



2022 OPERATION AND MAINTENANCE ANNUAL REPORT

PRESENTED BY: HNTB CORPORATION
PRESENTED TO: MAINE TURNPIKE AUTHORITY



October 5, 2022



Maine Turnpike Authority
2360 Congress Street
Portland, ME 04102

Ladies and Gentlemen,

We are pleased to submit our 2022 Operation and Maintenance Annual Report for the Maine Turnpike. This report sets forth our findings as to the condition of the Maine Turnpike and our recommendations concerning maintenance, operation, insurance, and deposits to be made to the Capital Improvement and Reserve Maintenance funds and the Operation and Maintenance budget.

Our findings and recommendations are based on a visual inspection of the turnpike facilities performed between April and July, 2022; several additional visual inspections of turnpike facilities made during the year; and, on a careful evaluation of turnpike operation and maintenance procedures. We have periodically reported to the Executive Director, Chief Operations Officer, or Director of Engineering, on other items which warranted prompt attention.

We appreciate the opportunity to provide consulting engineering services and we acknowledge the excellent cooperation of Authority members and personnel in the performance of these services.

Best regards,

A handwritten signature in blue ink that reads "Timothy R. Cote". The signature is written in a cursive style.

Tim Cote, P.E.
Vice President

TABLE OF CONTENTS

1. Introduction	1	5. Maine Turnpike Authority/ MaineDOT Joint Initiative	35
» Annual Inspection Program	2	» Operations & Maintenance	35
2. Inspection Findings and Corrective Measures	5	» Park & Ride Lot Coordination	35
» Pavement	5	» Project Development	36
» Bridges and Minor Spans	7	6. Planning Studies	36
» Ancillary Structures	14	» Exit 32 Feasibility Study	36
» Drainage	14	» Exit 36 Feasibility Study	37
» Guardrail and Safety Improvements	16	» Exit 45 Feasibility Study	37
» Emergency Vehicle Ramps	17	» Gorham Corridor Study and Alternatives Analysis	38
» Roadway Side Slopes	17	» Safety and Capacity Study	38
» Lighting	18	» Portland Area Mainline Needs Assessment	38
» Signage	18	» Study of the Future Needs of the Piscataqua River Bridge	39
» Roadway Markings	19	7. Funding	39
» Vegetative Cover	19	» Capital Improvement and General Reserve Fund	40
» Toll Plazas	20	» Reserve Maintenance Fund	40
» Service Areas and MTA Administration Building	23	» Operation and Maintenance Fund	40
» Maintenance Facilities	24	» Insurance	40
» Building Needs Assessment	25		
» Emergency Generator Assessment	25		
3. Toll Collection System	26		
» Electronic Toll Collection	26		
» E-ZPass Group	26		
» Toll Schedule	26		
4. Traffic Management and Technology	28		
» Reduced Speed Limit Signs	29		
» Traffic Count Stations	29		
» Roadway Sensors	29		
» Variable Message Signs (VMS)	29		
» Highway Advisory Radio	30		
» Closed Circuit Television (CCTV) System	31		
» Overheight Vehicle Detection System	31		
» Go Maine Program	31		
» Park & Ride Lot Program	32		
» Turnpike Safety and Law Enforcement	33		
» Turnpike Safety Patrol	34		

Appendix

Appendix A - Maintenance Area Buildings

Appendix B - Schedule of Insurance

Maine Turnpike

- » Peter Mills, Executive Director
- » Doug D. Davidson, Chief Financial Officer, and Authority Board Treasurer
- » Peter S. Merfeld, P.E., Chief Operations Officer
- » Jonathan A. Arey, Esq., Authority Board Secretary, and Staff Attorney

Authority Members

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- » Robert D. Stone, Vice Chair
- » Michael J. Cianchette, Member
- » Andrew McLean, Member
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1. INTRODUCTION

This 2022 Operation and Maintenance Annual Report is based on the findings of a visual inspection of Maine Turnpike (Turnpike) facilities; a review of current operating practices; and a review of the insurance coverage currently in effect, all as conducted by the licensed Professional Engineers of HNTB Corporation. It sets forth observations, conclusions and recommendations concerning the condition, maintenance, repair, and operation of the Turnpike and its associated facilities. Additionally, this report includes recommendations for the amount of funding required for the proper maintenance, repair, and operation of the Turnpike to be deposited into the Capital Improvement fund, Reserve Maintenance fund, and the Operation and Maintenance budget. Finally, recommendations regarding insurance coverage are also provided.



In 1941, the Maine Turnpike Authority (Authority) was created as an independent state agency and given the mandate to construct a turnpike "from some point at or near Kittery to a point at or near Fort Kent." The legislature intentionally delegated the responsibility for turnpike construction and operation and maintenance to the Authority and precluded any financial commitment by the state.

The original 45 miles of Turnpike, Section I, from Kittery to Portland opened to traffic in 1947 and Section II, from Portland to Augusta, was completed in 1955. The Turnpike also includes a three-mile spur from the Turnpike mainline to Route 1 and Interstate 295 in Falmouth. The extension of the Interstate Highway System into Maine in the 1960s and 1970s changed the limits of the Turnpike. The construction of the interstate eliminated the portion north of Augusta and utilized the portion south of York. Since then,

the Turnpike has purchased portions of the southerly section of I-95. The southerly terminus is now 75 feet north of the Piscataqua River Bridge while its northerly terminus remains unchanged.

In 2016, the Authority purchased from the Maine Department of Transportation (MaineDOT) approximately 1,800 feet of I-295 roadway in Scarborough northeast of the existing Exit 44 Toll Plaza. The acquisition was in preparation for the now complete Exit 44 open road tolling (ORT) toll plaza conversion project and included the addition of several regulatory and warning roadside signs, an overhead sign bridge structure with signage, a cantilevered sign structure with signage, and cable guardrail.

Almost two-thirds of the 111-mile Turnpike is a four-lane divided highway; the other third is a six-lane divided highway. Turnpike facilities include 198 structures (182 bridges and 16 minor spans), 22 interchanges, 19 toll plazas, an administration building, including the E-ZPass Customer Service Center and the State Police offices, five service areas, and nine maintenance facilities.

The Turnpike, designated as I-95, is one of the major north-south highways in the state, extending from Kittery to Augusta, Maine and is part of the National Highway System (NHS). The NHS is comprised of the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility. The NHS was developed by the United States Department of Transportation (USDOT) in cooperation with the states, local officials, and Metropolitan Planning Organizations (MPOs). The Turnpike system, shown in **FIGURE 1**, is the only interstate highway from Kittery to Portland, making it one of the most critical elements of Maine's transportation network. The Turnpike is a safe and efficient highway that accommodated approximately 69.8 million trips with 84.5 million transactions in 2021.

The COVID-19 pandemic has impacted Turnpike traffic and revenue. Beginning in March 2020, traffic volumes dipped to nearly half pre-pandemic levels. Traffic gradually rebounded throughout the year, ending 23.8% below 2019 levels. Traffic continued the upward trend through 2021, finishing the year 13.9% above 2020 but 6.4% below the record volume recorded in 2019. Commercial vehicle traffic continued to be



TURNPIKE MAINLINE

very strong in 2021, exceeding the record volume recorded in 2019 by 3%.

The demands placed on Turnpike facilities are enormous. Its roadways, bridges, interchanges, toll plazas, service areas and maintenance areas are subjected to increasing stress due to age, traffic levels, a high weight limit (100,000 lb. trucks allowed), and the demands of the harsh northern New England climate. To ensure the sound condition and effective operation of the Turnpike, the Authority funds and implements aggressive Operation and Maintenance, Reserve Maintenance, and Capital Improvement programs. The vigilance of the Authority through these programs has resulted in a well maintained and efficiently operated Turnpike. The Authority looks to continue initiatives such as pavement rehabilitation, bridge rehabilitations and replacements, and system modernization to assure that Turnpike facilities meet current safety standards as well as projected demands.

Annual Inspection Program

In accordance with Section 806 of the Bond Resolution dated May 1, 1991, HNTB Corporation, as the Consulting Engineer, is required to inspect the Turnpike at least once a year and submit to the Authority a report setting forth the following:

- » Opinion as to whether the Turnpike has been maintained in good repair, working order and condition
- » Advice and recommendations as to the proper maintenance, repair, and operation of the Turnpike during the ensuing fiscal year and an estimate of the amount of money necessary for such purposes
- » Advice and recommendations as to the amounts and types of insurance to be carried
- » Recommendations as to the amount of money that should be deposited into the Reserve Maintenance fund during the upcoming fiscal year

To comply with the listed requirements, the engineers and staff of HNTB Corporation annually conduct a visual inspection of the entire Turnpike. The inspection covers pavement, cut sections, embankments, bridges, roadway lighting, drainage structures, signs, pavement markings, toll plazas, utility buildings, service areas, maintenance areas, and other facilities. This report is based on observations made during the inspection which was conducted between April and July of 2022. The opinions, statements and recommendations made herein are based solely on conditions revealed by visual inspection. No representation or warranty is made that all defects have been discovered or that defects will not appear later. Inspections of specific Turnpike facilities are conducted whenever special attention is warranted.

A detailed Annual Inspection Report was submitted to the Authority in July of 2022, to be used in conjunction with this 2022 Operation and Maintenance Annual Report.

FIGURE 1: TRANSPORTATION NETWORK

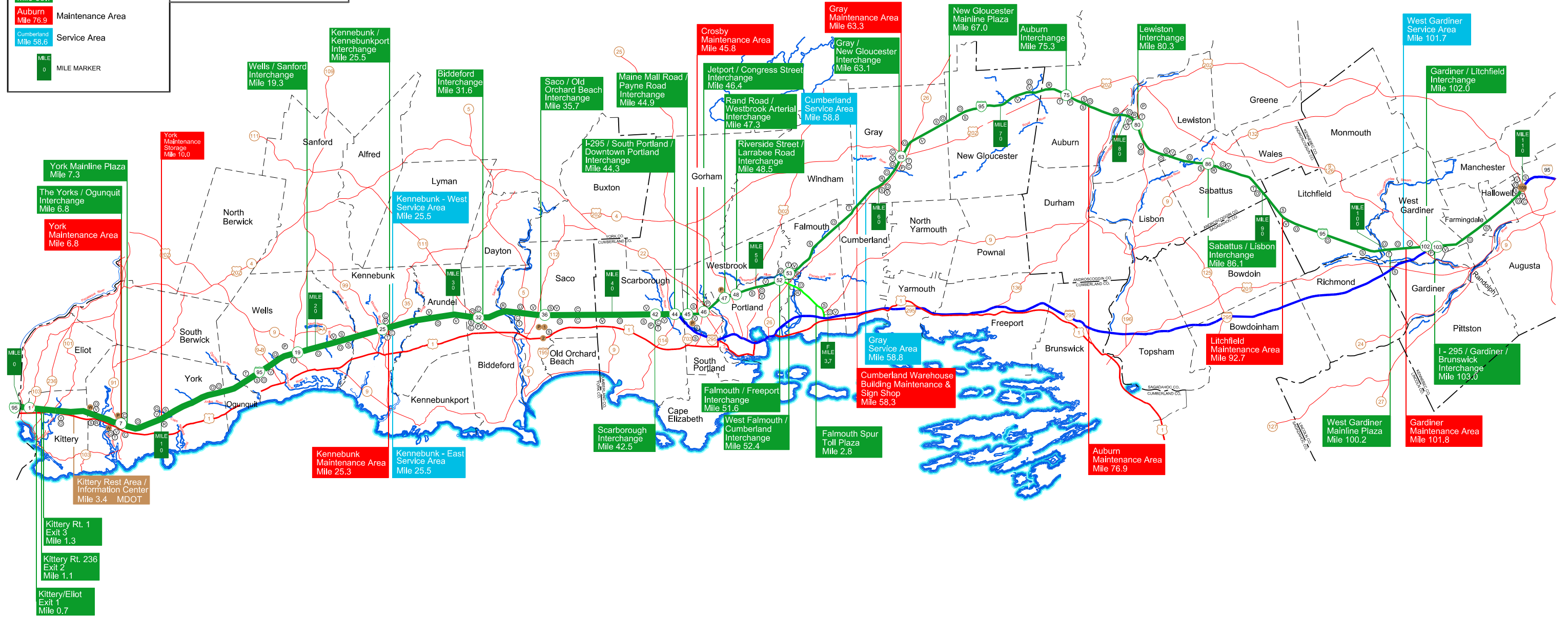
The Maine Turnpike System



LEGEND:

	Mainline	6 Lanes
	Mainline	4 Lanes
	Falmouth Spur	4 Lanes
	Interchange Number	
	Interchange Name & Mile	
	Maintenance Area	
	Service Area	
	MILE	
	MILE MARKER	

	= Highway Advisory Radio - Transmitter
	= Highway Advisory Radio - Sign
	= Closed Circuit Television
	= Variable Message Sign
	= Weigh Station
	= Commuter Park and Ride Lot
	= Median Opening
	= Roadway Weather Information System
	= MaineDOT Facility



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2. INSPECTION FINDINGS AND CORRECTIVE MEASURES

The Turnpike has been maintained in generally good condition and presents a favorable appearance. Traffic volumes and the age of the facility necessitate continued high levels of maintenance. The Authority’s Maintenance forces undertake routine maintenance while private contractors normally construct larger projects

which are publicly bid. These contracts include pavement resurfacing, bridge deck replacements, bridge repairs and painting, slope repairs, and new building construction. The following sections summarize the findings of the 2022 Annual Inspection of the Turnpike by HNTB Corporation (HNTB).

Pavement

Each year MaineDOT collects pavement condition data throughout the State using Automatic Road Analyzer, or ARAN, truck technology. This data is provided to the Authority and provides insight into the overall condition of the pavement on the Turnpike system. The most recent data available is for calendar year 2021. Data from the past five years, shown in **Table 1**, indicates 100% of the mainline pavement on the Turnpike is in good to fair condition.

TABLE 1: PAVEMENT CONDITIONS 2017 - 2021

	2017	2018	2019	2020	2021
Good	53.3%	25.1%	36.1%	22.9%	24.3%
Fair	46.5%	74.6%	63.6%	76.9%	75.7%
Poor	0.2%	0.4%	0.2%	0.2%	0.0%

In accordance with the Federal Highway Administration’s (FHWA) published Federal Register (82 FR 5886) final rule established in May of 2017, the performance measures for pavement on the National Highway System have been updated to include “Good”, “Fair”, and “Poor” conditions. The above reporting and classifications are consistent with current FHWA guidelines.

To maintain pavement quality and roadway safety, the Authority has a planned program of pavement rehabilitation. The Authority generally rehabilitates a pavement section approximately every 12 years. **Table 2** illustrates Pavement Contracts over the past 15 years.

Studies indicate that pavement maintained in good condition costs substantially less to preserve than pavement that is allowed to deteriorate to poor condition. Based on this concept, the Authority’s resurfacing program consists of rehabilitating one or more sections of roadway, totaling on average ten centerline miles each year, to minimize the cost of future repairs.

FIGURE 2: PAVEMENT LIFE CYCLE

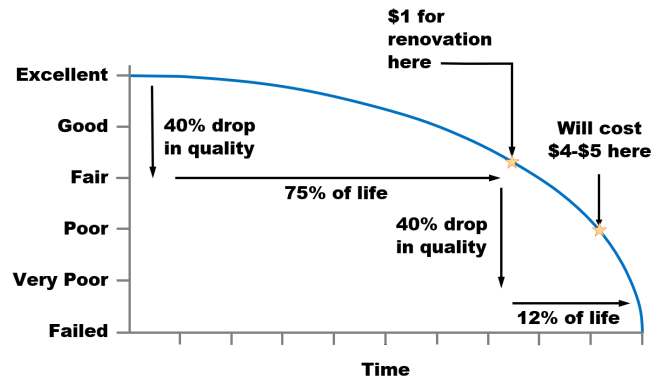


FIGURE 2 illustrates the rate of deterioration and relative cost of rehabilitation at various times throughout the Life Cycle of a section of pavement. Evidence that pavement requires rehabilitation includes wheel rutting, excessive cracking, and poor ride quality.

