations Damaged by Emergency Events.

Figure 6-5. Location Damaged More than Once and in the MYP.

An enhancement was made to the map since the 2019 TAMP. One of the districts suggested that any project in the MYP within 100 feet of an emergency event location be added to a layer in ArcGIS so the locations needing review may be identified more easily. Figure 6-5 to the left depicts a portion of the map with the MYP layer active (in orange).

Process to Identify and Evaluate Facilities

Identification of New Emergency Event Locations

Moving forward, IDOT has implemented a process for capturing new emergency response data related to facilities requiring repair and/or reconstruction due to emergency events as required under 23 CFR Part 667.

When an emergency is declared by either the Governor of Illinois or the President of the United States, the declaration will be forwarded to the Regional Engineer, Operations Engineer, and Local Roads Engineer of the affected district(s) and a Disaster Number will be established by the FHWA. In addition, a special project number will be created for tracking purposes by the Central Bureau of Operations. The Regional Engineer will be responsible to ensure that appropriate district staff receive the declaration. The district Local Roads Engineer will be responsible for ensuring the affected local agency staff receive the declaration.

Districts and/or local agencies will be responsible for collecting the data related to each repair or reconstruction for the impacted facilities including:

- Emergency event code.
- Asset type.
- Description of work activity, including labor, equipment, and materials.
- Location.
- Date(s) of the repair.
- Total cost (includes emergency repair and permanent repair categories).
- Pictures of damage to site (preferred but not required).

When expenditures exceed or are anticipated to exceed $5,000 per site, the district Operations Engineer will notify the Central Bureau of Operations Transportation Infrastructure Security Section Supervisor to document cumulative expenditures to evaluate for federal reimbursement based on minimum thresholds. If an event qualifies under FHWA's Emergency Relief (ER) Program, a Letter of Intent will be submitted to the FHWA Illinois Division Administrator and District Operations, and Local Roads Engineers will be notified. A Detailed Damage Inspection Report for each site will be completed by district Bureau of Operations and/or district Local Roads Engineer, submitted to the FHWA for concurrence, and copied for distribution to the IDOT Central Bureau of Operations Transportation Infrastructure Security Section Supervisor.

Upon FHWA approval, IDOT's Central Bureau of Operations will update the Statewide Emergency Site GIS map with the approved locations.

Process to Evaluate Emergency Event Locations

When a NHS location is damaged a second time or when an upcoming project is planned for a non-NHS location, the district will be responsible for conducting an evaluation and providing the following information:

- Root cause.
- Risk rating matrix.
- Vulnerability assessment.
- Critical infrastructure.

In addition, the district will develop a recommended plan of action for:

- Mitigation.
- Partial mitigation.
- No mitigation.

The requested information will be submitted to the district Programming Engineer or district Local Roads Engineer. The Programming Guidelines issued by the Bureau of Programming contain a chapter devoted to the evaluation process described above.

Under these requirements, as each project is being developed, it must be evaluated for prior use of ER funding, starting from January 1, 1997. The Bureau of Programming has provided the statewide GIS map showing locations, along with available descriptions and costs of repairs, for this analysis. The ER program manual, along with all the ER program requirements, can be found at https://www.fhwa.dot.gov/reports/erm/er.pdf. The ER program description along with other links can be found at https://www.fhwa.dot.gov/programadmin/erelief.cfm.

When any project is being programmed, the district Programming Engineer will be responsible for verifying if the facility has been damaged due to a prior emergency event. For identified sites, districts will complete:

- A risk assessment.
- An evaluation of treatment alternatives.
- A recommended treatment, if necessary, into the scope of the project before the project is included in the MYP.

The required evaluation will be retained by the district. The emergency event evaluation process will be incorporated into the next update of the Office of Planning and Programming, Programming Guidelines.

This process will ensure that IDOT is considering reasonable alternatives that could reduce the need for federal funds, better protect the natural environment, as well as public health and safety, and meet transportation needs.

Declared Emergency Events Since 2019

In 2019, flooding occurred in several locations around the state. All of those locations were added to the data compiled through June 2019 and included in the ArcGIS map. Only one of those locations was a second damage incident. Its evaluation is discussed in the next section.

In March 2020, a flash flood caused a minor issue in one town. On December 10, 2021, a tornado/severe weather event caused a disaster to be declared in 14 counties. On July 25 through 28, 2022, flooding occurred in one county. None of these events resulted in pavement and bridge damage extensive enough to trigger a disaster number and subsequent reporting by the FHWA. No additional disasters have occurred in Illinois as of December 22, 2022.

Evaluation of Emergency Events Locations

In 2021, as the FY22-27 MYP was being developed, a county project was identified at a location that had been damaged twice previously by declared emergency events, in 1999 and 2002. The Bureau of Programming worked with the District Local Roads staff and the County Engineer to evaluate the project. Permanent mitigation of the cause of the previous damage had been constructed in a project completed in 2004. A report was written to document the prior events and the project that permanently mitigated the root cause.

One NHS location, US 136 in Hamilton, was damaged a second time in 2019, after having first been damaged in 2008. The section is the approach pavement to a bridge over the Mississippi River connecting Hamilton, Illinois and Keokuk, Iowa. An evaluation was conducted of this section and the root cause was determined to be that the profile of the road is too low. A project is programmed for 2025 to raise the grade of the pavement section to permanently mitigate the cause of the damage. The responsible district utilized the data compiled to satisfy this TAMP requirement as evidence that permanent mitigation was warranted. Because this location is the only NHS pavement and bridge location damaged more than once due to an emergency event, there is no performance gap related to part 667 for NHS pavements and bridges.

In addition to the US 136 NHS route, there are currently 23 non-NHS routes that have been damaged by emergency events more than once. Three of the locations are under the jurisdiction of IDOT. Further investigation revealed one of the three locations reported as having been damaged more than once was incorrectly identified. The first event was the damage-causing event and the second “event” where funds were spent was the permanent mitigation of the root cause of the first issue. Another 19 locations are primarily under the jurisdiction of a county. The final location is primarily under township jurisdiction. The Bureau of Programming will coordinate with the Bureau of Local Roads and Streets to ensure each of these locations is evaluated for potential mitigation prior to including the facility in the STIP, in accordance with 23 CFR part 667.7(b).

CONSIDERATION OF RISKS IN THE DEVELOPMENT OF INVESTMENT STRATEGIES

The mitigation strategies that resulted from the enterprise risk analysis focus primarily on improving guidance, conducting training, streamlining existing processes, and enhancing IT capabilities. The specific activities that will be undertaken to improve data, processes, and analysis capabilities related to the investment strategies identified in the TAMP are described in Chapter 8, *Planned Enhancements*. The findings from the All-Hazard Asset Vulnerability Assessment will be incorporated into IDOT's programming processes in the near future, when the EAMS is deployed. As part of the programming process, no separate funding will be needed beyond what is shown in the investment strategies. If the upcoming RIP identifies needs outside of the regular program, funding will be reallocated at that time. Building resilience to seismic activity has long been a part of how IDOT evaluates bridges, so the funding needed to address seismic activity is already reflected in the investment strategy. Similarly, the singular NHS project covered by part 667 that is under IDOT jurisdiction is programmed for mitigation in FY 2025, therefore the investment needed for it is already included in the investment strategy.

ILLINOIS TOLLWAY RISK MANAGEMENT

The Tollway has implemented a Risk Based Cost Estimating and Management Guide. This guide helps review, track, and mitigate project risks throughout the entire design process. The guide is intended to provide guidance on how to alleviate and dimmish risks associated with Illinois Tollway projects. The guide aims to minimize the possibility for project-related risks and serves as the framework and minimum expectations for risk management regarding all Illinois Tollway projects.

CHICAGO SKYWAY RISK MANAGEMENT

Risk management practices for the Chicago Skyway are not available due to the private operation of the facility.

LOCAL AGENCIES RISK MANAGEMENT

As stated in Chapter 2, IDOT's Planning Processes and Asset Management Objectives, a survey was sent to all the MPOs that are also TMAs to ascertain the level of asset management implementation. The survey included a question regarding the use of any risk management methodology in managing assets. Responses indicated that none of the MPOs currently have a risk management methodology in place.

Chapter 7: Financial Plan and 10-Year Investment Strategies

OVERVIEW

Most of the revenue available to IDOT for addressing system needs is derived from Motor Vehicle Registration (MVR) Fees, Motor Fuel Tax (MFT), Sales Tax, reimbursements from the Federal Highway Trust Fund, and reimbursements from local governments. These funds are first used to address general and administrative expenses (such as debt service and IDOT operations) as well as ongoing construction projects from prior years' programs. The remainder of the funds are used to develop a MYP to sustain the condition of the existing infrastructure through investments in safety, roads, bridges, and other projects that improve the economic competitiveness and the overall quality of life for Illinoisans. This chapter summarizes the amount and sources of revenue anticipated over the next 10 years and presents IDOT's planned investments in its pavements and bridges during that time. IDOT used the best information available at the time this document was written to prepare this information but recognizes that both anticipated revenue and funding needs could vary considerably over the next several years. The first six years of the planned investments presented in the TAMP are based on information in the current MYP, and the last four years are estimated based on predicted conditions. Actual fluctuations in either revenue or funding needs will be reflected in updated versions of the TAMP.

REVENUE SOURCES

IDOT

In FY 2023, IDOT projects a total of $5.791 billion in revenue from two primary sources: reimbursements from the Federal Highway Trust Fund and state revenue (comprised primarily of Motor Vehicle Registrations and Motor Fuel Taxes). With the passage of the RBI, bond sales were authorized, adding another source of revenue. The balance of IDOT's revenue came from local government reimbursements. The distribution of these revenue sources is shown in Figure 7-1. All revenue information was provided by the Bureau of Budget and Fiscal Management.

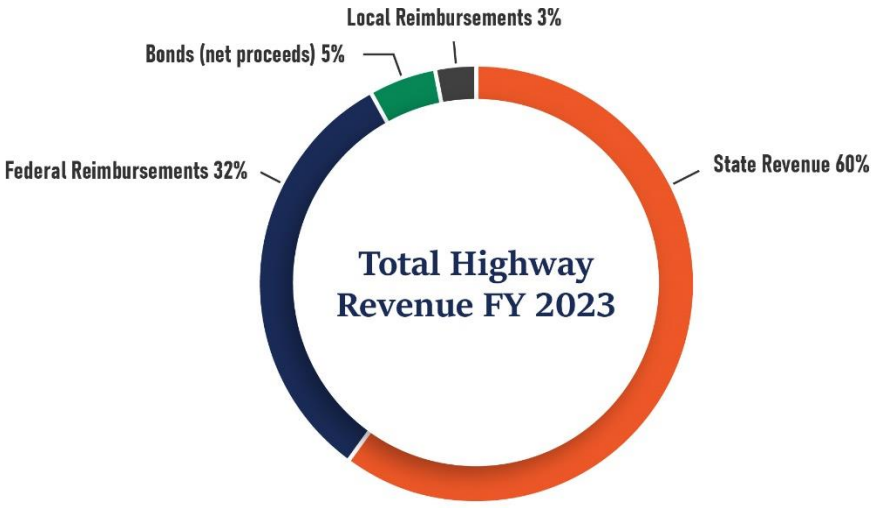


Figure 7-1. FY 2023 Total Highway Revenue Sources and Amount.

Each of the major funding sources is described in more detail in the following sections.

Federal Highway Trust Fund

Federal programs provide funding for transportation projects through the Highway Trust Fund (HTF), which is supported by the revenue collected from federal fuel taxes and a variety of tire and truck sales taxes. The taxes credited to the HTF are to be used for transportation spending and are split between the Highway Account and the Transit Account. Federal funding has been expanded to encompass not only highway projects, but also transit and environmental projects. In recent years, the HTF has required large and growing transfers from U.S. Treasury general funds to keep payments flowing to states under the various multi-year highway programs (such as the FAST Act). HTF support is available to all states. The amount of various apportionments (the purposes for which federal funds can be spent) are dependent on a number of factors, including the revenue contributions attributable to each individual state, while the amount of obligation limitation (the authority to draw cash from the HTF) that is awarded to each state is based on annual federal appropriations.

A "fair share" of federal funds for local governments is determined by the federal funds authorized in the federal bill and the amounts that have been determined to be an equitable allocation among state and local programs. The allocation is based on a percentage that was developed many years ago and is currently approximately 19 percent.

State Revenue Sources

Motor Vehicle Registrations (MVR)

Vehicle registrations and related fees are administered by the Secretary of State under the provisions of the Illinois Vehicle Code (625 ILCS). The Vehicle Code covers registration requirements that include everything from motorcycles, mopeds, and motorized bicycles to

80,000-pound tractor-trailer rigs and everything in between. The state participates in the international compact governing the registration of trucks operating in interstate commerce through the International Registration Program. Unlike the MFT, MVRs and related fees are not deposited into a single fund. Rather, the money is distributed into various funds as it is received in accordance with state law.

A significant portion of the revenue received from this source is used to support road and bridge projects. MVRs are the single-largest source of state revenue for Illinois' highway program. However, in recent years, there has been a growing trend to use motor-vehicle-related fees to support other, non-transportation purposes, such as the state's main operating fund, the State Police Vehicle Fund, and the Department of Natural Resources.

Motor Fuel Taxes (MFT)

The Illinois MFT is derived from a tax imposed on the privilege of operating motor vehicles on public highways and recreational-type watercraft on the waters in Illinois. The tax is a flat rate based on the amount of motor fuel purchased. On July 1, 2019, the rate was increased from 19.0 cents, as it had been since 1990, to 38.0 cents, with the increased revenue going to the newly created Transportation Renewal Fund. The Rebuild Illinois capital program (PA101-0032 Transportation Funding and Protection Act) indexed the rate to inflation, with the rate increasing by an amount equal to the percentage increase in the Consumer Price Index for all Urban Consumers on each following July 1. However, due to the effect on consumers of the excessive inflationary rate, the Governor passed Public Act 102-0700 suspending the scheduled July 1, 2022, CPI-U adjustment for six months from July 1, 2022, through December 31, 2022. The rates for Illinois MFT as of July 1, 2022 are:

- 39.2 cents per gallon on all fuel (including gasoline, gasohol, and diesel)
- 7.5 cents per gallon on diesel fuel in addition to the tax above

Illinois' MFT is administered by the Department of Revenue. The tax is passed along to consumers through the pump price but is actually collected from wholesalers and distributors whenever fuel is delivered as a way to encourage compliance and minimize collection costs. Illinois' share of MFT on interstate truckers is collected according to the International Fuel Tax Agreement (IFTA). Motor fuel is also subject to the state sales tax, but that revenue is used to support general state operating expenses and not the highway program. The motor fuel tax collections are deposited into the Motor Fuel Tax Fund and the Transportation Renewal Fund by the Department of Revenue. The Department of Transportation allocates the monies in the Motor Fuel Tax Fund monthly according to the provisions outlined in the MFT distribution statute (35 ILCS 505/8) and initiates the process for distribution of motor fuel tax revenue to the counties, townships, and municipalities. Net revenue from the MFT (after various deductions such as the cost of collection and IFTA payments to other states) is distributed between the state and local governments, with the state receiving 45.6 percent of the net proceeds and local agencies receiving 54.4 percent. The motor fuel tax revenue collected in the Transportation Renewal Fund is distributed 80 percent highway and roads (60 percent to the state and 40 percent to local government) and 20 percent for rail and mass transit. The motor fuel tax is the only source of state revenue sharing with local governments specifically for transportation-related purposes.

