



# Interstate Operating Plan

October 2018

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## Introduction:

### Purpose of the Plan

The interstate system is Maine’s single most important piece of transportation infrastructure and serves as the backbone of transportation within the state. The entire system is classified as Highway Corridor Priority 1 within MaineDOT’s corridor priority system. With the high value of this system there is a need to maximize performance and make wise investments in improvements. The most effective way to do this is through asset management principles and coordinated work efforts. This plan will summarize the detailed inventory of assets, provide condition and usage information, and a coordinated plan for improvements in the 5 year and 20 year timeframes across asset types.

### The System

The interstate system consists of 5 major routes within the state; I-95, I-295, I-395, I-195, I-495. These routes consist of two distinct directions of travel and identified as such with a Northbound, Southbound, Eastbound, or Westbound designation. All highways the Department is responsible for including the interstate are further segmented into destination based highway corridor assets with a distinct starting and ending point that integrate with the rest of the highway network. Each of these highway corridor assets is assigned a unique “HASS ID” and “HASS Description” which will be the basic framework for the information presented in this plan.

The table below describes Maine’s interstate system highway corridor assets:

<b><i>Maine's Interstate System</i></b>				
<b><i>Interstate Route</i></b>	<b><i>HASS Description</i></b>	<b><i>Begin Milepoint</i></b>	<b><i>Toll</i></b>	<b><i>Length</i></b>
I-95 NB	I-95 NEW HAMPSHIRE TO SACO	0.00	Y	35.20
	I-95 SACO I-195 TO SCARBOROUGH I-295	35.20	Y	8.31
	I-95 SCARBOROUGH I-295 TO FALMOUTH SPUR	43.51	Y	7.36
	I-95 FALMOUTH SPUR TO GRAY	50.87	Y	11.37
	I-95 GRAY TO LEWISTON	62.24	Y	16.87
	I-95 LEWISTON TO AUGUSTA WESTERN AVE	79.11	Y	28.99
	I-95 AUGUSTA WESTERN AVE TO NEWPORT	108.10		47.17
	I-95 NEWPORT TO BANGOR I-395	155.27		25.63
	I-95 BANGOR I-395 TO MEDWAY	180.90		61.75
	I-95 MEDWAY TO CANADA	242.65		60.47
				<b>303.12</b>
I-95 SB	I-95 MEDWAY TO CANADA	0.00		60.51
	I-95 BANGOR I-395 TO MEDWAY	60.51		61.78
	I-95 NEWPORT TO BANGOR I-395	122.29		25.59
	I-95 AUGUSTA WESTERN AVE TO NEWPORT	147.88		47.11
	I-95 LEWISTON TO AUGUSTA WESTERN AVE	194.99	Y	28.95
	I-95 GRAY TO LEWISTON	223.94	Y	16.80
	I-95 FALMOUTH SPUR TO GRAY	240.74	Y	11.45
	I-95 SCARBOROUGH I-295 TO FALMOUTH SPUR	252.19	Y	7.35

	I-95 SACO I-195 TO SCARBOROUGH I-295	259.54	Y	8.31
	I-95 NEW HAMPSHIRE TO SACO	267.85	Y	35.26
				<b>303.11</b>
I-295 NB	I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR	0.00		11.00
	I-295 FALMOUTH SPUR TO BRUNSWICK	11.00		17.15
	I-295 BRUNSWICK TO WEST GARDINER	28.15		24.35
				<b>52.50</b>
I-295 SB	I-295 BRUNSWICK TO WEST GARDINER	0.00		24.40
	I-295 FALMOUTH SPUR TO BRUNSWICK	24.40		17.20
	I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR	41.60		11.65
				<b>53.25</b>
I-395 EB	I-395 BANGOR TO BREWER	0.00		4.76
I-395 WB	I-395 BANGOR TO BREWER	0.00		4.94
I-195 EB	I-195 - SACO - I-95 TO ROUTE 1	0.00		1.60
I-195 WB	I-195 - SACO - I-95 TO ROUTE 1	0.00		1.54
I-495 EB	I-495 PORTLAND TO FALMOUTH	0.00	Y	4.36
I-495 WB	I-495 PORTLAND TO FALMOUTH	0.00	Y	4.39
<b>Grand Total</b>				<b>733.57</b>

This plan will address the interstate that is currently under MaineDOT jurisdiction. In the table above the assets flagged as “Toll” are not addressed in this plan and are the responsibility of the Maine Turnpike Authority.

## Outcomes

This plan will serve as the guide for capital improvement planning and investments to the interstate system in the future and will be updated regularly to reflect the current state of assets, performance, and financial constraints. The desired outcomes of this plan are:

- Eliminate any unplanned closure to the Interstate system by coordinating improvements, having sound traffic incident management plans, and closely monitoring all asset conditions.
- Prioritize preservation as a proactive strategy to increase the longevity of assets
- Regularly report on the effectiveness of preservation efforts.
- Improve congestion and safety through intelligent transportation solutions where applicable
- Promote communication between Department Bureaus in order to achieve synergy of work/functional groups.
- Analyze interchange performance to identify and prioritize improvements

As well as identifying strategies to coordinate asset work, the report also provides a summary of the specific needs of all assets that are part of the interstate system. Current and projected Customer Service Levels (CSLs) are analyzed for each asset regarding safety, service and condition and rated A – excellent, B – good, C – fair, D – poor, or F – unacceptable. According to Sec.1.23 MRSA 73, sub – 7, by 2022 it is the legislative goal to improve all priority 1 and 2 corridors to CSLs of C or better in all three areas, this report’s recommendations will move the interstate system to meet this goal.

## Existing Asset Inventory and Condition Assessment

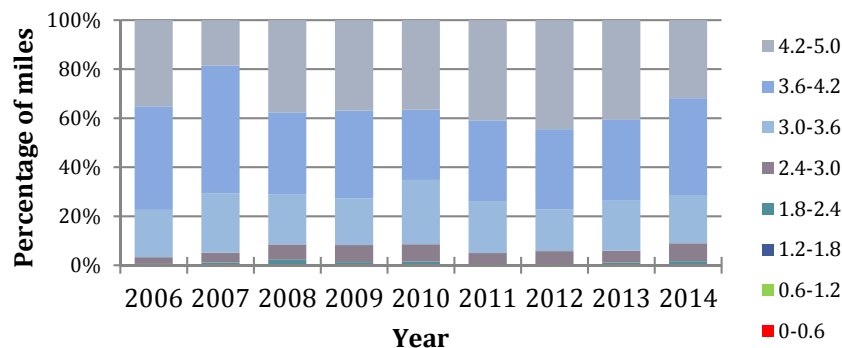
The Departmental Highway Corridor Assets described earlier in this document that comprise the Interstate System contain smaller asset types or components managed by different units within the Department.

Maine's non-toll Interstate System - Major Assets by Corridor												
Route	HASS Description	Length	Ramp Mileage	Bridges	Bridge Deck Area (SF)	Large Culverts	Cross Culverts	Guardrail (LF)	Retaining Walls	Noise Barriers (LF)	Major Signs	Sign Trusses
I-95 NB	I-95 AUGUSTA WESTERN AVE TO NEWPORT	47.2	6.7	45	409,113	13	207	137,229	0	0	217	13
	I-95 NEWPORT TO BANGOR I-395	25.6	3.5	21	152,190	8	83	57,960	0	0	116	2
	I-95 BANGOR I-395 TO MEDWAY	61.8	6.5	40	381,068	4	198	74,454	0	2694	192	5
	I-95 MEDWAY TO CANADA	60.5	4.5	33	209,795	31	134	120,686	0	0	162	1
		<b>195.0</b>	<b>21.2</b>	<b>139.00</b>	<b>1,152,166</b>	<b>56</b>	<b>622</b>	<b>390,329</b>	<b>0</b>	<b>2,694</b>	<b>687</b>	<b>21</b>
I-95 SB	I-95 MEDWAY TO CANADA	60.5	4.5	29	159,699	36	152	92,526	0	0	152	1
	I-95 BANGOR I-395 TO MEDWAY	61.8	6.5	18	124,984	8	216	77,695	0	0	192	4
	I-95 NEWPORT TO BANGOR I-395	25.6	3.5	14	64,850	5	72	51,769	0	0	103	1
	I-95 AUGUSTA WESTERN AVE TO NEWPORT	47.1	6.7	25	193,090	10	198	125,911	0	0	215	2
		<b>195.0</b>	<b>21.2</b>	<b>86.00</b>	<b>542,623</b>	<b>59</b>	<b>638</b>	<b>347,901</b>	<b>0</b>	<b>0</b>	<b>662</b>	<b>8</b>
I-295 NB	I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR	11.0	6.3	32	444,844	4	3	46,312	2	1347	108	21
	I-295 FALMOUTH SPUR TO BRUNSWICK	17.2	3.7	15	108,029	6	6	34,758	0	449	104	4
	I-295 BRUNSWICK TO WEST GARDINER	24.4	4.2	21	202,337	7	90	54,786	0	0	112	3
		<b>52.5</b>	<b>14.2</b>	<b>68.00</b>	<b>755,210</b>	<b>17</b>	<b>99</b>	<b>135,856</b>	<b>2</b>	<b>1,796</b>	<b>324</b>	<b>28</b>
I-295 SB	I-295 BRUNSWICK TO WEST GARDINER	24.4	4.2	10	72,526	8	85	45,249	0	0	114	3
	I-295 FALMOUTH SPUR TO BRUNSWICK	17.2	3.7	5	27,295	0	8	25,923	0	0	91	5
	I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR	11.7	6.3	4	21,096	1	1	47,223	2	0	127	13
		<b>53.3</b>	<b>14.2</b>	<b>19.00</b>	<b>120,917</b>	<b>9</b>	<b>94</b>	<b>118,395</b>	<b>2</b>	<b>0</b>	<b>332</b>	<b>21</b>
I-395 EB	I-395 BANGOR TO BREWER	4.8	3.8	8	233,491	2	5	6,435	2	0	66	12
I-395 WB	I-395 BANGOR TO BREWER	4.9	3.8	0	0	0	0	0	1	0	66	9
		<b>9.7</b>	<b>7.6</b>	<b>8.00</b>	<b>233,491</b>	<b>2</b>	<b>5</b>	<b>6,435</b>	<b>3</b>	<b>0</b>	<b>132</b>	<b>21</b>
I-195 EB	I-195 - SACO - I-95 TO ROUTE 1	1.6	1.1	2	14,959	0	0	1,084	0	0	23	3
I-195 WB	I-195 - SACO - I-95 TO ROUTE 1	1.5	1.1	0	0	1	0	0	0	0	20	2
		<b>3.1</b>	<b>2.2</b>	<b>2</b>	<b>14,959</b>	<b>1</b>	<b>0</b>	<b>1,084</b>	<b>0</b>	<b>0</b>	<b>43</b>	<b>5</b>
	<b>TOTALS</b>	<b>508.6</b>	<b>80.6</b>	<b>322</b>	<b>2,819,366</b>	<b>144</b>	<b>1,458</b>	<b>1,000,000</b>	<b>7</b>	<b>4,490</b>	<b>2,180</b>	<b>104</b>

## Pavements

Based on projected 2014 ARAN data, the current (2015) condition of the Interstate system (PCR\_CSL) has 11 miles of 'D', 93 miles of 'C', 184 miles of 'B', and 220 miles of 'A' rating. Given the current deterioration rate of the Interstate, a section in 'B' condition is ready for a light preservation treatment; a section in a 'C' condition is ready for a heavy preservation treatment; and a section in 'D' or 'F' condition needs a rehabilitation treatment.