Starting in 2014, pavement rehabilitation contracts specified polymer modified asphalt to alter several characteristics of the asphalt, each of which is intended to improve pavement durability, weatherability and performance. This practice has continued into 2022. The areas using this additive will be evaluated to determine if its use is providing adequate benefit.

TABLE 2: PAVEMENT CONTRACTS 2008 - 2022

Year	From MM to MM		Roadway
2022	102.6	109.1	NB/SB
	Int. 25 & 36		
2021	0.2	1.3	NB/SB
	30.0	35.5	NB/SB
2020	35.3	42.0	NB/SB
	102.2	102.6	NB/SB
2019	42.0	44.3	NB/SB
	49.3	51.2	NB/SB
2018	44.0	49.3	NB/SB
	74.9	80.7	NB/SB
	98.0	102.2	NB/SB
	Int. 32 & 47		
2017	64.4	68.5	NB/SB
	80.7	88.6	NB/SB
	Int. 86		
2016	54.5	57	NB/SB
	59.5	64.4	NB
	57	64.4	SB
	Int. 63		
2015	51	54.5	NB/SB
	68.5	74.9	NB/SB
	FS0.5	FS3.8	EB/WB
	Int. 46		
2014	23.3	30.3	NB/SB
	102.6	109.1	NB/SB
	57.0	59.5	NB
2013	7.4	13.5	NB/SB
	88.0	92.0	NB/SB
	Int. 7 & 44		
2012	30.0	35.0	NB/SB
	92.0	98.0	NB/SB
	102.0	Plaza	NB/SB
	Int. 42, 45 & 53		
2011	13.3	23.3	NB/SB
	Int. 19 & 48		
2010	2.2	7.0	NB/SB
	44.0	51.2	SB
	45.0	51.2	NB
2009	35.3	43.9	SB
	35.4	44.5	NB
2008	57.0	64.4	SB
	80.8	85.2	NB/SB
	Int. 102 & 103		



PAVEMENT REHABILITATION BY MTA MAINTENANCE CREW

HNTB Recommendation

Roadway and shoulder pavement is in generally fair to good condition and the ride quality of the Turnpike continues to be acceptable. HNTB recommends that the Authority continue with the annual maintenance paving program of addressing approximately ten centerline miles per year with polymer modified asphalt surface pavement. Pavement rehabilitation projects should continue to generally consist of a minimum 1 3/4” milling, crack sealing, shimming, and repaving.

Pavement rehabilitation for the 2023 construction season is recommended on the mainline between Mile 88.8 and Mile 98.0. In addition, pavement rehabilitation at the York, Crosby and Litchfield Maintenance Yards is recommended.

Bridges and Minor Spans

The Authority is responsible for the operation and maintenance of 182 bridges, defined as spans measuring more than 20 feet in length, and 16 minor spans measuring between 10 and 20 feet in length.

In 2021 the Authority removed the Ramp E Underpass Bridge at Mile 102.01 as part of the West Gardiner I-295 Toll Plaza Reconstruction Project. Additionally, the ownership of two minor spans passing beneath local state-aid roadways was transferred from the MTA to MaineDOT following coordination between the MTA and MaineDOT. These changes reduced the number MTA bridges and minor spans to 182 and 16, respectively.

The Authority's Operation and Maintenance Program for these structures involves multiple aspects including developing and maintaining a detailed inventory of Authority owned structures, scheduling and completing condition and safety inspections, compiling repair and replacement recommendations, and the development and execution of contracts for repair or replacement. The goals of this program are to accurately forecast bridge and minor span repair needs, identify critical deficiencies, repair and upgrade structures on a timely basis, and to maintain the safe condition of Authority owned bridges and minor spans.

This report quantifies and discusses bridges and minor spans separately. The National Bridge Inspection Standards established by FHWA require the inspection of bridges on a predetermined schedule and that the inspection data be reported in the National Bridge Inventory. No federal inspection or reporting requirements exist for minor spans. However, the MaineDOT collects and monitors condition data for minor spans for internal use. Since 2013, the inspection of Authority owned minor spans has been completed and reported using FHWA's bridge inspection procedures. This process provides inspection consistency between the Authority and MaineDOT and provides documentation of the condition of the Authority's minor spans.

INSPECTION PROGRAM

Inspections of Authority owned bridges and minor spans are completed by qualified inspectors in accordance with the National Bridge Inspection Standards established by FHWA. There are several different types of inspections that occur based on structure type, in-

formation needed, and federal regulations. The different inspection types are discussed in more depth in the following sections. Once these inspections are complete, the condition ratings for each structure are compiled and transmitted to the MaineDOT for inclusion in the National Bridge Inventory. The inspection data also becomes part of the Authority's records which are used to develop the Turnpike's rehabilitation and repair program.

The MaineDOT uses AssetWise as their recording platform. The Authority, to maintain consistency and streamline the reporting of bridge condition data, reports inspection data to MaineDOT directly through AssetWise. The MaineDOT has given the Authority access to the online AssetWise database and software to facilitate consistency for all bridge data in the state.

The following is a discussion of the bridge inspection program components:

ROUTINE INSPECTIONS

All Authority owned bridges and minor spans undergo routine inspections per FHWA guidelines on an annual basis. The purpose of these inspections is to identify potential safety concerns, document areas of deterioration, and to record condition ratings for key bridge components. The 2022 routine inspection by HNTB identified that bridges and minor spans along the Turnpike range from fair to very good condition. Structures that have been rehabilitated or reconstructed during the past 20 years were found to be in generally better condition than those that have not been recently rehabilitated.

UNDERWATER INSPECTION

The FHWA requires an inspection of underwater bridge elements every five years. The most recent underwater inspection was performed in the Summer of 2021 and included 20 bridges and culverts that carry the Turnpike over rivers and water bodies where certain elements of the substructures or culverts cannot be inspected as part of the routine inspection. No serious structural deficiencies were noted during the 2021 underwater inspection. The overall condition of the visible portions of the underwater substructures ranged from fair to good condition with the Southern Hart Brook box culvert located at Mile 79.65 identified as being in poor condition. Repairs at this loca-

tion are programmed for completion in 2028 as part of a planned culvert improvement project. Most deficiencies observed were attributed to freeze-thaw deterioration and abrasion from ice and debris.

The next underwater inspections should be completed in 2026.

DETAILED INSPECTIONS

Detailed inspections are completed on bridges with special features that warrant increased attention and inspection effort. Two sets of Turnpike structures, the Androscoggin River Bridges and the York River Bridges, require detailed inspections.

The Androscoggin River Bridges, each measuring 850 feet long, consist of roadway surfaces supported on stringer and floor beam framing systems. The loads from these roadway framing systems are carried almost entirely by two primary girders.

Because these structures are carried by only two primary girders, the bridge has insufficient redundancy to prevent a progressive collapse of all, or part of, the bridge if one of the primary girders were to fail. As a result, these structures are classified as “fracture critical” and are subject to more rigorous inspection requirements as outlined in FHWA’s Bridge Inspection Standards. To achieve compliance with these inspection standards, the Androscoggin River Bridges should have a fracture critical inspection completed at least once every 24 months.



HANDS-ON BRIDGE INSPECTION

The last fracture critical inspection was completed in May 2021. During the inspection several existing and new deficiencies were noted including numerous cracked welds. The cracks were not located on the primary girders and are not judged to pose a significant safety risk. Continued monitoring will be completed

in future inspections and, if crack sizes increase over time, the issuance of a repair contract will be recommended. The next fracture critical inspection of these structures is scheduled for 2023.

At the York River Bridges, the girder framing system includes pin-and-link assemblies. Because routine inspection procedures are insufficient to identify defects in the pins, ultrasonic testing of these elements is necessary. A five-year inspection frequency for ultrasonic testing is suggested. This frequency is based on engineering judgement since the FHWA does not have a required frequency for these components.

The first detailed inspection and ultrasonic testing of the pin-and-link systems at the York River Bridges was completed in December 2011. No serious structural deficiencies were noted during the inspection. The next detailed inspection was scheduled for 2016. However, a 2015 rehabilitation contract involved disassembling, reassembling, and painting the pin-and-link assemblies. This work was considered an acceptable detailed inspection procedure and, therefore, ultrasonic testing was not performed in 2016. The most recent detailed inspection was completed in the fall of 2020. The ultrasonic testing concluded the pin-and-link assemblies remain in good condition. No serious deficiencies were found. The next detailed inspection is scheduled for 2025.

SPECIAL DAMAGE INSPECTIONS

Special damage inspections of bridges are conducted when collisions occur or a condition requiring a more detailed inspection is observed. When this occurs, HNTB conducts an immediate field investigation to determine the extent of the damage and whether it is safe for traffic to continue using the structure. In some cases, emergency repairs or lane restrictions are required to maintain traffic. Four special damage bridge inspections have been completed since the issuance of the 2021 Operations and Maintenance Report.

The median guardrail and pier of the Wilson Road Underpass at Mile 2.00 was struck by a multi-unit box truck in December of 2021. HNTB conducted a special inspection and concluded the scrapes of the pier column should be coated with a protective coating and the guardrail should be replaced. This work has been completed.

The bridge rail of the Saco River Overpass (SB) at Mile 33.01 was struck by a vehicle in December of 2021. HNTB conducted a special inspection and concluded

the damaged rail, rail post and concrete curb required replacement. Temporary concrete barrier was installed along the section of damaged bridge rail. HNTB prepared contract documents for the work and a contractor completed the necessary repairs in early 2022, restoring the crashworthiness of the bridge rail system.



SACO RIVER OVERPASS (SB) RAILING COLLISION DAMAGE

The median pier of the Westbrook Street Underpass at Mile 47.10 was struck by a box truck in November 2021. HNTB conducted a special inspection and did not observe structural damage of concern. A few observed minor scrapes on the pier column did not warrant repair. However, several sections of damaged guardrail required replacement. This work was completed shortly after the crash.

The east guardrail and pier of the Hurricane Road Underpass at Mile 56.60 was struck by an SUV in July of 2022. HNTB conducted a special inspection and did not observe structural damage of concern. A few minor spalls and scrapes were recommended for patching followed by the application of a protective coating. Several sections of guardrail were also damaged and have been replaced.

INSPECTION FINDINGS

During the Annual Inspection, structure components such as the concrete deck, superstructure, substructure, culvert, and river channel conditions are assigned condition ratings. Using these ratings, structures requiring repair are further separated into five groups based on their overall condition and the safety implications of their deficiencies:

- » GROUP V - Bridges are not in need of any repair (typically new or recently rehabilitated).
- » GROUP IV - Bridges need repair, but of a minor nature. This work can most likely be done by Maintenance crews.
- » GROUP III - Bridges need repair, but generally the structural safety is not jeopardized at present.

» GROUP II - Bridges should be repaired as soon as possible. However, the problem is such that a short delay is not likely to create a safety problem. If left too long, it will become a Group I Bridge.

» GROUP I - Bridges need immediate repair. The problem is such that the safety of the highway is in danger if the repair is not made quickly. For example, heavy concrete deterioration under bridge bearings, scour around bridge foundations, weakened girders due to impact, etc.

Table 3, Bridge and Minor Span Tabulation, illustrates the number of structures in each group category based on the 2022 Annual Bridge inspection. Data from previous years has also been provided for reference. The grouped structures are then further prioritized for repair or replacement considering factors such as safety, bridge age, importance, rate of deterioration, scour susceptibility, load capacity, and traffic volumes.

Higher priorities are typically assigned to bridges and minor spans that are classified as “structurally deficient.” In 2017 FHWA updated the definition of “structurally deficient” to be consistent with the FHWA published “Federal Register (82 FR 5886)” final rule. Under the updated definition a “structurally deficient” bridge requires that only one key structural component be in “Poor” or worse condition. The key structural components primarily include: Deck, Substructure, Superstructure, and Culvert.

These components are assessed on a rating scale ranging from 0 (“Failed” condition) to 9 (“New” condition). A rating of “4” indicates Poor condition. If any one of the key structural components has a condition rating of 4 or less the bridge is classified as structurally deficient. A structure classified as structurally deficient is not necessarily unsafe; however, these structures require repair and maintenance in the near future to ensure they continue safe operation.

Additionally, the “Federal Register (82 FR 5886)” final rule created three additional bridge classification categories that were reported for the first time in 2018. A bridge with all the key components having a condition rating of 7 or higher is classified as being in “Good” condition. A bridge with one or more key components having a condition rating of 4 or lower is classified as being in “Poor” condition. A bridge that does not meet the condition requirements of good or poor is classified in “Fair” condition.

TABLE 3: BRIDGE AND MINOR SPAN TABULATION

Bridges						
Year	Group V	Group IV	Group III	Group II	Group I	Total
2022	8	55	119	0	0	182
2021	8	58	117	0	0	183
2020	10	60	113	0	0	183
2019	7	69	107	0	0	183
2018	8	68	107	0	0	183
2017	8	68	107	0	0	183
2016	9	67	108	0	0	184
2015	8	72	104	0	0	184

Minor Spans						
Year	Group V	Group IV	Group III	Group II	Group I	Total
2022	1	2	13	0	0	16
2021	2	5	11	0	0	18
2020	1	5	12	0	0	18
2019	1	5	12	0	0	18
2018	1	5	12	0	0	18
2017	1	6	11	0	0	18
2016	1	6	11	0	0	18
2015	1	4	13	0	0	18

Current FHWA regulations require that no more than 10% of the total deck area of National Highway System (NHS) bridges be classified as structurally deficient, or “poor”, for three consecutive years. If 10% or more of the deck area is in poor condition, FHWA requires that a larger portion of the State Agency’s Federal Funding be reapportioned to bridges on the NHS. Although the Turnpike does not receive federal funding, Turnpike bridges located on the NHS network are included in the State of Maine’s NHS bridge inventory.

Since 2009, a primary focus of the Authority’s bridge program has been to repair or rehabilitate “Poor” condition (i.e., structurally deficient) bridges. The 2009 inspection noted 24 “Poor” condition bridges equaling 13.6% of all Authority owned bridges and 14.2% of Authority owned bridges on the NHS. The Authority’s focus on the repair or replacement of “Poor” condition bridges has been successful. The 2022 inspection found no Authority owned bridges are in “Poor” condition. By comparison, according to the FHWA’s National Bridge Inventory database, 5.1% of the nation’s bridges, and 8.9% of Maine’s bridges, were in “Poor” condition in 2021 when measured as a percentage of bridge deck area. A tabulation of Authority owned bridges in “Good,” “Fair,” and “Poor” condition, based on total deck area by year, is provided in **Table 4**.

During the 2022 annual inspection, no bridges or minor spans were found to be in “Poor” condition. **Table 5**, Structurally Deficient (“Poor” Condition) Structure Summary, provides a listing of all Authority owned structures classified as “structurally deficient” since 2017. The table also identifies programmed repair and rehabilitation dates for these bridges. The Authority’s planned bridge and minor span rehabilitation program is reviewed and adjusted after each year’s inspection program. A continued emphasis on the repair or replacement of structurally deficient bridges and minor spans, if identified during the Annual Inspection, is recommended.

2022 BRIDGE REHABILITATION AND REPLACEMENT PROJECTS

Several rehabilitation and repair contracts were issued for construction in 2022. Rehabilitation and repair contracts include work such as deck replacement, concrete rehabilitation, replacing substandard bridge elements such as joints, railings, and end posts, increasing bridge under clearance, improving load capacity, and other miscellaneous repairs.

Following is a summary of bridge rehabilitation and repair work issued for construction in 2022:

ROUTE 236 UNDERPASS (MILE 1.25), RAMP J BRIDGE (MILE 1.5), RAMP H BRIDGE (MILE 1.6), RAMP M BRIDGE (MILE 1.7), WILSON ROAD UNDERPASS (MILE 2.0), SPRUCE CREEK OVERPASS (MILE 2.2), AND LITTLEFIELD ROAD UNDERPASS (MILE 17.7)

The work at these locations includes substructure repairs, deck repairs and the removal and replacement of the bituminous overlay and waterproof membrane on the structures. Work and maintenance of traffic will be coordinated with MaineDOT’s ongoing improvements at the Piscataqua River Bridge.