Each month, the net proceeds designated for local governments are apportioned on the basis of statutory formulas. Most counties receive a share of the revenue based on the level of motor vehicle registration activity recorded in those counties, while municipal apportionments are based on relative levels of municipal population, and townships/road district apportionments are based on a combination of miles under their jurisdiction plus tax effort. Monthly apportionments are posted on the Department's website and are paid out subject to appropriation by the General Assembly.

Sales Tax

Beginning July 1, 2021, the Department of Revenue began paying each month into the Road Fund the amount estimated to represent 16 percent of the net revenue realized from the taxes imposed on motor fuel and gasohol (subject to the payment of amounts into the State and Local Sales Tax Reform Fund, the Build Illinois Fund, the McCormick Place Expansion Project Fund, the Illinois Tax Increment Fund, the Energy Infrastructure Fund, and the Tax Compliance and Administration Fund). The percentage of net revenue increases by 16 percent each year until July 1, 2025 where it will remain at 80 percent thereafter.

FY 2023 Road Fund Grants to Local Agencies

Needy townships:	$16.8M
Needy counties:	$36.6M
High-growth cities:	$6.7M
Township bridges:	$15.0M
Total:	$75.1M

Local Match/Local Reimbursements

Local funds are appropriated when the project is paid for in conjunction with federal and/or state funds. In Illinois, most local projects are awarded through state lettings, and the local share of the project is initially paid with state funds. Afterwards, local agencies reimburse their share of project costs back to the state, whereby law they are deposited in the Road Fund.

State grants to local governments are based on need, growth, population, MFT collections, and other factors. The budget for the combination of all of these programs is approximately $75.1 million for FY 2023 and is comprised of grants from the Road Fund, as shown to the left.

Illinois Tollway

The primary source of operating revenue for the Illinois Tollway is toll revenue from both commercial and passenger vehicle traffic. In 2021, toll revenue generated approximately $1.46 billion. Revenue bonds are also issued to fund the capital program.

Chicago Skyway

The primary source of operating revenue for the Skway is also toll revenue. Because the Skyway is operated privately, the expected revenues are confidential.

Local Agencies

Local agencies are funded in the same way as IDOT, through the Federal Highway Trust Fund, Illinois MVR, and Illinois MFT.

REVENUE PROJECTIONS

IDOT

Projecting revenues involves estimating all federal project reimbursements (for both existing projects and future funding assumptions), state tax sources (including both MVR and MFT), and local project reimbursements. Based on information from the Bureau of Budget and Fiscal Management, over the 10-year period from FY 2023 to FY 2032, IDOT's revenue from the previously described sources is expected to remain relatively constant, as shown in Table 7-1.

Table 7-1. IDOT's FY 2023-FY 2032 Revenue Estimate (Millions).

Revenue	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
Federal Reimbursements	1,882.2	2,127.4	2,235.6	2,247.6	2,292.4	2,370.9	2,388.4	2,405.0	2,414.1	2,409.8
State Revenue	3,465.6	3,685.9	3,813.4	3,941.5	3,960.8	3,979.8	3,999.8	4,020.1	4,047.8	4,066.3
Local Reimbursements	182.2	200.0	206.7	207.0	208.8	196.8	189.4	178.4	172.3	169.2
Bonds (net proceeds)	261.2	616.8	810.4	801.9	940.9	538.5	426.8	278.8	183.7	110.7
Total	5,791.2	6,630.1	7,066.1	7,198.0	7,402.9	7,086.0	7,004.4	6,882.3	6,817.9	6,756.0

Assumptions

State revenue projections are based on trends in motor fuel tax receipts and motor vehicle registrations that the Bureau of Budget and Fiscal Management has observed over the past 5 years. One item of note is that MFT receipts are projected to decrease as both the fuel efficiency in gasoline-powered vehicles and the use of electric vehicles increase. Federal funding allocations are used from the latest federal highway bill and any years beyond the highway program are given at the same level as the final year of the federal bill. Only formula funds are included in the revenue projections. Any discretionary grants received will be added after notice of award.

Illinois Tollway

Since Illinois Tollway revenue is primarily generated by tolls, forecasted revenue is largely based on changes in toll rates and projected traffic levels. In 2018, an annual Consumer Price Index adjustment began to be applied to commercial vehicles, which is expected to result in additional revenue in future years. The Illinois Tollway is projecting $1.49 billion in estimated total revenue in 2022.

The Illinois Tollway provides an estimate of expected toll revenue in October of each year for the budget process. The estimate is based on actual data for the first eight months and estimates for the last four months of the year. A month-by-month estimate of toll revenues for the following

year is also provided. The short-term forecasts are based on several key variables, including recent trends, construction activities, weather-related events, land-use developments, and so on.

The Illinois Tollway is required by statute to file a capital plan every ten years. The capital planning process was deployed throughout 2020 to aid in the development of the 2021-2030 10-year capital plan as required by the Toll Highway Act. This effort evaluated the status of the Move Illinois Program and defined needs through the next capital plan timeline of 2030. The 2021-2030 Plan was finalized in March 2021 and includes the completion of the Move Illinois Program as well as identified improvements spanning the timeframe between the expected completion of Move Illinois in 2027 through 2030 to ensure that the Illinois Tollway assets remain in a state of good repair. The Illinois Tollway's cashflow documentation extends through their current Move Illinois Program, as shown in Table 7-2.

Table 7-2. Illinois Tollway 2022-2026 Projected Cashflow (Millions).

Revenues	2022	2023	2024	2025	2026
Total Revenues	1,491	1,533	1,596	1,624	1,698
Operating Expenses	411	426	442	458	475
Net Revenue Available for Debt Service	1,080	1,107	1,154	1,166	1,223
Debt Service*	496	537	564	594	628
Net Operating Revenue Less Debt Service	584	570	590	572	595
Capital Expenditures	1,486	1,261	1,040	757	538

*Debt service is debt service on all outstanding Tollway bonds including its most recent issuance, Series 2017A, on Dec. 6, 2017. It does not include debt service on projected future bond issuance. The Authority's projected future bond issuance to finance a portion of its current capital program, the Move Illinois program, is $2.9 billion.

Chicago Skyway

Because the Skyway is operated privately, the expected revenues are confidential.

Local Agencies

Local agency revenue is received from IDOT as a pass through, as described in the *Local Match/Local Reimbursements* section above (page 88).

ANTICIPATED EXPENDITURES

IDOT

Projected expenditures for FY 2023 to FY 2032 are summarized in Table 7-3, which details the general and administration expenses expected over that period. General and administrative costs, which may include debt service transfers, IDOT Operations, and other agency expenditures, represent the total expenditures in the table. In addition, IDOT must address multi-

year payouts for projects with available cash balances at the end of each fiscal year. IDOT determines its program size each year by maximizing the available balances during that period. Therefore, in years where expenditures are greater than revenues, IDOT spends down a higher cash balance, maximizing its resources while maintaining a fiscally-constrained program. The new program appropriation, shown in Table 7-4, is the program size available for new programs or appropriations. The funding appropriated to local agencies is also shown in Table 7-4. The program size is updated annually, as necessary, depending on cash balances, revenue, and expenditures.

Table 7-3. Projected FY 2023 to FY 2032 Estimated Expenditures (Millions).

Expenditures	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
Highway Construction	3,823.8	4,030.1	4,353.5	4,451.6	4,533.8	4,184.2	3,936.3	3,768.7	3,607.3	3,486.8
Highway Maintenance & Management	935.4	959.6	988.3	1,017.9	1,048.4	1,080.0	1,112.6	1,146.2	1,180.9	1,216.7
Grants & Highway Safety	152.6	131.0	134.6	138.4	142.5	146.7	151.3	156.0	158.2	163.4
Debt Service	694.2	803.0	911.1	999.9	1,059.4	1,101.7	1,118.2	1,122.5	1,115.7	1,099.5
IDOT Administration	124.7	128.3	132.2	136.1	140.1	144.3	148.7	153.1	157.6	162.3
Other State Agencies	148.1	154.1	160.5	167.1	173.9	181.1	188.5	196.3	204.3	212.8
Transfers Out/Other Misc.	383.5	374.8	366.1	361.7	361.7	361.7	361.7	349.2	338.2	324.6
Total Expenditures	6,262.3	6,580.9	7,046.3	7,272.7	7,459.8	7,199.7	7,017.3	6,892.0	6,762.2	6,666.1
Available Balance	1,287.8	1,337.0	1,356.8	1,282.1	1,225.3	1,111.8	1,098.8	1,089.3	1,144.9	1,234.9

Table 7-4. Projected FY 2023 to FY 2032 New Program Appropriations (Millions).

Appropriations	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
New Program Appropriation	2,367.8	2,512.0	3,077.5	3,318.8	3,241.2	3,073.1	3,114.5	3,131.6	3,235.0	3,210.0
Rebuild IL (Reappropriation)	1,284.7	2,198.3	1,427.6	1,061.1	508.6	471.9	296.2	183.3	0.0	0.0
Covid Relief (Reappropriation)	57.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total New Program	**3,710.0**	**4,710.3**	**4,505.1**	**4,379.9**	**3,749.8**	**3,545.0**	**3,410.7**	**3,314.9**	**3,235.0**	**3,210.0**
- Local Program	(987.0)	(986.0)	(966.0)	(968.0)	(945.0)	(926.0)	(926.0)	(926.0)	(926.0)	(926.0)
State Program Amount	**2,723.0**	**3,724.3**	**3,539.1**	**3,411.9**	**2,804.8**	**2,619.0**	**2,484.7**	**2,388.9**	**2,309.0**	**2,284.0**

The financially feasible six-year program size is provided to the Bureau of Programming once these adjustments have been made. The distribution of the expenditures in FY 2023 is provided in Figure 7-2.

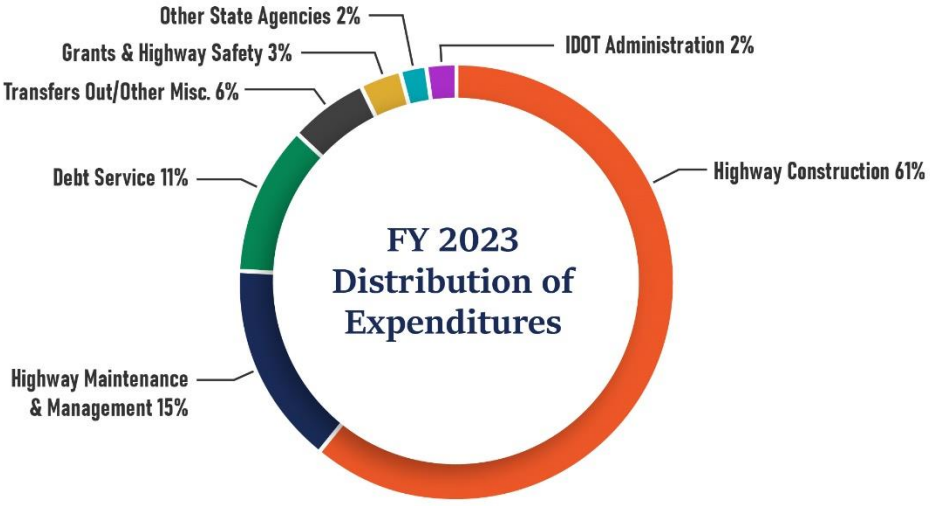


Figure 7-2. FY 2023 Distribution of Expenditures.

Since the development of the 2019 TAMP, IDOT has improved its ability to track and report the percentage of the program that is available for improving infrastructure condition versus other program needs, such as safety and environmental sustainability. Table 7-5 includes the anticipated spending on projects not related to improving pavements and bridges.

Table 7-5. Funding for Projects Not Related to Infrastructure Condition in FY 2023-FY 2032 (Millions).

Spending Category	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
Safety	163.7	283.3	173.0	138.2	243.8	197.8	160.6	154.4	149.2	147.6
Environmental Sustainability	17.3	18.4	16.7	1.5	0.8	3.0	7.4	7.1	6.9	6.8
Ramps & Railroads	4.3	20.9	50.8	164.7	12.9	-	30.9	29.7	28.7	28.4
Other*	477.3	550.0	391.0	256.5	394.9	296.6	315.5	303.4	293.2	290.1
Total	**662.6**	**872.6**	**631.5**	**560.9**	**652.4**	**497.4**	**514.4**	**494.6**	**478.0**	**472.9**

* Other spending includes projects such as statewide engineering, training, weigh station and rest area improvements, sign maintenance, etc.

These totals are subtracted from the total program amount in Table 7-4 to determine the anticipated funds available for the initial construction, maintenance, repair, rehabilitation, and replacement of IDOT's pavements and bridges, as shown in Table 7-6. The numbers provided in

the last row represent the funding levels used in developing the 10-year investment strategies outlined later in this chapter.

Table 7-6. Funding Available for IDOT's Pavement and Bridge Asset Management Activities in FY 2023-FY 2032 (Millions). *

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
State Program Amount	2,723.0	3,724.3	3,539.1	3,411.9	2,804.8	2,619.0	2,484.7	2,388.9	2,309.0	2,284.0
- Projects not Asset Management related	(662.6)	(872.6)	(631.5)	(560.9)	(652.4)	(497.4)	(514.4)	(494.6)	(478.0)	(472.9)
Total Available for Asset Management	2,060.4	2,851.7	2,907.6	2,851.0	2,152.4	2,121.6	1,970.3	1,894.3	1,831.0	1,811.1

Illinois Tollway

The Illinois Tollway's 2022 budget allocates $1,486 million for capital expenditures. This is broken down with $411 million to fund maintenance and operations, $486 million for debt service transfers, and $594 million for the 2022 capital program and capital investments (deposits to Renewal and Replacement and Improvement accounts), as shown in Figure 7-3.

