HNTB

2021 OPERATION AND MAINTENANCE ANNUAL REPORT

PRESENTED BY: HNTB CORPORATION
PRESENTED TO: MAINE TURNPIKE AUTHORITY

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HNTB

October 7, 2021

Maine Turnpike Authority
2360 Congress Street
Portland, ME 04102

Ladies and Gentlemen,

We are pleased to submit our 2021 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's facilities performed between April and July, 2021; 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 and Chief Operations Officer 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,

Tim Cote, P.E.,
Vice President

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Maine Turnpike

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» 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

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1. INTRODUCTION

This 2021 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 it's 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 201 structures (183 bridges and 18 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 (DOT) in cooperation with the states, local officials, and Metropolitan Planning Organizations (MPOs). The Maine Turnpike is the only interstate highway from Kittery to Portland, making it one of the most critical elements of Maine's transportation network (see **Figure 1**). The Turnpike is a safe and efficient highway that accommodated approximately 74.8 million trips with 92.3 million transactions in 2019.

Beginning in March 2020, numerous events related to the COVID-19 pandemic converged in a relatively short period of time, dramatically reducing economic activity and – as a consequence – suppressing Turnpike traffic as well. At the peak of the COVID crisis in late March and early April 2020, traffic volumes on the Turnpike were cut by nearly half, levels not seen since the 1970s. The impact was most profound on passenger cars while commercial traffic was less af-

fected. Starting in early May, the Maine economy began a process of gradual reopening and of slowly relaxing personal restrictions. This process was accompanied by growth in traffic. Traffic volumes continued to rebound through the summer and, by August 2020, traffic volumes were down approximately 22% from August 2019 levels. By year end, 2020 annual passenger car traffic for the year was 23.8% below 2019 levels while commercial vehicle traffic was 2.7% below 2019 levels. In total, the Turnpike accommodated approximately 58.4 million trips and 72.1 million transactions in 2020.

TURNPIKE MAINLINE

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

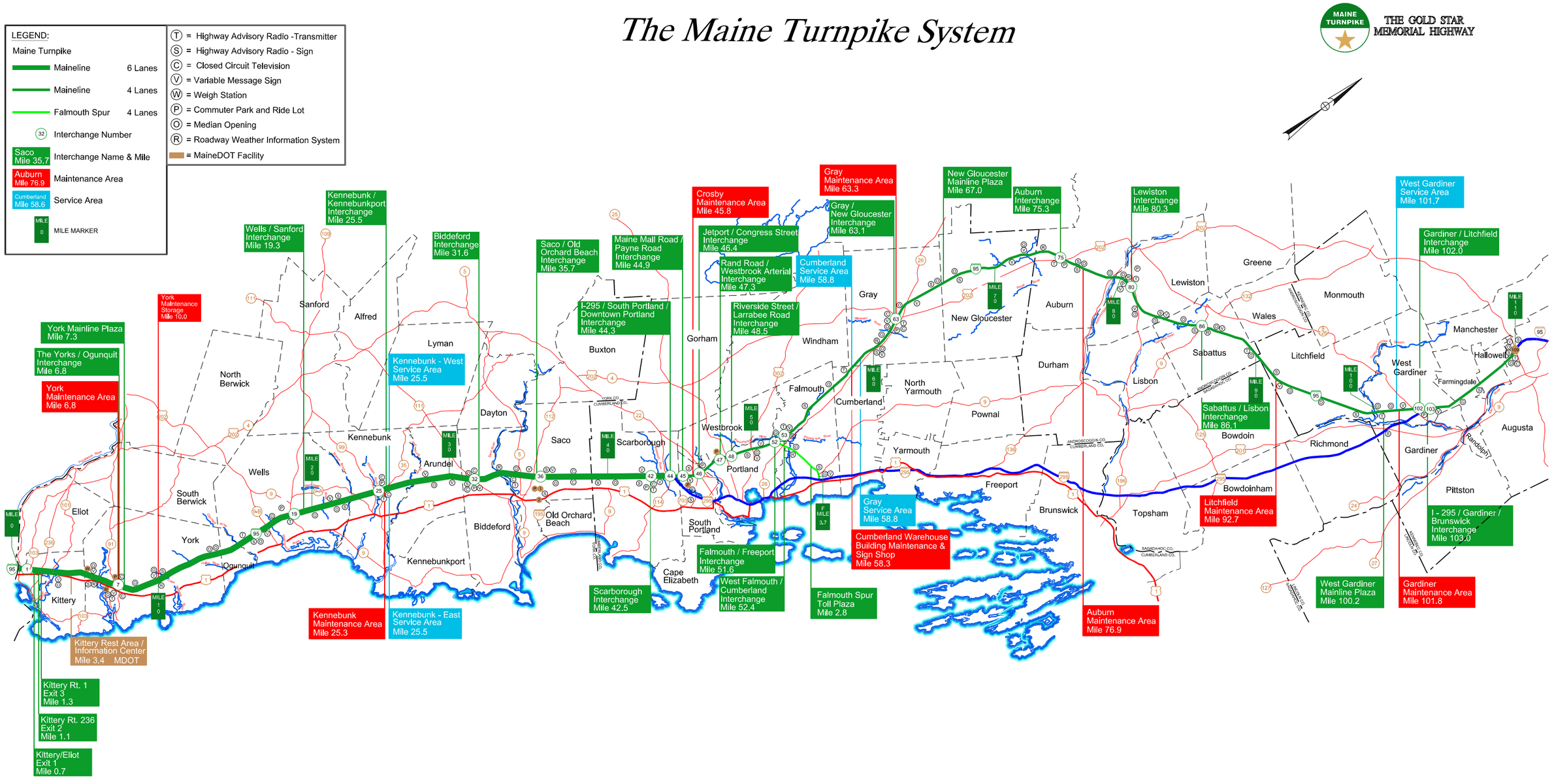
In accordance with Section 806 of the Bond Resolution dated May 1, 1991, HNTB Corporation, as the Consulting Engineer, is required to inspect the Turnpike at least once a year and submit to the Authority a report setting forth the following:

- 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 March and July of 2021. 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 2021, to be used in conjunction with this 2021 Operation and Maintenance Annual Report.

FIGURE 1: TRANSPORTATION NETWORK



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2. INSPECTION FINDINGS AND CORRECTIVE MEASURES

The Maine 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 2021 Annual Inspection of the Maine Turnpike by HNTB Corporation.

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 Maine Turnpike Authority and provides insight into the overall condition of the pavement on the Turnpike system. The most recent data available is for calendar year 2020. Data from the past four years, shown in **Table 1**, indicates more than 99% of the mainline pavement on the Turnpike is in good to fair condition.