ROUTE 197 UNDERPASS (MILE 93.3)

The work includes superstructure replacement and raising and will provide a wider bridge with increased



ROUTE 197 UNDERPASS SUPERSTRUCTURE REPLACEMENT

vertical clearance over the Turnpike. Substructure repairs, replacement of the steel girders and bridge deck, and modification and raising of the bridge approaches on Route 197 are included. This project, originally anticipated to occur in 2025, is under construction in 2022 to remedy damage caused by an overheight vehicle strike.

2022 EMERGENCY AND UNANTICIPATED BRIDGE REPAIRS

Emergency and unanticipated bridge repairs are periodically required and are usually related to collisions caused by vehicles hauling loads exceeding legal limits. Minor repairs are completed by Authority Maintenance forces; however, significant repairs warranting heavy equipment or specialty services, such as heat straightening, are completed through construction contracts. The Authority’s program of increasing the vertical clearance of underpasses during rehabilitation projects, combined with the installation of overheight vehicle detection systems at selected locations, has resulted in a significant decrease in the number of yearly overheight vehicle impacts. However, several structures with substandard vertical clearance remain. These structures have an increased risk of being struck by an overheight vehicle.

One emergency and unanticipated bridge repair project has been completed since the issuance of the 2021 Operation and Maintenance Annual Report. Emergency bridge railing repairs, including the replacement of damaged bridge railing, posts, and concrete

TABLE 4: TABULATION OF "GOOD," "FAIR" AND "POOR" CONDITION DECK AREAS

Year	All Authority Owned Bridges			NHS Authority Owned Bridges		
	"Good"	"Fair"	"Poor"	"Good"	"Fair"	"Poor"
2022	28.0%	72.0%	0.0%	18.3%	81.7%	0.0%
2021	29.0%	71.0%	0.0%	23.1%	76.9%	0.0%
2020	30.3%	69.7%	0.0%	25.0%	75.0%	0.0%
2019	34.3%	65.7%	0.0%	29.2%	70.8%	0.0%
2018	34.8%	63.8%	1.4%	28.7%	68.4%	2.9%

TABLE 5: STRUCTURALLY DEFICIENT ("POOR" CONDITION) STRUCTURE SUMMARY

Year	Structure Name	Structure Type	Mile Marker	Status
2022	N/A1	N/A	N/A	N/A
2021	N/A1	N/A	N/A	N/A
2020	N/A1	N/A	N/A	N/A
2019	N/A ¹	N/A	N/A	N/A
2018	Crediford Brook	Minor Span	18.75	Rehabilitation completed in 2018
	I-295 S.B. Underpass	Bridge	102.50	Rehabilitation completed in 2018

¹ No bridges or minor spans are structurally deficient in 2019, 2020, 2021 or 2022.

curbing were completed at the Saco River Overpass (Southbound) at Mile 33.01 in January of 2022.

An evaluation of the underside of Turnpike bridge decks was commenced in 2021 to assess portions of concrete decks adjacent to bridge girders. On many Turnpike bridges built before the mid-2000s, the deck steps downward along the edges of each bridge girder, a detail that was commonly used by bridge owners throughout the region. Agencies have since determined these unreinforced sections of the concrete deck, referred to as “unreinforced haunches,” are prone to premature cracking and deterioration. In some instances, portions of the concrete haunch have fallen from Turnpike bridges onto the roadway below. HNTB, working together with Turnpike staff, identified Turnpike owned bridges with this detail and prioritized the resulting list for inspection by Turnpike maintenance forces. The inspection of high priority structures was completed and, where loose or deteriorated concrete haunches were found, they were removed. Additional inspections are ongoing to assist in the development of an inspection and monitoring program. The resulting program may include measures such as periodic hands-on inspections or the installation of netting or shielding.

HNTB RECOMMENDATION (2023 BRIDGE REHABILITATION PROJECTS)

Based on the findings of the 2022 Bridge Inspection Program, HNTB recommends the following bridge repair and rehabilitations for 2023:

SACO INTERCHANGE IMPROVEMENTS - OPENING OF EXIT 35 (MILE 35.70)

The work, which is being completed as part of the planned opening of a new Exit 35, includes bridge work at the Exit 36 Saco Interchange Bridge and the North Street / Route 112 Bridge. The work at both bridges includes wearing surface replacement and joint repairs. At the Exit 36 Bridge, concrete slope protection modifications will be completed to accommodate the construction of a new collector-distributor road under the bridge. This project is scheduled for advertisement in the fall of 2022.

POLAND SPRING ROAD / ROUTE 122 UNDERPASS (MILE 74.0)

The work includes superstructure replacement and raising and will provide a wider bridge with increased vertical clearance over the Turnpike. Substructure re-

pairs, replacement of the steel girders and bridge deck, and modification and raising of the bridge approaches on Route 122 are included.

BRIDGE JOINT HEADER REPAIRS - VARIOUS LOCATIONS

The work includes replacing existing deteriorated or rutted asphalt pavement along armored bridge expansion joints with elastomeric concrete headers. Once complete, these headers will protect the existing bridge joints from plow damage and reduce the need for more extensive and costly repairs in the future.

HNTB RECOMMENDATION (2023 BRIDGE PAINTING PROJECTS)

The Authority has implemented an effective painting program intended to address deteriorating paint conditions. The program reduces the potential for costly future repairs that are necessary to correct steel corrosion. Since 1990, over 50 Authority owned bridges have been repainted, with the most recent painting projects occurring in 2018. Based on current bridge paint conditions additional painting contracts are not expected to occur in 2023.

During project development, the cost of repainting existing steel girders versus replacing the steel girders should be considered for all bridge rehabilitation projects. This analysis should consider cost, the load capacity of the existing girders, and the condition of the existing paint system.

BRIDGE OPERATIONS AND MAINTENANCE PROGRAM

HNTB recommends the following annual bridge maintenance activities on Turnpike bridges:

- » **DECKS** Sweep (power broom) and flush with ordinary water (preferably power rinse) particularly the gutter areas. Patch areas of obvious concrete delamination and potholes. At the deck underside remove areas of concrete delamination over lanes of traffic.
- » **PARAPETS** Power rinse. Periodically apply concrete sealer.
- » **SUPERSTRUCTURE** Power rinse the beams, girders, and bearings, particularly at expansion joint locations.
- » **SUBSTRUCTURE** Power rinse and/or clean debris from bridge seats, periodically apply concrete sealer.

The Authority maintains detailed bridge files as part of its bridge Operation and Maintenance Program. In accordance with FHWA requirements, these bridge files contain inventory and appraisal information such as bridge geometrics and age, as-built drawings, condition ratings, safe load capacities, and scour evaluations.

LOAD RATING OF IN-SERVICE BRIDGES

In 2014, the Authority completed its initiative to develop load ratings for all its bridges. Load ratings are used primarily to understand the safe load capacity of bridges and to identify structures that should be posted for load limits. Additionally, load ratings are used to evaluate overweight permit load requests and to aid in the prioritization of bridge repair projects. These uses require that bridge load ratings are reliable, uniformly consistent, and current. The results of these load ratings were reported to MaineDOT and are saved in the Authority's bridge files. HNTB recommends the completion of a bridge load rating when bridge construction with significant alterations is completed, or each time the condition rating of a key element drops below established thresholds set by FHWA.

The Authority has begun the process of rating all its applicable bridges for the new "Emergency Vehicle" requirements laid out in the FHWA Memorandum on "Load Rating for the FAST Act's Emergency Vehicles" with 2018 Revisions dated March 16, 2018. Since 2019, the Authority, HNTB, and the MaineDOT have been working together to develop rating computations that meet the FHWA requirements and deadlines. To date,

Emergency Vehicle updates have been performed on structures with State Legal Load ratings below 1.0, as well as structures considered to be the most likely to require posting as a result of overweight Emergency Vehicles. Work is currently ongoing to evaluate additional structures that require updated ratings in accordance with the FAST Act and, where necessary, implement load postings or program bridges for strengthening or rehabilitation.

SCOUR EVALUATIONS

In 2012, the Authority had HNTB complete scour evaluations for 24 river crossings (14 bridges and 10 culverts). The evaluations were completed to ensure compliance with the FHWA National Bridge Inspection Standards, Title 23, CFR 650, Subpart C. Individual reports for each structure were created, and in summary, the evaluations concluded that no Authority owned bridges or culverts were scour critical.

BRIDGE GEOMETRICS

The Authority's bridge inventory includes structures that are not compliant with current geometric design guidelines. These structures have narrow lanes or shoulder widths, substandard clearances, or the inability to handle current traffic volumes. When practical, the Authority should consider including improvements such as bridge raising and shoulder widening in its Capital Improvement Program to address substandard bridge geometrics.

Ancillary Structures

The Authority is responsible for 145 ancillary structures including 59 overhead sign bridges, 15 overhead cantilever sign structures, 1 light bridge, 10 AVI mast-arms, 10 space frames, 15 variable message signs on posts or butterfly supports, 4 communication towers, 4 overheight vehicle detectors, 8 weather stations, 2 sets of high mast lights, and 17 bridge-mounted signs. These structures carry regulatory, route marker, warning, and specialty signage or equipment.

Routine ground-level inspections of these ancillary structures are conducted yearly as part of the annual inspection. No significant deficiencies were observed during the 2022 inspection.

Sign structures, high mast light poles, mast arms and other ancillary structures located over, or immediately adjacent to, roadways require hands-on inspections every six years per FHWA guidance. In 2020, hands-on inspections were performed for the 81 Authority owned assets meeting this criterion. The inspection concluded these assets are in generally good condition. No significant deficiencies were observed.

HNTB RECOMMENDATION

The continuation of annual routine inspections is recommended. Additionally, we recommend the next hands-on inspection cycle for all overhead sign structures occur in 2026. This recommendation is consistent with the FHWA guidance that a typical two tower, two or four post sign bridge with a steel superstructure, be hands-on inspected at least once every six years.



ANCILLARY STRUCTURE INSPECTION

Drainage

The roadway's surface drainage system (consisting of side slopes, drainage ditches, catch basins, and cross culverts) was inspected and found to be primarily in fair to good condition. An important component of roadway drainage is allowing for storm water to sheet flow from the pavement down the side slope. The presence of winter sand buildup under guardrails prevents the sheet flow of water from the roadway. The resulting channelized flow is more likely to create an erosion issue.



PIPE CULVERT INSPECTION

Routine berm, ditch, and side slope maintenance and repairs are required for proper upkeep of the highway. Minor drainage, slope repairs, and maintenance are completed by the Authority while larger repairs are completed by contractors. Catch basin repair, pipe repair, winter sand removal, and slope repairs are often completed as part of pavement rehabilitation projects, while isolated areas requiring significant repair are typically bid as a Contract and completed separately. We recommend the continuation of this practice.

Numerous rivers and streams pass under the Turnpike through box culverts and culvert pipes. All box culverts and pipes 60" in diameter or greater are inspected annually (a total of 34 culverts and 68 individual culvert ends). In addition to inspecting the culvert ends, HNTB inspects the inside of culverts by walking through them when conditions allow. Culverts that cannot be accessed safely are inspected visually from each end. In cases where a reasonable visual inspection cannot be completed from each culvert end, the structure is flagged for periodic special inspections using robotic cameras. The last special inspection

was completed in 2018 and included 18 culverts. The results of the 2022 annual inspection, and the 2018 special inspection, determined these culverts are in generally satisfactory condition. In some locations culvert ends are deteriorating and separating from adjacent sections.

Culverts 36" to 54" in diameter are inspected every five years and were most recently inspected in 2018. They were found to be in fair to satisfactory condition. These pipes should be inspected again in 2023.

Prior to 2013, cross-culverts 30" and smaller were not inspected as part of the Annual Inspection. The Authority requested the inspection of these culverts over the five-year period starting in 2013 and ending in 2017. **Table 6** provides a summary of when these pipes were last inspected. This inspection cycle was started again in 2019 and is ongoing.

TABLE 6: PIPE INSPECTIONS

Mile Marker Range (Culverts 30" and Smaller)	Inspection Year
Mile 0.3 to Mile 25	2020
Mile 25 to Mile 49	2019
Mile 49 to Mile 63.3 & Falmouth Spur	2021
Mile 63.3 to Mile 85.2	2023
Mile 85.2 to Mile 109.1	2022

These 30-inch and smaller pipes ranged from good to poor condition. Many of the cross-culverts are reinforced concrete under the core roadway but change to corrugated metal under the side slopes. The Turnpike routinely replaces the corrugated metal culvert ends with reinforced concrete or high-density polyethylene as resources and funds allow. Over 70 culvert ends were replaced by maintenance between 2021 and 2022. However, some metal pipe ends remain.

While the concrete portion of the culverts are in generally fair to good condition, the remaining metal pipe ends are in poor condition. Common issues observed at the metal pipe ends are rusted flow lines,

disconnected joints, and disconnected metal flared end sections. Common issues observed in the reinforced concrete pipe ends are inlets and outlets that are either partially or completely obstructed by heavy vegetation or debris, and buried inlets and outlets. These conditions lead to erosion issues on the side slope which may eventually impact the roadway.

Periodically the Authority issues contracts to repair drainage issues that the Authority's Maintenance forces cannot repair due to their location or the type of equipment required to cost effectively complete the repair. We recommend that this practice continue.

HNTB RECOMMENDATION

We recommend the continued repair of culvert end locations rated in poor condition, as detailed in the Annual Inspection Report, with a goal of completing this effort by 2026. Once complete, these repairs will reduce the potential for more significant and costly improvements in the future, such as slope failures and sinkholes. A total of 14 circular culvert end locations, and two single-cell concrete box culverts, remain in poor condition, a 50% reduction from 2021.

Locations that can reasonably be repaired by the Authority's Maintenance forces should be prioritized and addressed as resources become available. The remaining locations should be programmed for repair by contract. The repair of the two single-cell box culverts rated in poor condition are programmed for completion in 2028 as part of a planned culvert improvement project.

Additionally, the MTA's efforts to replace deteriorated metal pipe ends with high density polyethylene or reinforced concrete pipe, together with associated slope and drainage channel stabilization work, should continue. In recent years this work has been either included in standalone projects focused on drainage improvements or included in adjacent pavement rehabilitation contracts. These efforts should continue.

Guardrail and Safety Improvements

The Authority has continued its program of improving safety by upgrading large sections of the roadway side slopes each year. These improvements include removal of vegetation and guardrail upgrades.

GUARDRAIL

Through the AASHTO/FHWA partnership, an agreement was executed in 2015 to define actions needed to fully implement the Manual for Assessing Safety Hardware (MASH) over the course of several years. The MASH guidelines replace its predecessor's guidelines defined in the National Cooperative Highway Research Program (NCHRP Report 350), published in 1993. MASH guidance includes four important parts:

1. Agencies are urged to establish a process to replace existing highway safety hardware that has not been successfully tested to NCHRP Report 350 or later criteria.
2. Agencies are encouraged to upgrade existing highway safety hardware to comply with the 2016 edition of MASH either when it becomes damaged beyond repair, or when an individual agency's policies require an upgrade to the safety hardware.
3. For contracts on the National Highway System with a letting date after December 31, 2019, only highway safety hardware evaluated using the 2016 edition of MASH criteria will be allowed for new permanent installations and full replacements.
4. Temporary work zone devices, including portable barriers, manufactured after December 31, 2019, must have been successfully tested to the 2016 edition of MASH. Such devices manufactured on or before this date, and successfully tested to NCHRP Report 350, or the 2009 edition of MASH, may continue to be used throughout their normal service lives.

The Turnpike's highway safety hardware is compliant with the above guidance. All new highway safety hardware installed on the Turnpike is MASH compliant.

A program to upgrade and modernize Turnpike guardrail on an as-needed basis has been in place since the mid-1990s and remains active. This program includes the following:

- » Installation of thrie beam guardrail or median concrete barrier at select locations
- » Closing median openings that are not critical for authorized vehicles
- » Constructing new median openings at areas with adequate sight distance
- » Installing Emergency Vehicle Ramps to eliminate the use of median openings, or where new openings cannot be constructed
- » Replacing non-crash attenuating guardrail terminal end sections with impact attenuating units
- » Adjusting guardrail heights
- » Improving strength of guardrail at locations where the guardrail was in close proximity to bridge piers,
- » Constructing new terminal end – anchored end sections

In 2021, upgrades to guardrail between Mile 30 and 35 were completed as part of a median and pavement rehabilitation improvement project. In 2022 median upgrades, including regrading and re-establishing basins, were completed between Mile 102 and 109 as part of the mainline paving project; however, no guardrail adjustments were deemed necessary within the limits of the project.