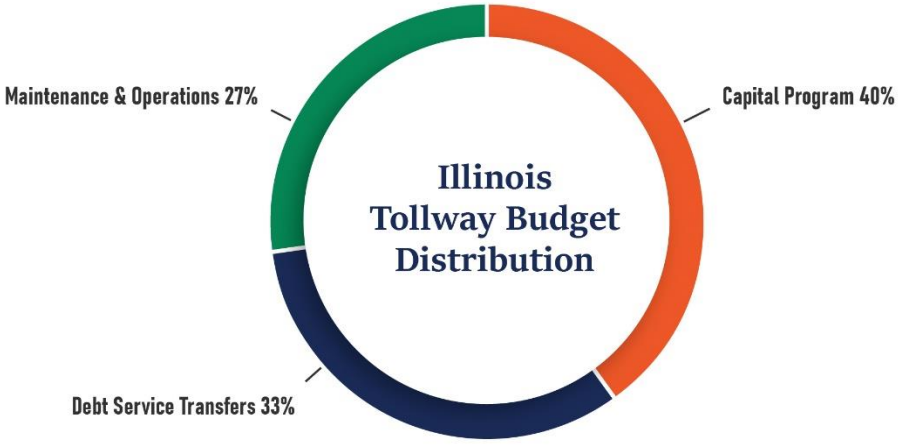


Figure 7-3. 2022 Budget Breakdown for the Illinois Tollway.

Chicago Skyway

Anticipated expenditures for the Chicago Skyway are not available due to the private operation of the facility.

Local Agencies

The total local agency program over the 10-year analysis period is shown in Table 7-4 above as a deduction from IDOT's program. Note that the program is the total available to all local agencies

and is *not specific* to local agencies with NHS pavements and bridges, nor is it specific to funds being spent on local NHS pavements and bridges.

PLANNED INVESTMENT STRATEGIES

Using the spreadsheet tool discussed in Chapter 5, IDOT analyzed different investment strategies using the expected funding levels presented in Table 7-6 above. IDOT analyzed investment scenarios in which NHS bridge conditions were improved to attain 90 percent of square footage at or above the State of Acceptable Condition, while maintaining NHS pavements at as high a level as possible, and incrementally changing the historic distribution of pavement and bridge funding.

IDOT

Planned Pavement Investment Strategy

For pavements, an investment strategy was developed that recognized existing project commitments but would gradually transition to the strategy recommended based on life-cycle planning. This strategy first allocated funds based on pavement class (using current condition distributions) and then allocated funding within each class to different pavement condition categories representing categories of repair. The amount of the budget allocated to each pavement class and condition category was varied to reflect current project commitments and satisfy the State of Acceptable Condition established for the network (as shown in Table 7-7) as much as possible. An iterative process was used to maximize the percent of the network that met the State of Acceptable Condition, with the higher-volume facilities established as the highest priority. The first objective was to meet the interstate targets and then allocate funds to the other NHS routes, marked and unmarked routes, where funding was inadequate to achieve the State of Acceptable Condition.

Table 7-7. State of Acceptable Condition for Pavements.

Pavement Class Category	Pavement Class	Acceptable Condition Level	
		Acceptable CRS Value	Target % Miles Acceptable
NHS	Interstates	5.5	90
	Other NHS (Includes Local NHS)	5.0	90
Non-NHS	Marked Routes	5.0	75
	Unmarked Routes	5.0	50

The final recommended pavement strategy invests heavily in replacement on the interstate and other NHS systems early in the 10-year period, and transitions to more funding going towards preservation and maintenance later in the 10-year period. The background for this was presented in Chapter 5, *Life-Cycle Planning*.

A summary of the recommended distribution of pavement funding is presented in Table 7-8, for FY 2023 through FY 2028, and Table 7-9, for FY 2029 through 2032. The projected pavement

conditions in 2032 from following this allocation strategy are presented in Table 7-10. As shown, the State of Acceptable Condition under this strategy is achieved on interstates. The remainder of the system does not meet the State of Acceptable Condition at this level of funding. The shift in funding priorities from interstates to the other systems beginning in 2029 should be maintained beyond 2032 to begin to close the performance gaps on those systems. As stated in Chapter 5, the life-cycle planning analyses will be rerun with the EAMS once it is online to validate the projected conditions.

Table 7-8. Funding Distribution for Pavements for FY 2023-FY 2028.

System	% Budget by System	Percent System Budget by Pavement Treatment Category				
		Low Preservation	High Preservation	Minor Rehab	Major Rehab	Replacement
Interstates	38.0	0	2	13	31	54
Other NHS	34.0	2	9	16	31	42
Marked Routes	25.0	0	2	18	50	30
Unmarked Routes	3.0	0	8	35	38	19

Table 7-9. Funding Distribution for Pavements for FY 2029–FY 2032.

System	% Budget by System	Percent System Budget by Pavement Treatment Category				
		Low Preservation	High Preservation	Minor Rehab	Major Rehab	Replacement
Interstates	14.0	7	15	33	35	10
Other NHS	49.0	10	33	30	17	10
Marked Routes	30.0	9	34	30	17	10
Unmarked Routes	7.0	8	32	30	20	10

Table 7-10. Resulting Pavement Conditions in 2032 with the Recommended Investment Strategy.

System	Total Pavement Miles	Number of Acceptable Miles		% Acceptable Miles		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	1,892.54	1,606.22	1,854.69	85	90	98
Other NHS	5,079.78	4,170.53	3,304.54	82	90	65
Marked Routes	6,568.97	4,414.31	3,730.97	67	75	57
Unmarked Routes	2,340.53	1,596.42	491.80	68	50	21
Statewide Total	**15,881.82**	**11,787.48**	**9,419.85**	**74**		**59**

Planned Bridge Investment Strategy

A similar approach was used to determine the optimal allocation of available funding to maximize the percent of bridge deck area that met the State of Acceptable Condition targets presented in Table 7-11. As with pavements, interstate and other NHS bridges were the highest priority to achieve targets under a constrained funding scenario. The distribution of funding that resulted in the highest percentage of bridge deck area in the State of Acceptable Condition is presented in Table 7-12, for FY 2023 through FY 2028, and in Table 7-13, for FY 2029 through FY 2032. The resulting conditions in 2032 under this scenario are presented in Table 7-14. As shown in the table, interstates achieve the State of Acceptable Condition and other NHS bridges nearly achieve the State of Acceptable Condition. This investment strategy also allows IDOT to achieve an acceptable NHS bridge deck area above 90 percent, or less than 10 percent structurally deficient. However, funding is inadequate to achieve the non-NHS targets. For this reason, some funding is shifted to the non-NHS bridges beginning in 2029, and this shift should be maintained into the future, beyond 2032. Again, once the EAMS is in place, the analyses will be rerun to validate the conditions predicted by the spreadsheet tool and also to potentially adjust the investment strategies.

Table 7-11. State of Acceptable Condition for Bridges.

Bridge Class Category	Bridge Class	Acceptable Condition Level	
		Acceptable NBI Value	Target % Sq Ft of Deck Area Acceptable
NHS	Interstates	5	93
	Other NHS (Includes Local NHS)	5	93
Non-NHS	Marked Routes	5	90
	Unmarked Routes	5	90

Table 7-12. Funding Distribution for Bridges for FY 2023-FY 2028.

System	% Budget by System	Percent System Budget by Bridge Treatment Category			
		Low Preservation	High Preservation	Major Rehab	Replacement
Interstates	39.6	5	23	5	67
Other NHS	30.4	6	11	27	56
Marked Routes	12.7	0	8	13	79
Unmarked Routes	17.3	4	4	37	55

Table 7-13. Funding Distribution for Bridges for FY 2029-FY 2032.

System	% Budget by System	Percent System Budget by Bridge Treatment Category			
		Low Preservation	High Preservation	Major Rehab	Replacement
Interstates	36.0	5	25	35	35
Other NHS	28.0	5	20	30	45
Marked Routes	14.0	10	25	30	35
Unmarked Routes	22.0	15	35	30	20

Table 7-14. Resulting Bridge Conditions in 2032 with the Recommended Investment Strategy.

System	Total Bridge Square Feet	Number of Acceptable Square Feet		% Acceptable Square Feet		
		Initial (Year 0)	Final (End of Year 10)	Initial % Acceptable (Year 0)	Target % Acceptable (Year 10)	Actual % Acceptable (Year 10)
Interstates	32,650,129	28,581,785	30,951,855	88	93	95
Other NHS	27,627,301	23,612,267	25,325,855	85	93	92
Marked Routes	12,128,031	10,812,460	9,443,852	89	90	78
Unmarked Routes	14,390,848	12,319,894	9,437,496	86	90	66
Statewide Total	**86,796,309**	**75,326,406**	**75,159,058**	**87**		**87**

Summary of IDOT's Planned 10-Year Investments

Using the information presented earlier, Tables 7-15 and 7-16 show the planned investments for pavements and bridges for FY 2023 to FY 2032, respectively, in accordance with the federal requirements for reporting this information. Table 7-17 includes the combined total for pavements and bridges. These tables summarize the level of investment in five different work types: maintenance, preservation, rehabilitation, replacement, and new construction. The information is presented for each of the systems that IDOT maintains. The funding level for new construction in the MYP is based on 10 percent of the available funding, to allow expansion projects to be constructed that are approved through the use of the data-driven decision tool introduced in Chapter 1.

Table 7-15. IDOT's Planned Pavement Investments by Work Type for FY 2023-FY 2032 (Millions).

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
Planned Investments - Interstate Pavements										
New Construction	37.2	152.0	178.2	33.1	76.7	66.2	67.5	64.9	62.7	62.0
Maintenance (reactive)	13.6	126.6	15.7	15.0	2.5	1.0	3.2	3.0	2.9	2.9
Proactive Maintenance and Preservation	13.2	50.7	2.0	2.0	2.0	2.0	8.9	8.6	8.3	8.2
Rehabilitation	132.3	133.1	266.2	261.1	125.4	150.7	150.9	145.1	140.2	138.7
Replacement	222.2	269.0	350.3	287.3	115.7	153.1	183.1	175.9	170.2	168.3
Subtotal	**418.5**	**731.4**	**812.4**	**598.5**	**322.3**	**373.0**	**413.6**	**397.5**	**384.3**	**380.1**
Planned Investments - Other NHS Pavements										
New Construction	17.5	194.7	203.0	197.2	160.3	175.8	52.4	50.4	48.7	48.2
Maintenance	6.2	1.0	0.1	2.9	0.0	0.0	0.6	0.5	0.5	0.5
Proactive Maintenance and Preservation	57.4	97.0	100.5	18.0	86.3	21.9	32.2	31.0	29.9	29.6
Rehabilitation	208.9	112.1	129.3	155.9	155.6	122.5	145.7	140.1	135.4	134.0
Replacement	45.1	138.6	233.5	182.2	210.9	211.4	128.9	123.9	119.8	118.4
Subtotal	**335.1**	**543.4**	**666.4**	**556.2**	**613.1**	**531.6**	**359.8**	**345.9**	**334.3**	**330.7**
Planned Investments - Marked Pavements										
New Construction	3.5	41.3	15.6	164.0	39.1	2.9	10.9	10.4	10.1	10.0
Maintenance	1.5	2.0	2.0	0.6	5.0	0.0	0.1	0.2	0.1	0.2
Proactive Maintenance and Preservation	25.8	8.6	12.1	5.7	4.9	6.9	4.3	4.1	4.0	3.9
Rehabilitation	143.5	156.2	154.8	138.0	148.5	217.3	153.6	147.7	142.8	141.2
Replacement	50.6	67.7	88.7	121.4	74.6	61.7	67.7	65.1	62.9	62.2
Subtotal	**224.9**	**275.8**	**273.2**	**429.7**	**272.1**	**288.8**	**236.6**	**227.5**	**219.9**	**217.5**
Planned Investments - Unmarked Pavements										
New Construction	0.5	9.2	18.5	38.5	61.0	12.0	2.1	2.0	1.9	1.9
Maintenance	0.9	0.2	0.1	0.5	0.0	0.0	0.1	0.1	0.1	0.1
Proactive Maintenance and Preservation	2.4	5.8	0.0	3.0	5.9	3.6	2.3	2.2	2.1	2.1
Rehabilitation	14.2	18.5	18.9	38.4	29.7	11.6	20.5	19.8	19.1	18.9
Replacement	14.1	1.5	1.2	15.5	0.0	15.6	5.4	5.1	5.0	4.9
Subtotal	**32.1**	**35.2**	**38.7**	**95.9**	**96.6**	**42.8**	**30.4**	**29.2**	**28.2**	**27.9**
Total Planned Investments - Pavements										
Total Pavements	**1,010.6**	**1,585.8**	**1,790.7**	**1,680.3**	**1,304.1**	**1,236.2**	**1,040.4**	**1,000.1**	**966.7**	**956.2**

Table 7-16. IDOT's Planned Bridge Investments by Work Type for FY 2023-FY 2032 (Millions).