**Historical non-toll Interstate Pavement Condition (PCR) Rating Distribution**



One of the biggest current challenges in maintaining the pavement structure of the Interstate system is the phenomenon called “aggregate loss”, “wheel path erosion” or “HMA (Hot Mix Asphalt) erosion”.

This is a condition where the aggregate in the pavement becomes separated from the asphaltic matrix and is removed by traffic. This condition was first noticed in the northern area of the state approximately 10 years ago, and spread statewide within 5 years. Extensive research is currently being done to find solutions to this issue. While initial results are promising, the problem will likely not be solved for several years.

The impact of HMA erosion is that treatment life expectancy has declined 40-50%. Currently the standard Interstate preservation treatment is a “mill & fill”. This treatment removes the top surface of the pavement (typically 2”) and replaces it with new pavement. These treatments typically lasted 12-14 years before a new treatment was necessary. Now they typically last 6-8 years before HMA erosion causes a safety issue.

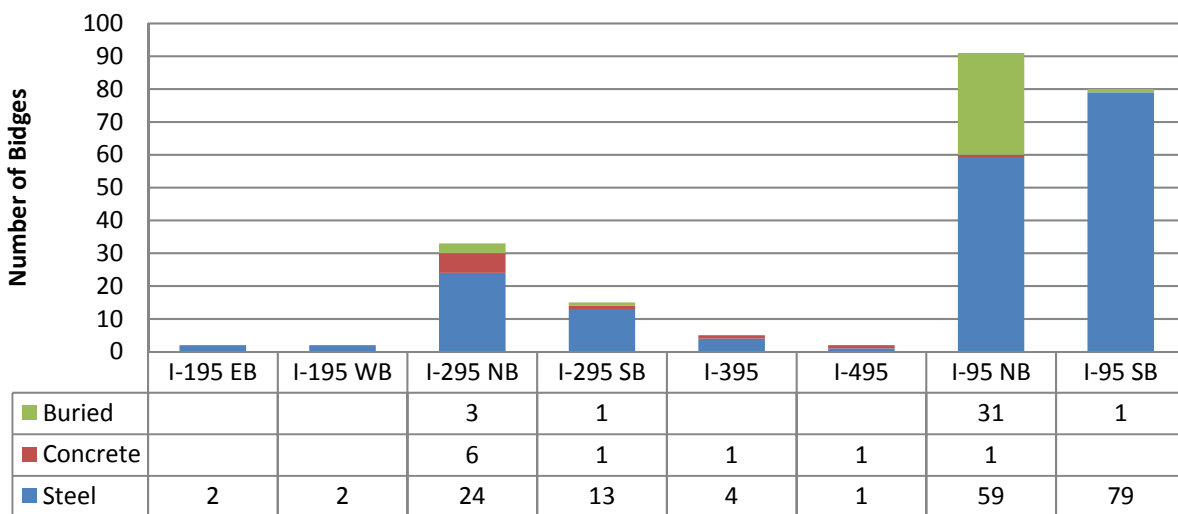
HMA erosion shows up in the condition data as a rut. Normal ruts are caused by the plastic deformation (pushing) of pavement due to overloading of the pavement structure. Ruts associated with HMA erosion are not due to pushing of the pavement but actual removal of material from the road. Based on current projections, by the spring of 2016 more than 60% of the total mileage of Interstate segments will have an average rut greater than 7/16”. This is a tremendous safety issue and is one of the biggest challenges facing the Department.

### Bridges

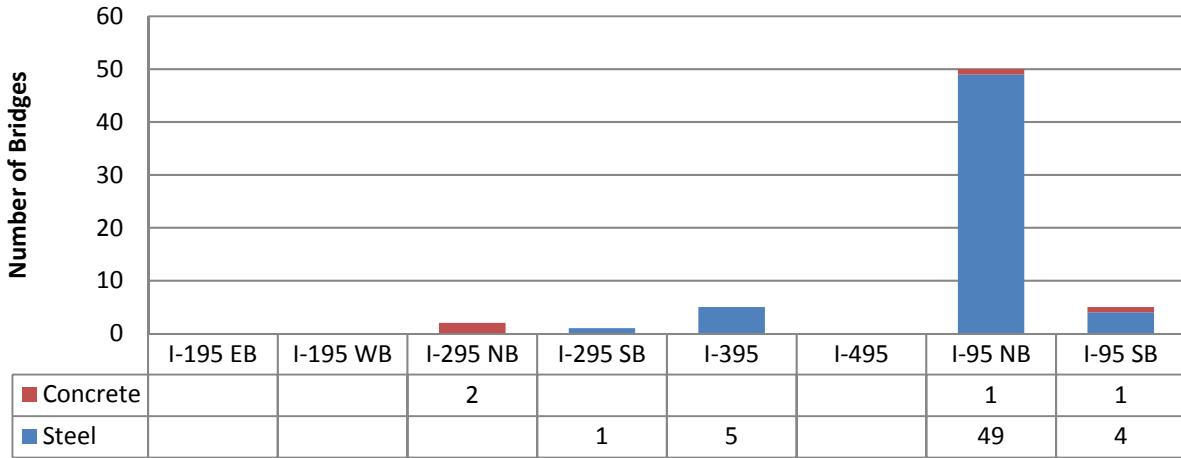
MaineDOT owns and maintains all bridges and minor spans on and over the Interstate system. There are 230 bridges on the Interstate system with a total deck area of 2,501,109 square feet. Over the Interstate system there are 92 bridges with a total deck area of 954,305 square feet.

Most of the interstate bridges are steel girder with concrete deck. There are some buried concrete boxes and concrete T-beams in various locations. Below is a graph showing the number of bridges and type distribution for each of the highway corridors.

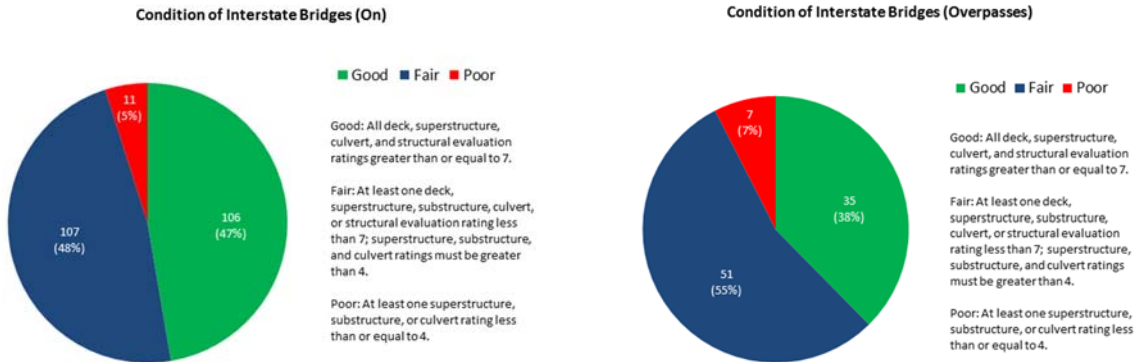
### On Interstate System



## Over Interstate System



The clear majority of the Interstate bridges are in overall good and fair condition per the 2015 inspection data. Of these bridges, 5.6% are deemed structurally deficient. Structurally deficient means these bridges have a deck, superstructures, or substructure rated in poor condition. These bridges are safe for all legal loads.



Although the bridges are in good condition, there were common themes found amongst the bridges. The themes are as follows:

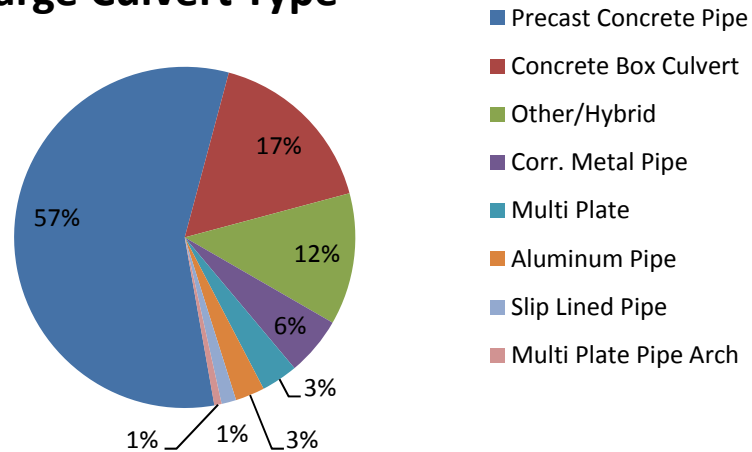
- Pier deterioration from leaking joints and spray from roadway below
- Failed joint seals
- Joint and header damage from plows and years of use
- Wearing surface from years of use
- Deck spalling from years of use
- Alkali-Silica Reaction of the concrete on the I-395 corridor



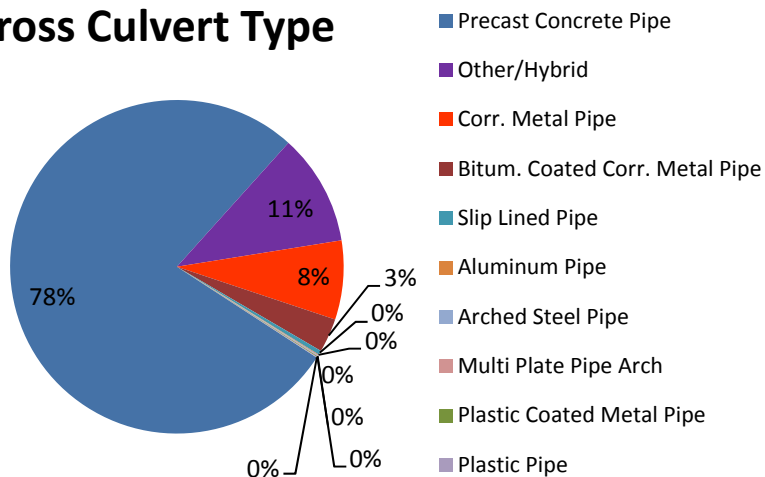
## Culverts

There are 1,609 culverts on the Interstate system, 144 of which fall into the large culvert category, which includes those culverts with diameters of 5 to 10 feet. Most of these culverts are constructed of precast concrete, with the next largest percentage consisting of hybrids that most typically consist of concrete under the interstate travel lanes and metal ends under the inslopes. The two charts below show the overall breakdown of the culvert types. The first chart breaks out the 144 large culverts, while the second shows all the remaining culverts with diameters less than 5 feet.