The practice of including guardrail and safety improvements within the yearly paving contracts, or within new Toll projects, has been successful and should continue as the need arises.

HNTB RECOMMENDATION



GUARDRAIL UPGRADES

HNTB recommends that guardrail continue to be repaired and upgraded as needed. Upgrades, such as adjusting guardrail height, are still needed as a regular activity and should be reviewed yearly for possible inclusion in adjacent paving rehabilitation contracts. We also recommend that any entity installing or main-

taining roadside safety hardware, including Authority Maintenance forces and contractors, be trained for

completing this work in accordance with the manufacturer's instructions and evolving federal standards.

Emergency Vehicle Ramps

Emergency Vehicle Ramps allow for emergency vehicles to enter and exit the Turnpike mainline at gated locations. In addition, these ramps allow maintenance vehicles to change direction without crossing the mainline. These ramps allow for improved safety by improving emergency vehicle response time and improved winter maintenance operations. In 2022, the Authority issued construction contracts for the installation of new Emergency Vehicle Ramps at Littlefield Road at Mile 17.3. These ramps are expected to be complete and in operation by Fall 2022.

In 2023, the improvement and paving of the existing of Emergency Vehicle Ramps is proposed at Bald Hill Road at Mile 71.6. In addition, new Emergency Vehicle Ramps are proposed for construction at High Street at Mile 103.6.

In 2022 the MTA started the process of upgrading and modernizing existing access gates at existing Emergency Vehicle Ramp locations to provide authorized vehicles with efficient access to and from the mainline, and to prohibit access by unauthorized users. A total of four locations are scheduled to be upgraded in 2023.

HNTB RECOMMENDATION

The Authority should continue to study the feasibility of constructing other Emergency Vehicle Ramps where new installations are critical to the safe and efficient operation of the Turnpike. Additionally, the maintenance or update of the gate systems installed at existing ramp locations should continue as required to provide safe and efficient access for authorized users, and to preclude unauthorized use.

Roadway Side Slopes

A program to clear vegetation near the roadway commenced in 2012. This clearing improves safety by removing vegetation in close proximity to the roadway and reduces roadway icing in the winter by minimizing shading of the roadway. **Table 7** illustrates contracts issued specifically to address side slope clearing since 2012. In 2021, side slope clearing was completed for areas in the vicinity of the Saco River Bridge at Mile 33.0, and near Exit 32 as part of a planned project to improve the southbound off-ramp.

When practical, Turnpike maintenance crews clear brush and small trees along the tree line to maintain the current tree line and to remove fallen and damaged trees.

HNTB RECOMMENDATION

The continued clearing of vegetation near the roadway is recommended. This activity provides for safe recovery or runout zones for errant vehicles, reduces shading of highway, which can contribute to roadway icing, and permits for improved roadway mowing operations.

TABLE 7: SIDE SLOPE CLEARING

Year	Locations
2022	N/A ¹
2021	Exit 32 and Mile 33
2020	Exit 45
2019	N/A ¹
2018	Mile 42.0 to Mile 45.0
	Mile 85.0 to Mile 85.8 (S.B.)
	Mile 93.0 to Mile 100.8
	Exit 103
2017	Mile 44.7 to Mile 61.8
	Falmouth Spur
2016	Mile 75 to Mile 83
	Mile 99 to Mile 109
2015	Mile 63 to Mile 75
2014	Mile 51 to Mile 63
2013	Mile 82.9 to Mile 93.0
2012	Mile 92.8 to Mile 100.3

¹ No contracts

Lighting

The roadway lighting system is in generally good condition. During the annual inspection, HNTB noted that most interchanges and service plazas had a few lights that were not operating. Some of these lights were located at the Kennebunk Service Plazas which were under construction at the time of inspection. Authority Maintenance forces replace or repair lights as required to maintain acceptable lighting levels.

In 2010, the Authority implemented a pilot study by installing Light Emitting Diode (LED) lighting at the Cumberland Service Area, Exit 46 Area, the Exit 45 canopies, Crosby Maintenance, and the Kennebunk Park & Ride lot. While LED lights are costlier to purchase, they have longer service life and use substantially less electricity to operate. The success of these trial locations led the Turnpike to replace all similar lights with LEDs.

The MTA's system-wide program to update its exterior lighting to LED fixtures was completed in 2022.

In 2020 and 2021, HNTB completed hands-on inspections of 30 weathering steel high mast light poles. The inspection identified a single high mast light near Exit 36 that was in poor structural condition and has been removed from service. This light is scheduled for replacement as part of the Saco Interchange Exit 35 Project scheduled for advertisement in the fall of 2022.

HNTB RECOMMENDATION

The Authority should continue to inspect and maintain its roadway lighting system on a regular basis to minimize the number of outages.

High mast lights should continue to receive annual routine inspections with hands-on inspections matching the frequency used for overhead sign structures. Debris, including road sand and excessive vegetation, should be removed from on and around the bases and foundations of light poles to minimize the potential for corrosion.

Signage

The Authority maintains its signs in generally good condition. The Authority's Sign Shop fabricates the majority of the regulatory, route marker, warning, and specialty signs on the Turnpike. Signs that are damaged, faded, or otherwise in poor condition are replaced on a routine basis.

In 2016, the Authority initiated a four-year plan to evaluate, upgrade and replace its existing guide signs. The first contract was awarded in 2016 for upgrades from Exit 75 to Exit 109. The second contract was awarded in 2017 for upgrades from Exit 25 to Exit 63. The third contract was awarded in 2018 for upgrades for Exits 32, 36, 42, 44, and 45. The fourth contract was awarded in 2019 for upgrades from Exit 1 to Exit 19. Additionally, the Authority's maintenance forces installed new signs for Exit 25 and Exit 19 northbound in 2020 and 2021.

Near the southern terminus of the Turnpike, sign upgrades were made as part of the York Toll Plaza replacement project and the Piscataqua River Bridge

improvement project. These projects were completed in 2021 and 2022 respectively.

Additional guide sign upgrades between Mile 45 and Mile 48 are being completed as part of the ongoing Portland Area Widening and Safety Improvement project scheduled for completion in 2023. Following the completion of this work the Authority's program to upgrade and replace existing guide signs will be complete.

HNTB RECOMMENDATION

HNTB recommends the Authority continue to monitor, maintain, and replace the regulatory, route marker, warning, and specialty signs as needed. Nighttime retroreflectivity is of specific concern and should continue to be assessed periodically. Signs that are found to have inadequate retroreflectivity should be replaced.

Roadway Markings

The Authority's Maintenance forces have historically re-striped the Turnpike once a year to maintain roadway markings in good condition. Beginning in 2020, the roadway was re-striped twice, once in the spring and once in the fall, to improve the visibility of pavement markings in the mid to late winter months.

The Authority is also utilizing reflectorized pavement marking tape installed in grooves at interchange ramps and to supplement the white skip lines on the mainline. The tape improves visibility of the pavement markings in wet conditions and at night.

Double yellow lines in two-way traffic areas within interchanges, and newly paved areas, are typically painted twice a year. This frequency has been adequate to maintain roadway striping.

HNTB RECOMMENDATION

HNTB recommends the Authority continue its current roadway marking practices.

Vegetative Cover

Vegetative cover generally includes the grass median and side slopes of the roadway. The inspection revealed that most median slopes are in good condition, although the vegetative cover is in poor condition in some locations. The width of the median makes maintenance of the vegetation impracticable. The typically gentle slopes of the median allow the sand placed during winter maintenance activities to accumulate and replace the vegetation.

Maintenance crews have fixed nearly a mile of median areas prone to washouts at the southern end of the Turnpike by replacing median material with millings. This inexpensive solution has successfully repaired and mitigated future washouts at susceptible locations.

The Authority plans to replace the vegetated median with a more practical and maintainable paved surface as capacity projects are undertaken. Where capacity improvements are not planned, median grading has been completed as part of adjacent paving projects to improve drainage, remove built up sediment, and re-establish vegetative cover.

The majority of the roadway side slopes are stable with good vegetative cover. Slope locations requiring minor corrective action are detailed in the Annual Inspection Report. The most common observations include an excessive buildup of winter sand, localized sloughing (most typically around structures) and some localized erosion due to roadway runoff. Corrective

actions are warranted at edge-of-pavement drop-off locations (where the gravel shoulder directly adjacent to the paved shoulder is too low) and where minor gullying may lead to an erosion issue if not mitigated. In most instances, the Authority's Maintenance forces can accomplish this work. The remainder should be completed by combining this type of repair into larger local contracts, such as adjacent paving contracts, such that cost efficiencies are achieved.

The construction of median safety improvements, including replacing vegetative cover with pavement and installing concrete barrier between Mile 43 and Mile 49 is being completed as part of the Portland area mainline widening project scheduled for completion in 2023. Similar improvements between Mile 0.3 and Mile 1.3 were completed in 2022 as part of the Piscataqua River Bridge improvements project.

HNTB RECOMMENDATION

We recommend that berm drop-off corrections be completed by Authority Maintenance forces, or included as part of the pavement rehabilitation projects, as warranted. A program to eliminate vegetation from the median including paving the median and replacing guardrail with concrete barrier, is also recommended where practical. This will simplify maintenance, increase safety, and eliminate the need to mow a narrow area immediately adjacent to traffic.

Toll Plazas

TOLL COLLECTION EQUIPMENT

A May 2013 Toll System Assessment Report outlined that the legacy cash toll collection system installed in 2004 provides acceptable levels of performance, reliability and system uptime availability based on the originally intended functionality. However, the system is reaching the end of its anticipated life. The Authority has implemented a program of converting its legacy cash toll collection system at all toll plazas to a new toll collection system called the “Infinity System.” The Infinity System has specific infrastructure requirements such as vehicle detection loops installed in a concrete roadway slab with non-metal reinforcement. The slabs must meet specific dimensional requirements to accommodate the way the loops are embedded in the concrete slab to sense vehicles and interact with other toll collection equipment.

The Infinity Toll System offers the following advantages to the Authority:

- » Improved accuracy allowing for maximized revenue collection.
- » Provides programmed system enhancements for violation enforcement in staffed lanes, video audit, and reduced maintenance costs.
- » Uses loops embedded in concrete slabs for vehicle classification and eliminates ongoing maintenance concerns associated with the use of treadles.

Progress toward the Authority’s transition to the Infinity Toll System is nearly complete following the successful completion of the York Toll Plaza replacement project at Mile 8.8 and the West Gardiner I-295 toll plaza replacement project at Mile 103.0 in early 2022. The Infinity Toll System is now installed and functioning as intended throughout the entire Turnpike system with the exception of the Exit 45 side plaza. Construction of the new Exit 45 Interchange side plazas are underway and are on schedule for completion in September 2022.

TOLL PLAZAS

The Turnpike’s 19 toll plazas are comprised of open-road toll lanes, space frames, tollbooths, canopies, gantries, utility buildings and other structures. The Authority’s 19 toll plazas are located in the following 16 locations:

Mainline Toll Plazas

- » York
- » Scarborough (Exit 44)
- » Falmouth (Exit 52)
- » New Gloucester
- » West Gardiner
- » Gardiner

Side Toll Plazas

- » Wells (Exit 19)
- » Kennebunk NB & SB (Exit 25)
- » Biddeford (Exit 32)
- » Saco (Exit 36)
- » Scarborough (Exit 42)
- » South Portland (Exit 45)
- » Jetport NB & SB (Exit 46)
- » Westbrook/Rand Road (Exit 47)
- » Portland/Westbrook (Exit 48)
- » Gray NB & SB (Exit 63)



TOLL CANOPY CONSTRUCTION AT EXIT 45 INTERCHANGE

MAINLINE TOLL PLAZAS

The six mainline plazas generated nearly \$83 million in toll revenue in 2021. This accounted for nearly three-fourths of all toll revenue collected by the Authority. The remaining toll revenue was generated by side toll plazas. A Tabulation of Traffic, Revenue and E-ZPass Usage is illustrated in **Table 8**.

Items of note include:

- » The biggest contributors to Turnpike toll revenue are as follows:
 - The York Toll Plaza is the greatest single contributor, and historically has accounted for more than 40% of all Turnpike toll revenue.
 - The mainline plaza at New Gloucester is the next highest contributor, historically accounting for approximately 12% of all toll revenue.
 - Combined, the side toll plazas account for about 25% of all toll revenue.
- » The percentage of motorists with an E-ZPass continues to grow across the Turnpike system.
- » From the plaza at New Gloucester and south, E-ZPass users account for more than 83% of all transactions. At the two plazas north of New Gloucester, E-ZPass usage is closer to 75%.
- » At the plazas located on the I-95 mainline (i.e., York, New Gloucester, and Gardiner I-95), trucks have historically accounted for slightly greater than 10% of all traffic. In 2021 this percentage increased to at least 12% at each location. Similarly, the percentage of trucks at other locations also increased. Truck volumes represented nearly 10% of the total traffic volume at West Gardiner I-295, and more than 6% at Exit 44 / I-295 and at Exit 52 / Falmouth Spur.

» E-ZPass usage among trucks is extremely high. Trucks equipped with E-ZPass now account for more than 95% of all truck transactions on the Turnpike system.

YORK TOLL PLAZA

The original York Toll Plaza, which consisted of eight cash lanes northbound and nine southbound, was constructed in 1969, was in poor condition, and was challenged by both operational and safety issues. Additionally, the existing toll system had reached the end of its useful life. Replacement of the original plaza with a new facility began in the fall of 2018 and was completed in September 2021.



YORK TOLL PLAZA CONSTRUCTION

The newly completed facility consists of an Open Road Toll (ORT) Plaza at Mile 8.8, approximately 1-mile north of the original plaza. The new facility features three ORT lanes in each direction as well as five southbound and four northbound cash lanes.

NEW GLOUCESTER TOLL PLAZA

In April 2013, the Authority opened the reconstructed New Gloucester Toll Plaza featuring three cash lanes and one ORT lane in each direction. The cash booths, slabs and toll collection equipment were also

TABLE 8: TABULATION OF TRAFFIC, REVENUE AND E-ZPASS USAGE

2021 Traffic Characteristic	York	Exit 44	Exit 52	New Gloucester	West Gardiner I-95	Gardiner I-295	Side Toll Plazas
Annual Tolloed Traffic (millions)*	15.1	7.5	3.9	6.2	3	6.8	26.9
Annual Revenue (\$millions)**	\$45.39	\$7.45	\$3.87	\$13.91	\$5.24	\$6.79	\$28.59
Share of Total Turnpike Revenue	40.80%	6.70%	3.50%	12.50%	4.70%	6.10%	25.70%
Truck% (MTA Classes 3-6)	12.90%	6.60%	6.30%	13.50%	12.40%	9.40%	4.60%
Overall E-ZPass%	85.50%	83.70%	83.50%	83.80%	76.10%	73.20%	84.20%
Truck E-ZPass%	95.80%	95.40%	95.50%	97.10%	95.80%	93.30%	96.90%

* This table only counts vehicles that paid tolls; it excludes violators and non-revenue vehicles.

**Annual revenue totals are after business and personal discounts for Maine-based E-ZPass accounts are applied.

replaced or rehabilitated. As a result of the recent expansion and improvements, this plaza is rated in good condition. The plaza received additional improvements in 2020 including equipment upgrades related to the Infinity System and rehabilitation of the concrete roadway slabs serving the ORT lanes.

WEST GARDINER I-95 TOLL PLAZA

In November 2016, the Authority opened the reconstructed West Gardiner I-95 Toll Plaza. The reconstructed plaza consists of one ORT lane and two cash lanes in each direction. The cash booths, slabs and toll collection equipment were also replaced or rehabilitated. As a result of the recent expansion and improvements, this plaza is rated in good condition. The plaza received additional improvements in 2020 including equipment upgrades related to the Infinity System and rehabilitation of the concrete roadway slabs serving the ORT lanes.