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
Planned Investments - Interstate Bridges										
New Construction	0.1	7.4	15.2	0.2	0.0	1.5	17.2	16.6	16.0	15.8
Maintenance (reactive)	1.9	2.5	4.0	0.8	4.6	1.3	1.3	1.3	1.3	1.2
Proactive Maintenance and Preservation	109.9	101.5	111.1	86.6	137.8	25.1	96.0	92.3	89.2	88.3
Rehabilitation	12.6	51.8	28.8	11.3	1.7	20.4	18.9	18.1	17.6	17.3
Replacement	425.0	332.8	198.0	283.3	69.2	419.5	228.1	219.3	211.9	209.6
Subtotal	**549.5**	**496.0**	**357.1**	**382.2**	**213.3**	**467.8**	**361.5**	**347.6**	**336.0**	**332.2**
Planned Investments - Other NHS Bridges										
New Construction	0.9	0.0	22.6	86.8	5.6	1.5	33.5	32.2	31.2	30.8
Maintenance (reactive)	12.0	6.4	4.7	6.5	0.0	0.0	1.8	1.7	1.7	1.7
Proactive Maintenance and Preservation	65.1	87.2	69.0	37.3	35.7	11.2	46.2	16.6	16.0	15.8
Rehabilitation	70.6	72.6	163.2	60.2	98.1	49.5	71.3	96.5	93.3	92.3
Replacement	119.6	310.3	215.2	192.8	119.9	121.8	146.6	140.9	136.1	134.7
Subtotal	**268.2**	**476.5**	**474.7**	**383.6**	**259.3**	**184.0**	**299.4**	**287.9**	**278.3**	**275.3**
Planned Investments - Marked Bridges										
New Construction	0.0	2.3	1.7	1.9	2.2	0.0	4.7	4.5	4.3	4.3
Maintenance (reactive)	5.2	0.4	0.1	1.3	0.0	0.0	0.3	0.3	0.3	0.3
Proactive Maintenance and Preservation	26.7	21.3	16.0	4.0	2.6	2.5	8.8	8.5	8.2	8.1
Rehabilitation	0.3	8.5	16.3	23.6	31.3	0.6	14.3	13.7	13.3	13.2
Replacement	115.9	57.8	63.2	131.8	175.3	51.3	86.8	83.5	80.7	79.8
Subtotal	**148.1**	**90.3**	**97.3**	**162.6**	**211.4**	**54.4**	**114.9**	**110.5**	**106.8**	**105.7**
Planned Investments - Unmarked Bridges										
New Construction	0.0	0.8	0.1	0.7	3.2	0.0	3.7	3.5	3.4	3.4
Maintenance (reactive)	0.3	1.4	0.0	0.1	2.3	0.3	0.5	0.5	0.5	0.5
Proactive Maintenance and Preservation	9.0	16.3	23.7	2.8	18.1	1.8	12.7	12.3	11.8	11.7
Rehabilitation	23.2	19.6	60.6	83.2	78.9	124.3	54.7	52.6	50.9	50.3
Replacement	51.5	165.0	103.4	155.5	61.8	52.8	82.5	79.3	76.6	75.8
Subtotal	**84.0**	**203.1**	**187.8**	**242.3**	**164.3**	**179.2**	**154.1**	**148.2**	**143.2**	**141.7**
Total Planned Investments - Bridges										
Total Bridges	**1,049.8**	**1,265.9**	**1,116.9**	**1,170.7**	**848.3**	**885.4**	**929.9**	**894.2**	**864.3**	**854.9**

Table 7-17. Summary of Total Pavement and Bridge Expenditures in FY 2023-FY 2032 (Millions).

	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032
Total Investments - Pavements & Bridges										
Total Pavements & Bridges	**2,060.4**	**2,851.7**	**2,907.6**	**2,851.0**	**2,152.4**	**2,121.6**	**1,970.3**	**1,894.3**	**1,831.0**	**1,811.1**

IDOT's Implementation of the Recommended Investment Strategies

Once the amount of funding for pavement and bridges is determined, the Bureau of Programming works with the districts to develop Annual and Multi-Year Programs that reflect the planned investment strategies.

TAMP Practices in Developing MYPs

To assist with the development of each MYP, the nine highway districts are issued funding targets and technical guidance to use in developing, prioritizing, and submitting projects. Each year, districts are also provided with the number of pavement miles and square feet of bridge deck area that need to be addressed to meet the statewide targets. In addition, the districts are advised which system to prioritize, based on systemwide conditions.

The district funding targets are comprised of both restricted funds and unrestricted funds. The restricted funding amounts are determined by special programs and special federal fund types such as Illinois Special Bridge Program, Border Bridge projects, congestion mitigation and air quality (CMAQ), Highway Safety Improvement Program (HSIP), etc. Each district's restricted program amount is deducted from the state program amount per fiscal year. The remaining funding is available for the district's unrestricted programs.

The following statistical data elements related to pavements and bridges are used each year in the development of weighted percentages that are applied to the unrestricted funds to determine the allocation to each district:

- Centerline miles (marked and unmarked)
- Interstate lane miles
- Interstate centerline miles
- Marked route miles
- Unmarked route miles
- Vehicle miles of travel
- Number of bridges
- Square footage of bridges
- Average annual daily traffic per centerline mile
- Average annual daily traffic per lane mile
- Truck average vehicle miles of travel
- Square footage of bridges in an unacceptable condition

- Square footage of bridges that are projected to become unacceptable in the next six years based on the bridge deterioration models
- Total pavement lane miles in an unacceptable condition
- Total pavement lane miles that are projected to become unacceptable in the next six years based on the bridge deterioration models

As IDOT began to transition to asset management practices, in 2018 the districts were instructed by the Bureau of Programming to use at least 5 percent of their unrestricted funds on bridge and pavement preservation, although they still retained considerable flexibility in how those funds would actually be used. The percentage of funding for preservation projects has been increased to 7 percent in subsequent years. When the Rebuild Illinois program was enacted, funds restricted to preservation activities were allocated to each district, to be used in addition to the 7 percent of unrestricted targets.

The selection of treatments for the projects that are programmed in the MYP are guided by the asset-management based pavement and bridge treatment rules that have been integrated into IDOT's policies. The proper treatments are chosen based on where the asset (pavement or bridge) is in its life cycle to optimize its life-cycle cost. Before a project is programmed in the MYP, the districts determine if the project is at a location that has been previously damaged by a declared emergency event, and if so, the process described in Chapter 6, *Risk Management and Planning for Resilience*, is followed. The Bureau of Programming reviews all projects to ensure the treatment guidelines are followed and the emergency events status has been reviewed. This increased involvement by the Bureau of Programming in the program development process is expected to help IDOT focus investments on high-priority objectives, such as reducing agency risks. In addition, it will help to ensure that the STIP is consistent with the TAMP recommendations.

A summary of the steps that are taken to develop each MYP is shown in Figure 7-4. It establishes the important link between available revenues, system needs, and performance targets that help to ensure that investment decisions are aligned on a statewide basis to achieve acceptable conditions. IDOT will continue to improve this process over the next several years to further strengthen these important links.

Figure 7-4. IDOT's Process for Developing Each MYP.

Moving Forward with TAMP Investment Strategies

As stated in Chapter 5, *Life-Cycle Planning*, the chosen life-cycle strategy and resulting investment strategies are the most implementable because the first 6 years mirror the committed projects in the FY23-28 MYP. Also noted in Chapter 5, the RBI capital program allowed for a large number of pavement and bridge replacement projects in the MYP. As each pavement and bridge replacement project is completed, the districts are slotting those projects immediately into a structured sequence of maintenance, preservation, and rehabilitation actions to sustain a desired state of good repair over the life cycle of each asset at minimum practicable cost.

As the committed projects are completed, funding in the last 4 years of the 10-year period will be transitioned to increased preservation and rehabilitation activities. Once the EAMS is brought online and the districts are trained in using it, they will be able to see firsthand the impact that this transition will have on their own pavement and bridge networks.

Asset Valuation

Since its inception, IDOT has made significant, on-going investments in its pavements and bridges. If the existing pavements and bridges on the NHS were replaced today, they would require an investment of approximately $105 billion, as shown in Table 7-18. The unit costs for replacement include all direct and indirect costs from inception until final completion of the project.

The replacement value shown in Table 7-18 is different than the value of the state-maintained system reported on IDOT's financial statements for two very important reasons. First, Table 7-18

represents only the pavements and bridges on the NHS, so a significant number of pavement and bridge assets, as well as many ancillary assets (such as lighting, signs, and drainage culverts) are not represented in the table. Second, IDOT's financial statements use a depreciation approach to represent asset value, which decreases the value each year based on the expected life of the asset. As a result, a pavement or bridge that has exceeded its design life would be totally depreciated, resulting in a book value of $0. Since all of IDOT's pavements and bridges, especially those on the NHS, have a significant value to the traveling public, the replacement value method of estimating asset value was determined to be more representative than the book value method for purposes of developing this TAMP. No changes are being made to the way asset value is being reported on IDOT's financial statements.

To preserve the $105 billion investment in its pavements and bridges, IDOT continues to invest in maintenance, preservation, and rehabilitation activities that preserve system conditions and keep the system operating safely. Without additional funding beyond that outlined in the TAMP, IDOT anticipates that the current value of its system is likely to decrease as the number of years between pavement treatments and the average age of the bridges increase. To minimize the impact on the travelling public, the TAMP investments prioritize repairs on the NHS pavements and bridges, which preserves the value on the portion of the network that serves the greatest number of users.

Table 7-18. NHS Pavement and Bridge Value Calculations.[28]

Pavement System	Centerline Miles	Unit Replacement Cost ($ per centerline mile)	Estimated Replacement Value
IDOT Interstate	1,893	$17,000,000	$32,181,000,000
Other NHS (includes local NHS)	5,559	$6,800,000	$37,801,200,000
Total - Pavements	7,452		$69,982,200,000
Bridge System	**Deck Area in Square Feet**	**Unit Replacement Cost ($ per centerline mile)**	**Estimated Replacement Value**
IDOT Interstate	32,650,000	$562	$18,349,300,000
Other NHS (includes local NHS)	32,932,000	$517	$17,025,844,000
Total - Bridges	65,582,000		$35,375,144,000
Total Value - Pavements and Bridges			$105,357,344,000

Illinois Tollway Investment Strategies

The Illinois Tollway uses a comprehensive capital planning process that identifies opportunities to increase system efficiency and to analyze and evaluate the investments required to address needed improvements[29]. Projects are evaluated through a

[28] IDOT's replacement costs based on the FY23-28 MYP include all direct and indirect costs related to completing projects from inception to completion.
[29] https://www.illinoistollway.com/projects/capital-programs

rigorous prioritization process that is based on several criteria, including (Illinois State Toll Highway Authority 2022 Budget):

- The condition of the existing roadway network and facilities.
- Benefits in terms of congestion relief and improved operations.
- Accident reduction and improved traffic flow and response time.
- The timing of the project to minimize commuter disruption.
- Anticipated local and regional growth.
- Impact on revenue and future maintenance/operating costs.
- Estimated project cost and risk.
- Assessment of right-of-way needs and environmental resources.
- Consideration of external agency projects and initiatives.

The Illinois Tollway's Capital Budget is comprised of one major program, the ongoing program called *Move Illinois: The Illinois Tollway Driving the Future*, scheduled to run through 2026. The Move Illinois Program is targeted at completing the rebuilding of the Illinois Tollway system and improving mobility, relieving congestion, reducing pollution, and linking economies across northern Illinois.

The capital budget process is conducted each year, beginning in the summer. The budget division works with each department to compile a comprehensive list of capital needs, which is used to identify new projects recommended for funding. The proposed pavement and bridge projects are evaluated by the Illinois Tollway's Project Management Office and General Engineering Consultant using the inspection reports prepared by the inspection teams, which identify asset conditions and repair recommendations. The information is used to help the Illinois Tollway establish priorities and investment strategies. Then, a thorough cost-benefit analysis is performed to justify the proposed capital expenditures and impacts to the operating budget. The final proposed project list is reviewed with department chiefs, approved by the Executive Director, and presented to the Board of Directors in October for approval. Changes to the projects are made and public hearings are held in November. Once final changes are made, a final budget is presented to the Board of Directors for adoption at its December meeting.

Future projects are evaluated through a transparent process that includes collaboration with IDOT, transit agencies, and local/regional transportation and planning agencies to help identify projects that will significantly reduce congestion, expand economic opportunities, improve the region's transportation infrastructure, and foster environmental responsibility and sustainability.

The planned Illinois Tollway five-year investment levels are presented in Table 7-19. This level of funding for pavements and bridges will enable the Illinois Tollway to achieve its desired State of Good Repair which consists of 100 percent of pavements and bridges in *Good* condition.

Table 7-19. Illinois Tollway's Planned 2022-2026 Investment Levels (Millions).

Expected Funding	2022	2023	2024	2025	2026	5-Year Total
Planned Investments ($ Millions)	1,486	1,261	1,041	757	538	5,083
Percent of Pavements at Desired State of Good Repair	100	100	100	100	100	100
Percent Bridges in State of Good Repair	100	100	100	100	100	100

A summary of the Illinois Tollway's planned five-year investments by work type is provided in Table 7-20. This table combines the planned investments for pavements and bridges on the NHS highways that are maintained by the Illinois Tollway. It also combines proactive maintenance and preservation into a single work type.

Table 7-20. Illinois Tollway's Planned Pavement and Bridge Investments by Work Type for FY 2022-FY 2026 (Millions).

Planned Investments	2022	2023	2024	2025	2026	5-Year Total
Maintenance & Preservation	296.8	283.4	283.0	286.6	248.0	1,397.8
Rehabilitation	10.2	10.6	21.6	12.8	4.2	59.4
Reconstruction	690.1	511.3	365.2	341.5	272.7	2,180.8
New Construction	489.3	456.1	370.7	115.7	12.9	1,444.7
Total	**1,486.4**	**1,261.4**	**1,040.5**	**756.6**	**537.8**	**5,082.7**

Chicago Skyway Investment Strategies

The Skyway's goal is early intervention with preservation and maintenance to extend the life of major elements as much as possible. This is facilitated by the Skyway's aggressive goal of maintaining pavement and bridges above Fair ratings. Repair recommendations are categorized as High, Medium, and Low priority following annual inspections. Higher risk elements (fracture critical bridge elements, for example) are typically more highly prioritized.

Over the next 10 years, the Skyway anticipates bridge spending to be 95 percent on maintenance and 5 percent on preservation. Additionally, the Skyway anticipates pavement spending to be 97 percent on major and minor rehabilitation and 3 percent on preservation.

No pavement replacement or bridge replacement activities are planned in the next 10 years.

Local Agencies Investment Strategies

Although local agencies receive payment through IDOT, not all local projects are entered into IDOT's programming database, making it difficult to determine anticipated expenditures on NHS pavements and bridges by local agencies. However, the survey of MPOs did provide insight into spending priorities:

- CMAP prioritizes funding for the freight network, which frequently coincides with the NHS system. CMAP also has rough estimates of revenues and expenditures through 2050 in its *On to 2050* plan[30].
- East-West Gateway prioritizes principal arterials and the highest volume routes. Again, these routes frequently coincide with the NHS system.
- Rockford uses NHS as a criterion in a majority of their prioritization analyses. Rockford's *2050 Metropolitan Transportation Plan* lists priority projects per decade through 2050[31].
- Bi-State Regional Commission ranks projects on collectors and above by Average Daily Traffic and anticipated future traffic. Because NHS routes are amongst the routes with the highest traffic in a region, the rankings will tend to favor NHS routes.
- Champaign/Urbana Urbanized Area Transportation Study takes multiple factors into account when considering projects to recommend, including the NHS designation, public inputs, local agency priorities, and LRTP goals and objectives. Champaign/Urbana Urbanized Area Transportation Study, like Rockford, has a list of regionally-significant projects in their *Long Range Transportation Plan 2045*[32].