### Large Culvert Type

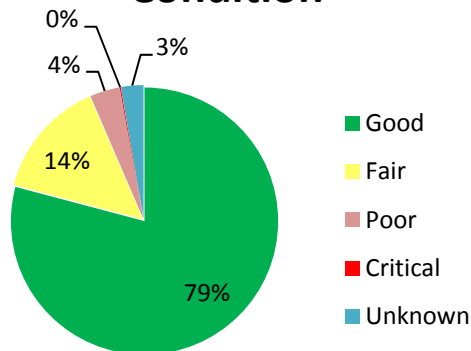


### Cross Culvert Type

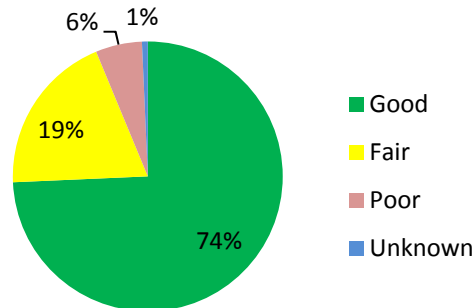


The clear majority of the Interstate culverts are in overall good and fair condition per the latest inspection data. In some cases, the condition may be currently unknown due to the pipes being completely submerged under water or otherwise inaccessible. These pipes will require a separate special effort in the future to properly rate their condition.

## Cross Culvert Condition



## Large Culvert Condition



Culverts on Maine's state roads are currently being rated in accordance with Report No. FHWA-CFL/TD-10-005 *Culvert Assessment and Decision-Making Procedures Manual for Federal Lands Highway*.

### Highway Lighting

There are 65 interchanges on the Interstate System. These are a mix of interchanges lit with standard 40-foot light poles, and those lit using 80-100-foot Tower Lighting. Fifteen interchanges are lit with High Mast Towers, 9 are not lighted, and 41 are lighted using standard 40 foot poles. Only six interchanges have lighting that is considered beyond its intended life.

### Sign Trusses

Sign trusses are used to hold large signs over the traveled way. MaineDOT has 3 types of sign truss:

- Span – is held up by supports on both ends of the overhead portion of the truss
- Cantilever – is supported on only one side of the overhead portion of the truss
- Overpass – directly connected to a bridge

MaineDOT owns approximately 165 sign trusses, 104 of which are located on or over the interstate travel lanes or interstate ramps:

- 65 span (includes 1 truss owned by MTA, located over I-295)
- 8 cantilever
- 31 overpass

Trusses will be inspected as part of the Ancillary Structure Inspection Program, starting in 2016. Inspections will start at an accelerated two-year cycle for the first round of inspections (2016 and 2017), before settling into a six year cycle. This will allow us to better prioritize repair and replacement of existing trusses.

In the meantime, we assume the span and cantilever structures have a 50-year design life, based on the AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals

1985 and 2013. From the information we could find it appears that 19 interstate trusses are at or beyond their 50 year design life, and 25 more will reach this point in the next 5 years.

It is estimated that overpass truss arrays have a 25-year design life. It appears that each of the 31 overpass truss arrays is beyond this 25-year design life.

## Signs

Most signs on our system today are already in need of replacement (older than 15 years). A 10 Year Plan is outlined later in this document to get us to a point where all signs are 15 years old or newer.

### Mainline Interstate

- There are 2145 Major Signs on mainline Interstate, not including LOGO signs.
- There are approximately 120 LOGO signs on mainline.

### Ramps and Interchange Cross Roads

- There are approximately 1540 Minor Signs on ramps and cross roads.
- There are approximately 140 Extruded Major Signs on Interchange Cross Roads.
- There are approximately 120 Extruded LOGO Signs on ramps.

## Changeable Message Signs(CMS)/ITS and Variable Speed Signs

We have a mixture of large pole mounted CMS and trailer mounted CMS that we currently use to relay messages to the travelling public, such as accident information, lane closures, expected delays, construction information. We also have Variable Speed Signs which are primarily used to indicate when speed limits have been reduced, normally due to winter storms. Cameras on these units allow us to view current conditions on the interstate.

We have a total of 18 fixed location CMS on the interstate: 4 large pole mounted and 14 CMS on trailers that, although technically portable, are in a fixed location and are considered “permanent” installations.

We have 65 Variable Speed Signs at fixed locations, on mainline interstate which are typically located a short distance after an on ramp. Most of our interchanges currently have a Variable Speed Sign. These signs also have radar units which can collect vehicle speed data.

Both CMS and VSS have an expected life of 10 years. Our inventory of these signs is currently in fair condition and have no immediate need for replacement.

## Highway Noise Barriers

Currently, highway traffic noise barriers exist at two locations along Maine’s interstate highways: I-295 northbound between Exits 3 and 4 in South Portland and I-95 northbound south of Exit 185 in Bangor.

### *South Portland I-295 Wood Fiber Concrete Noise Barrier*

The noise barrier, located along I-295 northbound between Exits 3 and 4 in South Portland, was constructed in 2009 from precast wood fiber concrete panels manufactured by Durisol. The barrier is 3350 feet in length and varies in height from 10 to 20 feet. Based on the estimated life expectancy (50 years) of concrete, no major repairs are anticipated within next 20 years.

### *Bangor I-95 Timber Plank Noise Barrier*

The noise barrier, located at Exit 185 (Broadway) in Bangor, was constructed in 1999 using pressure-treated southern yellow pine posts and planks. The traditional timber barrier is 1140 feet in length and varies in height from 10 to 20 feet. Based on the estimated life expectancy (20-40 years) for pressure treated southern yellow pine, the barrier may require rehabilitation (replacement of planks) or reconstruction (replacement of planks and posts) within the next 20 years.

### **Traffic Monitoring Sites**

As part of MaineDOT's Continuous Count Program each count site produces average weekday data, weekly average days, monthly averages, and Annual Average Daily Traffic (AADT). From this data weekly factors are calculated, which are part of an approved methodology for adjusting short duration counts collected along the Interstate system.

Axle based classification sites collect data for 13 FHWA vehicle classifications, necessary for the new pavement design process. This information may also be summarized into passenger vehicles, single unit trucks and tractor trailers.

The length based classification summarizes vehicles in 4 categories, utilizing their overall length. Future needs include development of conversion factors to adjust this data to axle classification.

The broad span of information and decisions that this data affects includes:

- Vehicle Miles Traveled (VMT) computations
- Federal allocation formulae
- Highway crash rates
- Transportation system planning
- Maintenance prioritization and planning
- Project prioritization
- Geometric and structural design calculations for bridge and highway
- Work zone traffic control planning
- System performance measurement
- Revenue forecasting
- Public information requests

Traffic Monitoring currently has 14 permanent count sites along the Interstate as follows:

- I-95, Kittery (length based classification)
- I-95, Sidney (axle based classification)
- I-95, Carmel (volume)
- I-95, Howland (volume)
- I-95, Medway (axle based classification)
- I-295, South Portland (length based classification)
- I-295 in Portland between Exits 5 and 6 (length based classification)
- I-295 in Portland between Exits 7 and 8 (length based classification)
- I-295 in Portland between Exits 9 and 10 (length based classification)
- I-295, Freeport between Exits 17 and 20 (volume)
- I-295, Brunswick between Exits 22 and 28 (length based classification)
- I-295, Brunswick (axle based classification)
- I-395, Brewer (length based classification)
- I-195, Saco (volume)

### Condition of Existing Traffic Monitoring Sites

Location	Condition
I-95, Kittery (length based classification)	Good
I-95, Sidney (axle based classification)	Fair – Will be removed by 2016 paving project
I-95, Carmel (volume)	Fair – Needs to be resealed
I-95, Howland (volume)	Good
I-95, Medway (axle based classification)	Good
I-295, South Portland (length based classification)	Fair – Sensor may need to be replaced
I-295 in Portland between Exits 5 and 6 (length based classification)	Good
I-295 in Portland between Exits 7 and 8 (length based classification)	Good
I-295 in Falmouth between Exits 9 and 10 (length based classification)	Good
I-295, Freeport (volume)	Fair – Needs to be resealed, but may be replaced by a nonintrusive sensor
I-295, Brunswick (axle based classification)	Fair – Will be removed by 2016 paving project
I-295, Brunswick (length based classification)	Good – Installed in 2015
I-395, Brewer (length based classification)	Good
I-195, Saco (volume)	Fair – May need to be resealed

### Weigh-In-Motion Systems

Weigh-in-Motion (WIM) systems are used to collect truck weight data, which is in turn used to determine how much the road system is being damaged and plan paving projects accordingly. More specifically, the data is used to separate vehicles into 13 different FHWA recognized vehicle classifications, 10 of which are trucks. Data for these 10 truck types are used for inputs into the mechanistic pavement design program, Pavement ME; this data is also used to develop pavement damage factors in the form of Equivalent Single Axle Loads (ESALs).

WIMs use piezo quartz sensors and Electronique Controle Mesure (ECM) equipment to collect and process vehicle data. To ensure data quality, WIMs are calibrated semi-annually, once in spring and once in autumn. The data is checked at least once a week, to detect any malfunctions with software, hardware, or calibration, thus preventing data loss.

MaineDOT owns 8 WIM sites, 4 of which are located on the interstate:

- I-95, Kittery (located on the Turnpike)
- I-95, Waterville
- I-95, Hermon
- I-295, Cumberland

### Condition of Existing Weigh-In-Motion Systems

Location	Condition
I-95, Kittery	Good – NB installed in 2010, SB installed in 2013
I-95, Waterville	Good – Will be replaced as part of 2016-2017 paving project
I-95, Hermon	Poor – NB sensor loop needs to be replaced
I-295, Cumberland	Good – Will be replaced as part of 2016-2017 paving project

## Road Weather Information Systems (RWIS)

We currently have 4 RWIS Stations on the Interstate System. They provide information on Road and Weather Conditions which is then relayed to a central server and made available to Maintenance and Operations personnel.

The 4 RWIS Stations are located on I-95 in Bangor and Etna, as well as on I-295 in Cumberland and Portland.

The oldest stations have been in place since the late 90's. Components are modular and are replaced as needed, at an annual cost of \$5,000 per year per Station. All Stations are currently operating as intended, although are not being fully utilized to their fullest potential as an "in-storm" tool in most areas.

## Interstate Retaining Walls

MaineDOT owns and maintains seven retaining wall structures on the Interstate system. Four of the walls are in Portland around I295 and the other three are in Bangor on I395. The table below shows their location and attributes.