WEST GARDINER I-295 TOLL PLAZA

Construction of the new West Gardiner I-295 Mainline Toll Plaza, and removal of the existing plaza, was completed in November 2021. The new facility consists of two ORT lanes and three cash lanes in each direction and operates using the new Infinity Toll System.



WEST GARDINER BARRIER TOLL PLAZA ORT LANE

EXIT 44 TOLL PLAZA

In May 2019, the Authority opened a new ORT toll plaza at Exit 44 in Scarborough which consists of two ORT lanes and two cash lanes in each direction. Exit 44 connects the Turnpike to I-295 south of Portland making it vitally important to the interstate transportation network. This plaza is in new condition.

EXIT 52 FALMOUTH SPUR TOLL PLAZA

In December 2017, the Authority opened the ORT lanes at the Falmouth Spur Toll Plaza, consisting of a single ORT lane and two cash lanes in each direction. All toll collection equipment was replaced with the Infinity System during the project. Exit 52 connects the Turnpike to Interstate I-295 north of Portland and is an integral part of the transportation network. Several elements were replaced or rehabilitated as a part of this work including new westbound toll booths, new slabs, and a new access tunnel. This plaza is in generally good condition.

SIDE TOLL PLAZAS

The Authority has undertaken a program to replace and upgrade its toll system at all side toll plaza locations. These upgrades transitioned the plazas to the Infinity System. In addition, the program included repairs and modifications to the existing toll plazas to repair areas of deterioration and to meet current needs. This program will be complete once the ongoing the Exit 45 Interchange Reconfiguration project is completed in late 2022.

Except for the plaza at Exit 45, the Turnpike's side toll plazas are in fair to good condition with many of the facilities being recently constructed.

The Exit 45 toll plaza is in generally fair to poor condition. The replacement of this toll plaza is included in the Exit 45 Interchange Reconfiguration project. The new Exit 45 plaza will include the construction of two new ramp toll plazas and the removal of the existing toll plaza.

Improvements at Exit 86 and Exit 75 were completed in 2017 and 2019 respectively. These improvements allowed for automatic vehicle classification and other system upgrades.

HNTB RECOMMENDATION

At several locations the epoxy overlays placed over the toll sensor loops are degrading due to normal wear and tear associated with traffic loadings and weather. These overlays protect the sensor loops embedded in the toll plaza slabs. HNTB recommends the Authority coordinate with their toll vendor to replace the failing epoxy overlay where required to maintain functionality of critical components to the tolling system.

SPECIAL DAMAGE INSPECTIONS

Special damage inspections of toll plazas are conducted when collisions occur or a condition requiring a more detailed inspection is observed. When this occurs, HNTB conducts an immediate field investigation to determine the extent of the damage. In some cases, emergency repairs or lane restrictions are required to maintain safe operations. Three special damage inspections were completed as a result of toll plaza crashes since the issuance of the 2021 Operations and Maintenance Report.

A crash occurred on November 20, 2021 at the West Gardiner 102 toll plaza. A van traveling southbound collided with the shoulder guardrail and was redirected into the concrete pedestal supporting the southern space frame. The vehicle caught fire following the crash. The inspection by HNTB identified surficial damage to the concrete pedestal and column and heat damage to the roadway pavement. HNTB recommended repairing the damaged pavement and apply-

ing protective coatings to the concrete pedestal and support column.

A crash occurred at the Exit 32 Toll Plaza on March 21, 2022. A truck hauling a snowplow on a trailer was traveling westbound through the plaza in lane 3. The snowplow was overhanging the trailer and impacted the booth north of lane 3, rebounded, and impacted the booth south of lane 3. HNTB completed a field visit and recommended repairs to the concrete booth surround, the toll booth and signs damaged in the collision.

A crash occurred at the York Toll Plaza at Mile 8.80 on May 5, 2022. An SUV traveling southbound through the cash lanes impacted a concrete bumper protecting the toll booth. The crash cracked the concrete bumper and marred the concrete island. HNTB recommended repairing the crack and recoating the areas of concrete marred by the crash.

Service Areas and MTA Administration Building

SERVICE AREAS

The Turnpike system includes five service plazas and one transportation center at the following locations:

- » Wells Transportation Center
- » Kennebunk NB
- » Kennebunk SB
- » Cumberland SB
- » Gray NB
- » West Gardiner

In 2007, new buildings were completed, and parking was improved for cars and trucks at Kennebunk NB and SB, Cumberland SB, and Gray NB service plazas. The new service plaza located at the confluence of the Turnpike (I-95) and I-295 in West Gardiner opened in November 2008.

Each location has a fuel service station and food services. At the three larger plazas (Kennebunk NB and SB, and West Gardiner) there is also a convenience store. Cumberland and Gray service plazas were converted from Starbucks/convenience stores into Burger Kings with drive-throughs in 2016.

Replacement of the fuel system at the Gray service plaza was completed in the Spring of 2021. The Cumberland SB fuel system received maintenance repairs and was satisfactorily tested in the Spring of 2020. This work allows the existing fuel system to remain in operation through 2025. After 2025, annual testing will be required.

At the Kennebunk SB and NB Service Areas the fuel systems were replaced in 2018 and 2019, respectively. A recent project to expand truck parking at both Kennebunk Service Plazas was substantially completed in August 2021.

A contract to complete repairs to the exterior gutter systems, replace corroded entryway door systems, flooring, and other related repairs is ongoing at the five service areas. This work is scheduled for completion in late 2022.

Food concessions at each of the service plazas was managed by HMSHost Company until the summer of 2021 when Applegreen Limited acquired HMSHost Company's U.S. motorway business. With their acquisition of HMSHost now complete, Applegreen Limited is assessing the current offerings and operations at MTA service plazas. Applegreen Limited may request

capital improvements at these facilities to support changes to current restaurant offerings and concepts, and to align the general operations of the buildings with the needs of the new concessions operator.

MTA ADMINISTRATION BUILDING

The MTA Headquarters building, located near the Jetport Exit at Mile 46, was constructed in 2009. The headquarters building includes office space for MTA staff and serves as the MTA's EZPass Customer Service Center. The State Police troop serving the Turnpike also operates out of the Headquarters building. In September 2021, the Authority finished improvements to its parking area. The work included the addition of seven parking spaces and the installation of additional lighting fixtures ensure Turnpike patrons

and employees have a safe and well-lit pathway to their vehicles.

HNTB RECOMMENDATION

Continued coordination with Applegreen Limited is recommended to understand the scope, cost, and timing of any requested changes at Service Areas to support the MTA's ongoing capital planning efforts.

At the Wells Transportation Center, the existing sewer pump station and force main has suffered from recent performance and reliability issues. A system review and evaluation of rehabilitation options is recommended to identify a scope of repairs for implementation to ensure system reliability.

Maintenance Facilities

Nine maintenance facilities are located along the Turnpike at the following locations:

- » York (Chases Pond Road)
- » York Mile 10 (Storage Building)
- » Kennebunk (NB)
- » Crosby (SB)
- » Sign Shop (NB)
- » Gray (SB)
- » Auburn (NB)
- » Litchfield (NB)
- » Gardiner (NB)

Each maintenance area has a different combination of buildings ranging from material storage, to vehicle and equipment storage, to repair facilities and offices as shown in **APPENDIX A**.

In 2020, the expansion and upgrade of eight vehicle storage garages originally built in the 1960s was completed. The work, located at five separate maintenance facilities, allow the garages to better accommodate modern plow truck configurations and provided improved storage conditions, enhanced access for maintenance, and upgraded electrical and HVAC systems.

The construction of an additional 8-bay garage at the Crosby maintenance facility is underway with completion scheduled in 2023. Once complete, this garage will house Turnpike equipment and the additional plow trucks needed to complete winter maintenance on the additional lanes that are under construction as part of the Portland Area Widening.

The 8-bay garage at the Litchfield Maintenance Yard was destroyed by fire on the evening of December 2, 2021. Following the fire, the design for a replacement garage was completed on a heavily accelerated schedule and a contract for the construction of a new 8-bay garage was awarded in March 2022. Construction of the new garage is underway and is expected to be complete in 2023.

All maintenance areas were found to be in generally fair to good condition.

HNTB RECOMMENDATION

As a supplement to the Annual Inspection Report, which captures the most pressing needs for improvement, separate Maintenance Reports for the maintenance areas are also created and submitted as part of each annual inspection cycle. We recommend the Authority's maintenance actively address the maintenance items reported to the degree practical.

Building Needs Assessment

At the request of the Authority, HNTB completed a building needs assessment of the 95 buildings owned and maintained by the MTA. The buildings have a total floor space of over 460,000 square feet. The resulting June 2022 report concluded MTA buildings are in generally fair to very good condition. Recommendations were provided for the scope and timing of capital improvements and maintenance activities needed to maintain MTA buildings in a state of good repair, to support efficient operations, and to meet the evol-

ing needs of the Turnpike and the traveling public. Many of the recommendations included in the Building Needs Assessment Report have been incorporated into the MTA's Capital Plan.

HNTB RECOMMENDATION

We recommend completing the capital improvement and maintenance activities outlined in the June 2022 Building Needs Assessment Report.

Emergency Generator Assessment

In May 2022 an evaluation was completed of the MTA's 43 emergency standby generators. The evaluation identified three units in need of replacement due to either poor condition or a lack of manufacturer support. The Biddeford Toll generator was recommended for replacement as soon as practical, the Central Inventory Generator was recommended for replacement within the next five years, and the Gardiner Maintenance generator was recommended for replacement in the next five to ten years.

HNTB RECOMMENDATION

The replacement of the identified generators is recommended for inclusion in the Authority's capital plan. Additionally, the MTA should retain the services of a qualified firm to complete periodic testing and routine maintenance of the MTA's generator inventory.

3. TOLL COLLECTION SYSTEM

Electronic Toll Collection

The Authority operates its Electronic Toll Collection (ETC) system as a closed-barrier toll system from the York Toll Plaza north to the New Gloucester Toll Plaza, and as an open-barrier toll system from the New Gloucester Toll Plaza north to the Turnpike terminus in Augusta. The open-barrier toll system allows free travel between interchanges within the limits of the mainline barrier toll plazas on the northern section of the Turnpike.

All trips on the Turnpike between the I-95 Piscataqua River Bridge and Exit 7 are toll-free. Historically, these trips account for about 17% of all trips taken on the Turnpike. Additionally, all trips between Exit 75 in Auburn and Exit 86 in Sabattus are toll-free. Historically, these trips account for roughly 2%-3% of the trips on the Turnpike that occur north of Exit 7.

E-ZPass Group

On February 1, 2005, the Authority implemented its current electronic toll collection (ETC) system, E-ZPass, thereby gaining admission into the E-ZPass Group. Formerly known as the Inter Agency Group (IAG), membership provides the Authority with a voice in one of the largest and most successful toll collection systems in the world. Originally founded in 1990, members of the E-ZPass Group have collected over \$14.5B in tolls in 19 states from more than 49 million collection tags.

The primary mission of the E-ZPass Group is to enable E-ZPass members to provide the public with a seamless, accurate, interoperable electronic method for paying tolls and fees as well as the ability to collaborate with other agencies regarding new technologies and services. Since becoming a member of the E-ZPass Group, the Authority has increased electronic revenue collections, reduced toll plaza footprints, and maximized collections while increasing efficiency and maintaining customer satisfaction.

Toll Schedule

Events related to the COVID-19 pandemic had a significant impact on Turnpike traffic and revenue in 2020. As a result, the Authority collected approximately \$24.5 million less revenue in 2020 than in 2019, an approximate decrease of 17.5%. A rebound in traffic volumes in 2021, combined with an increase in the volume of commercial vehicles and the implementation of a toll adjustment in late 2021, resulted in 2021 toll revenues that were within 1% of 2019 pre-pandemic levels.

The 2021 toll adjustment increased the cash toll rate at the York Toll Plaza from \$3.00 to \$4.00. The cash rate at the remaining locations was unchanged and remains \$2.25 at the New Gloucester Toll Plaza, \$1.75 at the West Gardiner Toll Plaza, \$1.50 for motorists traveling

north from Exit 19 in Wells and south from Exit 63 in Gray; and \$1.00 at all other locations.

The 2021 adjustment also reduced the discounts provided through the Volume Base Discount Program as described below and increased Maine E-Z Pass fares from 7.7 cents per mile to 8.0 cents per mile. The E-Z Pass fares remain structured in such a way that they are equal to, or less than, the cash rate for a given movement.

A passenger car traveling the full length of the turnpike pays \$8.00 (7.2 cents per mile), while five axle tractor trailers pay \$32.00 (28.8 cents per mile). E-ZPass patrons who have an E-ZPass tag from other toll authorities are charged the cash fare.

For those who acquire their E-ZPass tag from the Authority, the following discount programs are available:

DISCOUNT PROGRAMS

Patrons who drive a motorcycle, passenger car, van, or pickup with four tires or less can establish a Personal Account. The advantages of a personal account include having tolls automatically deducted from your pre-paid balance when traveling on the Turnpike or other E-ZPass compatible facilities, no-stop payment of tolls and often paying less than, but never more than, the cash fare. Trips are charged based on the lesser of the current cash fare or the E-ZPass rate per mile fare. Passenger cars with a Maine-based E-ZPass account save an average of 34% compared to the cash rate, before the application of Volume Based Discounts.

The Authority offers personal and commercial Volume Based Discount Programs to Maine E-ZPass account holders.

PERSONAL VOLUME BASED DISCOUNT

The Authority offers the Volume Based Discount Program to all Maine E-ZPass account holders. Under this system, the total fare for travelers of the Turnpike is discounted by 20% if more than 30 one-way trips occur in a month, and a 40% discount if 40 or more one-way trips occur in a month as shown in **Table 9**. Prior to the 2021 toll adjustment the discounts were 25% and 50% respectively.

TABLE 9: VOLUME BASED DISCOUNT PROGRAM

Number of Trips (Per Month)	Volume Based Discount Program (Personnel Accounts Only)	
	PREVIOUS	CURRENT
30 - 39	25%	20%
40+	50%	40%

BUSINESS VOLUME BASED DISCOUNT

Business Accounts are intended for commercial vehicles. As with passenger cars, commercial vehicles having an E-ZPass tag from the Authority are charged the lesser of the current cash fare or the underlying per-mile rate. Commercial vehicles that enroll in this program can establish a pre-paid or a post-paid account, or a combination of the two.

POST-PAID PLAN VOLUME DISCOUNT

Commercial vehicles with a post-paid Turnpike E-ZPass account (with the required \$5,000 surety bond) receive an additional “volume discount” based on the amount of their monthly tolls. **Table 10** describes how the Post-Paid Plan Volume Discount program works. In essence, all tolls in excess of \$50 for the month are discounted between 10% and 20%. On a system-wide basis, post-paid E-ZPass business accounts receive an average volume discount of over 17%. This discount program is in addition to the already-discounted E-ZPass fares described earlier. For post-paid commercial vehicles, the combined effect of the E ZPass discount and the volume discount produces an average savings of roughly 45% compared to the cash fare.

Pre-paid commercial accounts do not require a surety bond, but they do not provide their account holders with a volume discount. However, the accounts do receive the normal E-ZPass discount compared to the cash fare. This discount averages about 33% for commercial vehicles.

TABLE 10: POST PAID PLAN VOLUME DISCOUNT

E-ZPass Charges (Per Month)	Post-Paid Plan Volume Discount (Business Accounts Only)
Between \$0 and \$50	No discount
Between \$50 and \$100	10% discount off everything over \$50
Between \$100 and \$300	\$5 discount plus 15% off everything over \$100
Over \$300	\$35 discount plus 20% off everything over \$300

4. TRAFFIC MANAGEMENT AND TECHNOLOGY

Since opening in 1947, the Turnpike has served as a vital transportation link for the state. Traffic on the Turnpike has grown steadily from 3.8 million vehicle trips in 1956 to a record of over 74.8 million at its peak in 2019. Due to the COVID-19 pandemic, toll transactions were down approximately 21.8% in 2020 but recovered significantly in 2021 ending the year approximately 6.4% less than the 2019 record year. Traffic volumes in 2022 continue to increase. Through the end of June 2022, the total number of transactions on the Turnpike had increased 7.3% compared the same period in 2021.