IDOT'S PLANNED INVESTMENT STRATEGIES' SUPPORT OF NATIONAL GOALS

One of the requirements for a state's TAMP is a discussion of the affect that the investment strategies will have on the ability of the state to support the national goals identified in 23 U.S.C. 150(b). The seven national goals are as follows:

- Safety.
- Infrastructure Condition.
- Congestion Reduction.
- System Reliability.
- Freight Movement and Economic Vitality.
- Environmental Sustainability.
- Reduced Project Delivery Delays.

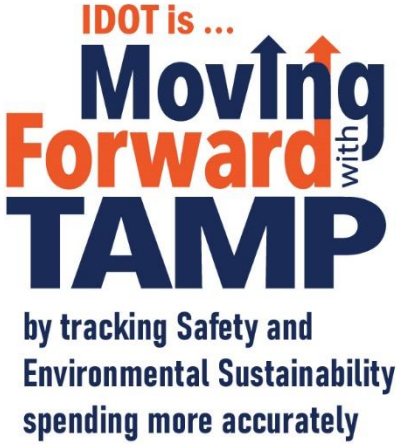
IDOT has made supporting the national goals a priority and has recently taken steps to quantify this support in concrete ways. Any project for which the primary improvement type supports one of the national goals is now identified in the programming process and the next MYP will show

[30] https://www.cmap.illinois.gov/documents/10180/911391/FINAL+Financial+Plan+for+Transportation+Appendix.pdf
[31] https://static1.squarespace.com/static/memo_6+detailed+project+list_final.pdf
[32] https://ccrpc.gitlab.io/lrtp2045/vision/futureprojects/

the national goal it most closely supports. The planned investment strategies' support of the seven goals are described in this section.

Safety

Safety is an overarching initiative throughout IDOT. The TAMP strategies support the goals and objectives of the HSIP by setting aside those funds as not available for programming general highway and bridge needs. There are several statewide funding lines targeted specifically to safety that are also set aside in the budgeting process as not available for programming general highway needs. Some of these include work zone safety, cable barriers, pavement markings and raised reflective pavement markers, and homeland security. These programs are reflected in the Safety line of Table 7-5. Additionally, safety factors such as critical safety tier crash locations and ADA ramps are considered in the programming process for pavement and bridge projects. Implementing the HSIP and TAMP will reduce traffic fatalities and serious injuries. Safety projects are now being tracked as a "TAMP category" in IDOT's Program Planning System (PPS) to be able to report on spending more accurately in support of this national goal.



Infrastructure Condition

The investment strategies in the TAMP are an integral part of the programming process that is used to develop the STIP. The investment strategies are aligned to meet the federal pavement and bridge performance targets IDOT reported to FHWA, which are used in conjunction with IDOT's State of Acceptable Condition targets to maintain the highway infrastructure system in a state of good repair. The investment strategies shared in Tables 7-13 and 7-14, with the exception of the New Construction lines, are directly in support of the Infrastructure Condition national goal.

Congestion Reduction

The TAMP investment strategies identify funding directed to New Construction. IDOT has developed and implemented a Data Driven Decision tool to ensure selected projects will contribute to reducing congestion. This funding can be seen in the New Construction component of the investment strategies in Tables 7-13 and 7-14. Implementation of the TAMP investment strategies, with 10 percent of the available funding directed to new construction, will aid in reducing congestion on the NHS.

System Reliability

The Highway Maintenance and Management category in Table 7-3, Projected FY 2023 to FY 2032 Estimated Expenditures, comprises 15 percent of IDOT's FY 2023 expenditures and contains many programs designed to enhance system reliability. Some of the programs include aggressive anti-icing and added snow plowing capabilities in the winter months and emergency patrols in

the Chicago and East St. Louis areas to aid stranded motorists, thereby reducing delays. Additionally, the Grants and Highway Safety category in Table 7-3 includes the Illinois Transportation Enhancement Program (ITEP) that funds transportation alternatives such as pedestrian and bicycle paths. Additionally, the DDD tool used to prioritize added capacity projects includes a goal area of traffic operations/congestion worth 20 percent of the overall score for each project, recognizing the importance of selecting projects that support this national goal. These and other programs combine to improve efficiency of the surface transportation system.

Freight Movement and Economic Vitality

Because Illinois' interstate system is the core of its freight roadway network, all pavement and bridge projects on the 12 interstates identified in the 2017 Illinois State Freight Plan support freight movement[33]. Projects on these interstates improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.

Environmental Sustainability

Environmental considerations are evaluated as part of every pavement and bridge project included in the STIP. Environmental sustainability is one of the national goals that IDOT is now specifically tracking in the MYP. There are several statewide line items in the budget that are represented in Table 7-5 in the Environmental Sustainability line. A few examples include archeological and historical surveys, wetland monitoring, and pollinator habitat restoration and preservation. Implementing the TAMP has resulted in more closely identifying where non-infrastructure condition funding is being spent and will ensure it continues to be supported. Continuing these programs will enhance the performance of the transportation system while protecting and enhancing the natural environment.

Reduced Project Delivery Delays

IDOT uses many methods to streamline and improve project delivery. The NEPA/404 Merger Process simplifies, standardizes, and condenses the process by which projects are coordinated with environmental resource agencies. A Memorandum of Understanding facilitates the coordination of projects with federally-recognized tribes with interests in lands in Illinois. A Programmatic Agreement (PA) on Section 106 of the National Historic Preservation Act significantly increases the number of projects that can be cleared for cultural resources internally and reduces overall coordination time. A PA for Categorical Exclusions (CE's) simplifies and clarifies the process and allows more state-approved CE's.

[33] https://idot.illinois.gov/Assets/uploads/files/Transportation-System/Reports/OP&P/Freight/ILFreightPlan_FINAL.pdf

Chapter 8: Performance Gap Analysis

OVERVIEW

In the short term, IDOT's annual program amounts are high due to the use of bonds issued as part of the RBI program; however, the longer-term outlook shows flat to declining revenues. At the same time, construction and maintenance costs continue to rise, with the annualized inflation rate currently topping 8 percent. These factors present challenges for meeting performance targets over the 10-year analysis period.

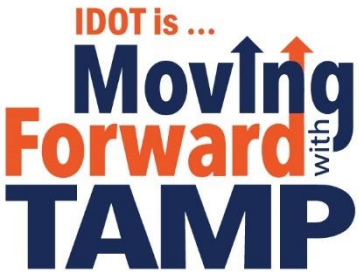
Recognizing the reality of inadequate funding, the Bureau of Programming continues to improve the project identification and selection process to control costs and extend the useful lives of existing transportation assets. The process has led to a life cycle approach that includes strategic investments in preserving system conditions, delaying the need for rehabilitation, and extending the service life. While some improvement has been made in programming preservation activities for pavements and bridges, there is still more work to do to reach an optimum mix of treatments that take into consideration the aged system, underlying pavement structural issues, and the pull of other needs such as safety and environmental sustainability on the program.

Although the investment strategies allow IDOT to maximize pavement and bridge conditions as much as possible, some of the State of Acceptable Condition targets are not anticipated to be met in the next 10 years. This chapter discusses the expected performance gap and the funding needed to eliminate the gap.

GAPS IN STATE OF ACCEPTABLE CONDITION TARGETS

As discussed in Chapter 4, by setting the "State of Acceptable Condition" at a level where preservation activities are most effective, IDOT's pavement and bridge performance metrics focus on a proactive approach that recognizes the importance of preservation activities before assets deteriorate to an unacceptable condition. For pavements, the new approach uses CRS values to determine the percentage of the highway system in a State of Acceptable Condition at 5.5 or higher for interstate pavements and 5.0 for all other systems. These CRS values were selected because they represent the range of conditions at which preservation treatments are considered viable.

Using current and predicted CRS values in conjunction with anticipated funding levels, the initial targets shown on the right were established for pavements.



by programming based on State of Acceptable Conditions for Pavements

- Interstates: 90 percent of the network with a CRS ≥ 5.5
- Other NHS routes: 90 percent of the network with a CRS ≥ 5.0
- Non-NHS Marked routes: 75 percent of the network with a CRS ≥ 5.0
- Non-NHS Unmarked routes: 50 percent of the network with a CRS ≥ 5.0

For bridges, the performance metric also changed and the definition for State of Acceptable Condition was set at a primary NBI element rating of 5 or better, representing a bridge element that could be preserved using maintenance or preservation treatments. The initial targets established for bridge conditions are also listed to the right.

IDOT is ... Moving Forward with TAMP by using State of Acceptable Condition Targets for Bridges

- Interstate and all other NHS bridges: 93 percent at or above a primary NBI rating of 5 or better
- All other bridges: 90 percent at or above a primary NBI rating of 5 or better

Performance Gaps

As discussed in Chapter 7, the planned investment strategies were developed to help IDOT achieve the State of Acceptable Condition for its pavement and bridge networks. Unfortunately, funding is not sufficient to achieve the acceptable conditions on all systems, so there are gaps between the acceptable and actual conditions in some instances. Figures 8-1 and 8-2 illustrate the performance gaps for pavements on each system. Funding is adequate to achieve State of Acceptable Condition for the interstate system; however, a more significant performance gap exists for the remainder of the pavement network.

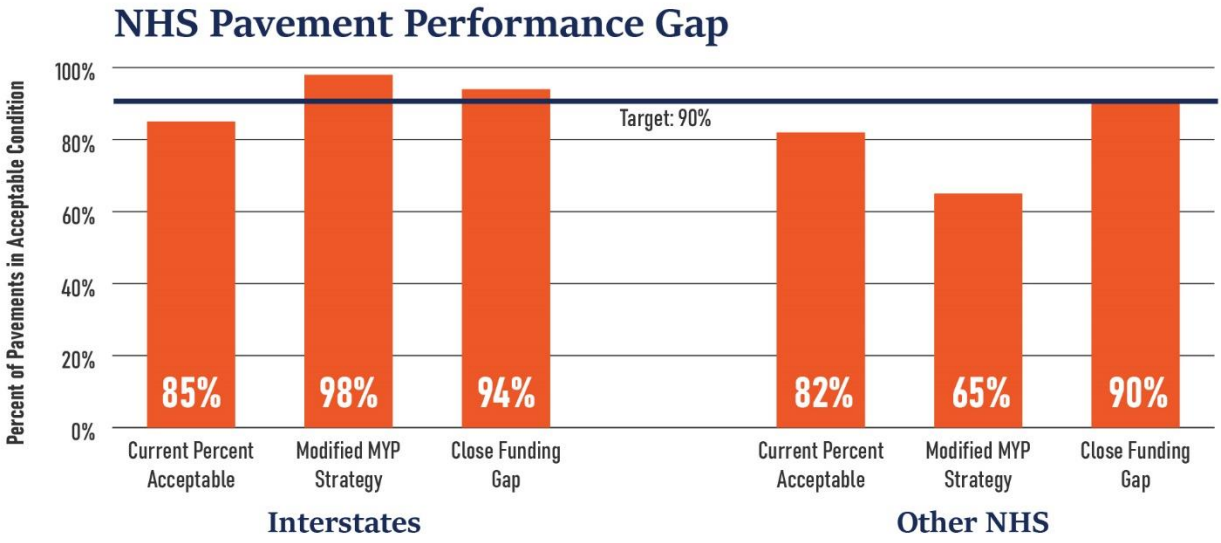


Figure 8-1. NHS Pavement Performance Gap.

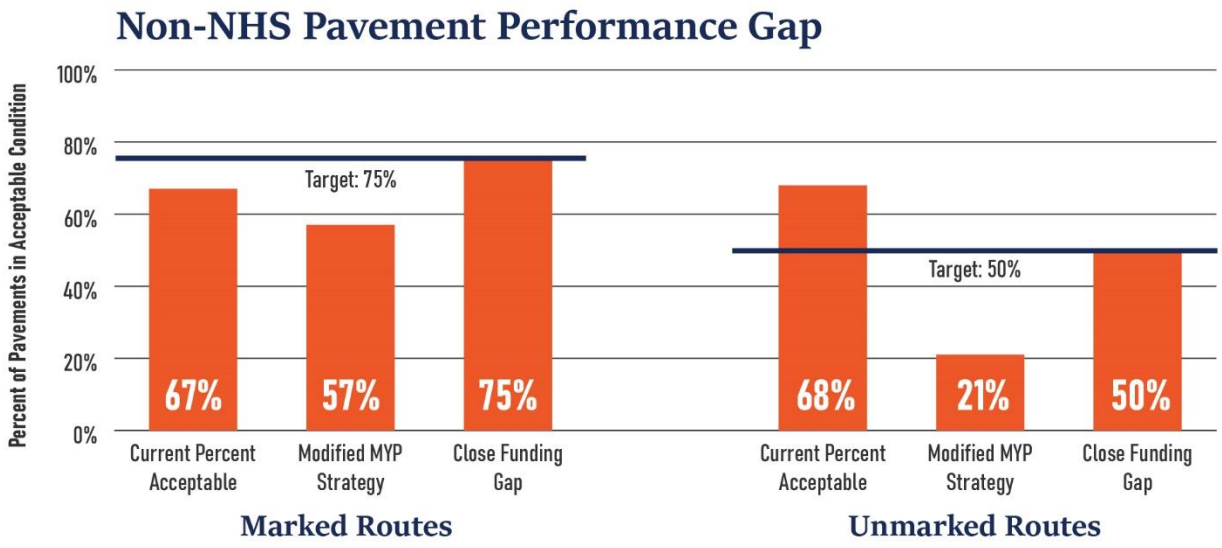


Figure 8-2. Non-NHS Pavement Performance Gap.

For bridges, the interstate NHS bridges meet the State of Acceptable Condition target and the other NHS bridges nearly meet the target. However, the non-NHS bridges have larger performance gaps. Figures 8-3 and 8-4 present the performance gaps for bridges.