Road	Town	Location	Condition	Size	Type
I-295	Portland	Exit 6A ramp	Poor	250' L x 8' H	Bin Wall
I-295	Portland	Under I295 Overpass NB Exit 8	Satisfactory	500'L x 10'H	Timber
I-295	Portland	Next to NB I295, Exit 8	Satisfactory	72' L x 6' H	Timber
I-295	Portland	Next to NB I295 Before Tukey's Bridge	Good	500'Lx16'H	Bin Wall
I-395	Bangor	Exit 3A Ramp, EB	Good	330'L x 20'H	Concrete Panel
I-395	Bangor	Exit 3B ramp, EB	Good	350'Lx25'H	Concrete Panel
I-395	Bangor	On Ramp Exit 3 Towards WB	Poor	190'L x 20'H	Concrete

Condition ratings for retaining walls were conducted under the same standards that are used for bridge condition ratings based on type of structure. As summarized above, the majority of retaining walls on the interstate system are in satisfactory to good condition with just two in poor.

Some of the common problems reducing condition rating with these structures, all related to time of use, are:

- General rust to bin walls
- Rotting timbers at the tops of the timber walls
- General cracking and wear to concrete walls

## Concrete Median Barrier

MaineDOT owns and maintains median concrete barrier in three locations statewide on the Interstate system. Below is a table showing the locations and lengths.

Town	Corridor	Length	Condition
Bangor	95	11,515 ft	Good
Bangor	395	1,745 ft	Fair
Portland	295	6,990 ft	Poor

The condition of the barrier varies depending on location and are shown in the table above. The barrier on I-95 in Bangor was recently replaced and in good condition. The rail in the other locations is in fair-poor condition and will require attention within 20 years.

### Park & Ride Facilities

MaineDOT currently supports 16 Park & Ride Facilities adjacent to Maine’s interstate System, which vary in size but collectively represent over 1,100 parking spaces.

Facility	Condition/ Identified Needs
Augusta Civic Center	Surface is in very good condition. Additional signage and replacement signage is needed.
Bangor – Odlin Road	Erosion issues around perimeter of the lot. This lot has extensive parking off the apron and is currently slated for expansion. Lot needs restriping. Additional signage and lighting is also needed.
Bangor -- Walmart	This facility is in excellent condition and is very well maintained. The only identified need at this time is the installation of on-site signage
Bowdoinham	This facility is in poor condition and needs extensive maintenance including paving, signage, erosion mitigation, and striping.
Freeport North	The lot currently has widespread drainage issues, minor surface cracking, and multiple erosion issues. Additional signage is needed. Additional investment includes bike racks, grading of the gravel surface and additional paving.
Freeport South	Pavement has extensive cracking and here are erosion issues around the entrance. Resurfacing is needed in the near future. Additional signage is needed.
Gardiner	Pavement surface is in very good condition but the edge of the parking apron has a significant drop off. The lot needs restriping. Additional signage is needed.
Medway	The lot is in generally good condition with some residual sand remaining on the surface. Additional signage and restriping is needed.
Portland -- Marginal Way	Minor surface maintenance needed. On-site signage is worn and faded. Bike rack needs to be replaced and the shelter is damaged. Sweeping is needed.
Portland Transportation Center	MaineDOT has contracted with Concord Trailways for the management and operation of this Park and Ride Facility including its maintenance. This lot is in excellent condition and only needs additional signage.
Saco North	The lot has extensive pavement deterioration with frequent standing water. The perimeter curbing is moderately damaged. Additional/replacement on-site signage is needed.
Saco South	Surface has major cracking with grass intrusion and standing water issues. Some curbing damage on the perimeter.
South Portland MTA Exit 45	This facility is in poor condition and needs extensive maintenance including paving, signage, erosion mitigation, and striping.
Topsham Home Depot	The parking surface is in excellent condition, but there are large potholes at the entrances. Additional signage and replacement signage is needed.
Yarmouth -- Exit 15	Lot is in excellent condition and needs minimal maintenance at this time.
Yarmouth -- Exit 17	Minor surface cracking issues and one pothole needs to be filled. There is also a catch basin that has begun to sink. signage is needed.

### Guardrail / Right-of-Way Fencing

There currently is approximately 1,000,000 L.F. of guardrail on the Interstate; 100,000 L.F. of which are cable. There is also approximately 2,500,000 L.F. of Right-of-Way fencing.

Guardrail is currently in fair or better condition on the Interstate. Right-of-Way fencing is generally considered in fair to poor condition with the clear majority not being repaired or replaced since initial construction.

## Customer Service Levels

The Department uses customer-focused engineering measures to determine Customer Service Levels (CSLs) to track highway Safety, Condition and Serviceability, and assigns a letter grade to each category where A=Excellent, B=Good, C=Fair, D=Poor, and F=Unacceptable. The following table describes each of the component within these categories.

Component	Category	Definition
<b>Pavement Condition</b>	Condition	This measure uses the Pavement Condition Rating (PCR), a 0-5 scale that is composed of International Roughness Index, rutting, and two basic types of cracking. The A-F scale varies by Highway Corridor Priority.
<b>Roadway Strength</b>	Condition	This measure uses the results of the falling weight deflectometer, a device that estimates roadway strength. The A-F scale is uniform across Highway Corridor Priority, since even low-priority roads must support heavy loads in Maine's natural resource-based economy.
<b>Bridge Condition</b>	Condition	This measure converts the 0-9 national bridge inventory (NBI) condition ratings to pass or fail; it is uniform across Highway Corridor Priority.
<b>Ride Quality</b>	Condition	This measure uses the International Roughness Index (IRI), which is expressed in inches per mile of deviation. IRI is the nationally accepted standard for passenger comfort, and the A-F scale varies by Highway Corridor Priority.
<b>Posted Road</b>	Service	Each year, MaineDOT posts more than 2,000 miles of road during spring thaw to protect their longevity, but some posted roads directly affect Maine's economy. Road segments that are permanently posted get a D, those with seasonal postings get a C.
<b>Posted Bridge</b>	Service	This measure uses load weight restrictions to arrive at an A-F score that varies by Highway Corridor Priority.
<b>Congestion</b>	Service	This measure uses the ratio of peak traffic flows to highway capacity to arrive at an A-F score for travel delay. Peak summer months are specifically considered to capture impacts to Maine's tourism industry. This scale is uniform across Highway Corridor Priority, since tourist travel is system-wide and sitting in traffic affects customer service similarly on all roads.
<b>Crash History</b>	Safety	This measure includes the two types of motor vehicle crashes most likely related to the highway-head-on and run-off-road crashes. The A-F scale compares these crash rates with the statewide average.
<b>Paved Roadway Width</b>	Safety	This measure compares total paved width (lane plus shoulder) with minimum acceptable widths by Highway Corridor Priority (not new design standards). If a highway segment fails this minimum, the Safety Customer Service Levels for that segment is decreased one letter grade.
<b>Pavement Rutting</b>	Safety	This measure looks at wheel path rutting, since excessive rutting holds water and contributes to hydroplaning and icing in winter. The A-F scale set points vary by Highway Corridor Priority, and are based on hydroplane tests.
<b>Bridge Reliability</b>	Safety	This measure is pass/fail. If a highway segment contains a bridge with a Condition Rating of 3 or less (excluding non-overpass decks), the Safety Customer Service Level is decreased one letter grade. These bridges are safe, but may require increased inspection or remedial work that could affect traffic flow.

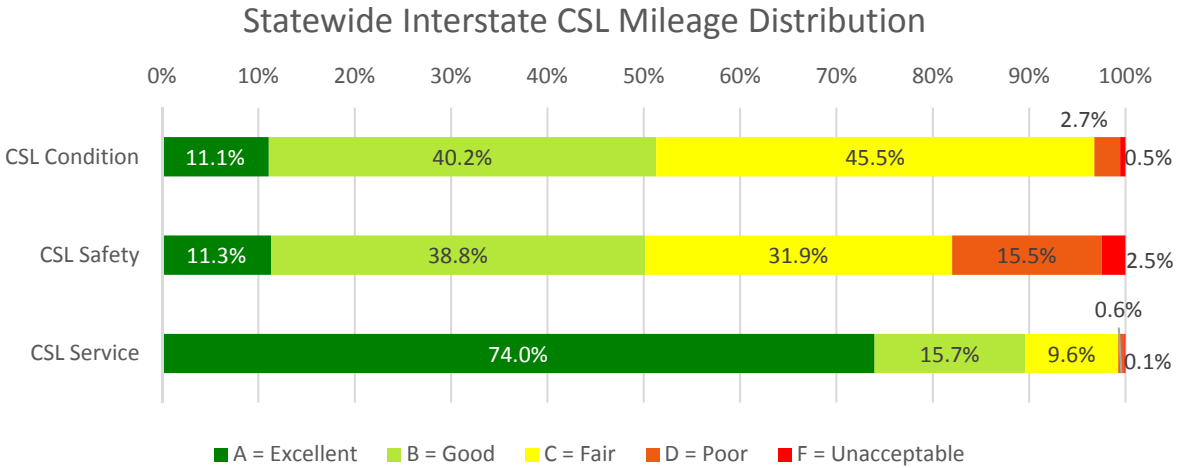
The specific methodology for determining letter grades for each of the components listed above is described in detail in the following document:

<http://www.maine.gov/mdot/about/assets/docs/CSLMethodology.pdf>

For each segment within a highway corridor asset, we calculate a Condition CSL, Service CSL, and a Safety CSL grade. The lowest grade for any component within a category in the table above will determine the CSL rating for that category. For example, if there is a section of highway with a significant crash history, that one component would likely be graded as a "D" or "F" even if the other three components (Paved Roadway Width, Pavement Rutting, and Bridge Reliability) were given higher marks. The following table shows the CSL distribution of all three customer service level components for