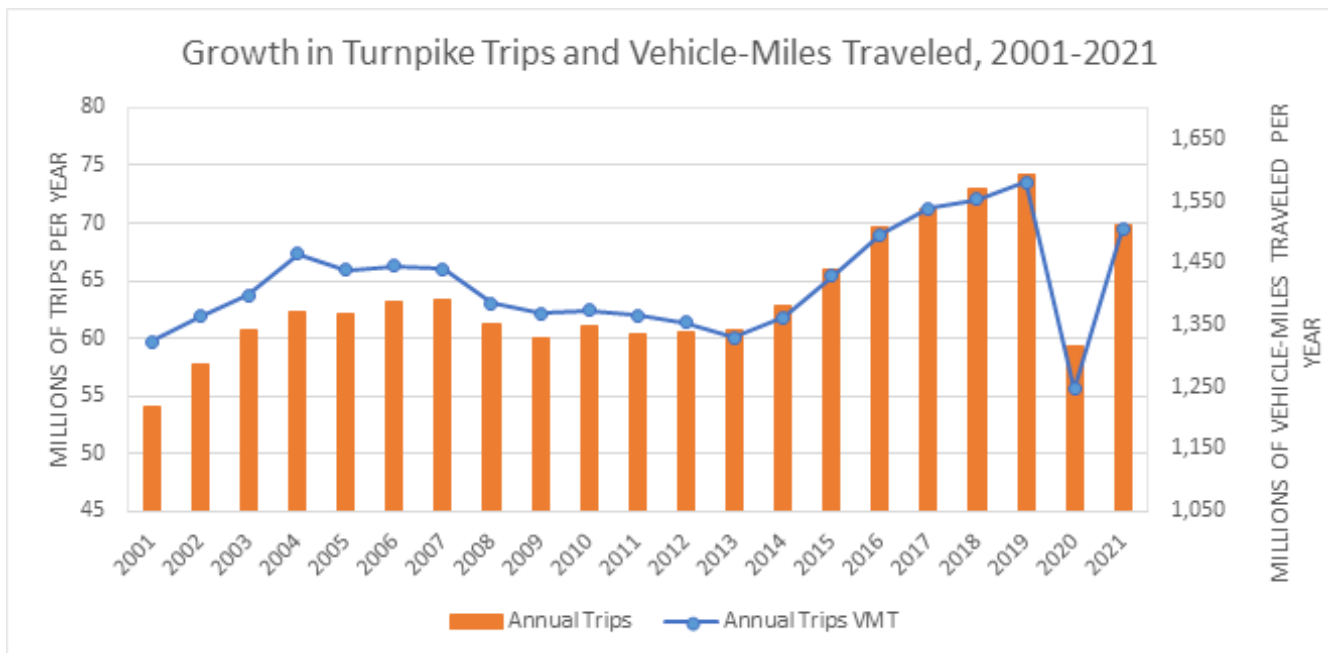
There are two common transportation measures to compare volumes on the Turnpike: annual Vehicle-Miles Traveled (VMT) – the estimated number of miles traveled on the Turnpike throughout the entire year, and annual number of trips – the estimated total number of trips along the Turnpike. In 2019, the Turnpike logged a record 1.42 billion VMT while serving approximately 74.8 million trips north of Exit 7. Comparatively, in 2020 these values dropped to 1.1 billion VMT and 59 million trips, approximately 80% of the prior year. These values rebounded in

2021 to within 6% of 2019 pre-pandemic levels with 1.34 billion VMT and approximately 70 million trips. The trend of increasing VMT and trips has continued through the first half of 2022.

FIGURE 3 illustrates the trends of both measures over the past 20 years (2001 – 2021). VMT and Annual Trips both experienced rapid growth in the early-2000s, but following this period of growth, both measures became relatively stagnant from 2005-2013. Since 2013, and through 2019, both measures increased by approximately 20%. The COVID-19 pandemic resulted in a steep decline in VMT and annual trips in 2020. Both measures have rebounded in 2021.

The length of Turnpike trips decreased from an average of 21.3 miles in 2001 to 19.3 miles in 2019, indicating people are increasingly using the Turnpike for short, local trips. During 2020 changes in travel patterns attributed to the COVID-19 pandemic caused the average trip length to increase to 20.1 miles. Following the easing of COVID-19 restrictions in 2021 the prevalence of short trips increased and the average trip length began to decline once again.

FIGURE 3: VMT AND ANNUAL TRIPS



Reduced Speed Limit Signs

As part of an overall effort to reduce vehicle speeds and crashes during poor travel conditions, the Authority maintains eighteen "45 MPH Reduced Speed Limit" signs that are controlled remotely from the

Turnpike Communication Center. In addition, all new ORT lanes are specified to include variable speed limit sign.

Traffic Count Stations

To gather accurate and timely traffic data, the Authority began installing traffic count stations at interchanges in 1996. The controllers currently utilize side-fired radar technology to continuously record traffic volume and speed data. The system enables the Authority to col-

lect the data automatically. The existing count stations cover each ramp and the mainline from the Maine state line through Exit 109 in West Gardiner.

In 2022 Turnpike started the process of evaluating and modernizing their existing traffic count stations.

Roadway Sensors

There are eight Roadway Weather Information Systems (RWIS) located on the Turnpike – installed between 2008 and today. Each location measures the surface temperature of the road, road state (dry, damp, wet, frost or ice), and other factors. This information helps maintenance supervisors make cost-effective decisions regarding the application of de-icing materials during winter storm events and provides detailed information regarding changes in weather conditions

along the length of the Turnpike. RWIS are currently installed at the York River Bridge (Mile 5.2), York Maintenance (Mile 10), the Saco River Bridge (Mile 33.0), the Falmouth Spur Presumpscot River Bridge (Mile FS1.1), the Eagles Nest Road Bridge (Mile 60.8), the Poland Spring Road Bridge (Mile 74.2), the Androscoggin River Bridge (Mile 78.9), and at the Sabattus Interchange (Mile 86.1).

Variable Message Signs (VMS)

The Authority currently maintains a network of Variable Message Signs (VMS) to provide motorists with critical real-time traffic information. There are 15 VMS and 28 portable changeable message signs installed along the Turnpike, primarily focused in the more heavily traveled southern section. The signs typically advise Turnpike patrons of current traffic conditions, weather restrictions, accidents, and delays. Message displays are controlled by Turnpike dispatchers from the communication center at the Authority Headquarters.

In 2017, the Authority installed two additional VMS at the southbound Kittery weight station at Mile 4.3 and on I-195 Westbound, just east of the Saco Exit 36 Toll Plaza. In 2019 the Authority installed one additional VMS at Mile 32.5 northbound and one each northbound and southbound near Bald Hill Road at Mile 71.6.

Twenty-eight Portable Changeable Message Signs (PCMS) have been deployed long-term throughout portions of the Turnpike for incident management purposes and can be controlled from the communication center in the same manner as the fixed VMS.

Highway Advisory Radio

The Authority installed its first Highway Advisory Radio (HAR) transmitter in Saco in 1997 and, since that time, has expanded the system to cover nearly the full length of the Turnpike. Transmitters along the Turnpike are located in strategic locations to provide information at critical decision points along the highway, typically at or near interchanges.

In 2007, the Authority upgraded 11 transmitter sites and the software platform located in the Turnpike Communication Center. This upgrade synchronized all the HAR transmitters improving coverage on the mainline.

In 2011 an additional HAR transmitter was installed in the vicinity of the Kennebunk Service Plazas to better cover a gap in reception between adjacent transmitters. In 2019 the HAR transmitter near the existing York Toll Plaza was relocated south to Mile Marker 6.2 and two new transmitters were con-

structed at Mile Markers 15.4 in Wells and 58.3 in Cumberland to further reduce gaps in reception. An additional HAR transmitter was installed in the vicinity of Brighton Avenue at Mile 48.3 in 2022.

The Highway Advisory Radio Transmitter Locations are listed in **Table 11** below. Each transmitter location is supplemented by signs advising motorists to tune their radios to 1610 AM to receive real-time Turnpike information.

Prerecorded messages are continually broadcast to provide information about traffic conditions, weather, and construction zones. The Turnpike Communication Center has the ability to control and quickly update messages. The HAR system is a significant resource for providing information to motorists.

TABLE 11: HIGHWAY ADVISORY RADIO TRANSMITTER LOCATIONS

Town/City	General Location	Mile Marker
York	I-95 SB at Cider Hill Underpass	6.2
Wells	I-95 SB at Tatnic Road Underpass	15.4
Wells	I-95 SB at Sanford Road Overpass	19.1
Kennebunk	I-95 NB at Fletcher Street Overpass	25.3
Saco	I-95 NB at Boom Road Underpass	33.4
Scarborough	I-95 NB at Holmes Road Underpass	43.0
Portland	I-95 NB at Brighton Avenue Underpass	48.3
Falmouth	Exit 53 On-Ramp	53.0
Cumberland	I-95 NB at Sign Shop	58.3
Gray	I-95 SB at Gray Maintenance	63.3
Auburn	Exit 75 NB On-Ramp	75.4
Lewiston	Exit 80 SB On-Ramp	80.3
Litchfield	I-95 NB at Marsh Road Underpass	89.2
West Gardiner	I-95 NB at West Gardiner Toll Plaza	100.2
Augusta	I-95 SB, N. of Winthrop Street Underpass	108.7

Closed Circuit Television (CCTV) System

There are currently 13 CCTV cameras transmitting streaming video 24-hours a day, seven days a week, to monitors located in the communication center at the Authority Headquarters. Still images from these cameras are also viewable on the Turnpike website.

The CCTV cameras are located at the following locations:

- » York Toll Plaza - NB & SB
- » Exit 25 (Route 35) - NB & SB
- » Exit 32 (Route 111) - NB & SB
- » Between Exits 32 & 36 (Boom Road) - NB Only
- » Between Exits 36 & 42 (Flag Pond Road) - NB & SB
- » Exit 42 (Holmes Road) - NB Only
- » Exit 63 (Gray) - NB & SB
- » Mile 108.8 – SB Only

These cameras allow the Turnpike Communication Center to view traffic in the vicinity of these heavily traveled interchanges.

Two additional CCTV cameras are located with the Road Weather Information Systems (RWIS) that were installed in the fall of 2008 at the Saco River Bridge in Saco and Eagles Nest Overpass in Gray. Presently, these cameras are providing still images viewable through the RWIS website, but the cameras do have the capability to provide streaming video.

Four additional trailer-mounted CCTVs were purchased after 2010 for temporary work zone monitoring and incident management.

One additional CCTV was installed in 2018 and is collocated with the newly installed VMS at the Southbound Kittery weight station. Six Additional CCTVs were installed in 2019 and are located with the RWIS at York River north median, Mile 10.00 southbound, Mile 74.20 southbound, Androscoggin River southwest end post, Mile 86.15 northbound, and Presumpscot River east median.

Overheight Vehicle Detection System

Many of Turnpike bridges have been struck and damaged by overheight loads. This issue has been mitigated by the Authority's policy of increasing bridge underclearance as part of bridge rehabilitation projects and by constructing new bridges with a minimum of 16.5 feet of underclearance. However, several bridges still have minimal underclearance and have a potential for damage if struck by an overheight vehicle. The Authority has addressed this concern by installing Overheight Vehicle Detection Systems at select locations. These

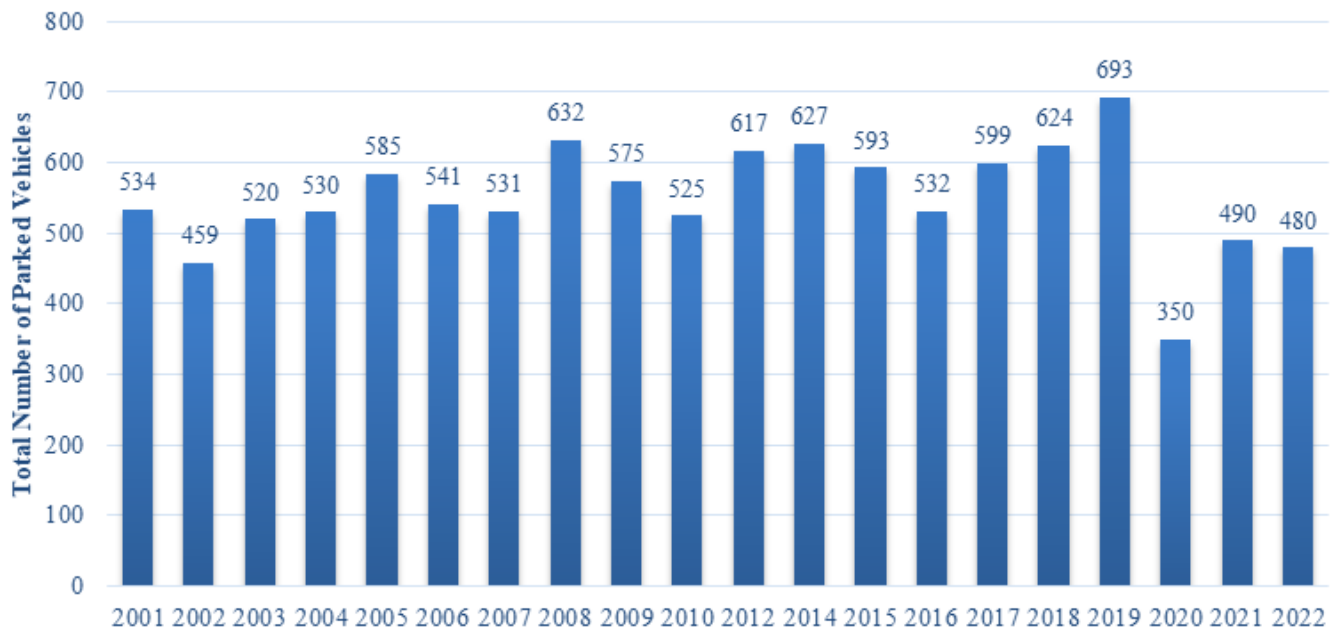
systems detect overheight vehicles and send a signal to a flashing sign that notifies the driver of an overheight vehicle to come to a stop or exit the highway. The Turnpike's Communication Center is also notified of the occurrence and receives video of the incident. A system was installed on Auburn Interchange in 2013 and on the mainline in West Gardiner in 2014. A system previously in place on the Warren Avenue Bridge was removed in 2021 following replacement of the old bridge.

Go Maine Program

Between April 2013 and October 2021, the Authority administered the GO MAINE Program. GO MAINE is a statewide commuter program designed to help commuters find information on alternatives to commuting alone. GO MAINE helps match up carpoolers online and rewards people for using a "green commute." Beginning in October 2021, administration of the GO

MAINE program will transfer to MaineDOT to support a further expansion of the program across the State. The Turnpike continues to play a strong supporting role in the program.

FIGURE 4: PARK AND RIDE LOT USAGE - 2001 THROUGH 2022



Park & Ride Lot Program

Currently, the Authority maintains a network of 9 Park & Ride lots. The MTA maintained lots, combined with MaineDOT maintained lots, provide Park & Ride facilities at or near most Turnpike interchanges. The Authority recently updated the Park & Ride policy to be more consistent with the policy of the MaineDOT. One of the major changes is that vehicles can now park more than 24-hours in the Park and Ride lots during non-winter months.

The Authority strongly encourages motorists to utilize its Park & Ride lots to reduce congestion on the Turnpike through ridesharing. The Authority monitors the use of these lots to assure that adequate capacity is available.

FIGURE 4 summarizes overall Park & Ride Lot Usage from 2001 through 2022. The data is reflective of the number of vehicles observed on the day of the survey. The survey is completed yearly on weekdays between 9 a.m. and 5 p.m. to capture lot usage during working hours. The 2020 survey found roughly half as many cars present in the lots compared with recent years.

This discrepancy is attributed to reduced travel associated with the COVID-19 pandemic. During the 2022 survey, Park & Ride Lot utilization had recovered somewhat, but remained reduced compared to 2019 levels.