TABLE 1: PAVEMENT CONDITIONS 2017 - 2020

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

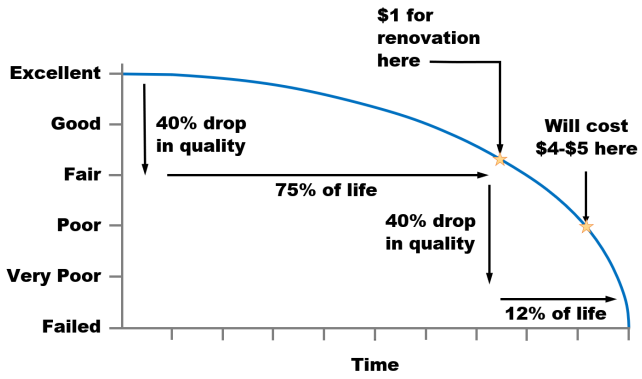
In accordance with the FHWA published Federal Register (82 FR 5886) final rule established in May of 2017, the performance measures for pavement on the National Highway System have been updated to include "Good", "Fair", and "Poor" conditions. The above reporting and classifications consistent with current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

To maintain pavement quality and roadway safety, the Authority has a planned program of pavement rehabilitation and 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 approximately ten centerline miles each year, to minimize the cost of future repairs.

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.

FIGURE 2: PAVEMENT LIFE CYCLE



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 2021. The areas using this additive will be evaluated to determine if its use is providing adequate benefit.

TABLE 2: PAVEMENT CONTRACTS 2007 - 2021

Year	From MM	to MM	Roadway
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		
2007	64.4	68.5	NB/SB
	25.0	Plaza	NB/SB
	58.0	Plaza	SB
	59.0	Plaza	NB
	Int. 36		

MILLING OPERATION TO PREPARE EXISTING PAVEMENT TO RECEIVE NEW PAVEMENT

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 MTA continue with the annual maintenance paving program of addressing approximately ten centerline miles per year with polymer modified asphalt surface pavement.

Pavement rehabilitation for the 2022 construction season is recommended on the mainline between Mile 102.6 and Mile 109.1. Pavement rehabilitation should continue to consist of a minimum 1¾" milling, crack sealing, shimming and repaving. In addition, paving portions of the Interchange 36 ramps and portions of the Kennebunk Service Plaza parking area is recommended.

DISPENSED AT OVER 350 DEGREES THE RUBBERIZED ASPHALT SEALANT IS INJECTED DIRECTLY INTO PAVEMENT CRACKS DURING CRACK REPAIRS

Bridges and Minor Spans

The Authority is responsible for the operation and maintenance of 183 bridges, defined as spans measuring more than 20 feet in length, and 18 minor spans measuring between 10 and 20 feet in length. 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, information 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 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 2021 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. Most deficiencies observed were attributed to freeze-thaw deterioration and abrasion from ice and debris.

The next underwater inspection 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.

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.

HANDS-ON INSPECTION OF THE ANDROSCOGGIN RIVER BRIDGE

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.

PIN-AND-LINK ASSEMBLY AT THE YORK RIVER BRIDGE

SPECIAL DAMAGE INSPECTIONS

Special damage inspections are conducted as a result of collisions or when a condition requiring a more detailed inspection is noted. 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. Three special damage inspections have been completed since the issuance of the 2020 Operations and Maintenance Report.

The bridge rail of the Saco River Overpass (SB) at Mile 33.01 was struck by a vehicle in November of 2020. 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 2021, restoring the crashworthiness of the bridge rail system.

The Grove Street Underpass at Mile 83.7 was struck by an unknown overheight vehicle in February of 2021. HNTB conducted a special inspection and concluded structural repairs were required. Along the south fascia girder, the damage required heat straightening and replacement of a 5-foot section of the girder bottom flange. Two additional girders required heat straightening to repair areas of girder deformation. Following the accident, the south shoulder of the bridge was closed to reduce loads on the south fascia girder to acceptable levels. HNTB prepared contract documents for the work and a contractor completed the necessary repairs in August 2021.

The Route 197 Underpass at Mile 93.3 was struck by an over height vehicle on August 10, 2021. An inspection completed by HNTB found three of the four girders were damaged over the southbound roadway. Both fascia girders were heavily damaged and one of the interior girders was moderately damaged. Based on the observed damage, and a subsequent analysis by HNTB, the Route 197 roadway was restricted to a single lane of alternating traffic controlled by temporary traffic signals. This restriction was sufficient to reduce the weight on the bridge to acceptable levels. The Route 197 bridge had been scheduled for rehabilitation in 2025. Because the scope of the required repairs is significant, and because leaving Route 197 restricted to a single lane until 2025 is not practical, rehabilitation of the Route 197 Bridge is now recommended in 2022.

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 2021 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.

SACO RIVER OVERPASS DAMAGED BRIDGE RAIL

SACO RIVER OVERPASS REPAIRED BRIDGE RAIL

TABLE 3: BRIDGE AND MINOR SPAN TABULATION

Bridges						
Year	Group V	Group IV	Group III	Group II	Group I	Total
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
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

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 ("Good" condition") 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.

Current Federal 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 Maine 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 2021 inspection found no Authority owned bridges are in "Poor" condition. By comparison, according to the FHWA's National Bridge Inventory database, 5.2% of the nation's bridges, and 7.7% of Maine's bridges, were in "Poor"

condition in 2020 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 2021 bridge inspection, no "Poor" (i.e., structurally deficient) bridges or minor spans were identified. **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.

2021 BRIDGE REHABILITATION AND REPLACEMENT PROJECTS

Several rehabilitation and repair contracts were issued for construction in 2021. 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 brief summary of bridge rehabilitation and repair work issued for construction in 2021:

MILE 44.9 - EXIT 45 INTERCHANGE BRIDGE

The work, which is being completed as part of the Exit 45 Reconfiguration project, includes demolition of the existing bridge and the construction of a new bridge that provides a wider roadway and improved vertical clearance over the Turnpike.

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"
2021	29.00%	71.00%	0.00%	23.10%	76.90%	0.00%
2020	30.30%	69.70%	0.00%	25.00%	75.00%	0.00%
2019	34.30%	65.70%	0.00%	29.20%	70.80%	0.00%
2018	34.80%	63.76%	1.44%	28.73%	68.36%	2.91%
2017	-	-	2.29%	-	-	1.94%
2016	-	-	0.68%	-	-	0.00%
2015	-	-	1.14%	-	-	0.00%
2014	-	-	3.37%	-	-	2.65%
2013	-	-	3.20%	-	-	2.65%
2012	-	-	1.59%	-	-	0.77%
2011	-	-	8.62%	-	-	10.80%

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

Year	Structure Name	Structure Type	Mile Marker	Status
2021	N/A[1]	N/A	N/A	N/A
2020	N/A[1]	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 SB Underpass	Bridge	102.50	Rehabilitation completed in 2018
2017	Crediford Brook	Minor Span	18.75	Rehabilitation completed in 2018
	Mousam River (Northbound)	Bridge	25.00	Rehabilitation completed in 2019
	Cobbosseecontee Stream (Northbound)	Bridge	99.20	Deck repairs completed in 2017. Bridge rehabilitation scheduled for completion in 2020.
	Cobbosseecontee Stream (Southbound)	Bridge	99.21	Deck repairs completed in 2017. Bridge rehabilitation scheduled for completion in 2020.

[1] No bridges were structurally deficient in 2019, 2020 or 2021.

MILE 68.6 - BENNETT ROAD UNDERPASS

The work includes substructure repairs, deck repairs, and removal and replacement of the bituminous overlay and waterproofing membrane.

MILE 86.1 - ROUTE 9 UNDERPASS

The work includes substructure repairs, deck repairs, and removal and replacement of the bituminous overlay and waterproofing membrane. Additionally, adjustments to the roadway striping will be completed to improve sight lines for vehicles turning onto Route 9 from the Turnpike off ramps.