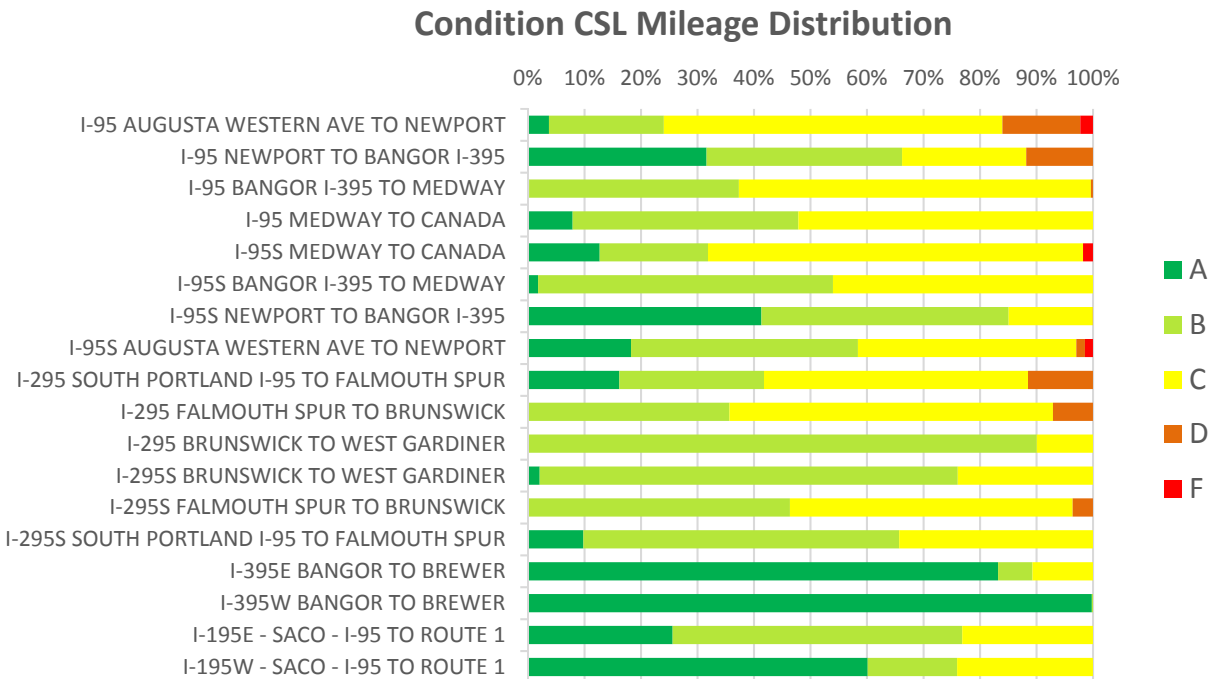
the non-toll interstate system as a whole:



Most of the interstate assets have fair or better condition and service ratings, while only 82% of the highway mileage have a fair or better safety rating. Each of these CSL metrics will be discussed in detail below.

### Condition CSL Assessment

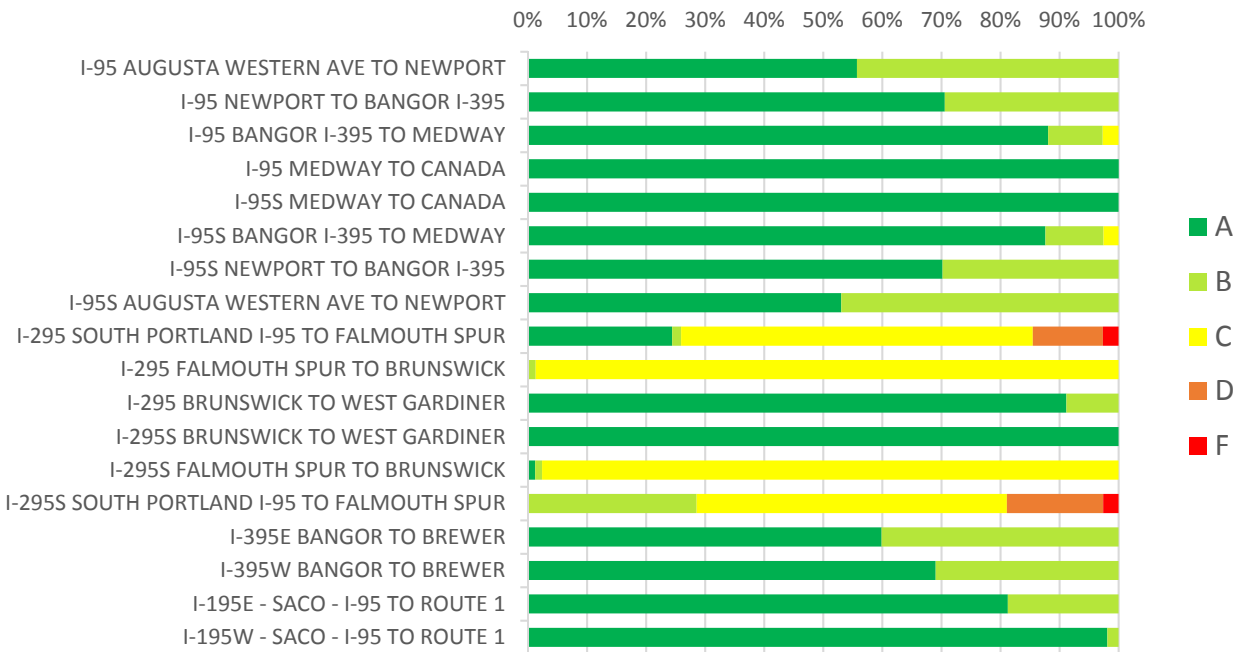
96.8% of the interstate corridor assets are in fair or better condition, but there are several assets in poor or worse condition that must be addressed to meet our customer service level goals. The following chart illustrates the Condition SCL mileage distribution by highway corridor asset and Route:



## Service CSL Assessment

The Serviceability of the Interstate system is measured based on its number of posted roads, number of posted bridges, and congestion. 99.4% of the Interstate system is level of service C or better which meet our goals set forth by the Legislature. 3.3 miles are in Customer Service Level D and F that must be upgraded by 2022 to meet legislative goals.

### Service CSL Mileage Distribution



## Traffic/Congestion

Level-Of-Service (LOS) is a measure of the traffic congestion on a roadway as defined by the Highway Capacity Manual (HCM) and uses an A through F grading scale like MaineDOT's Customer Service Level metric.

- More than 80% of the mileage of Maine's Interstate System operates at LOS C or better at all hours of the day.
- Of the remaining mileage that operates in peak hours at LOS D or worse, MaineDOT is responsible for approximately 20 miles, nearly all of which is on I-295 between South Portland and Freeport. Five of those miles operate at LOS E.
- In addition, there are more than 50 locations where ramps join the main line on MaineDOT Interstate operate at LOS D or worse: 41 at LOS D and 11 at LOS E. Most of these ramp locations are on I-295 between South Portland and Freeport, with the majority of ramp locations with LOS E in South Portland and Portland.

- Many of the I-295 locations experience poor levels of service because of the strong Portland commuter pattern with high inbound volumes in the morning peak hour and strong outbound volumes in the evening peak hour.

### Traffic by HASS, Average, Low, High

The following table illustrates the average, low, and high AADT for each highway corridor asset as well as annual vehicle miles travelled (VMT in Millions).

<i>Maine's Interstate System AADT and Annual VMT</i>					
<i>Interstate Route</i>	<i>HASS Description</i>	<i>AADT</i>			<i>Annual VMT</i>
		<i>Average</i>	<i>Low</i>	<i>High</i>	<i>(M)</i>
I-95 NB	I-95 AUGUSTA WESTERN AVE TO NEWPORT	11737	6370	18290	204.57
	I-95 NEWPORT TO BANGOR I-395	11406	6370	15340	106.39
	I-95 BANGOR I-395 TO MEDWAY	6220	1660	25340	142.04
	I-95 MEDWAY TO CANADA	2172	240	2510	44.70
I-95 SB	I-95 MEDWAY TO CANADA	2406	390	2760	48.15
	I-95 BANGOR I-395 TO MEDWAY	6430	2040	25740	144.91
	I-95 NEWPORT TO BANGOR I-395	11672	6220	23160	108.81
	I-95 AUGUSTA WESTERN AVE TO NEWPORT	12470	6220	18790	214.82
I-295 NB	I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR	27628	9830	43800	108.96
	I-295 FALMOUTH SPUR TO BRUNSWICK	26310	21530	29230	165.66
	I-295 BRUNSWICK TO WEST GARDINER	12702	9460	16310	107.65
I-295 SB	I-295 BRUNSWICK TO WEST GARDINER	12673	9020	15640	108.39
	I-295 FALMOUTH SPUR TO BRUNSWICK	25335	13990	28020	160.25
	I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR	27227	14770	42920	110.72
I-395 EB	I-395 BANGOR TO BREWER	11513	1830	19160	20.67
I-395 WB	I-395 BANGOR TO BREWER	11297	6363	19540	20.16
I-195 EB	I-195 - SACO - I-95 TO ROUTE 1	10394	6390	15210	1.48
I-195 WB	I-195 - SACO - I-95 TO ROUTE 1	10691	5950	15400	1.43
<b>Grand Total</b>					

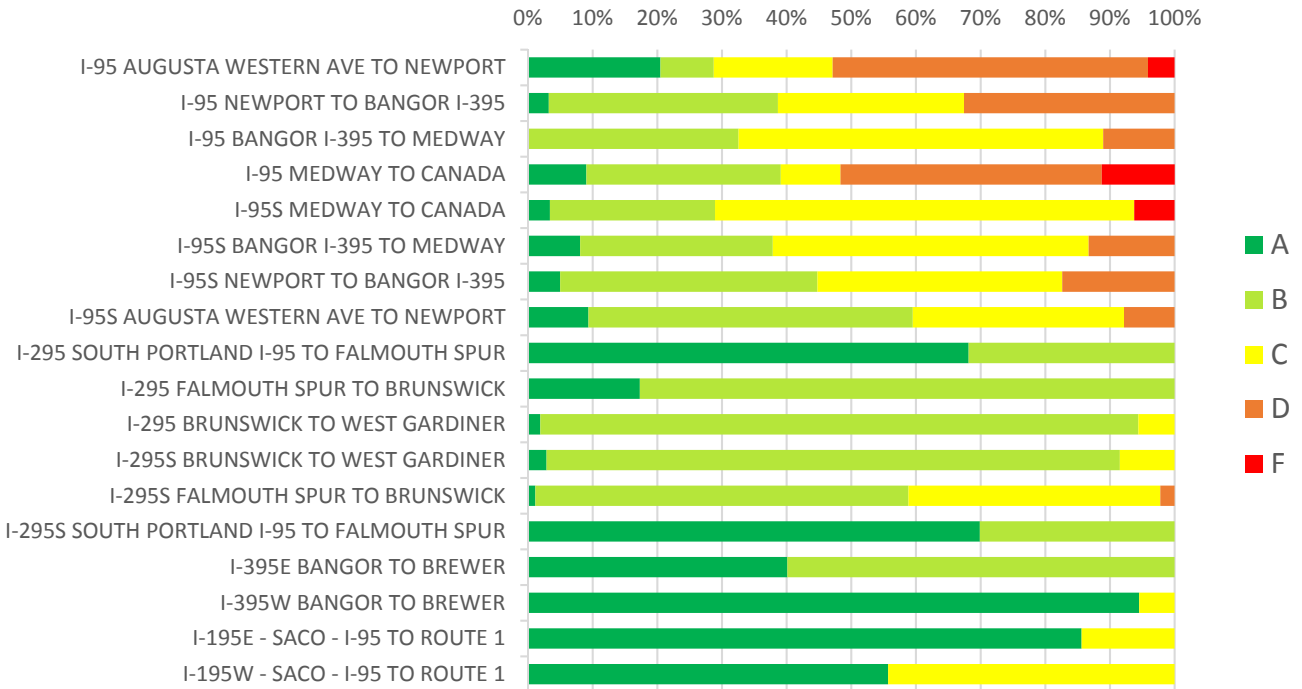
### Critical Congestion Points

- MaineDOT will have approximately 25 miles of I-295, between South Portland and Brunswick, operating at level of service D or worse. Six of those miles will be at level of service E and one mile, between Exits 4 and 5, at level of service F.
- In addition, there will be more than 50 locations where ramps join the main line on MaineDOT Interstate operate at level of service D or worse: 30 at level of service D, 24 at level of service E, and two at level of service F. Nearly all of these ramp locations are on I-295 between South Portland and Freeport, with most of the ramp locations with level of service E in South Portland and Yarmouth. Four of the level of service D locations would be on I-95 in Bangor.