The following observations may be drawn from the figure above:

- » Over the past 20 years, total Park & Ride lot usage has generally remained in a fairly narrow range of 500 to 700 vehicles (recorded in 2019).
- » In 2020, total usage on the day of the survey was 350 vehicles. Given that a total of 1,181 spaces were available, the overall system operated at just under 30% of its capacity. The total usage in 2022 was improved, but still below 2019 levels. These decreases are attributed to the COVID-19 pandemic that reduced overall traffic on the interstate and limited the use of ride sharing lots due to social distancing requirements

Five noticeable increases in park and ride usage have been noted over the past two decades:

- » In the fall of 2005, when fuel prices rose rapidly in the wake of Hurricane Katrina.
- » In the spring of 2008, when fuel prices hit record highs.
- » In the spring of 2012, when fuel prices again climbed abruptly after a temporary reprieve in prices over the winter.
- » In 2014 following the opening of the new, larger park and ride lot in Lewiston.

TABLE 12: PARK AND RIDE LOT USAGE PER LOCATION - 2021

Town	Location	Owner	Spaces	2022 Volume	% Capacity
York	Chases Pond Road, US-1 Connector	MaineDOT	26	10	38%
Wells	Maine Tpk Exit 19, adj. to Wells Trans Ctr.	MTA	100	39	39%
Kennebunk	Maine Tpk Exit 25 SB, on Rt. 35	MTA	52	24	46%
Biddeford	Maine Tpk Exit 32, on Rt. 111	MTA	155	59	38%
Saco	I-195 Exit 1, on Industrial Park Road	MaineDOT	135	58	43%
Scarborough	Maine Tpk Exit 42, shared w/ Cabela's Parking Lot	MTA	66	29	44%
S. Portland	Maine Tpk Exit 45, on Rt. 703	MaineDOT	111	17	15%
Portland	Maine Tpk Exit 46, adj. to toll plaza	MTA	68	24	35%
Westbrook	Larrabee Road, near Maine Tpk Exit 47	MaineDOT	91	34	37%
W. Falmouth	North side of Hannaford behind the Irving	MTA	9	6	67%
Gray	Maine Tpk Exit 63, on US-26	MTA	127	51	40%
Auburn	Maine Tpk Exit 75, on US-202	MTA	137	46	34%
Lewiston	Maine Tpk Exit 80 - Route 196	MTA	93	57	61%
W. Gardiner	Maine Tpk Exit 102, near Rt. 126	MTA	54	26	48%
Overall			1,224	480	39%

» In 2019 at the peak of a long period of economic expansion and traffic growth on the Turnpike.

Table 12 summarizes Park & Ride Lot Usage per location, on the day it was surveyed, as part of the 2022 Annual Inspection of the Turnpike. The table also records the number of spaces available at each lot, as well as each lot’s operational capacity. The 2022 Park & Ride

Lot usage survey was completed in May.

As this table indicates, the four busiest lots on the Turnpike are Biddeford (Exit 32), Saco (Exit 36), Gray (Exit 63) and Lewiston (Exit 80). These three lots combined serve about 47% of the Authority’s Park & Ride customers. The Exit 63 Park & Ride Lot was relocated and doubled in size in 2015 due to interchange construction.

Turnpike Safety and Law Enforcement

In 2019 there were 1,022 reported crashes on the Maine Turnpike. In 2020, the COVID-19 pandemic lessened travel and the number of crashes fell to 773 – a year over year reduction of 24%. Traffic volumes rebounded to near pre-pandemic levels in 2021 and a total of 915 crashes were reported. Through the middle of June 2022 more than 300 crashes have been reported.

In 2021 the severity of crashes, and the number of crashes resulting in injuries or fatalities, remained consistent with historical levels. This trend has continued into 2022 thus far.

A High Crash Location (HCL) is defined as a roadway node or segment that has more than eight crashes in a three-year period, and a Critical Rate Factor (CRF) greater than 1.0. The CRF relates the crash rate at a location to the statewide crash rate average for a similar type of facility.

From 2019 - 2021, there were a total of 26 HCLs on the Turnpike system which includes the mainline, toll plazas, and interchange ramps. These locations included three ramps, seven ramp intersections, one mainline merge, one mainline diverge, and 14 mainline segments. A summary of these HCLs is provided in **Table 13**.

Compared with the prior 3-year period from 2018-2020, the number of HCLs has remained the same.

Law enforcement services on the Turnpike are provided by Troop G of the Maine State Police. Troop G is funded entirely by the MTA and located in the MTA Administration Building. With access at Exit 46, Troop G has a safe entry/exit to the Turnpike mainline, and good accessibility to the public. In addition, Troop G benefits from a modern facility with state-of-the-art law enforcement components similar to other recently constructed state police facilities.

Troop G consists of a Lieutenant, Sergeants, Corporals and Troopers assigned to the Turnpike. In recent years, the staff size of Troop G has ranged between 20 and 25. These troopers are responsible for patrolling the entire Turnpike, 24-hours a day, 365 days per year.

The troopers are dedicated to making the road safer by enforcing speed limits; assisting disabled motorists; detecting and apprehending operators who are under the influence of drugs or alcohol; and enforcing other Maine State laws.

Turnpike Safety Patrol

In October 2016 the Authority started a State Farm Safety Patrol program to cover PM peak hours in the Portland area year-round, and in the Kittery area during the summer season. In October 2018 this successful service was expanded to provide additional hours of coverage. In October of 2021 GEICO became the new program sponsor and an additional 1,000 hours of patrol time were added.

The service vehicle made a total of 1,158 stops in 2019. The most frequent calls are for disabled vehicles, fuel, tire changes, and welfare checks for vehicles that are stopped but not disabled. Vehicles on the side of the road can cause congestion and can lead to safety hazards. Clearing them quickly and efficiently is crucial to maintaining mainline operations. Turnpike Safety Patrol.

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TABLE 13: SUMMARY OF HIGH CRASH LOCATIONS (2019 - 2021)

Town/City	Description	Location Description	Crashes	CRF
Kittery	Mainline	I-95 NB SL to Exit 1	26	1.08
Kittery	ML Merge	Intersection - Exit 2 C-D SB On Ramp	9	2.19
Kittery	Mainline	I-95 N/o Exit 3	22	1.22
York	Ramp Intersection	Exit 7 SB Intersection w/ Spur Road	22	1.22
York	Ramp	Exit 7 SB off Ramp	11	3.37
York	Mainline	I-95 SB N/o Exit 7 SB Off Ramp	46	1.09
Biddeford	Mainline	I-95 NB S/o Exit 32	13	1.45
Biddeford	Ramp	Exit 32 Ramps Segment N/o Route 111	13	2.05
Biddeford	Ramp Intersection	Exit 32 Ramps at Route 111	85	1.73
Scarborough	Mainline	I-95 NB S/o Exit 42	71	1.06
Scarborough	Ramp Intersection	Exit 42 Ramps at Payne Road	30	1.13
Scarborough	Mainline	I-95 SB N/o Exit 42	39	1.16
Scarborough	Mainline	I-95 NB S/o Exit 44	11	1.12
Scarborough	ML Diverge	Exit 44 NB Off	9	1.04
Portland	Mainline	I-95 NB S/o Exit 47	34	1.39
Portland	Ramp	Exit 48 Ramps E/o Riverside St	12	3.38
Portland	Ramp Intersection	Exit 48 Ramps at Riverside St	42	1.29
Portland	Mainline	I-95 SB N/o Exit 48	15	1.25
Gray	Ramp Intersection	I-95 SB at W Gray Road	35	1.07
New Gloucester	Mainline	I-95 SB N/o Weymouth Road	13	1.01
Auburn	Mainline	I-95 NB S/o Exit 75	12	1.11
Auburn	Ramp Intersection	Exit 75 Ramps at Toll	8	3.1
Auburn	Ramp Intersection	Exit 75 Ramps at Washington St	11	7.86
Auburn	Mainline	I-95 NB S/o Riverside Drive	20	1.17
Litchfield	Mainline	I-95 NB S/o Lunts Hill Rd	17	1.2
Litchfield	Mainline	I-95 NB N/o Lunts Hill Rd	18	1.74

The service vehicle made a total of 1,158 stops in 2019. The most frequent calls are for disabled vehicles, fuel, tire changes, and welfare checks for vehicles that are stopped but not disabled. Vehicles on the side of the road can cause congestion and can lead to safety hazards. Clearing them quickly and efficiently is crucial to maintaining mainline operations.

5. MAINE TURNPIKE AUTHORITY/MAINEDOT JOINT INITIATIVES

Operations & Maintenance

The Authority and the MaineDOT have a long history of working together to provide an efficient transportation system.

Beginning in 1995, the Authority provided winter maintenance and litter patrol for a fee on a two mile stretch of I-95 (from Kittery to York) that, at the time, was owned and maintained by the MaineDOT. The agreement also included cooperation with NHDOT for the winter maintenance of the Piscataqua River Bridge. In 2016 the Authority purchased this two-mile section and is no longer reimbursed for the related maintenance work. Winter maintenance of the Piscataqua River Bridge, however, is still reimbursed.

In 2014, the two agencies entered into an agreement that reimburses the Turnpike for the maintenance of various roadways and visitor centers connecting to the Turnpike roadway. Additional discussions occur annually to confirm that all overlap points are being covered in the most efficient manner.

In 2018, the MaineDOT called and needed help painting pavement markings on I 295 in Portland. The Authority forces worked the night shift during a week in August to paint pavement markings.

In the summer of 2021, MaineDOT made a portable temporary signal system available for the Turnpike's use at the Route 197 Bridge after it was struck by an overheight vehicle.

Additionally, the Authority coordinates with MaineDOT when developing pavement rehabilitation projects. Although the two agencies use differing standards, this working relationship has resulted in improved consistency for paving projects.

As part of 2013 LD 1538 (the MTA Omnibus Bill), the Authority is providing transportation dollars or credit to the MaineDOT for projects and initiatives that will provide a benefit to the Authority. This includes MaineDOT projects that physically connect to the Turnpike or are consistent with the overall Turnpike Authority mission. Alternative programs, such as the ones identified below, are included in these transportation dollars provided to the MaineDOT.

The Authority and MaineDOT also work together regarding storm-water issues. Permitting processes through Maine Department of Environmental Protection (MaineDEP) are reviewed jointly by both agencies and three-party agreements are signed so that MaineDOT and Authority are treated the same for transportation purposes.

Park & Ride Lot Coordination

The Authority and MaineDOT continue to coordinate on the use, condition, and improvements to Park & Ride lots. The Authority, in coordination with MaineDOT, performed an updated inventory of all Park & Ride lots throughout the State of Maine in the spring of 2013. This involved an inventory of available parking spaces, an assessment of signing and amenities, and a count of the number of vehicles served by each lot.

The Authority and MaineDOT agree to continue to work to identify future Park & Ride lot needs through the continued inventory and evaluation of these lots. (These are described in Section 4.)

Project Development

The Authority coordinates with the MaineDOT on projects that are located near the Turnpike. In Auburn, the Authority provided land to the MaineDOT for a bus terminal and parking area. This project was completed in 2019. Additionally, the MaineDOT and the Authority worked together on the I-295 corridor study to understand the implications to the Turnpike traffic flow and surrounding areas. This effort led to the installation of travel distance and time signage along the Turnpike in 2019 to encourage motorists to travel I-95, thereby relieving congestion on I-295.

In Kittery, MaineDOT and the Authority are coordinating regarding ongoing bridge preservation work and capacity enhancements at the Piscataqua River Bridge linking Maine and New Hampshire.

This working relationship also involves the planning and construction of projects. Both agencies worked together on the Turnpike West Gardiner Service Plaza project, and on the Central York County and Gorham East-West Corridor Studies.

6. PLANNING STUDIES

As the Authority evaluates possible new transportation projects, various planning studies must be undertaken to evaluate and identify the best available

alternatives. Recent or ongoing planning studies are described in the following paragraphs.

Exit 32 Feasibility Study

The Authority completed a study looking at safety and capacity concerns related to the Exit 32 interchange and Route 111 in Biddeford. Specifically, the purpose of the Study was to use short and long term solutions to address building queues on the Exit 32 southbound off ramp, improve capacity at the Exit 32 and Route 111 intersection, and to improve accessibility between local communities and the Turnpike. Alternatives evaluated were designed to increase capacity near the existing interchange and to remove vehicles from congested areas by providing new connections. These alternatives include additional off-ramp lanes, signal modifications, new connections to Route 111 and South Street, and new interchange configurations.

The feasibility report recommended short, medium, and long-term solutions that add capacity over time. Short-term recommendations included queue detection on the southbound approach to the intersection of Exit 32 and Route 111 as well as an increased deceleration length for the southbound off-ramp. Queue detection has been added and the proposed off-ramp

modifications are currently in construction. Mid-term recommendations included a new connection from the Turnpike to Route 111 and a second southbound off ramp lane. The recommended long-term improvement involved a reconfiguration of the existing interchange. A connection from South Street proposed by others would be an additional mechanism to remove vehicles from the congested intersection of Exit 32 and Route 111. Design and implementation of short-term alternatives is underway.

The Turnpike, MaineDOT and the City of Biddeford began a joint study in August of 2021 to further evaluate alternatives for the mid-term improvements identified in the feasibility study. The ongoing study will also evaluate options for the addition of a connector road to South Street, and the resulting impact to traffic patterns in the area.

Exit 36 Feasibility Study

The Authority completed an initial feasibility study in 2019 in the vicinity of Exit 36 and Route 112 with the goal of identifying long-term improvements and addressing regional transportation issues. Specifically, the study sought to evaluate the potential for managing and improving access to Route 112, making safety improvements at intersections, maintaining, and improving easy access to and from the Turnpike, and separating local and through traffic as much as practicable.

The study documented existing conditions and evaluated alternatives that address transportation conges-

tion and safety deficiencies. Alternatives were evaluated based on transportation measures, environmental resources, land use, cost, funding, and property impacts. The study concluded with a recommendation to modify the existing Exit 36 interchange together with a reopening of the Exit 35 interchange.

Design and permitting for the project is nearly complete and construction is scheduled to begin in 2023. Construction of the project is estimated to last three years. In 2022, the northbound on-ramp acceleration lane was improved in preparation for the larger project.

Exit 45 Feasibility Study

In 2018, two feasibility studies were completed for the Authority that evaluated several interchange alternatives at Exit 45 (the Maine Mall Exit) in South Portland. The first, the Exit 45 Conceptual Assessment of Interchange Alternatives, evaluated the need to replace the obsolete toll system and infrastructure which could no longer be maintained, address safety and operational deficiencies of the existing interchanges, and improve the substandard vertical clearance and deteriorating condition of the Exit 45 underpass bridge. Seven interchange concepts were evaluated. Three were recommended for further evaluation: 1) a modified no-build, 2) interim diamond interchange, and 3) a full build diverging diamond interchange.

The second feasibility study, the Exit 45 Analysis of Recommended Alternatives, documented a detailed refinement, evaluation, and feasibility of the three recommended alternatives to address short and long-term needs. The interim diamond interchange, which can accommodate a future Gorham Connector, was the recommended alternative.

Based on this recommendation, Exit 45 is being reconstructed as a Diamond Interchange to accommodate growing traffic numbers with two new ramp toll plazas and wider bridge. The existing bridge over the Turnpike has been hit on numerous occasions by over height vehicles and will be replaced and raised approximately 6 feet to provide a 16.5-foot clearance over the Turnpike. The existing toll booth will be removed and two new ramp toll plazas with both cash and electronic toll collection on either side of the mainline of the Turnpike will be constructed.

Embankment construction started in September 2019 following the receipt of environmental permits. Construction of the interim diamond interchange started in March of 2021 following a waiting period to allow for embankment settlement to occur. Opening of the new interchange is expected in the fall of 2022 followed by removal of the existing bridge and project completion in 2023.

Gorham Corridor Study and Alternatives Analysis

The Gorham Corridor Study began in the spring of 2009 at the direction of the 123rd Maine State Legislature and was a major new transportation and land use study of the corridor immediately west of Portland. This area is the location of what has historically been the fastest-growing residential market in Maine. The study's goal was to evaluate all the options and find the right package of alternatives to protect homeowner's quality of life over the long-term, without adding excess transportation capacity.