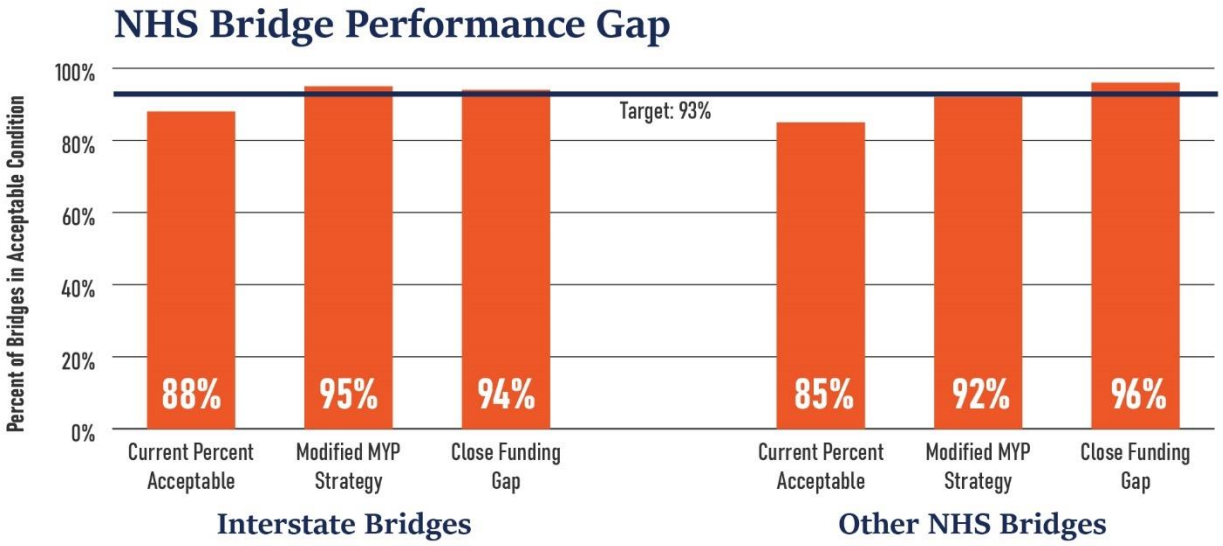


Figure 8-3. NHS Bridge Performance Gap.

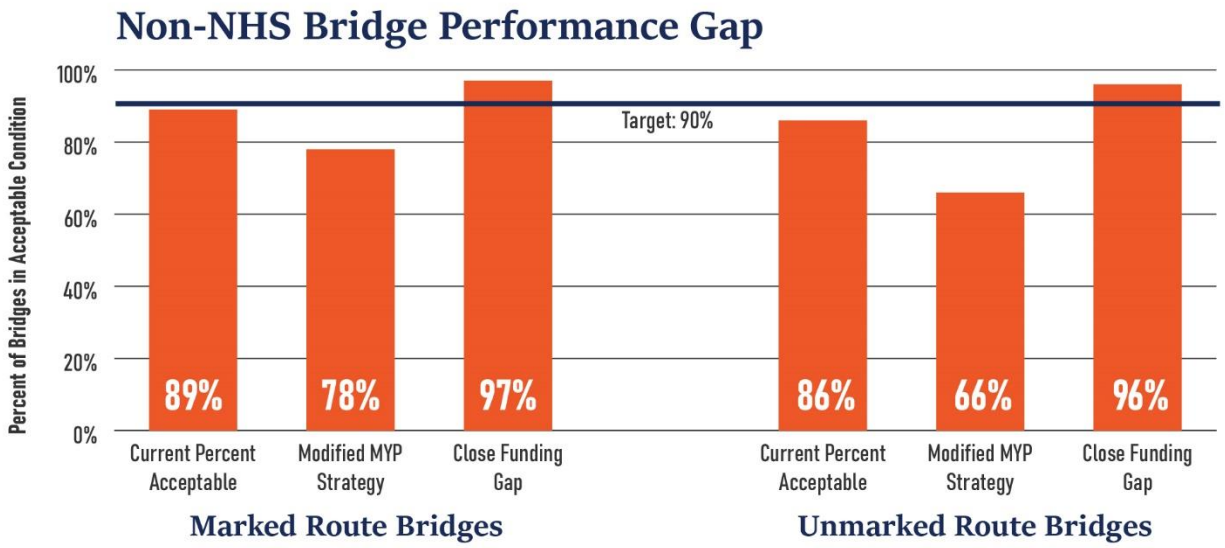


Figure 8-4. Non-NHS Bridge Performance Gap.

An analysis was conducted to determine the additional funding that would be needed to eliminate both the pavement and bridge performance gaps by the year 2032. The analysis used the Optimized Asset Type, System, and Work Type Distributions life-cycle planning strategy presented in Chapter 5. If the funding distributions are changed to those shown in Table 8-1 (pavements) and 8-2 (bridges) for all 10 years of the analysis period, the additional funding needed to address the gaps on all systems for both pavements and bridges will be minimized.

Table 8-1. Funding Distribution for Pavements under the Optimized Strategy.

System	% Budget by System	Percent System Budget by Pavement Treatment Category				
		Low Preservation	High Preservation	Minor Rehab	Major Rehab	Replacement
Interstates	14.0	7	15	33	35	10
Other NHS	49.0	10	33	30	17	10
Marked Routes	30.0	9	34	30	17	10
Unmarked Routes	7.0	8	32	30	20	10

Table 8-2. Funding Distribution for Bridges under the Optimized Strategy.

System	% Budget by System	Percent System Budget by Bridge Treatment Category			
		Low Preservation	High Preservation	Major Rehab	Replacement
Interstates	36.0	5	25	35	35
Other NHS	28.0	5	20	30	45
Marked Routes	14.0	10	25	30	35
Unmarked Routes	22.0	15	35	30	20

Table 8-3 shows the change in funding needed to meet the State of Acceptable Condition targets on all pavements if the distribution of funding by systems and work types shown above were to be adopted. The same type of analysis was conducted for bridges. Table 8-4 includes the results of the analysis for bridges.

Table 8-3. Change in Funding to Address the State-Maintained Pavement Performance Gaps (Millions).

System	Modified MYP Strategy	Optimized Strategy	Change
Interstates	$4,270	$1,820	$(2,450)
Other NHS	$3,820	$6,369	$2,549
Marked Routes	$2,809	$3,899	$1,090
Unmarked Routes	$337	$910	$573
Total	$11,236	$12,998	$1,762

Table 8-4. Change in Funding to Address the State-Maintained Bridge Performance Gaps (Millions).

Bridges	Modified MYP Strategy	Optimized Strategy	Change
Interstates	$3,218	$3,119	$(99)
Other NHS	$2,479	$2,426	$(52)
Marked Routes	$1,032	$1,213	$181
Unmarked Routes	$1,407	$1,906	$499
Total	$8,136	$8,665	$529

If funding allocations between asset types (pavements and bridges), systems, and work types were to be made immediately, the funding gap to achieve all performance targets would be $2.3 billion. Note that the costs include all direct and indirect costs, as defined in Chapter 5.

Strategies to Address the Condition Gaps

The gap analysis described above highlights the need to make sure that available funds are used as wisely as possible. As the performance gap in NHS bridges is closed, IDOT will increase the

percentage of preservation funds on NHS bridges while shifting bridge funding for rehabilitation and replacements to the non-NHS bridges. Similarly, the percentage of funding going to pavement preservation will be increased as the RBI program is completed. This strategy is consistent with the shift in investment strategies toward increased preservation beginning in FY 2029.

One of the most effective strategies to highlight the importance of increased preservation early in an asset's life-cycle is the use of asset management systems to run life-cycle planning optimization analyses. Once the EAMS is implemented into each district, the Bureau of Programming will work with each district to perform optimization analyses with their specific funding levels and network conditions. This process will allow the individuals closest to the project prioritization decisions to be able to directly see the effect that applying life-cycle concepts has on the overall condition of the network.

One additional strategy to close the performance gap in pavement and bridge conditions is to spend a greater percentage of the annual budget on preserving, rehabilitating, and replacing existing pavements and bridges. This strategy has been employed over the last several MYP cycles. Since this statistic began to be tracked, with the FY20-25 MYP, IDOT's percent of each 6-year MYP going to those three work types has increased, as shown in Figure 8-5.

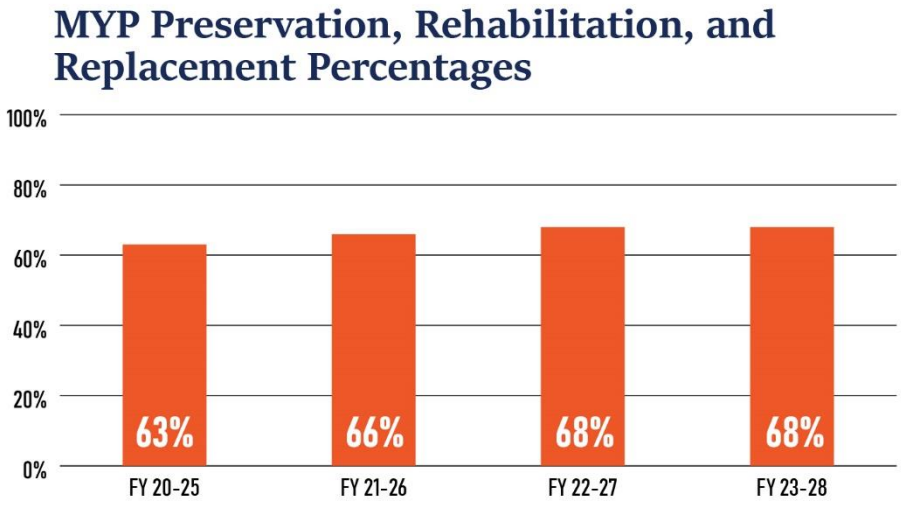


Figure 8-5. Percentage of Each MYP Used for Preservation, Rehabilitation, and Replacement.

GAPS IN FEDERAL PERFORMANCE MEASURES

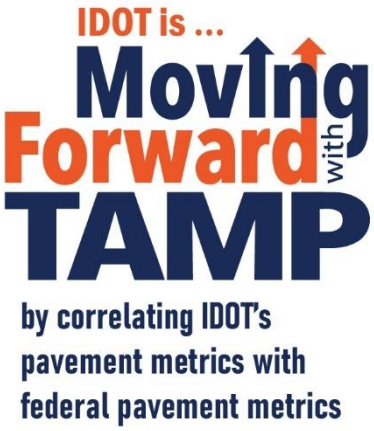
The federal measures presented in Chapter 4, *Performance Measures, Targets, and Trends*, include minimum condition requirements for interstate pavements and NHS bridge deck area. The legislation requires that if more than 5 percent of the interstate miles are in *Poor* condition using definitions provided by FHWA (which differ from the CRS), some flexibility in funding will be lost. For bridges, legislation states that some flexibility in funding will be lost if more than

10 percent of the NHS bridge deck area is classified as Structurally Deficient in accordance with the NBI definitions.

In the absence of an EAMS, predicting pavement and bridge conditions in 2024 and 2026 based on the federal performance measures is difficult. The spreadsheet tool used to analyze life-cycle strategies and develop the investment strategy is calibrated for IDOT's State of Acceptable Condition targets. Additionally, the spreadsheet tool is designed to analyze 10 years, as required by 23 CFR part 515.7(d).

It was demonstrated in Chapter 4 that the condition data IDOT collects for its State of Acceptable Condition measures somewhat correlate with the federal measures. The following assumptions may be made based on this fact:

- Percentage of Interstate in *Poor* condition: currently, less than 1 percent of interstate miles are in *Poor* condition based on the federal metric. Because interstate pavement conditions are predicted to improve over the 10-year time period based on CRS, and because CRS was shown to correlate with the federal metric, it is anticipated the interstate percentage in *Poor* condition will remain at or below 1 percent for the 2024 and 2026 reporting periods. Therefore, no performance gap exists and is not anticipated for this metric.



- Percentage of Bridges in *Poor* condition: it has been acknowledged that IDOT's bridge conditions currently exceed 10 percent *Poor*, although the percentage has decreased in each of the last three years. Due to the lag in condition improvement based on the timing of construction, inspection, and reporting on bridge projects, it is anticipated there will still be a performance gap in the *Poor* percentage of bridges in the 2- and 4-year reporting periods. However, IDOT's emphasis on NHS bridges as reflected in the investment strategies presented in Chapter 7 is expected to decrease the percentage of *Poor* bridges below 10 percent within the 10-year analysis period.

Once the EAMS has been deployed, more definitive predictions of conditions related to the federal metrics will be possible. In addition, as more years of data become available, it is anticipated that IDOT will undertake research to develop pavement deterioration models for the federal metrics. To improve its confidence in predicting future bridge conditions, Chapter 9 discusses the steps IDOT is taking to develop bridge performance models. Together, these steps will help IDOT better manage its bridges to ensure that the minimum condition requirements for NHS bridge deck area are achieved during the 10-year analysis period and maintained beyond the 10-year period.

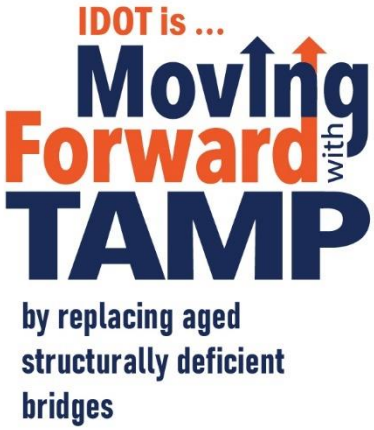
Future traffic growth is not considered in the performance gap analysis, as average vehicle miles traveled has been flat in Illinois since the early 2000s, as noted in Chapter 5, *Life-Cycle Planning*. The DDD tool used to evaluate added capacity projects includes a scoring component for traffic operations/congestion to address isolated locations that may experience an increase in traffic.

While the official 2020 census numbers report that Illinois gained 250,000 in population between 2010 and 2020, the number for 2020 itself shows a decline of 80,000[34,35]. Therefore, changes in population are not considered in the performance gap analysis. In addition, no performance gap exists related to part 667, as the only NHS location damaged more than once is programmed for mitigation in FY 2025.

OTHER FACTORS IMPACTING THE PERFORMANCE OF PAVEMENTS AND BRIDGES

States DOTs are required to initiate processes for identifying gaps in the performance of the NHS beyond asset condition. IDOT recognizes the need to achieve a balance between system performance goals related to improving safety, addressing capacity needs, and fostering economic development by preserving asset conditions. Asset management processes need to support a healthy, overall transportation system by focusing on both condition and other performance goals. IDOT has begun to monitor impacts on pavements and bridges caused by the implementation of the national goals discussed in Chapter 7, *Financial Plan and 10-Year Investment Strategies*, which will inform the ability to close the infrastructure condition performance gap.