2021 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.

Three emergency and unanticipated bridge repair projects have been completed since the issuance of the 2020 Operation and Maintenance Annual Report.

Emergency bridge railing repairs, including the replacement of damaged bridge railing, posts, and concrete curbing were completed at the Saco River Overpass (Southbound) at Mile 33.01 in January of 2021.

Emergency bridge girder repairs, including heat straightening and replacing a damaged section of girder, were completed at the Grove Street Underpass at Mile 83.7 in August 2021.

Unanticipated repairs were made in the fall of 2020 to replace deteriorating concrete joint headers at the Kittyhawk Avenue Underpass at Mile 75.0 after significant cracking and delamination was observed. These repairs are intended to minimize the need for maintenance until the next scheduled rehabilitation project in 10 to 15 years.

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,

GROVE STREET UNDERPASS, MILE 83.7

LEIGHTON ROAD UNREINFORCED HAUNCH SPALLS

identified Turnpike owned bridges with this detail and prioritized the resulting list for inspection by Turnpike maintenance forces. These inspections are ongoing and, when loose or deteriorated concrete haunches are found, they are removed. A program for addressing unreinforced haunches will be developed following the completion of the Turnpike's inspection efforts. The resulting program may include measures such as periodic hands-on inspections or the installation of netting or shielding.

HNTB RECOMMENDATION (2022 BRIDGE REHABILITATION PROJECTS)

Based on the findings of the 2021 Bridge Inspection Program, HNTB recommends the following bridge repair and rehabilitations for 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. 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 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 recommended for in 2022 to remedy damage caused by an overheight vehicle strike.

HNTB RECOMMENDATION (2022 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 until 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 Maine Turnpike bridges:

- **DECKS** Sweep (power broom) and flush with ordinary water (preferably power rinse) particularly the gutter areas. Patch obvious delaminations and potholes, and scaling. Remove loose spalls 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 their 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 their 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 their 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 FAST Act Emergency Vehicles. Work is currently on-going 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 Maine Turnpike 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 their Capital Improvement Program to address substandard bridge geometrics.

Ancillary Structures

The Authority is responsible for 121 ancillary structures including 44 overhead sign bridges, 13 overhead cantilever sign structures, 1 light bridge, 10 AVI mast-arms, 3 traffic signal mast arms, 8 space frames, 12 variable message signs on posts or butterfly supports, 4 overheight vehicle detectors, 8 weather stations, and 18 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 2021 inspection.

OVERHEAD SIGN STRUCTURE 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.

The Authority's last aluminum sign structure, located at Mile 8.3 southbound, was removed as part of the ongoing York Toll Plaza Replacement Project and is no longer in the Turnpikes inventory. This structure was subject to hands-on inspection every two years per FHWA guidance to address fatigue concerns specific to aluminum sign structures

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.

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 guardrail prevents the sheet flow of water from the roadway. The resulting channelized flow is more likely to create an erosion issue.

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 2021 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.

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 as resources and funding allow. However, many metal pipe ends remain.

While the concrete portion of the culverts are in generally fair to good condition, many of the 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 repair of culvert end locations rated in poor condition, as detailed in the Annual Inspection Report, within the next five years. Once completed, these repairs will reduce the potential for more significant and costly improvements in the fu-

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

TYPICAL DETERIORATED PIPE/OUTLET

ture, such as slope failures and sinkholes. A total of 28 circular culvert end locations, and two single-cell concrete box culverts, are in poor condition.

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.

Recommendations for additional culvert repairs include the removal of deteriorated metal pipe ends and replacement with high density polyethylene or reinforced concrete pipe, along with associated slope and drainage channel stabilization. These lower-priority drainage repairs should be either included in standalone projects focused on drainage improvements or included in adjacent pavement rehabilitation contracts.

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.

GUARDRAIL UPGRADES

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 Maine Turnpike guardrail on an as-needed basis has been in place since the mid-90s 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;

» Adding guardrail; and,

» Constructing new terminal end – anchored end sections.

In 2020, upgrades to guardrail between Mile 35 and 42 were completed as part of a pavement rehabilitation improvement contract. The practice of including guardrail and safety improvements within the yearly paving contracts, or within new Toll projects, has been successful and should continue.

HNTB Recommendation

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 maintaining 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 2020, the Authority issued construction contracts for the installation of emergency ramps at Cider Hill Road at Mile 6.2, Mountain Road at Mile 10.6, Burnt Mill Road at Mile 19.9, and Forest Avenue/Riverside Industrial Park at Mile 50.0. These ramps are now complete and in operation.

In 2022, the construction of Emergency Vehicle Ramps is proposed at Littlefield Road at Mile 17.3.

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 gate system installed at ramp locations should be maintained and upgraded as required to provide safe and efficient access for authorized users, and to preclude unauthorized use.

Roadway Side Slopes

A program to clear vegetation in close proximity to 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 also near Exit 32 as part of a planned project to improve the southbound off-ramp.

TABLE 7: SIDE SLOPE CLEARING

Year	Locations
2021	Mile 32 and 33
2020	Exit 45
2019	N/A[1]
2018	Mile 42.0 to Mile 45.0
	Mile 85.0 to Mile 85.8 (SB)
	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

SIDE SLOPE CLEARING

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 in close proximity to 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.

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. As of 2018 all lighting system fixtures have been upgraded to LED fixtures, with the exception of the York and Gardiner Toll Plazas. The lights located at these plazas are scheduled to be replaced or removed as part of ongoing toll plaza reconstruction projects.

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 has been lowered. This light is programmed for replacement in 2021

HNTB RECOMMENDATION

The Authority should continue to inspect and maintain their 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 Maine 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 upgrade and replace their 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. The Authority's maintenance forces installed new signs for Exit 25 and Exit 19 northbound in 2020 and 2021.

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. Near the southern terminus of the Turnpike, sign upgrades are being made as part of ongoing improvements to the Piscataqua River Bridge.

HNTB RECOMMENDATION

HNTB recommends completing the remaining guide sign upgrades at all service plaza locations by 2023. HNTB also 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 re-stripe the Turnpike once a year to maintain roadway markings in good condition. In 2020, the roadway was re-striped twice, once in the spring and once in the fall, in an effort 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.

ROADWAY MARKINGS

HNTB RECOMMENDATION

HNTB recommends the Authority continue their 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 larg-

er local contracts, such as adjacent paving contracts, such that cost efficiencies are achieved.

The construction of median safety improvements, including guardrail adjustments and repairing vegetative cover with new topsoil is ongoing between Miles 31 to 35. Additionally, the construction of median safety improvements, including replacing vegetative cover with pavement and installing concrete barrier is ongoing between Mile 0.3 and Mile 1.3 as part of the Piscataqua River Bridge improvements project, and between Mile 43 and Mile 49 as part of the Portland area mainline widening 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.

NEW GLOUCESTER TOLL PLAZA ORT, MILE 67.0

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.

The Infinity Toll System has been installed and is functioning as intended throughout the entire Turnpike system except at the York and West Gardiner I-295 mainline toll plazas, and at the Exit 45 side plaza. All three of these locations have active construction projects that will transition the toll facilities to the Infinity Toll System by the end of 2022.