## Safety CSL Assessment

The Safety of the Interstate system is a measurement of crash history, pavement rutting, paved roadway width, and bridge reliability. 82.0% of the Interstate system is level of service C or better while 91.2 miles are in service level D and F that must be upgraded by 2022 to meet legislative goals.

### Safety CSL Mileage Distribution



### Known issues/hotspots

Most interstate sections with low Safety CSL scores can be attributed to pavement rutting due to aggregate loss, or high crash locations either due to ramp geometry/intersections or animal-vehicle collisions.

The Department has identified 46 high crash locations or “hot spots” on Interstate ramps as described in the following table:

#### Interstate Ramp High Crash Locations:

Interstate Route	Exit	Town	Percent Injury Crashes	TOTAL CRASH	CRF	Location Description
<b>INTERSTATE I-95</b>						
I-95 SB Off	109B	Augusta	19.1	47	9.35	Int of RAMP OFF TO WESTERN AV WESTERN AV
I-95 NB On	109A	Augusta	13.3	15	3.38	Int of RAMP OFF TO WESTERN AV RAMP ON
I-95 NB/SB Off	109A	Augusta	9.5	21	5.06	Int of RAMP OFF WESTERN AV
I-95 NB/SB Off	109A	Augusta	37.5	8	1.77	Int of RAMP OFF TO WESTERN AV WESTERN AV
I-95 NB/SB Off	109A	Augusta	50.0	8	2.21	Int of RAMP OFF TO WESTERN AV RAMP ON FROM WESTERN AV

I-95 NB Off	112	Augusta	38.5	13	1.98	Int of CIVIC CENTER DR RAMP OFF TO CIVIC CENTER DR
I-95 SB On/Off	184	Bangor	33.3	9	3.21	Int of RAMP OFF RAMP OFF TO UNION ST RAMP ON
I-95 SB off	182	Bangor	5.6	18	4.64	Int of I 395 WB RAMP I 95 SB OFF I 395 WB ON
I-95 NB Off	182	Bangor	25.0	8	1.33	Int of I 395 EB RAMP I 95 NB OFF I 395 EB ON
I-95 SB On	182	Bangor	24.0	25	3.55	Int of I 95 SB RAMP I 395 WB OFF I 95 SB ON
I-95 NB On	183	Bangor	25.0	8	1.16	Int of I 95 RAMP ON FROM HAMMOND ST
I-95 NB On	184	Bangor	36.4	11	1.46	Int of I 95 RAMP ON FROM UNION ST
I-95 NB Off	185	Bangor	50.0	8	1.06	Int of I 95 RAMP OFF TO BROADWAY ROUTE 15
I-95 NB On	185	Bangor	25.0	16	2.14	Int of I 95 RAMP ON FROM BROADWAY
I-95 SB On	185	Bangor	33.3	12	1.57	Int of I 95 SB RAMP ON FROM BROADWAY
I-95 SB On/Off & NB Off	186	Bangor	37.5	48	1.36	Int of KOHLS TEXAS ROADHOUSE Z RD RAMP OFF TO STILLWATER AV RAMP ON FROM STILL
I-95 SB On	186	Bangor	23.1	13	1.74	Int of I 95 SB RAMP ON FROM STILLWATER AV
I-95 NB Off	186	Bangor	62.5	8	1.17	I-95 NB Off to Stillwater Ave
I-95 NB Off	187	Bangor	35.1	37	1.09	Int of HOGAN RD RAMP OFF TO HOGAN RD RAMP ON FROM HOGAN RD
I-95 SB Off	187	Bangor	41.7	12	2.64	Int of HOGAN RD RAMP OFF I95
I-95 NB Off	193	Orono	5.0	20	3.08	Int of RAMP OFF TO STILLWATER AV RAMP ON FROM STILLWATER AV STILLWATER AV
<b>INTERSTATE I-295</b>						
I-295 SB Off	3	South Portland	20.9	43	1.03	Int of RAMP OFF WESTBROOK ST WESTBROOK ST
I-295 NB On	3	South Portland	53.3	15	2.6	Int of BROADWAY RAMP WESTBROOK ST SOKOKIS ST
I-295 NB On	3	South Portland	22.2	9	1.08	I-295 NB On from Rte 9
I-295 NB Off	4	South Portland	55.6	9	1.01	I-295 NB Off to Veterans Bridge
I-295 NB On	5	Portland	27.3	11	4.64	Int of RAMP ON FROM CONGRESS ST SLIP RAMP ON OFF 295 NB
I-295 NB Off	5	Portland	25.0	20	4.18	Int of CONGRESS ST RAMP OFF TO CONGRESS ST
I-295 SB Off	5	Portland	37.5	48	1.3	Int of CONGRESS ST FORE RIVER PKY RAMP D OFF TO CONGRESS ST
I-295 SB Off	6	Portland	14.3	14	2.84	Int of FOREST AV RAMP D OFF TO FOREST AV
I-295 NB Off	6	Portland	30.0	50	9.36	Int of FOREST AV RAMP E OFF TO FOREST AV
I-295 SB Off	6	Portland	28.8	59	9.65	Int of FOREST AV RAMP H OFF TO FOREST AV
I-295 NB Off	6	Portland	25.0	16	2.99	Int of FOREST AV RAMP A OFF TO FOREST AV
I-295 NB Off	7	Portland	28.6	21	1.13	Int of FRANKLIN ST RAMP A OFF TO FRANKLIN ST ART
I-295 SB On/Off	7	Portland	30.4	56	1.31	Int of FRANKLIN ST FRANKLIN ST ART MARGINAL WAY MARGINAL WY
I-295 NB Off	8	Portland	44.4	9	1.39	I-295 NB Off to Rte 26
I-295 NB On/Off	10	Falmouth	23.8	21	3.66	Int of BUCKNAM RD, LEGION RD, RAMP OFF TO BUCKNAM RD, RAMP ON FROM BUCKNAM RD
I-295 NB On/Off	17	Yarmouth	47.1	17	3.49	Int of RAMP D ON FROM US 1 RAMP OFF ROUTE 1 US 1 SB
I-295 NB Off	22	Freeport	12.5	8	1.37	Int of MALLETT DR RAMP OFF TO ROUTE 125 AND 136
I-295 SB Off	22	Freeport	30.0	10	1.73	Int of MALLETT DR RAMP OFF TO ROUTE 125 AND 136
I-295 SB Off	31	Topsham	31.6	19	5.39	Int of LEWISTON RD RAMP A OFF TO LEWISTON RD
I-295 NB On/Off	31	Topsham	27.0	37	1.26	Int of LEWISTON RD RAMP F1070 RD INV 23G1070
<b>INTERSTATE I-395</b>						
I-395 WB/EB On/Off	182	Bangor	33.3	36	1	Int of HAMMOND ST I 395 EB I 395 WB ODLIN RD

I-395 WB On/Off	4	Brewer	46.2	13	2.66	Int of RAMP B0332 ON RAMP OFF TO S MAIN ST S MAIN ST
I-395 EB On	182	Bangor	25.0	28	4.88	Int of I 395 EB RAMP I 95 SB OFF I 395 EB ROUTE 15 ON
<b>INTERSTATE I-195</b>						
I-195 EB Off	2	Saco	38.6	44	1.21	Int of MAIN ST OCEAN PARK RD RAMP E OFF TO MAIN ST
I-195 EB Off	2	Saco	30.0	10	2.18	Int of MAIN ST RAMP F

Maine currently only collects animal vehicle collision information for reported crashes. These are crashes with injury; or property damage over \$1,000. Crashes are categorized by species, separating out crashes with moose, deer, black bear, and wild turkey. There are 49 “hot spots” on our interstate corridor assets with high numbers of reported animal vehicle collisions.

## Maintenance and Operations Level of Service (LOS) Performance Measures by Activity

The Department’s Bureau of Maintenance and Operations has several policies in place that define performance measures and minimum level of service goals for our interstate system. The following list of LOS Activities provide a brief overview of the standards that are in place for these assets.

### *Activity 112 Repairing Pavement Surface*

- Priority 1 & 2: Potholes patched within 24 hours of identification/notification. Rapid Repair locations will be reviewed and scheduled for replacement as needed with a Standard Repair or Permanent Repair during normal working hours.

### *Activity 191 Patrolling & Inspecting*

- Priority 1 Roads: 2X per week (on the first and last work day of the week)

### *Activity 311 Litter & Debris Removal*

- Interstate litter and debris removal: 100% of all mowed areas annually.
- Park & Ride Lots: Litter removed every other month, starting in April of each year.

### *Activities 321, 331, 332, and 334 – Vegetation Management*

- Inslopes and Clear Zone Areas

Mow grass areas within **100 feet** of the edge of pavement, and not located on slopes steeper than **2½ to 1** at least one time per year and when they reach or exceed a height of **10 inches** and before they reach a height of **24 inches**. Mowing inslope areas may occur one, two, or three times per season. The cut height for all vegetation in designated mowing areas will be **4 to 5 inches**.

Sustainable vegetation that does not exceed an average height of **24 inches** is an acceptable strategy to reduce the amount of mowing or to eliminate mowing in areas that are dangerous to access with mowing equipment.

Clear zones should extend to the toe of slope free of trees and shrubs. Level areas extending beyond the inslope shall be free of trees and shrubs and maintained by mowing to the extent

feasible. Backslopes extending beyond the inslope should be free of trees and shrubs and maintained by mowing to the extent feasible to a minimum distance of **10 feet** up the backslope.

Medians that are continuous without backslopes, transition zones, or forested areas should remain free of trees and shrubs and maintained by mowing to the extent feasible. Medians with living snow fence shall be free of trees and shrubs outside of the planted area of living snow fence. Areas of living snow fence do not require maintenance except for the purpose of insuring establishment or removing unwanted or competitive vegetation.