Other factors identified during the performance gap analysis include the overall age of the system and the significant cost of replacing structurally deficient major river crossing bridges. The analysis described in Chapter 3, *Asset Inventory and Condition Assessment*, determined that 46 percent of existing structures are greater than 50 years old and nearly 92 percent of existing pavements are more than 40 years old. Many of the pavements have underlying structural issues that a preservation treatment cannot address. Because a large portion of the network is nearing the end of its service life, this could limit IDOT's ability to maintain and improve overall system conditions. To address these numbers, IDOT is applying life-cycle planning strategies to pavements and bridges to extend their service life in the most cost-effective manner.



Recognizing the challenge of accomplishing high-dollar bridge projects, IDOT has a separate Illinois Special Bridge Program that specifically targets deficient highway bridge projects that exceed replacement or rehabilitation costs of $7.5 million for state bridges and $1.0 million for local bridges. The Illinois Special Bridge Program provides federal NHPP funds and/or STP funds for up to 90 percent of eligible costs for projects on the interstate system and up to 80 percent of eligible costs for projects off the interstate system. A similar program may be needed for aged interstate pavements with structural issues, as they are quite costly to replace.

[34] https://www.chicagotribune.com/news/ct-census-update-illinois-population-gain-20220523
[35] https://www.cmap.illinois.gov/updates/all/-/asset_publisher/UIMfSLnFfMB6/content/population-loss-2020-census

A final factor that may impact the performance gap is the ability to accomplish the projects that are programmed. Inflation, as noted in Chapter 6, *Risk Management and Planning for Resilience*, will cause available funding to be used up on fewer projects, impeding the ability to make progress toward performance targets. Another issue contributing to accomplishing the program is land acquisition. The land acquisition process is cumbersome and frequently takes several years. Land acquisition is nearly always required for pavement replacement projects and is generally required for pavement rehabilitation projects due to the need to address ADA issues. Similarly, land acquisition is almost certainly needed for bridge replacement projects because new bridges are typically longer than their predecessors due to the need to be higher above water features to accommodate climate change projections. It is not unusual for a bridge or pavement project to be delayed due to the failure to complete land acquisition in a timely manner.

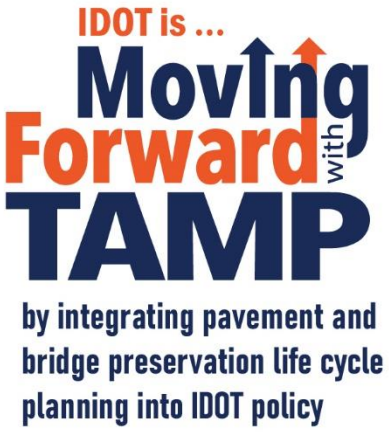
Chapter 9: TAMP Implementation and Integration

OVERVIEW

As described in this TAMP, IDOT is committed to ensuring the success of its asset management initiatives as a way to improve system conditions while managing the network through strategic, cost-effective improvements. IDOT recognizes that asset management is not a static process; rather, it requires continual evaluation of the process to identify possible changes that could be made to agency policies and practices that will help improve efficiency, reduce risks, and address agency priorities. This chapter outlines IDOT's implementation accomplishments in support of asset management, integration of the TAMP with other federally-required plans and with local owners of NHS pavements and bridges, and the planned enhancements that will be implemented within the next several years to further enhance IDOT's asset management practices.

IMPLEMENTATION ACCOMPLISHMENTS

Development of Improved Project and Treatment Selection Guidance



IDOT has made significant progress toward the development of changes to the guidance available to districts to help them select projects and treatments. The Pavement Policy Technical Working Group rewrote the Bureau of Design and Environment Chapter 53 – Pavement Preservation and Rehabilitation Strategies to codify the pavement treatment strategies outlined in the 2019 TAMP[36]. The working group will soon distribute a Pavement Management and Evaluation Manual to explain in more detail what life-cycle planning is and how to evaluate where a pavement is in its life cycle.

In addition to implementing the pavement treatment strategies outlined in the 2019 TAMP, the Bridge Technical Working Group completed the *Bridge Preservation Guide* in 2020. They also report to the FHWA annually on the year end bridge preservation performance measures. The bridge treatment selection guidelines have been incorporated into the Bureau of Programming's Guidelines for an initial approximation of bridge needs. The Bureau of Bridges and Structures continues to review projects recommended by the districts to ensure that progress is being made toward statewide bridge targets and that the selected treatments reflect the best treatment for each bridge's life-cycle needs.

[36] https://idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Design-and-Environment/Design and Environment Manual, Bureau of.pdf

Finally, the Bureau of Programming will be responsible for evaluating the results of the new strategy on an annual basis and communicating the results throughout IDOT.

District Training

Much effort has been spent in training the districts and other central bureaus on various aspects of asset management implementation. The state's annual Program Development Meeting has been a great avenue for district training:

- 2019: pavement life-cycle planning and evaluating emergency events, pavement preservation strategies
- 2020: updated pavement life-cycle policy in the BDE Manual Chapter 53, pavement investigations in support of the life-cycle policy
- 2022: 4-hour TAMP breakout session, incorporating several presentations by districts to district and central office staff.
    - Pavement and Bridge Preservation Successes (District 8)
    - Pavement Preservation Failures and How to Avoid Them (Bureau of Research)
    - Bridge Preservation Early Impressions (District 6)
    - If You Ask the Pavement What It Needs... (District 9)
    - EAMS demonstration (Deighton Associates)
    - General Topics and Open Discussion

The TAMP breakout was very well attended and most likely will become an annual event. A strong emphasis will be placed on districts sharing best practices with each other. As the EAMS reaches the implementation phase, one of the primary methods anticipated for training is to train one district and then have that district participate in training the other districts.

Several courses and workshops related to pavement preservation techniques have been attended by the districts in the last four years. The courses include:

- Every Day Counts 4 – Pavement Preservation Where and When
- Every Day Counts 4 – Pavement Preservation How
- Virtual micro-surfacing training provided by National Center for Pavement Preservation
- Virtual Attendance to the 2021 International Slurry Surfacing Association Annual Workshop
- Micro-surfacing mix design workshop at IDOT's Central Bureau of Materials
- FHWA Pavement Preservation Peer Exchange

In addition, the Bureau of Programming hosted a FHWA Bridge Management Systems Workshop in August 2022 to give the districts a feel for what goes into, and comes out from, a bridge management system. The course was well-attended by all 9 Districts (19 attendees), Central Bureau of Bridges & Structures (6 attendees) and Central Office Bureau of Programming (7 attendees).

Consideration of Repetitive Damage in Project Programming

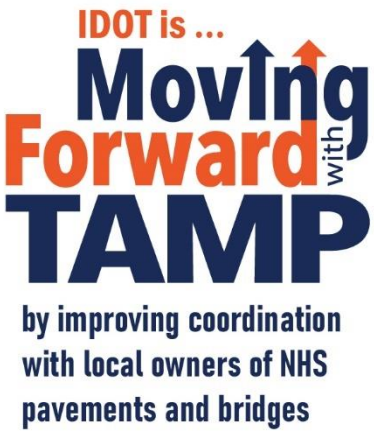
As noted in Chapter 6, state DOTs are required to establish processes to consider alternate treatment strategies on assets that have been damaged two or more times due to emergency events declared by the Governor of the State or the President of the United States. IDOT has established a process that collects, compiles, and tracks the required information and has incorporated a review of emergency repairs into the Bureau of Programming Program Development Section's programming processes beginning with the FY21-26 MYP. The districts are now following the evaluation procedures for all pavements and bridges prior to projects being added to the MYP and the STIP.

INTEGRATION

Coordination Between LRTP, TAMP, Other Federally Required Plans

The asset management processes that IDOT has developed have been integrated fully into the transportation planning processes that lead to the STIP. This has been demonstrated in Chapter 2, *IDOT's Planning Process and Asset Management Objectives*. Chapter 6, *Risk Management and Planning for Resilience*, documents the evaluation of locations repeatedly damaged by declared emergency events prior to projects being added to the STIP. The Bureau of Planning is currently working to update its 2017 Illinois State Freight Plan[37]. The data related to the locations damaged by declared emergency events may be used to increase planning for resiliency on the freight network.

Improved Coordination with Local and Regional Transportation Partners



IDOT currently complies with federal requirements to provide information on the NHS, regardless of whether the assets are managed by the state or by local partners. IDOT has been able to satisfy this requirement because of its decision to collect asset condition data for the entire NHS. However, IDOT recognizes the importance of working with its local and regional transportation partners to help ensure that all federal funds are used effectively to meet short- and long-term performance targets. The coordination efforts will be the responsibility of the Bureau of Programming. IDOT recently formed an internal Local Agency Technical Working Group to ensure local agency coordination and communication is consistent across the State. Additionally, the Bureau of Programming has presented on the new TAMP at several meetings and conferences targeted to local agencies.

[37] https://idot.illinois.gov/Assets/uploads/files/Transportation-System/Reports/OP&P/Freight/ILFreightPlan_FINAL.pdf

IDOT provided funding to CMAP to conduct a program where CMAP will provide technical assistance to MPO municipalities in collecting, storing, and analyzing asset conditions. This will assist CMAP in planning for improvements, prioritizing funding, and setting targets.

PLANNED ENHANCEMENTS

There are several specific enhancements that IDOT will make to existing business processes and analysis tools within the next several years to meet federal requirements and improve IDOT's ability to effectively manage its pavements and bridges. The most significant of these enhancements are detailed below.

Acquisition and Implementation of Improved Analysis Tools

IDOT recognizes that it currently does not have pavement and bridge management systems that meet the minimum requirements outlined by the federal requirements. Therefore, one of the most important enhancements that will occur is the acquisition and implementation of a new EAMS that contains software that will give IDOT the ability to evaluate the long-term impacts and cost-effectiveness of different pavement and bridge treatment strategies. The Bureau of Programming is responsible for the EAMS implementation. The current status of the procurement is as follows:

- Deighton Associates was selected as the vendor and the project kickoff was held in August 2020.
- Configuration of the system is on-going, with user acceptance testing completed in December 2022 and training slated to begin in February 2023.
- The current deployment plan includes utilizing the EAMS alongside current processes for the development of the FY24-29 MYP and in place of current processes for the development of the FY25-30 MYP.

Once training has occurred, the Bureau of Programming intends to roll out the system to the districts. With guidance from Programming, the districts will be able to use the software to analyze their own pavement and bridge networks, perform cross asset analysis, and develop an optimized program to best meet the performance targets established in this TAMP.

As the asset management system gets implemented, the Bureau of Programming will work with the districts to establish accountability criteria that can be used to drive district investment decisions and to help ensure that IDOT's statewide strategies are being implemented.

On-going and Upcoming Projects in Support of Asset Management

Asset management should be continually evolving in an organization. As such, there are several projects already in progress to support moving forward with asset management at IDOT.

- On-going project to develop element-level deterioration models for bridge elements[38].

[38] https://ict.illinois.edu/research/projects. R27-238 Developing Deterioration Curves for Bridge Elements

- On-going research to develop alternate rehabilitation strategies for unmarked and low traffic volume roadways[39].
- As noted in Chapter 2, the Bureau of Planning just began a project to update the LRTP that is due 2024. One of the goals of the department is to better integrate the LRTP and TAMP.
- The Bureau of Planning will be initiating a RIP that will include updating the vulnerability assessment completed in 2017, in support of integrating risk and resilience into the life-cycle planning process in Illinois.
- The Bureau of Planning will also develop a Carbon Reduction Plan, in support of the environmental sustainability national goal and the upcoming rule to create a carbon reduction performance measure.
- A project was advertised in November 2022 that looks to harmonize bridge costs used for asset management, project-level decisions, and jurisdictional transfers. The Bureaus of Programming and Bridges and Structures are coordinating the project. It is expected to take 15 months from the award to complete.
- The Bureau of Bridges and Structures has received funding for an updated seismic vulnerability assessment.

MOVING FORWARD

As documented in this TAMP, IDOT has made a strong commitment to *Moving Forward* through improved asset management practices that make use of performance metrics to emphasize the importance of preservation treatments, enhanced analytical tools to predict funding needs, stronger guidance to support project and treatment selection, and improved coordination with regional transportation partners. These efforts will continue as IDOT moves forward with implementing its new investment strategies and analysis software to enable the Department to achieve the goals set forth over the coming decade.