TOLL PLAZAS

The Turnpike's 19 toll plazas are comprised of tollbooths, canopies, gantries, utility buildings and other structures. Toll plazas are located in the following locations:

Mainline Toll Plazas

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

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

2020 Traffic Characteristic	York	Exit 44	Exit 52	New Glouces-ter	West Gardiner I-95	Gardiner I-295	Side Toll Plazas
Annual Tolled Traffic (millions)*	15.1	7.5	3.9	6.2	3.0	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	40.8%	6.7%	3.5%	12.5%	4.7%	6.1%	25.7%
Truck% (MTA Classes 3-6)	12.9%	6.6%	6.3%	13.5%	12.4%	9.4%	4.6%
Overall E-ZPass%	85.5%	33.7%	83.5%	83.8%	76.1%	73.2%	84.2%
Truck E-ZPass%	95.8%	95.4%	95.5%	97.1%	95.8%	93.3%	96.9%

* 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.

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)

MAINLINE TOLL PLAZAS

The six mainline plazas shown in Table 8 generated nearly $105 million in toll revenue in 2019. 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**.

Some items of note:

» The biggest contributors to Maine Turnpike toll revenue are as follows:
  - The York Toll Plaza is the greatest single contributor, and historically accounts for more than 40% of all Maine 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 West Gardiner I-95), trucks have historically accounted for slightly greater than 10% of all traffic. The share of trucks averages nearly 5% at most other locations.

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

YORK TOLL PLAZA

The existing York Toll Plaza, which consists of eight lanes northbound and nine southbound, was constructed in 1969 and is challenged by both operational and safety issues. The existing toll system has reached the end of its useful life and is being replaced by a new facility approximately 1-mile to the north. This plaza, which is in generally poor condition, is scheduled for decommissioning and demolition beginning in September of 2021.

NEW YORK TOLL PLAZA

WEST GARDINER I-295 TOLL PLAZA REPLACEMENT, MILE 103

The Authority secured the needed permits to construct a new Open Road Toll (ORT) Plaza at Mile 8.8 approximately one mile north of the existing plaza. The new facility will have three ORT lanes in each direction, as well as five southbound and four northbound cash lanes. Construction of this new plaza began in the fall of 2018 and is scheduled to be opened in September of 2021.

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 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 that incorporated additional equipment upgrades related to the Infinity System..

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 that incorporated additional equipment upgrades.

WEST GARDINER I-295 TOLL PLAZA

The new Gardiner I-295 Mainline Toll Plaza is under construction. This new facility features Infinity System toll equipment and consists of two ORT lanes and three cash lanes in each direction. The cash lanes for the new plaza were completed and placed into service during the Summer of 2021. The existing plaza was decommissioned in mid-2021 and is currently being demolished. Following the completion of demolition work the new ORT lanes will be opened to the public, marking the completion of the project. Construction of a new plaza, including the installation of highway speed lanes, began in 2019 and is scheduled for completion in 2021.

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 Maine 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 Maine 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 their 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.

With the exception of 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 competed 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. The Authority should continue coordinating with their toll vendor to maintain and replace epoxy overlays on an as-needed basis.

EXIT 45 RECONSTRUCTION

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.

KENNEBUNK NB SERVICE PLAZA

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 of the Kennebunk Service Plazas was substantially completed in August 2021.

HNTB RECOMMENDATION

Repairs to the exterior gutter systems, the replacement of corroded entryway door systems, flooring, and other related repairs are recommended at the five service areas to address ongoing deterioration. This work is programmed for construction in 2022.

Aside from the entryways, the existing service plazas have a range of maintenance repair needs that should be addressed to preserve the infrastructure in their current condition; all are captured in the 2021 Building Maintenance Item Summary prepared and submitted by HNTB.

The construction improvements to the Kennebunk service plazas and fuel system upgrades at the Gray facility have addressed the most pressing needs at each location.

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 programmed for construction in 2022. 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 in the Portland area.

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

HNTB RECOMMENDATION

As a supplement to this 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..

MAINTENANCE GARAGE EXTENSIONS

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 Maine 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 Maine 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 Maine Turnpike that occur north of Exit 7.

NEW GLOUCESTER ORT PLAZA

E-ZPass Group

On February 1, 2005, the Maine Turnpike 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 $11.3B in tolls in 19 states from more than 42 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.

E-ZPASS SIGNAGE

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%. Traffic has been rebounding in 2021 based an easing of restrictions

combined with a strong tourism season. Currently, through July 31, 2021, Turnpike revenue is down 5.2% ($4.1 million) compared to the same period in 2019. Mid-range projections estimate toll revenue for 2021 will be approximately 3% less than in 2019.

Despite the pandemic the Authority invested more than $106 million in capital projects in 2020. These projects helped sustain the economy and maximized the benefits of reduced traffic volumes by providing contractors with improved construction conditions and increased work window:

The Turnpike has more than $939 million in major capacity improvements planned to begin over the next 15 years. These projects will improve mobility through the region and add the capacity required to safely accommodate increased traffic. Based on revenues and projected needs, the Authority evaluated their work plan with respect to projects and available funding. While reluctant to raise tolls with an economy in-flux, the Authority determined doing so was required for the first time since November 1, 2012. If approved, the MTA will become one of the more than 50 toll agencies across the nation to raise toll rates since March 2020. A plan for toll rate increases was presented to the Authority in August 2021 and is slated for vote in September 2021. If approved, the changes will become effective November 1, 2021.

Described in more detail in the sections that follow, the proposed changes are expected to increase revenues by approximately 13%. This will be accomplished predominantly by increasing the cash toll rate at the York Toll Plaza, increasing the Maine E-ZPass rate per mile, and reducing the discounts provided in the Volume Based Discount Program.

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

VOLUME BASED DISCOUNT PROGRAMS

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 Turnpike travelers is currently discounted 25% if they have 30 or more one-way trips occur in a month. The discount increases to 50% if they have more than 40 one-way trips in a month. The proposed toll modifications will reduce these discount rates to 20% and 40%, respectively, as shown in **Table 9**.

BUSINESS VOLUME BASED DISCOUNT

Business Accounts are intended for commercial vehicles. As with passenger cars, commercial vehicles having an E-ZPass tag from the Maine Turnpike 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 either a pre-paid or a post-paid account.

POST-PAID PLAN VOLUME DISCOUNT

Commercial vehicles with a post-paid Maine 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 by up to 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 is to produce an average savings of nearly 40% compared to the cash fare.

PRE-PAID PLAN VOLUME DISCOUNT

The pre-paid account does not require a surety bond, but neither does it provide a volume discount.

TABLE 9: VOLUME BASED DISCOUNT PROGRAM

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

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 Maine 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 in 2019. Events related to the COVID-19 pandemic had a significant impact on Turnpike traffic and, at year end, the Turnpike accommodated approximately 58.4 million trips and 72.1 million transactions in 2020.