- *Backslopes*

Mowing of grass backslopes one time each season when the backslope is less than **2½ to 1** during the mid-summer to fall dry period. This should include, at a minimum, all backslope areas within 10 feet of the ditch centerline. The cut height for all vegetation in designated backslope mowing areas will be **4 to 5 inches**.

Forested backslope areas beyond the clear zone may require review for clearing needs to maintain slope stability, reduce shading, and improve visibility as funding permits.

Mowing with specialized equipment or treatment with herbicide to non-forested backslopes steeper than **2½ to 1** shall take place at least every other year. Sustainable vegetation that suppresses tree growth is an alternative to specialized mowing or herbicide application in these areas.

- *Urban Interchange Islands*

Mowing grass areas located adjacent to on and off ramps and close to pedestrian walkways shall commence whenever the grass has reached a height of **5 inches**. The cut height for these areas shall be **2.5 inches**.

- *Tree Removal*

Monitor trees regularly to determine if they present a risk of falling into the roadway; interfere with normal maintenance activities such as litter removal or mowing; routinely shade pavement surface; impede visibility of signs and other structures; or obstruct driver visibility. Landscape planted trees may need be considered for removal when they no longer serve the intended purpose.

- *Guardrail areas*

No significant vegetative growth exceeding the height of the guardrail should be within **3 feet** of guardrails, under the rail, or in front of the rail. Remove trees and shrubs whose trunks exist within a distance of **15 feet** (Figure 2).

- *Visibility of signs*

Maintain visibility of all directional, warning, advisory, historical, and service signs on interstate and control of access corridors at all times. When feasible remove trees that encroach within the sight zone rather than pruning them. Signs should be completely visible for at least **650 feet**. A clearing zone may feather back in the shape of a triangle within the approach (Figure 1).

Perform incidental maintenance around signs erected under the Maine Logos Program (typically blue) when performing such maintenance activities in adjacent areas. Incidental

maintenance may include mowing, removal of brush, occasional trimming of branches or herbicide applications for vegetation control. Refer all other maintenance issues associated with logo signage (e.g. - anything requiring mobilization to address a specific issue) to the Supervisor for Right of Way Control in the Traffic Engineering Division of the Bureau of Maintenance & Operations.

- *Ditches*

Remove trees and shrubs that establish in ditches using herbicides, hand, or mechanical methods to maintain proper drainage. Use of herbicides must be limited to dry periods when no water is present and in accordance with the label and applicable Variances year to year. Do not use herbicides when the ditch is also an intermittent or permanent stream. Interstate mowing contracts may include mowing ditches.

#### *Activity 351 Maintaining Rest Areas and Picnic Areas*

Interstate other year-round rest areas shall meet the following requirements:

- Grounds shall be patrolled for litter daily.
- Trash barrels shall be emptied at least once a day.
- Building shall be cleaned twice daily, or more often during high use periods. Cleaning shall include all rest room facilities and floors in the immediate area of the rest room facilities.
- Grass shall be kept neatly mowed and typically less than 4" in height.
- Windows shall be cleaned once a week.
- Doors and glass in doors shall be cleaned daily
- Walkways shall be kept clear of hazards at all times.
- Parking and access areas shall be swept annually in the spring.
- Finished floors shall be stripped and retreated once a year.
- Any needed repairs shall be made as soon as possible.
- Building and grounds shall be inspected for major repairs annually.

#### *Activity 412 & 413 Snow & Ice Control*

##### **Priority 1 Corridors**

Snow will be plowed and salt (in addition to other chemicals as conditions require) will normally be used as needed during the storm to maintain a brine layer on the pavement surface to prevent snow and ice from bonding to the road. Following a winter event, bare travel lanes shall be provided as soon as practicable and on these roads before all others. In most cases, this will occur within three (3) daylight hours, however, on the I-95 corridor north of Exit 197, Old Town, this standard shall only apply to the travel lanes and, due to the low traffic volumes, the passing lanes will often exceed this standard.

The suggested maximum travel speed during the storm for the Interstate system is 45 M.P.H. The suggested maximum travel speed during the storm for all other Priority 1 roads is 40 M.P.H. During a winter storm event, average cycle times for the plows will be between 1 to 1½ hours. Between the hours of 10:00 P.M. and 4:00 A.M, these cycle times may double, depending upon the type of storm. The average plow route length for this class of road is approximately 10 centerline miles and the average salt allotment is 14 tons per lane mile. In the case of urban interstate corridors with a winter ADT in



excess of 20,000, an average salt allotment of 20 tons per lane mile will be used to assure an additional safety factor in consideration of the higher traffic volumes and higher speeds. For urban interstate corridors with a winter ADT in excess of 30,000, an average salt allotment of 22 tons per lane mile will be used. As of 2009, the following corridors exceed the 20,000 ADT threshold: the portion of I-95 from the NH border to the southern limit of the Maine Turnpike (Spruce Creek), the portion of I-295 from its southern limit to Exit 28, Brunswick, and the portion of I-95 in Bangor from Exit 182, I-395, to Exit 187, Hogan Road. Of these areas, the following corridors exceed the 30,000 ADT threshold: the portion of I-95 from the NH border to the southern limit of the Maine Turnpike (Spruce Creek), the portion of I-295 from Exit 4, South Portland, to Exit 9, Falmouth Foreside.

#### *Activity 513 Repairing Bridge Joints*

All open joints or joints with failed seals, except for finger joints which will be addressed on an individual basis, will be sealed.

100% of the joints discovered with deficiencies will be remedied within 12 months of discovery of the deficiency. Joints that require significant work such as new joint armor requiring work on the backwall and deck side of the joint will be recorded in a Work Request and considered for inclusion in the next immediate Biennial Maintenance Work Plan.

#### *Activities 137, 139 & 531 Roadside Safety Barriers*

##### *Initial Assessment*

All Roadside Safety Barrier that is damaged shall be immediately assessed upon discovery or notification to determine the level of damage severity. Any condition that presents a hazard to the public (such as a blunt end or an unprotected void) shall be immediately addressed to minimize exposure and to delineate the condition until permanent repairs can be made. In the case of a damaged W-beam and crash ends, this will often require cutting and removing the damaged sections that encroach into the shoulder or travel lanes and delineating the area with barricades, cones or barrels. Damage that renders a bridge rail ineffective may additionally require the use of concrete barrier or other similar measures to minimize exposure to traffic until such time that permanent repairs can be made.

##### *Permanent Repairs*

Permanent repairs shall be made in accordance with the time frames set forth in the following table. Critical damage is defined as damage that has rendered the Roadside Safety Barrier ineffective and complete units or sections need to be replaced to restore functionality. Non-critical damage is defined as damage beyond cosmetic that may have impacted the original design of the barrier to some extent, but the barrier will still function in a manner close to that which was originally intended. This may include flattened sections of W-beam, a cracked wooden post on a crash end, impacted bridge rail, guardrail beam where a section has been pushed out of line and other similar conditions.

Repair Schedule for Critical Damage*	Priority 1	Priority 2	Priority 3-5
W-Beam Crash End	2 weeks	4 weeks	6 weeks
W-Beam Post/Beam	2 weeks	4 weeks	8 weeks
Median Cross-over Cable	2 weeks	N/A	N/A
Crash Cushion	3 weeks	6 weeks	N/A
Bridge Rail	1 week	1 week	1 week

**Non-critical damage** should be repaired within **3 months** for Priority 1 & 2 corridors and within **6 months** for all lower priority corridors.

\*Winter Damage

Accumulated damage that cannot be repaired over the winter months due to frost and/or snow banks shall be seasonally exempted from the time frames noted above. Following the winter season, all Roadside Safety Barrier damage on Priority 1 corridors shall be inventoried by the **end of April** and repaired or replaced by **June 15<sup>th</sup>**.

*Activity 579 & 582 Bridge Cleaning & Washing*

- 100% of MaineDOT owned/maintained bridges that are not buried bridges will be cleaned and washed annually.

*Activity 631 & 632 Installing Signs/ Maintaining Signs*

**General (ALL priorities):**

- STOP, YIELD, ONE WAY, DO NOT ENTER, WRONG WAY, Posted Bridge, and Maine DOT (non-contractor) Work Zone signs: Any damaged, knocked down or missing signs of these type shall be **immediately** replaced using an emergency call out to the responsible Transportation Crew Supervisor. When the sign is replaced using a temporary support, arrangements shall be made the **next full workday** to permanently replace the sign. New sign installations shall be completed within two (2) weeks from receipt of a request..
- Warning Signs (Black on Yellow; i.e. curve/chevron): When a sign is damaged or missing, the sign shall be repaired or replaced within **two (2) weeks**. New warning sign installations shall be completed within two (2) weeks.
- Speed Limit and other regulatory signs: When a sign in this category is damaged or missing, it shall be replaced within **two (2) weeks**. New sign installations shall be completed within two (2) weeks.

- Guide and Directional signs: When a Guide or Directional sign is damaged or missing, it shall be repaired or replaced within **eight (8) weeks**. New sign installations of this category shall be completed within eight (8) weeks.
- Delineator Posts: When a delineator is damaged or missing, it shall be repaired or replaced **annually**, in the spring or as weather permits during the winter months.
- Sign Straightening: Sign posts and delineators shall be straightened **annually**, preferably in the spring while the ground is soft.
- Official Business Direction Sign (OBDS): When an OBDS is damaged or missing, it shall be repaired or replaced within four (4) weeks. New OBDS installations or takedowns for cancellations shall be performed within four (4) weeks.
- Sign Logs: Sign logs shall be maintained for all state routes whenever a sign is replaced, repaired, updated, installed or otherwise maintained.

**Priority 1 Roads:**

- Signs should be upgraded or replaced every **10 years**.
- Damaged/missing guide/directional signs on the Interstate System shall be repaired/replaced within **four (4) weeks** of notification/discovery (as opposed to the 8 weeks for all other directional/guide signs listed above).

**Incident Response**

**Annual Expenditures/Needs by Asset Type**

MaineDOT currently spends an average of \$32 million a year for the past 5 years on the Interstate system. MaineDOT is committed to eliminate all “D”s and “F”s on the Interstate system by 2022. In order to meet the goals stated previously and preserving what we have, money must be invested. This report shows an average annual need of \$69 million over the next 20 years for a total of \$1.31 billion. Here is a chart showing the needs per asset.