[39] https://ict.illinois.edu/research/projects. R27-240 Development of Potential Strategies for Unmarked and Low Traffic Volume Roadways in Illinois

Appendix A: List of NHS Mileage and Bridge Deck Area Managed by Local Agencies

Agency	Pavements (centerline mi)	Bridge Deck Area (sq ft)
Counties		
Champaign	0.24	-
Cook	56.54	198,422
DuPage	56.43	61,303
Kane	48.36	393,935
Kankakee	1.44	-
Lake	2.42	-
Madison	7.11	18,394
McHenry	15.67	23,548
Peoria	0.73	-
Rock Island	2.90	16,856
St. Clair	5.12	20,103
Will	50.70	69,916
Winnebago	18.01	34,774
Total Counties	265.67	837,251
Municipalities		
Aurora	6.35	125,690
Bartlett	2.23	-
Bedford Park	3.41	-
Bensenville	0.30	-
Bolingbrook	1.85	6,048
Calumet City	1.01	-
Campton Hills	1.71	-
Carol Stream	2.24	-
Champaign	9.47	6,223
Cherry Valley	0.50	2,493
Chicago	70.43	3,762,250

Agency	Pavements (centerline mi)	Bridge Deck Area (sq ft)
Creve Coeur	0.23	-
Crystal Lake	1.19	-
Danville	1.06	-
Decatur	2.11	1,847
Deerfield	0.06	10,816
DeKalb	1.61	-
Des Plaines	0.22	-
Downers Grove	0.52	-
Dupo	0.16	-
East St. Louis	3.48	-
Edwardsville	1.38	-
Elgin	1.83	-
Elmhurst	0.55	-
Elwood	2.40	-
Franklin Park	1.87	1,920
Galesburg	2.00	-
Geneva	0.12	-
Glen Carbon	0.32	-
Glen Ellyn	1.00	-
Glenview	0.35	4,683
Grayslake	0.29	-
Hanover Park	1.17	-
Harvey	2.03	-
Highland Park	0.89	-
Hodgkins	2.32	-
Hometown	0.62	-
Lake Forest	1.52	-
Lincolnwood	0.00	9,969
Lisle	0.23	-
Lombard	1.87	-
Loves Park	3.74	47,843
Machesney Park	1.51	4,400
Matteson	0.54	-

Agency	Pavements (centerline mi)	Bridge Deck Area (sq ft)
Mattoon	0.10	-
Mokena	0.55	-
Monticello	1.54	-
Mount Vernon	2.16	-
Naperville	9.59	7,998
Northbrook	0.56	2,709
Northlake	0.13	-
Palatine	0.70	-
Pekin	3.73	-
Peoria	0.58	-
Plainfield	2.09	-
Rock Island	3.68	5,037
Rockford	25.13	281,235
Savoy	1.19	-
Schaumburg	0.42	-
Skokie	0.14	-
South Elgin	1.04	4,940
Springfield	6.72	45,723
St. Charles	1.58	-
Tinley Park	1.63	-
Troy	0.78	-
Urbana	3.81	20,882
Venice	0.45	-
Villa Park	1.27	7,826
Westmont	0.50	-
Wheaton	0.42	-
Total Municipalities	209.18	4,360,532
Townships		
Elgin	0.84	-
Plato	1.18	-
Schaumburg	0.07	-
St Charles	0.01	-
Wayne	0.01	-

Agency	Pavements (centerline mi)	Bridge Deck Area (sq ft)
Total Townships	2.11	-
Other		
Other	2.01	106,786
Total Other	2.01	106,786
Total All Agencies		
Totals	478.97	5,304,569
Note: Other pavement NHS owners include the federal government, one private entity, and 1.1 mile where jurisdiction is unknown. Other NHS bridge owners include two private entities and one other state.		

Appendix B: Major Bridges

Bridge Type	# of Bridges	Deck Area (sq ft)
1) All bridges with Structure Length greater than or equal to 1,000 feet.	183	22,324,207
2) All bridges with Main Span Type coded "13 - Suspension" or "14 - Cable Stayed" or "15 - Moveable Lift" or "16 - Moveable Bascule" or "17 - Moveable Swing" and Structure Length less than 1,000 feet. Excluded 060-0170 (Fairmont Ave. over I-55 & 64 & 70)	10	215,876
3) All additional bridges part of Dan Ryan Elevated with Structure Length < 1,000 feet.	9	623,874
4) All additional bridges part of Congress Parkway/Circle Interchanged and Structure Length less than 1,000 feet.	10	197,255
5) All additional bridges part of IL-171 First Avenue Complex and Structure Length less than 1,000 feet.	8	223,438
6) All additional bridges part of IL-83/171 Kingery Highway and Structure Length less than 1,000 feet.	2	56,717
7) All additional bridges part of I-55 Elevated over South Br. Chicago River and Structure Length less than 1,000 feet.	2	57,406
8) All additional bridges part of Central Avenue & Ramps, Pulaski Road & Ramps, and IL-83 Torrence and Structure Length less than 1,000 feet.	3	163,007
9) All additional bridges part of Poplar Street Complex and Structure Length less than 1,000 feet.	9	261,090
10) All additional bridges on I-57 in Alexander County north of Mississippi River and Structure Length less than 1,000 feet.	2	51,264
Totals	238	24,174,134

Appendix C: Bridge Treatment Decision Guidelines

Table C-1. Construction

Improvement Types	Culvert Condition	Deck Condition		Superstructure Condition		Substructure Condition	Age	Other Criteria	Recurrence (Years)
New Structure									

Table C-2. Reconstruction

Improvement Types	Culvert Condition	Deck Condition		Superstructure Condition		Substructure Condition	Age	Other Criteria	Recurrence (Years)
Complete Replacement		≤4	or	≤4	&	≤4	Any		100
		≤4		≤4		≥5	≥60		
	≤4						Any		

Table C-3. Rehabilitation

Improvement Types	Deck Condition		Superstructure Condition		Substructure Condition	Age	Recurrence (Years)
Deck Replacement	≤4		≥5*	&	≥5	<60	50
Superstructure Replacement	≤4		≤4	&	≥5	<60	50
Superstructure Rehabilitation**			≤4	&	≥5		
Major Substructure Rehabilitation	≥5		≥5		≤4		50
Bridge Widening (with/without adding beams) - includes super and/or sub widening							

* Superstructure may be ≤4 if only isolated superstructure repairs are needed.
** Not always driven by superstructure condition rating ≤4. In some cases, may be needed for strengthening to meet current loading and/or design code requirements, or for fatigue retrofit etc.

Table C-4. Preservation

Improvement Types	Deck Condition	Superstructure Condition	Substructure Condition	Other Criteria	Recurrence (Years)
Washing	≥5	≥3	≥3		1
Deck Sealing	≥5	Any	Any		4
Concrete Super/ Substructure Sealing	Any	≥5	≥5		4
Painting	Any	≥5*	≥5	Main or approach span material type = steel	25
Expansion Joint Replacement	≥5	≥5**	≥5**		12-25
PPC Deck Beam Keyway Repair	≥5	≥5**	≥5**		
Bearing Replacement/ Repair	≥5	≥5**	≥5**		25
Overlay (includes deck patching if needed)	≥5	≥5**	≥5**	Deck Patching considered preservation only if included with an overlay.	25
Scour Mitigation	Any	Any	≥5	Provided the action is being taken to prevent scour from affecting an essentially good streambed and substructure units	
Drainage	≥5	Any	Any		

* Painting can be allowed when a substructure condition rating is 4 or below due to localized deterioration, but not when there is widespread deterioration. If painting is to be done when a superstructure condition rating is 4 or below, there must also be imminent plans to make repairs that will raise the superstructure condition rating to 5 or higher. Any project with a superstructure condition rating of 4 or below shall be reviewed by the Bureau of Bridges and Structures.
** Expansion joint replacement and/or bearing replacement/repair and/or overlays and/or keyway repair for PPC deck beams (PPCDB) can be allowed when a deck (PPCDB only), superstructure and/or substructure condition rating is 4 or below due to localized deterioration, but not when there is widespread deterioration. If expansion joint replacement and/or bearing replacement/repair and/or overlay placement and/or keyway repair for PPCDB is to be done when a deck (PPCDB only), superstructure and/or substructure condition rating is 4 or below, there must also be repairs included in the project that will raise the condition ratings to 5 or higher. Any project with a deck (PPCDB only), superstructure and/or substructure condition rating of 4 or below shall be reviewed by the Bureau of Bridges & Structures.

Note 1: Preservation projects can include some repair work (that will raise NBI rating(s) from '4' to '5') on the same structure(s) as long as the preservation work is > 60% of the cost.

Note 2: Refer to *Bridge Preservation Guide* for IDOT-Maintained Bridge Assets for additional guidance and detail regarding appropriate preservation activities.

Table C-5. Maintenance

Improvement Types	Deck Condition		Superstructure Condition		Substructure Condition	Other Criteria
Bearing Replacement/ Repair	Any		Any		Any	Steel and concrete repair are considered maintenance when they are stand-alone activities. However, these can be included as minor work within a preservation project*
Steel Repair						
Concrete Repair						
Deck Patching	Any		Any		Any	Considered maintenance if stand-alone activity with no overlay included. However, this can be included as minor work with a preservation project. *
Bridge Beam Replacement	Any		Any		Any	
Expansion Joint Replacement	Any		Any		Any	
Overlay (includes deck patching if necessary)	≤4	Or	≤4	Or	≤4	
Scour Mitigation	Any		Any		≤4	If severe scour has already occurred, resulting in a low scour critical, and possibly low substructure condition, rating.
* Preservation projects can include some repair work (that will raise NBI ratings(s) from 4 to 5) on the same structure(s) as long as the preservation work is ≥60% of the cost. If repair work is estimated at $250K or more is being done to a major bridge (≥1000' long), then this repair work is federally eligible.						

Appendix D: Risk Register with Likelihood, Impact, and Risk Rating

Risk Cat.	Risk Event	Primary Impacts	Likelihood	Impact	Risk Rating	Mitigation Strategies
Asset Performance	Preservation activities are not performed on a timely basis	• The expected service life of an asset is not achieved • Repair costs increase due to a lack of maintenance • May impede the ability to meet the performance targets	Almost Certain	Major	High	Treat – Review and enhance guidance on preservation; increase investment in preservation
	Increases in illegal or oversized/ overweight vehicles	• The rate of pavement and bridge deterioration increases, leading to the need for more frequent treatments or repairs • The expected life of an asset is not achieved, increasing the overall cost of preserving the system • May impede the ability to meet the performance targets	Likely	Major	High	Transfer – Increase enforcement Treat – Identify priority corridors for oversized/overweight vehicles; increase permit fees
	Increase in maximum legal loads	• The rate of pavement and bridge deterioration increases, leading to the need for more frequent treatments or repairs • The expected life of an asset is not achieved, increasing the overall cost of preserving the system • May impede the ability to meet the performance targets • Increased number of structures restricted to less than legal loads (new legal loads), with possible adverse effects on the movement of goods through the state.	Possible	Major	Medium	Terminate - Oppose legislation to increase legal weigh limits Treat – Identify structures likely to be load restricted under new legal load limits and prioritize for rehabilitation/replacement
External Threats	Extreme weather and climate change risks: Flooding, Extreme heat, Increased freeze/ thaw cycles	• Complete loss of asset • Temporary closure of main evacuation route • Loss of life • More frequent maintenance and mitigation strategies	Likely	Major	High	Treat – Use PROTECT funds as recommended in upcoming Resilience Improvement Plan; utilize “reserve for emergencies and other highway needs” funds
	Geologic risks: Seismic Activity, Mine Subsidence, Sinkholes	• Complete loss of asset • Temporary closure of main evacuation route • Loss of life • More frequent maintenance and mitigation strategies	Unlikely	Critical	Medium	Tolerate – For existing assets Treat – Perform regular inspections; enact recommendations from upcoming seismic vulnerability assessment

Risk Cat.	Risk Event	Primary Impacts	Likelihood	Impact	Risk Rating	Mitigation Strategies
Highway Safety	Highway Crash Rates increase Vulnerable road user crash rates increase	• Driver safety • Loss of life • Federal funding penalties	Likely	Critical	High	Treat - Screening for safety tier crash locations; safety benefits/cost evaluations; safety program evaluations
Programmatic Shifts	Shifts in modes of transportation from cars to transit and bicycles.	• Reduced funding from the gas tax reduces the amount of state revenue available for asset preservation • May improve IDOT's ability to meet performance targets	Possible	Minor	Low	Removed from risk register because risk rating is low
	Inability to demonstrate consistency with TAMP investment strategies and goals	• Federal reimbursement levels will be reduced, resulting in a smaller program • May decrease ability to meet performance targets	Possible	Critical	High	Treat – Prioritize programming consistent with TAMP investment strategies and allocate the required resources
	Unplanned changes in regulatory laws by FHWA or other government agencies	• Shifts how funds are distributed, which can potentially impact funding • Adds additional requirements without associated funding • May have an effect on IDOT's ability to meet performance targets • May require additional reporting resulting in additional work without additional staff	Almost Certain	Major	High	Tolerate
	The federal focus on the NHS will impact IDOT's flexibility in using federal funds	• The LOS for non-NHS assets could deteriorate further • Political pressure for project selection could increase • Increase the ability to meet the pavement and bridge and system performance targets (except total emission and non-SOV travel targets)	Almost Certain	Major	High	Tolerate/Take Advantage – Use the opportunity to prioritize life-cycle planning strategies to external partners. Enhance freight movement
Financial	Decrease or increase in the level of federal funding	• Not allow IDOT to invest sufficiently to meet performance targets (safety, pavement and bridge condition, system performance) • Reduces the asset Level of Service (LOS) • Unable to match with state funds	Possible	Critical	High	Tolerate
	Decrease or increase in the level of state revenue available	• Not allow IDOT to invest sufficiently to meet performance targets • Time required to get projects ready to go; lag time spending additional funds • Reduces the asset LOS and the program size • Difficulty in meeting federal match • Lack of correlation between CPI increase on MFT and rate of inflationary costs	Likely	Critical	High	Tolerate

Risk Cat.	Risk Event	Primary Impacts	Likelihood	Impact	Risk Rating	Mitigation Strategies
Financial	Inflation in project costs (from project inception)	• Effectively reduces available funds agency-wide. • Requires districts to push back projects or remove from their programs to cover costs • Not allow IDOT to invest sufficiently to meet performance targets, TAMP goals	Almost Certain	Critical	Critical	Tolerate/Treat – Prioritize projects and streamline to fit within available budget; develop consistent method across districts to program for inflation
	Failure to meet regulatory standards and performance measures	• Reduced flexibility with federal funding	Likely	Minor	Medium	Treat - Focus funding to increase compliance by reviewing internal program eligibility
	Increased transition to hybrid/electric vehicles	• Reduced MFT revenues, which impacts total program size (state and local); Increased cost to provide charging infrastructure	Almost Certain	Major	High	Tolerate – Study funding alternative
Information and Decision Making	Opportunities provided by emerging technologies (and materials) are not utilized and current technologies are not maintained	• Productivity and organizational advancement are limited • May impede the ability to meet performance targets	Almost Certain	Major	High	Treat – Educate management on ability to accomplish new technologies; act timely on new products; enhance and streamline IT processes to allow for innovative development/purchases; include training and/or support in any emerging technology
	Data accuracy and consistency issues	• The wrong solution could be recommended or recommended at the wrong time • May impede the ability to meet the performance targets	Unlikely	Major	Low	Risk was determined to have been mitigated
Business Operations	Decreased staffing due to impending retirements or staffing losses	• The agency loses institutional knowledge that can decrease the ability to manage assets • May impede the ability to meet performance targets • Staffing levels are not adequate to move projects forward so projects fall behind and impact asset LOS	Almost Certain	Catastrophic	Critical	Treat – Cross train; increase headcount; incentivize staying within section/bureau; make non-union positions attractive to union members
	Employee salaries and benefits do not keep pace with industry	• Productivity and quality suffer, errors increase • May impede the ability to meet performance targets • Unable to attract new talent	Almost Certain	Critical	Critical	Treat – Conduct compensation study and implement. Consider cost to the agency if not implemented. Make non-union positions attractive to union members