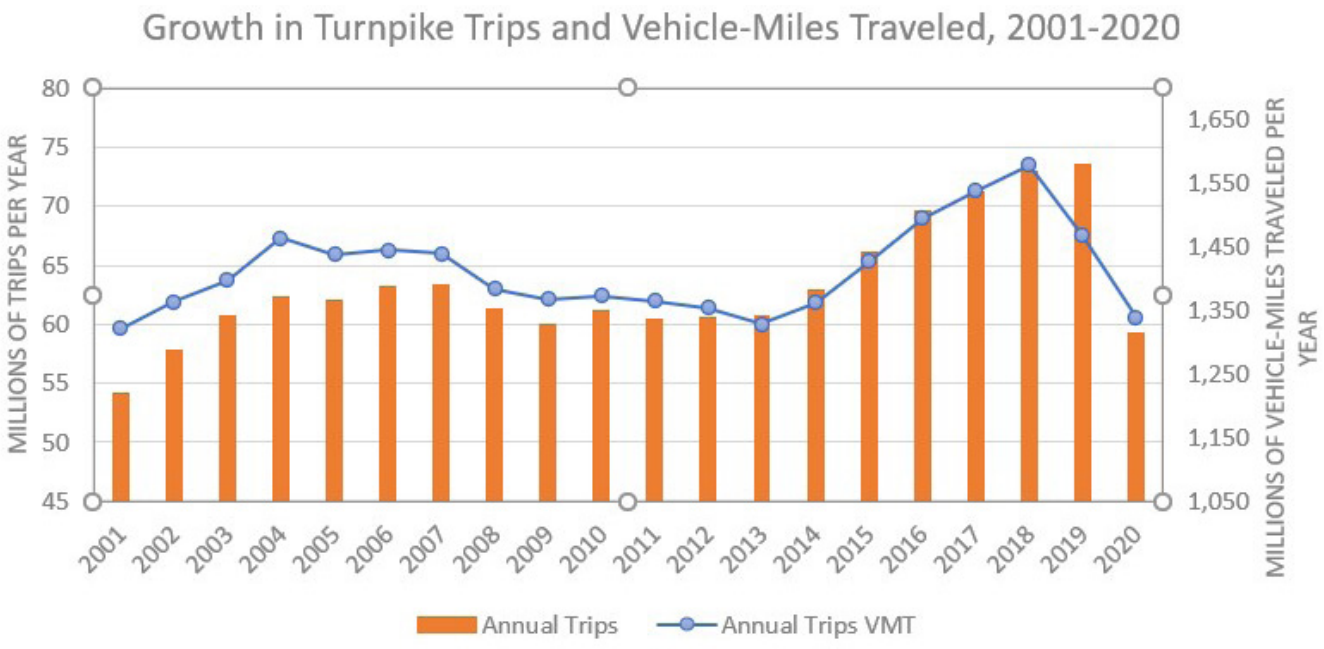
Traffic volumes in 2021 are increasing over 2020. After a sluggish January, traffic volumes have steadily rebounded and the months of June, July and August have been at, or near, the record-setting volumes observed for the same months in 2019.

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 Maine Turnpike logged 1.42 billion VMT while serving approximately 74.8 million trips north of Exit 7. Comparatively, in 2020 this number dropped to 1.1 billion VMT serving approximately 59 million trips north of Exit 7 – approximately 80% of the prior year. Through June of 2021 VMT and trips on the Turnpike have increased to within approximately 90% of 2019 levels.

FIGURE 3 illustrates the trends of both measures over the past 19 years (2001 – 2020). 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%. A steep decline in VMT and Annual Trips occurred in 2020 due to the effects of the COVID-19 pandemic. 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 the average trip length increased slightly 20.1 miles.

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. Each station is composed of a Type 170 Controller housed in a traffic cabinet. The controller currently utilizes side-fired radar technology to continuously record traffic volume and speed data. The system enables the Authority to collect the data automatically.

Count stations now cover each ramp and the mainline from the Maine state line through Exit 109 in Gardiner.

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 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 22 VMS 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 Maine Turnpike 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 constructed at Mile Markers 15.4 in Wells and 58.3 in Cumberland to further reduce gaps in reception. An additional HAR transmitter will be installed in the vicinity of Brighton Avenue at Mile 48.3 by 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.

HIGHWAY ADVISORY RADIO SIGN

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
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 Maine Turnpike Authority Headquarters. Still images from these cameras are also viewable on the Maine 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. In 2016, HNTB recommended an additional CCTV in the Kittery area to monitor the high crash location around Exit 1 area in this highly congested corridor.

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. These cameras are providing still images viewable through the RWIS website only at this point in time, but the cameras do have the capability to provide streaming video. These cameras are anticipated to be incorporated into the CCTV system in the near future.

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 currently in place on the Warren Avenue Bridge was removed in 2021 following replacement of the old bridge.

Go Maine Program

Since April 2013, the Maine Turnpike Authority has 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."

In October of 2015, GO MAINE switched ride matching software providers to Agile Mile. When commuters sign up with Agile Mile, they can match with other commuters who are doing similar commutes. While it is mostly used for carpool matches, it can be made for vanpools, transit and even biking. An innovative

component of Agile Mile is that commuters can earn rewards for the "green" trips that they take. Rewards include discounts from online, national, and local companies, along with periodic drawings for larger prizes.

Since 2017, GO MAINE has hosted an event known as *WAY 2 GO MAINE*, a business vs. business challenge in October. The goal of this event is to inspire green commuting, to reward those who use green commutes, and to normalize the act of not driving alone. GO MAINE attempts to pursue this goal in a fun and competitive way. The *WAY 2 GO MAINE* event has grown since its inception and has seen participation by some of Maine's largest employers (along with many smaller ones) throughout the state.

Beginning in October 2021, administration of the GO MAINE program will transfer to MaineDOT. This change will support a further expansion of the program across the State. The Maine Turnpike will continue to play a strong supporting role in the program.

Park & Ride Lot Program

Currently, the Authority maintains a network of 14 Park & Ride lots located at or near most 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.

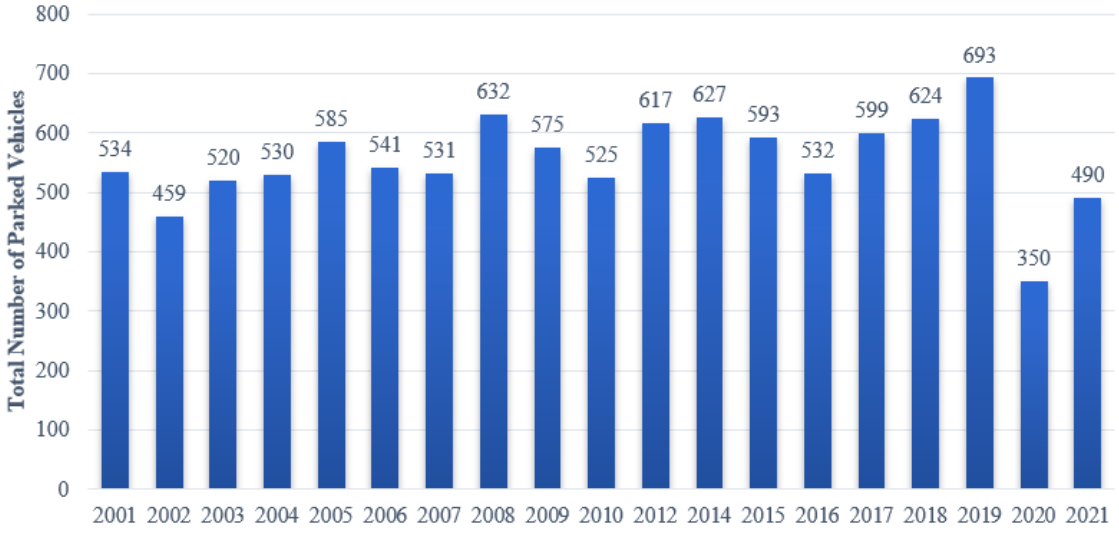
The Authority strongly encourages motorists to utilize its Park & Ride lots to reduce congestion on the Turnpike through ridesharing. The Authority monitors the use of these lots to assure that adequate capacity is available.