The study began when the municipalities of Gorham, Westbrook, Scarborough, and South Portland signed a joint resolution in 2007 asking for such a study, specifically to assess the feasibility of a new Turnpike Spur that will connect to the terminus of the Gorham By-pass located approximately 4.5 miles northwest of Turnpike Exit 45. The resolution stated that existing ways to manage traffic congestion, such as widening roads and adding turning lanes, would have a negative effect on their downtowns, village centers and neighborhoods. Both the Authority and MaineDOT officials believed that integrating all modes of trans-

portation (transit, bike, pedestrian) was an integral part of the study.

A final study report was completed in the fall of 2012. Since that time, the Authority has been coordinating with the United States Army Corps of Engineers (ACOE) to finalize a project purpose statement and determine next steps moving forward.

In 2017, a bill was introduced to the Maine State Legislature that would allow the Authority to borrow up to \$150 million to plan, design and build a spur from the terminus of the Gorham Connector at Route 114 in South Gorham to the Turnpike in the area of Exit 45 in Scarborough. This bill, LD 905, was voted and signed into law in May of 2017.

In 2019, a traffic and revenue feasibility study was completed for the Authority and concluded a new Gorham Connector would be financially viable. Since 2020, work has continued on the Gorham Connector Alternatives Analysis. The analysis is evaluating a range of capacity adding roadway alternatives and includes ongoing coordination with the ACOE and MaineDEP.

Safety and Capacity Study

Periodically, the Authority requests that a System-wide Traffic Operation and Safety Study of the Turnpike be conducted to assess both current and future operating conditions of all interchanges, mainline sections, ramps, and toll plazas between Kittery and Augusta. Typically, the Safety and Capacity Study is prepared every five years.

Based on the data collected and results of the analyses performed for this study, a series of recommendations are presented. These recommendations include possible future improvements such as roadway or inter-

change ramp widening, addition of toll plaza capacity, and safety improvements. The recommendations are accompanied by an approximate timetable of when the improvements will become necessary and an estimate of the forecasted construction costs. This document is used by the Authority as a long-range planning tool. The most recent system-wide Traffic Operation and Safety Study was completed in 2015. Work on an updated study was started in 2022. A completed report is expected by the end of the year.

Portland Area Mainline Needs Assessment

The Authority completed a Portland Area Mainline Needs Assessment in 2018 which looked at growing safety and capacity issues on the Turnpike between Exits 44 in Scarborough and Exit 53 in West Falmouth. The purpose of the Portland Area Mainline

Needs Assessment was to evaluate a full range of reasonable alternatives to address identified issues. Existing and future conditions were evaluated, and alternatives including Transportation Demand Management (TDM), Transportation System Management (TSM),

various tolling strategies, enhanced/expanded transit alternatives, and widening/capacity expansion alternatives were considered.

The Authority assembled a Public Advisory Committee (PAC) to provide input to the Portland Area Mainline Needs Assessment process and information. This PAC consisted of transportation, land use, commercial, and safety individuals who provided a broad range of knowledge and experience to the process. The Portland Area Mainline Needs Assessment was completed in 2018 and concluded that widening and modernization of the Turnpike mainline through the Portland area was appropriate and prudent.

Construction of the first two phases of the Portland-Area Mainline Improvements project is underway and includes adding a third lane in each direction, together with drainage and median improvements, between Mile Marker 44 and 49. This work is scheduled for completion in 2023.

Additional lane widening and median improvements in the Portland area are anticipated to be completed between Mile Marker 49 and 52 by 2029. Similar work between Mile Marker 52 and 53 is programmed for completion by 2031.

Study of the Future Needs of the Piscataqua River Bridge

Summer peak hour traffic volumes on the southern end of I-95, including the Piscataqua River Bridge, result in significant congestion and motorist delay, especially during peak travel hours. To address this concern, the Authority is working together with MaineDOT on this MaineDOT-led effort to evaluate, prioritize and implement potential transportation alternatives to improve traffic flow on I-95 between New Hampshire and Maine. The study area consists of the stretch of I-95 from Exit 3 in New Hampshire north to Exit 2 in Maine, including the Piscataqua River Bridge.

In recent years the Authority worked collaboratively with MaineDOT to complete improvements to the Dennett Road Bridge and to assess what enhancements can be made to improve highway throughput,

such as part-time shoulder use on the I-95 Piscataqua River Bridge. A MaineDOT bridge rehabilitation project at the Piscataqua River Bridge was completed in 2022 and included bridge preservation activities as well as modifications to allow part-time shoulder use during periods of heavy traffic. The installation of median barrier at the bridge approaches was included in the project to improve safety. A separate contract to install supplemental signage and intelligent transportation systems (ITS) to support part-time shoulder use is underway and is scheduled for completion in April 2023.

7. FUNDING

Recommendations will include possible future improvements (such as roadway or interchange ramp widening and safety improvements) and an estimate of the forecasted construction costs.

Funds for the operation, maintenance and improvement of the Turnpike are deposited into accounts designated for specific purposes. These accounts are:

CAPITAL IMPROVEMENT FUND:

» Includes specific projects to upgrade roadway facilities and improve highway safety, such as the Portland Area Widening Project and the Electronic Toll Collection system.

RESERVE MAINTENANCE FUND:

» Includes projects that exceed the constraints of normal maintenance, such as bridge reconstruction programs.

OPERATION AND MAINTENANCE FUND:

» Includes routine operation and maintenance work carried out by Authority personnel such as daily operations, repairs, and improvements.

The details of each fund are described below, as well as the recommended amounts of money to be deposited for fiscal year 2023. In addition, a recommendation regarding insurance coverage is included.

Capital Improvement and General Reserve Fund

As part of the Sensible Transportation Policy Act, the Authority identified projected deficiencies in Turnpike facilities that need to be addressed in the near- and long-term. From this planning effort, the Authority developed a Capital Improvement Program that detailed the need to significantly expand the extent of rehabilitation and maintenance work. The result of this effort made clear that routine maintenance programs could no longer stem the deterioration of Turnpike facilities or provide the higher level of operational efficiency made possible by current technologies.

The Capital Improvement Program was proposed for projects that require a faster pace of reconstruction work due to compelling public safety interests and for projects intended to significantly enhance operations. At the end of 2022, we estimate this fund will have a balance of \$122,745,338. Including carryover projects from 2022, we estimate \$108,638,715 in Capital Improvement expenditures in 2022.

Based on the estimated fund balances and Capital Improvement expenditures no additional deposit into the Capital Improvement and General Reserve Fund is required for 2023.

Reserve Maintenance Fund

The Reserve Maintenance Fund dedicates the revenue required to keep Turnpike infrastructure safe and in proper operational condition. This category normally funds contract work that exceeds the scope of rou-

tine maintenance such as bridge rehabilitation, bridge painting, and annual paving projects. The recommended deposit to the Reserve Maintenance Fund for fiscal year 2023 is \$40,000,000.

Operation and Maintenance Fund

Operation and Maintenance work is usually carried out by Authority personnel and includes activities such as administration, toll collection, snow plowing, minor repair work, sign replacements and other activities. We estimate that the cost of Operation and Maintenance during 2023, exclusive of Reserve

Maintenance and Capital Improvement expenditures, will be in the amount of \$44,808,549. This estimate is based on careful examination of 2022 expenditures and an evaluation of factors expected to influence these costs during 2023.

Insurance

Based on the replacement values provided by HNTB, the current Turnpike insurance coverage appears to adequately protect the properties, interests, and operations of the Authority. Insurance is provided under several policies including a comprehensive commercial package; worker's compensation; and public officials and employee's liability. A detailed schedule of insurance is presented in **APPENDIX B**.

Appendix A - Maintenance Area Buildings

	York	Old York	Kennebunk	Crosby	Sign Shop	Gray	Auburn	Litchfield	Gardiner	TOTAL
<u>Description</u>	<u>Mile</u>	<u>Mile</u>	<u>Mile</u>	<u>Mile</u>	<u>Mile</u>	<u>Mile</u>	<u>Mile</u>	<u>Mile</u>	<u>Mile</u>	
	7	10	25	46	58	63	77	93	102	
Maintenance Garage, 3 Bay		1	1					1		3
Maintenance Garage, 4 Bay			1			1			1	3
Maintenance Garage, 5 Bay				1				1		2
Maintenance Garage, 8 Bay			2	1		1	1	1		6
Maintenance Garage, 10 Bay			1	1						2
Salt Shed	1		1	1		1	1	1	2	8
Sand/Salt Storage Building	1		1	1		1	1	1		6
Flammable Storage Building	1		1							2
Storage/Body Shop Building						1				1
Cold Storage Building	1	1	1	2	2		1			8
Central Inventory Building					1					1
Sign Shop					1					1
Disaster Recovery Building					1					1
Office Building				1						1
Office Building, 5 Bay Garage								1		1
Office Building, 6 Bay Garage						1				1
Office Building, 7 Bay Garage							1		1	2
Office Building, 10 Bay Garage			1							1
Office Building, 13 Bay Garage	1									1
Fuel Distribution System	1		1	1		1	1	1	1	7
Generator Building	1		1	1	1	2		1	1	8

Appendix B - Schedule of Insurance

THE MAINE TURNPIKE AUTHORITY

Schedule of Insurance

2022-2023

Comprehensive Package Policy Including Turnpike Property

Underwritten by the Acadia Insurance Company

Agent: Cross Insurance

Premium Amt

Commercial Property **Policy No. CPA1000627-40** **Term: October 1, 2022 to October 1, 2023** **\$435,386.00**

Risk	Coverage	Limit	Remarks
Fire and Related	Blanket Buildings	\$134,589,510	Agreed Amount and Replacement Cost
	Contents	\$19,327,223	
	Extra Expense & Loss of Rents	\$3,611,500	
	Boiler and Machinery	\$166,106,444	
	(excludes bridges, overpasses & underpasses)		
	Earthquake Excluding Bridges	\$10,000,000	
	Flood	\$10,000,000	
	Scheduled Property:		
	Miscellaneous Unscheduled		
	Locations	\$500,000	
	Bridges, Overpasses, and Underpasses	\$374,773,840	
	Ordinance of Law Coverage	\$10,000,000	
	Fine Arts	\$200,000	
	Property In Transit	\$100,000	
Inland Marine			
a. Direct Physical loss or damage	Scheduled Maintenance Equipment *	\$5,361,877	
b. Direct Physical loss or damage	Valuable Papers	\$500,000	
	EDP Includes E-Z Pass Equipment*		
	Radar Counters, Radios, camera equipment, Signs and transmitting equipment		
	Message Boards*		
	*Included in the Contents Limit on Policy		

Premium Amt

Business Auto **Policy No. CAA1000628-40** **Term: October 1, 2022 to October 1, 2023** **\$346,905.00**

Comprehensive	Bodily Injury Liability, CSL, BI & PD	\$1,000,000	Each Occurrence
	Uninsured Motorist	\$1,000,000	Each Occurrence
	Medical Payments	\$5,000	Per Person
	Hired & Non-Owned Liability	\$1,000,000	
	MCS-90		Included
Auto Physical Damage	Comprehensive and Collision \$1,000 Deductible Applies to PPT		
	Comprehensive and Collision \$3,000 Deductible Applies to light, medium and heavy trucks and trailers		
	Hired Physical Damage	\$200,000	
	Garagekeepers	\$100,000	

Comprehensive General Liability Policy

Underwritten by Acadia Insurance Co.

Agent: Cross Insurance

<u>General Liability</u>	Policy No. CPA1000627-40	Term: October 1, 2022 to October 1, 2023	<u>Premium Amt</u> \$96,067.00
	Comprehensive General Liability		
	Each Occurrence Limit	\$1,000,000	
	Personal & Advetising Injury	\$1,000,000	
	General Aggregate Limit	\$2,000,000	
	Products-Completed Ops Aggregate	\$2,000,000	
	Fire Legal Liability	\$300,000	
	Premises Medical Payments	\$10,000	
	Employee Benefits Liability	\$1,000,000	

**\$25,000 premises/operations BI/PD per claim deductible applies with a \$175,000 aggregate

Comprehensive Crime

Underwritten by Travelers

Agent Cross Insurance

	Policy No. 106807620	Term: October 1, 2022 to October 1, 2023	<u>Premium Amt</u> \$7,262.00
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Crime

<i>Coverage</i>	<i>Limit</i>	<i>Ded</i>
Employee Theft	2,000,000	10,000
Forgery or Alteration	2,000,000	10,000
On Premises	2,000,000	10,000
In Transit	2,000,000	10,000
Computer Fraud	2,000,000	10,000
Funds Transfer Fraud	2,000,000	10,000
Money Orders/Counterfeit Money	2,000,000	10,000
Electronic Data Restoration Costs	1,000,000	10,000
Investigative Expenses	10,000	n/a

Worker's Compensation Self-Insurance Excess Policy

Underwritten by Midwest Employers Casualty Company; Agent: USI Insurance Services

	Policy No. EWC009992	Term: February 1, 2022 to February 1, 2023	<u>Premium Amt</u> \$130,521.00
	Policy in keeping with the laws of the State of Maine; cancellation; 60 days		
	\$750,000 Insurers retention for each accident or each employee for disease insurer's Limit of Indemnity for each employee for disease		
	1. As respects Coverage A (worker's compensation)		
	Statutory	Each Accident	
	Statutory	Aggregate - Disease	
	2. As respects Coverage B		
	\$1,000,000	Each Accident	
	\$1,000,000	Aggregate - Disease	

\$27,135,266 Total Estimated Annual Remuneration - February 2022-2023

Claim Service: Cannon, Cochran Management Service, Inc.

Public Officials and Employees Liability

Underwritten by ACE American Insurance Company

Agent: Cross Insurance

Policy No. EON M00608592 010

Term: October 1, 2022- October 1, 2023

Premium Amt

\$56,887.00

Public Officials Employee Liability	Elected and appointed officials and all full-time and part-time employees	\$5,000,000 each loss and aggregate for each policy year	Retention: \$50,000 loss
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Fidelity Bond-Public Officials

Underwritten by Travelers Insurance Company:

Agent: USI Insurance Services

Member of Authority Term

Amount of Bond Remarks

Premium Amt

Peter S. Mills Executive Director Policy No. 105619973	May 24, 2022-2023	\$500,000	Insures faithful performance of duties by the individual
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\$1,750.00

Douglas D. Davidson Treasurer Policy No. 105220484	January 1, 2022-2023	\$500,000
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Premium Amt

\$952.00

Jonathan Arey Secretary Policy No. 105220456	January 2, 2022-2023	\$50,000
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Premium Amt

\$175.00

Fiduciary Responsibility

Underwritten by ACE Insurance Company

Agent: Cross Insurance

Policy No. G25749522 011

Term: October 1, 2022-October 1, 2023

Premium Amt
\$8,576.00

Limit \$2,000,000
Provides protection for your errors/omissions or negligent acts in connection with handling of employee benefit plans: Maine State Health Insurance Plan; Maine State Dental Insurance Plan; Maine Turnpike Group Life Insurance Plan; and Maine State Retirement System

Group Hospital-Surgical

Effective April 1999

Primary Coverage

Anthem

Full semi-private room allowance

Self-Insured Workers Compensation Bond

Underwritten by Travelers Insurance Company

Policy No. 103464379

Term: December 2022

Premium Amt
\$960.00

Obligee: Maine Bureau of Insurance

Privacy & Network Liability Insurance

Underwritten by Travelers

Agent: Cross Insurance

Policy No. 106807615

Term: October 1, 2022-October 1, 2023

Premium Amt
\$136,580.00

A. Limit of Liability for Insuring Agreements

	Each Claim	Retention
A. Network and Information Security	\$10,000,000	\$100,000
B. Communications and Media	\$10,000,000	\$100,000
C. Regulatory Defense Expense	\$10,000,000	\$100,000
Policy Aggregate Limit	\$10,000,000	

Excess Cyber Liability

Underwritten by Houston Casualty Company

Agent: USI Insurance

Policy No. 106807615

Term: October 1, 2022-October 1, 2023

Premium Amt
\$45,030.00

Limits of Liability	Each Claim	Aggregate
	\$ 4,000,000	\$ 4,000,000