FIGURE 4 summarizes overall Park & Ride Lot Usage from 2001 through 2021. 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 2021 survey, Park & Ride Lot utilization had recovered somewhat, but remained reduced compared to 2019 levels.

The following observations may be drawn from the figure below

- Over the past 20 years, total Park & Ride lot usage has stayed in a fairly narrow range from 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 2021 was improved, but still below 2019 levels. These significant 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

FIGURE 4: PARK & RIDE LOT USAGE - 2001 THROUGH 2021



Four 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.

» 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 2021 Annual Inspection of the Maine Turnpike. The table also records the number of spaces available at each lot, as well as each lot's operational capacity. The 2021 Park & Ride Lot usage survey was completed in May.

As this table indicates, the three busiest lots on the Turnpike are York, Biddeford (Exit 32), Gray (Exit 63) and Lewiston (Exit 80). These three lots combined serve about 40% 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

Although traffic volumes across the Turnpike system was reduced by more than 20% in 2020, there were 850 reportable crashes on the Maine Turnpike mainline – a 15% reduction over the 975 crashes in 2019. Through the end of July 2021 there have been more than 560 reported crashes.

Crash severity has increased during the COVID pandemic. In 2019, 11% of crashes resulted in injuries or fatalities. In both 2020 and 2021, approximately 20% of crashes resulted in injuries or fatalities. There were no significant changes in types of crashes, or in general distribution of crashes along the Turnpike.

Increased travel speeds resulting from fewer cars being on the road, together with reduced enforcement due to the pandemic, are likely contributing to the increased rate and severity of crashes.

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.

TABLE 12: PARK AND RIDE LOT USAGE PER LOCATION - 2020

Town	Location	Owner	Spaces	2021 Volume	% Capacity
York	Chases Pond Road, US - 1 Connector	MaineDOT	26	15	58%
Wells	Maine Tpk Exit 19, adj. to Wells Trans Ctr.	MTA	100	30	30%
Kennebunk	Maine Tpk Exit 25 SB, on Rt. 35	MTA	52	25	48%
Biddeford	Maine Tpk Exit 32, on Rt. 111	MTA	155	87	56%
Saco	I-195 Exit 1, on Industrial Park Road	MaineDOT	135	59	44%
Scarborough	Maine Tpk Exit 42, shared w/Cabela's Parking Lot	MTA	66	15	23%
S. Portland	Maine Tpk Exit 45, on Rt. 703	MaineDOT	111	26	23%
Portland	Maine Tpk Exit 46, adj. to toll plaza	MTA	68	23	34%
Westbrook	Larrabee Road, near Maine Tpk Exit 47	MaineDOT	91	33	36%
Gray	Maine Tpk Exit 63, on US-26	MTA	127	59	46%
Auburn	Maine Tpk Exit 75, on US-202	MTA	137	48	35%
Lewiston	Maine Tpk Exit 80 - Route 196	MTA	93	50	53%
W. Gardiner	Maine Tpk Exit 102, near Rt. 126	MTA	54	18	33%
		Overall	1,181	490	41%

From 2018 - 2020, there were a total of 26 HCLs on the Turnpike system which includes the mainline, toll plazas, and interchange ramps. These locations included five ramps, six ramp intersections, and 15 mainline segments. A Summary of these HCLs is provided in **Table 13.**

Compared with the prior 3-year period from 2017-2019, the number of HCLs increased by ten locations.

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 now 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, five Sergeants, three Corporals and 25 Troopers assigned to the Turnpike. At full strength, Troop G has 35 troopers. They patrol the entire Turnpike, 24-hours a day, 365 days per year. This provides Turnpike patrons with a very high level of coverage.

TABLE 13: SUMMARY OF HIGH CRASH LOCATIONS (2018-2020)

Town/City	Description	Location Description	Crashes	CRF
Kittery	ML Merge	Intersection - Exit 2 C-D SB On Ramp	9	2.45
Kittery	Ramp	Exit 2 NB Off Ramp	8	2.05
York	Ramp	Exit 7 SB Off Ramp	9	4.51
York	Mainline	I-95 SB North of Exit 7 SB Off Ramp	11	3.97
Wells	Ramp	Exit 19 Ramp Segment	8	1.76
Kennebunk	Ramp Intersection	SB Ramps and Alewive Road	8	2.27
Biddeford	Mainline	I-95 NB South of Exit 32	10	1.14
Biddeford	Ramp	Exit 32 Ramps Segment North of Route 111	17	2.69
Biddeford	Ramp Intersection	Exit 32 Ramps at Route 111	77	1.58
Scarborough	Mainline	I-95 NB South of Exit 42	71	1.07
Scarborough	Ramp Intersection	Exit 42 Ramps at Payne Road	32	1.09
Scarborough	Mainline	I-95 SB North of Exit 42	38	1.13
Scarborough	Mainline	I-95 NB South of Exit 44	10	1.02
Portland	Mainline	I-95 NB South of Exit 47	43	1.75
Portland	Mainline	I-95 SB North of Exit 47	25	1.22
Portland	Ramp	Exit 48 Ramps East of Riverside Street	14	4
Portland	Ramp Intersection	Exit 48 Ramps at Riverside Street	61	1.9
Portland	Mainline	I-95 SB North of Exit 48	14	1.17
Falmouth	Mainline	I-95 SB North of Exit 52	9	1.09
New Gloucester	Mainline	I-95 SB North of Weymouth Road	15	1.23
Auburn	Ramp Intersection	Exit 75 Ramps at Toll	9	4.26
Auburn	Ramp Intersection	Exit 75 Ramps at Washington Street	16	13.19
Auburn	Mainline	I-95 SB South of Hackett Road	10	1.12
Auburn	Mainline	I-95 NB North of S Main Street	17	1.01
Lewiston	Mainline	I-95 NB South of Grove Street	8	1.17
Litchfield	Mainline	I-95 NB South of Lunts Hill Road	17	1.67

These 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 P.M. peak hours in the Portland area year-round, and in the Kittery area during the summer season. In October 2018 the Authority staff recommended expanding this successful service to cover additional hours. This service remains in operation.

The service vehicle makes an average of 2-3 stops per day. In 2019 a total of 1,158 stops were made. Through May of 2021, the service responded to 434 calls. 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

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 Maine Turnpike or are consistent with the overall Maine Turnpike Authority mission. Alternative Programs, such as the ones identified below, are included in these transportation dollars provided to the MaineDOT.

The Authority and the MaineDOT have a long history of working together to provide an efficient transportation system. Since 1995, the Authority provided winter maintenance and litter patrol for a fee on a two mile stretch of I-95 (from Kittery to York) previously owned and maintained by the MaineDOT (sharing with NHDOT, the winter maintenance of the Piscataqua River Bridge). In 2016 the Authority purchased the two mile stretch of I-95 (from Kittery to York) and is no longer reimbursed for the related maintenance work in that roadway section from the MaineDOT. Winter maintenance of the Piscataqua River Bridge however is still reimbursed.

In 2004, the two agencies agreed that the Authority would provide winter maintenance on I-195, and the MaineDOT would provide winter maintenance at the Kittery Rest Area and the Park & Ride lot in South Portland. 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 week of August 5th to assist in this effort. 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. In addition, the Authority coordinates with the MaineDOT when developing pavement rehabilitation projects. This relationship has provided some consistency for Interstate paving specifications between the two agencies however, both agencies still have differing standards.

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.

Alternatives Program Coordination

The Authority has participated in and funded all, or part, of Alternative Programs that were deemed to have a direct or indirect benefit to the Maine Turnpike. Examples of these Alternative Programs include GO Maine and ZOOM Turnpike Express. These are described in more detail in Section 4.

Project Development

The Authority coordinates with the MaineDOT on projects that are located near the Maine Turnpike.

In Auburn, the Authority provided land to the MaineDOT for a bus terminal and parking area. This project was completed in 2019

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.

Additionally, the MaineDOT and the Authority worked together on the I-295 corridor study to understand the implications to the Maine Turnpike traffic flow and surrounding areas. This effort led to the installation of travel distance and time signage along the Maine Turnpike in 2019 to encourage motorists to travel I-95, thereby relieving congestion on I-295.

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

This working relationship also involves the planning and construction of projects. Both agencies worked together on the Maine Turnpike West Gardiner Service Plaza project, the Central York County and the 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 congestion 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 underway with construction tentatively scheduled to begin in 2023. Construction of the project is estimated to last three years.

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 currently 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 Maine 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. Completion of the project is expected by the end of 2022.

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 Maine Turnpike Spur that will connect to the terminus of the Gorham By-pass located approximately 4.5 miles northwest of Maine Turnpike Exit 45. The resolution stated that existing ways to manage traffic congestion, such as widening roads and adding turning lanes, will have a negative effect on their downtowns, village centers and neighborhoods. Both the Authority and MaineDOT officials believed that integrating all modes of transportation (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 Maine Turnpike 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 Maine 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 continues on a Gorham Connector Alternatives Analysis evaluating a range of capacity adding roadway alternatives and ongoing coordination with the ACOE.

Safety and Capacity Study

Periodically, the Authority requests that a System-wide Traffic Operation and Safety Study of the Maine 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 interchange ramp widening, addition of toll plaza capacity, and safety improvements), an approximate timetable of when the improvements become necessary, and an estimate of the forecasted construction costs. This document is used by the Authority as a long-range planning tool. HNTB most recently prepared a 2015 System-wide Traffic Operation and Safety Study. An updated study is suggested for 2022.

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 Maine Turnpike between Exits 44 in Scarborough and Exit 53 in West Falmouth. The purpose of the 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 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 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 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.

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 is currently underway and includes 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 is also included to improve safety. The construction of supplemental signage and intelligent transportation systems (ITS) to support part-time shoulder use will be completed a part of a separate project beginning in the fall of 2021.

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 Maine 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 2022. 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 2021, we estimate this fund will have a balance of $136,661,017. Including carryover projects from 2021, we estimate $141,833,308 in Capital Improvement expenditures in 2021.

We recommend depositing $5,200,000 into the Capital Improvement and General Reserve Fund for 2022 projects.

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 routine maintenance such as bridge rehabilitation, bridge painting, and annual paving projects. The recommended deposit to the Reserve Maintenance Fund for fiscal year 2022 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 2022, exclusive of Reserve Maintenance and Capital Improvement expenditures, will be in the amount of $44,402,933. This estimate is based on careful examination of 2021 expenditures and an evaluation of factors expected to influence these costs during 2022.

Insurance

Based on the replacement values provided by HNTB, the current Maine Turnpike insurance coverage appears to adequately protect the properties, interests, and operations of the Authority. Insurance is provided under a number of 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

Description	York Mile 7	Old York Mile 10	Kennebunk Mile 25	Crosby Mile 46	Sign Shop Mile 58	Gray Mile 63	Auburn Mile 77	Litchfield Mile 93	Gardiner Mile 102	TOTAL
Maintenance Garage, 3 Bay		1						1		**2**
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	1	**7**
Sand/Salt Storage Building	1		1	1		1	2	1	1	**8**
Flammable Storage Building	1		1	1						**3**
Storage/Body Shop Building						1				**1**
Cold Storage Building	1	1	2	1	1			1	1	**8**
Hazardous Waste Storage Vault						1				**1**
Central Inventory Building					1					**1**
Sign Shop					1					**1**
Storage/Tool Shed					1					**1**
Office Building				1						**1**
Office Building, 6 Bay Garage						1				**1**
Office Building, 7 Bay Garage							1	1	1	**3**
Office Building, 10 Bay Garage			1							**1**
Office Building, 14 Bay Garage	1									**1**
Fuel Distribution System	1			1		1	1			**4**
Generator Building	1		1	1		1	1	1	1	**7**

Appendix B - Schedule of Insurance

THE MAINE TURNPIKE AUTHORITY

Schedule of Insurance

2021-2022

Comprehensive Package Policy Including Turnpike Property

Underwritten by the Acadia Insurance Company — Agent: Cross Insurance

			Premium Amt
Commercial Property	**Policy No. CPA1000627-39**	**Term: October 1, 2021 to October 1, 2022**	**$325,623.00**

Risk	Coverage	Limit	Remarks
Fire and Related Blanket	Buildings	$100,617,000	Agreed Amount and
	Contents	$30,273,870	Replacement Cost
	Extra Expense & Loss of Rents	$3,611,500	
	Boiler and Machinery (excludes bridges, overpasses & underpasses)	$130,890,870	
	Earthquake Excluding Bridges	$10,000,000	
	Flood	$10,000,000	
	Scheduled Property: Miscellaneous Unscheduled Locations	$500,000	
	Bridges, Overpasses, and Underpasses	$334,992,000	
	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 *	$6,442,370	
b. Direct Physical loss or damage	Valuable Papers	$500,000	
	EDP Includes E-Z Pass Equipment*	$1,302,026	
	Radar Counters, Radios, camera equipment, Signs and transmitting equipment		
	Message Boards*	$2,499,474	

***Included in the Contents Limit on Policy**

			Premium Amt
Business Auto	**Policy No. CAA1000628-39**	**Term: October 1, 2021 to October 1, 2022**	**$275,833.00**

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

			Premium Amt
General Liability	**Policy No. CPA1000627-39**	**Term: October 1, 2021 to October 1, 2022**	**$88,814.00**
	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

				Premium Amt
	Policy No. 106807620	**Term: October 1, 2021 to October 1, 2022**		**$6,846.00**
Crime	Coverage	Limits	Deductible	
	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	
	Money Orders/Counterfeit Money	$2,000,000	$10,000	
	Computer Fraud	$2,000,000	$10,000	
	Computer Restoration Expense	$1,000,000	$10,000	
	Funds Transfer Fraud	$2,000,000	$10,000	
	Claim Expenses	$10,000	$0	

Worker's Compensation Self-Insurance Excess Policy

Underwritten by Arch Insurance Company; Agent: USI Insurance Services

		Premium Amt
Policy No. WCX 0059427 02	**Term: February 1, 2021 to February 1, 2022**	**$118,408.00**

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

$26,270,951Total Estimated Annual Remuneration - February 2020-2021
Claim Service: Cannon, Cochran Management Service, Inc.

Public Officials and Employees Liability

Underwritten by ACE American Insurance Company — Agent: Cross Insurance

				Premium Amt
Policy No. EON M00608592 009		**Term: October 1, 2021- October 1, 2022**		**$49,418.00**
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	

Fidelity Bond-Public Officials

Underwritten by Travelers Insurance Company: — Agent TD Insurance, Inc

Member of Authority	**Term**	**Amount of Bond**	**Remarks**	Premium Amt
Peter S. Mills Executive Director Policy No. 105619973	May 24, 2021-2022	$500,000	Insures faithful performance of duties by the individual	**$1,750.00**
Douglas D. Davidson Treasurer Policy No. 105220484	January 1, 2021-2022	$500,000		**$865.00**
Jonathan Arey Secretary Policy No. 105220456	January 2, 2021-2022	$50,000		**$175.00**

Fiduciary Responsibility

Underwritten by ACE Insurance Company — Agent: Cross Insurance

		Premium Amt
Policy No. G25749522 009	**Term: October 1, 2021-October 1, 2022**	**$7,795.00**

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	Aetna	Full semi-private room allowance

Self-Insured Workers Compensation Bond

Underwritten by Travelers Insurance Company

		Premium Amt
Policy No. 103464379	**Term: December 2021**	**$960.00**

Obligee: Maine Bureau of Insurance

Privacy & Network Liability Insurance

Underwritten by Travelers — Agent: Cross Insurance

		Premium Amt
Policy No. 106807615	**Term: October 1, 2021-October 1, 2022**	**$92,719.00**

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 Philadelphia Insurance Company — Agent: USI Insurance

		Premium Amt
Policy No. PHSD1279465	**Term: October 1, 2021-October 1, 2022**	**$13,908.00**

	Each Claim	Aggregate
Limits of Liability	$ 2,000,000	$ 2,000,000

APPENDIX A

Appendix A - Maintenance Area Buildings

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Maintenance Garage, 5 Bay				1				1		**2**
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Flammable Storage Building	1		1	1						**3**
Storage/Body Shop Building						1				**1**
Cold Storage Building	1	1	2	1	1			1	1	**8**
Hazardous Waste Storage Vault						1				**1**
Central Inventory Building					1					**1**
Sign Shop					1					**1**
Storage/Tool Shed					1					**1**
Office Building				1						**1**
Office Building, 6 Bay Garage						1				**1**
Office Building, 7 Bay Garage							1	1	1	**3**
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Office Building, 14 Bay Garage	1									**1**
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Generator Building	1		1	1		1	1	1	1	**7**

APPENDIX B

Appendix B - Schedule of Insurance

THE MAINE TURNPIKE AUTHORITY

Schedule of Insurance

2021-2022

Comprehensive Package Policy Including Turnpike Property

Underwritten by the Acadia Insurance Company — Agent: Cross Insurance

			Premium Amt
Commercial Property	**Policy No. CPA1000627-39**	**Term: October 1, 2021 to October 1, 2022**	**$325,623.00**

Risk	Coverage	Limit	Remarks
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	Contents	$30,273,870	Replacement Cost
	Extra Expense & Loss of Rents	$3,611,500	
	Boiler and Machinery (excludes bridges, overpasses & underpasses)	$130,890,870	
	Earthquake Excluding Bridges	$10,000,000	
	Flood	$10,000,000	
	Scheduled Property: Miscellaneous Unscheduled Locations	$500,000	
	Bridges, Overpasses, and Underpasses	$334,992,000	
	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 *	$6,442,370	
b. Direct Physical loss or damage	Valuable Papers	$500,000	
	EDP Includes E-Z Pass Equipment*	$1,302,026	
	Radar Counters, Radios, camera equipment, Signs and transmitting equipment		
	Message Boards*	$2,499,474	

***Included in the Contents Limit on Policy**

			Premium Amt
Business Auto	**Policy No. CAA1000628-39**	**Term: October 1, 2021 to October 1, 2022**	**$275,833.00**

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

			Premium Amt
General Liability	**Policy No. CPA1000627-39**	**Term: October 1, 2021 to October 1, 2022**	**$88,814.00**
	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

				Premium Amt
	Policy No. 106807620	**Term: October 1, 2021 to October 1, 2022**		**$6,846.00**
Crime	Coverage	Limits	Deductible	
	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	
	Money Orders/Counterfeit Money	$2,000,000	$10,000	
	Computer Fraud	$2,000,000	$10,000	
	Computer Restoration Expense	$1,000,000	$10,000	
	Funds Transfer Fraud	$2,000,000	$10,000	
	Claim Expenses	$10,000	$0	

Worker's Compensation Self-Insurance Excess Policy

Underwritten by Arch Insurance Company; Agent: USI Insurance Services

		Premium Amt
Policy No. WCX 0059427 02	**Term: February 1, 2021 to February 1, 2022**	**$118,408.00**

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

$26,270,951Total Estimated Annual Remuneration - February 2020-2021
Claim Service: Cannon, Cochran Management Service, Inc.

Public Officials and Employees Liability

Underwritten by ACE American Insurance Company — Agent: Cross Insurance

				Premium Amt
Policy No. EON M00608592 009		**Term: October 1, 2021- October 1, 2022**		**$49,418.00**
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	

Fidelity Bond-Public Officials

Underwritten by Travelers Insurance Company: — Agent TD Insurance, Inc

Member of Authority	**Term**	**Amount of Bond**	**Remarks**	Premium Amt
Peter S. Mills Executive Director Policy No. 105619973	May 24, 2021-2022	$500,000	Insures faithful performance of duties by the individual	**$1,750.00**
Douglas D. Davidson Treasurer Policy No. 105220484	January 1, 2021-2022	$500,000		**$865.00**
Jonathan Arey Secretary Policy No. 105220456	January 2, 2021-2022	$50,000		**$175.00**

Fiduciary Responsibility

Underwritten by ACE Insurance Company — Agent: Cross Insurance

		Premium Amt
Policy No. G25749522 009	**Term: October 1, 2021-October 1, 2022**	**$7,795.00**

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	Aetna	Full semi-private room allowance

Self-Insured Workers Compensation Bond

Underwritten by Travelers Insurance Company

		Premium Amt
Policy No. 103464379	**Term: December 2021**	**$960.00**

Obligee: Maine Bureau of Insurance

Privacy & Network Liability Insurance

Underwritten by Travelers — Agent: Cross Insurance

		Premium Amt
Policy No. 106807615	**Term: October 1, 2021-October 1, 2022**	**$92,719.00**

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 Philadelphia Insurance Company — Agent: USI Insurance

		Premium Amt
Policy No. PHSD1279465	**Term: October 1, 2021-October 1, 2022**	**$13,908.00**

	Each Claim	Aggregate
Limits of Liability	$ 2,000,000	$ 2,000,000