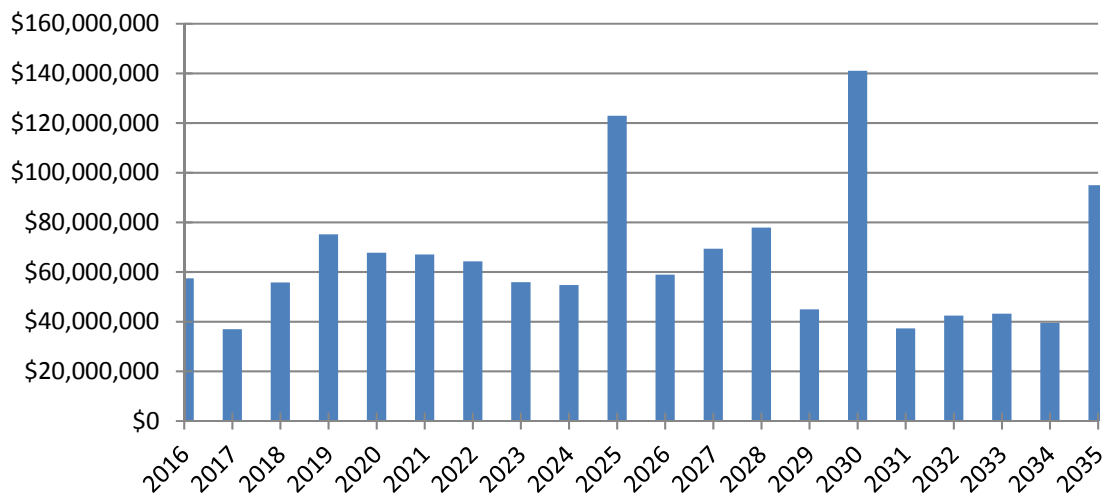
The chart below displays the current Interstate expenditures in comparison to projected needs. The general condition is a relative rating of the asset group. The percent deficient column shows the percent of the inventory that do not meet the customer service level goals or are past the asset’s design life.

Asset	Average Annual Current (Million) 2010 - 2018	Average Annual Need (Million) 2016 - 2035	Total Need (Million) 2016 - 2035	Average Annual Difference (Million)
Pavement	\$20.0	\$20.0 through 2020 \$16.0 after	\$345.0	-\$4.0 after 2020
Bridge On	\$7.3	\$22.7	\$454.4	\$ 15.4
Bridges Over	\$0	\$14.2	\$285.0	\$ 14.2
Large Culverts	\$0	\$3.0	\$54.0	\$ 3.0
Cross Culverts	\$0.25	\$0.65	\$11.7	\$ 0.4
Highway Lighting	\$1.0	\$1.0	\$20.0	\$0
Sign Trusses	\$0	\$0.29	\$5.9	\$ 0.3
Guardrail	\$0.5	\$1.5	\$27.0	\$ 1.5

Signs	\$0.1	\$0.35	\$6.8	\$ 0.25
Changeable Message Boards/ITS	\$0.21	\$0.21	\$4.12	\$0
Striping	\$.65	\$.65	\$13.0	\$0
Variable Speed Signs	\$0	\$0	\$0	\$0
Noise Barriers	\$0	\$0.3	\$5.9	\$ 0.3
Traffic Monitoring Sites	\$0	\$0.05	\$0.9	\$ 0.1
Weigh-In-Motion	\$0	\$0.14	\$2.8	\$ 0.1
Road Weather Information Systems	0	\$0	\$1.4	\$0
Retaining Walls	\$0	\$0	\$1.7	\$0
Park and Rides	\$0.1	\$0.22	\$4.3	\$ 0.1
Safety Ramp Improvements	\$1.7	\$1.05	\$21	\$ 0.7

The graph below illustrate the annual needs and cumulative needs of the system. This shows the Department will need an average annual increase of \$36.6 million and a total of \$1,307.4 million over the next 20 years.

### Projected Overall Annual Interstate Investment Need



There are some large capital projects that influence the yearly expenditures significantly:

- Bangor – Hogan Road, \$24.5 million in 2025
- Portland – Tukey’s Bridge, \$52.5 million in 2030
- Bangor/Brewer – Veterans Remembrance, \$38.5 million in 2035
- Kittery – I95 over Piscataqua River, MaineDOT’s share is \$13.5 million of a \$27 million project in 2018
- System-Wide – Determining specific alternatives to improve LOS to C or better over the next 20 years was outside the scope of this plan due to the associated modeling and regulatory requirements. There is currently a planning study underway to evaluate congestion and safety improvements that would effectively increase customer service levels on the interstate system.

## Costs to Maintain Level of Service Goals

In addition to the capital costs expended for asset improvement/replacement summarized above, the Department incurs additional expenses for the maintenance and operation of our interstate assets as described below:

Activity	Lane Miles	Annual \$ per LM	Interstate LOS Cost
Snow and Ice Removal	1115	\$4,337	\$4,835,755
Incident Response	1115	\$338	\$376,870
Spot Surface Repair	1115	\$68	\$75,820
Vegetation Management	1115	\$1,220	\$1,360,300
ROW Fencing	1115	\$976	\$1,088,240
Custodial Maintenance	1115	\$148	\$165,020
		<b>Subtotal</b>	<b>\$7,902,005</b>

## 20 Year Asset Type Investment Levels and Strategies (2016 through 2035)

20 year HASS Totals ***	Paving Cost	Bridge Cost	Other Cost	Total
I-195 - SACO - I-95 TO ROUTE 1	\$758,400	\$2,490,000	\$1,802,057	\$5,050,457
I-295 BRUNSWICK TO WEST GARDINER	\$19,298,445	\$35,360,000	\$9,771,539	\$64,429,984
I-295 FALMOUTH SPUR TO BRUNSWICK	\$16,572,685	\$71,435,000	\$7,361,352	\$95,369,037
I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR	\$10,465,070	\$128,510,000	\$10,427,519	\$149,402,589
I-395 BANGOR TO BREWER	\$8,411,600	\$56,630,000	\$4,670,311	\$69,711,911
I-495 PORTLAND TO FALMOUTH	\$0	\$11,410,000	\$51,620	\$11,461,620
I-95 AUGUSTA WESTERN AVE TO NEWPORT	\$58,733,930	\$149,435,000	\$20,190,875	\$228,359,805
I-95 BANGOR I-395 TO MEDWAY	\$46,333,406	\$128,532,000	\$18,947,330	\$193,812,736
I-95 LEWISTON TO AUGUSTA WESTERN AVE	\$601,805	\$865,000	\$137,382	\$1,604,187
I-95 MEDWAY TO CANADA	\$57,730,694	\$74,030,000	\$34,757,578	\$166,518,272
I-95 NEW HAMPSHIRE TO SACO	\$0	\$9,200,000	\$119,980	\$9,319,980
I-95 NEWPORT TO BANGOR I-395	\$16,514,165	\$75,725,000	\$9,882,450	\$102,121,615
No location	\$2,432,800	\$0	\$0	\$2,432,800
Total *** Paving Goes to 2028	\$237,853,000	\$743,622,000	\$118,119,993	\$1,099,594,993

### Pavements

With the current condition of the Interstate and the reduced life of treatments, a new strategy is needed. It was decided in 2014 that the Department would follow modified Pavement Preservation strategies in managing the Interstate. The basic idea of pavement preservation is that it is much more cost effective to keep a “good” road in good condition than it is to bring a “bad” road up to a good condition.

The standard mill & fill treatment costs around \$400k/mile in rural areas and \$500k/mile in urban settings (Portland, Augusta, Waterville, and Bangor). Recently, several states have been using a newer preservation treatment call Ultra-Thin Bonded Wearing Course (UTBWC). This is a thinner (3/4” +/-) treatment that improves the ride, reduces road noise and tire spray, and increases skid resistance. The cost for this treatment is around \$160k/mile if utilized on road sections in appropriate condition (less than 1/2” ruts). It is estimated that the life of UTBWC is 7-9 years. Based on current treatment life

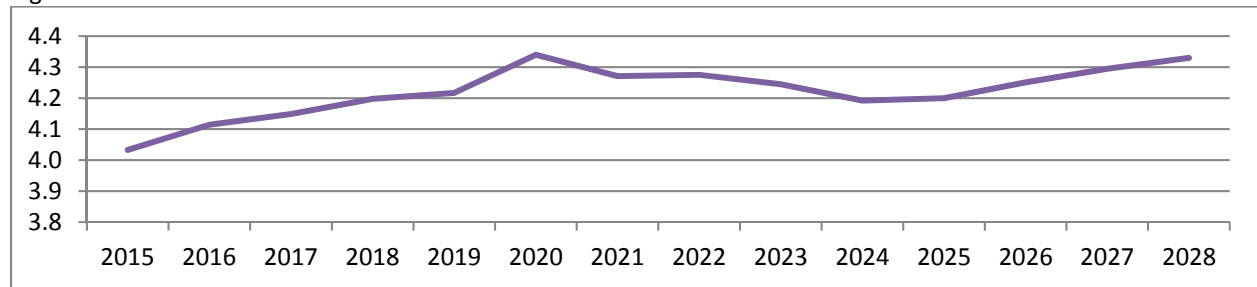
expectancies, both treatments last about the same amount of time and the UTBWC is 40% of the cost of a mill & fill. UTBWC can be applied multiple times to the same stretch of roadway, but every other treatment would be estimated at \$240k/mile to include shoulders, ramps, ditching, guardrail, and pipes.

The premise behind the current candidate selection strategy is to fix underlying issues in the ‘C’ and ‘D’ sections to get them into good enough condition that a light treatment can be done in the future and to perform a light treatment on the ‘B’ sections before they deteriorate to the point of requiring a heavy treatment.

Based on this strategy and extensive research showing the acceleration of the pavement deterioration on I-295, the Department has determined that pavement preservation on the Interstate will be funded at \$25 million in 2016 and \$20 mil/year from 2017 to 2020.

With this level of funding, it is anticipated that the average pavement condition rating of the system will increase by 7.5% in the next twelve years – Figure 1.

Figure 1



The mix of treatments focus on heavier preservation treatments at first bringing the system up to a condition to transition to primarily light treatments within 6 years – Figure 2.

Figure 2

Year	PPM_125	Hvy_Rehabil	Mill_Fill_175	Ultra_Thin_Bond	
2015	-	-	13,130,000	-	13,130,000
2016	-	3,800,000	18,735,500	3,440,000	25,975,500
2017	-	-	9,458,000	9,232,000	18,690,000
2018	-	3,342,000	12,306,500	5,339,200	20,987,700
2019	-	-	11,713,000	7,833,600	19,546,600
2020	-	-	5,080,000	14,545,600	19,625,600
2021	-	-	428,000	6,091,200	6,519,200
2022	-	-	1,280,000	17,542,400	18,822,400
2023	-	-	-	12,804,800	12,804,800
2024	-	-	160,000	7,948,800	8,108,800
2025	-	-	-	15,524,800	15,524,800
2026	-	-	-	19,150,400	19,150,400
2027	-	-	-	19,987,200	19,987,200
2028	-	-	452,000	18,528,000	18,980,000
					<b>237,853,000</b>
	-	7,142,000	72,743,000	157,968,000	
	<b>0.0%</b>	<b>3.0%</b>	<b>30.6%</b>	<b>66.4%</b>	

This scoping approach will also address the rutting issue. It is projected that the miles with an average rut greater than 7/16” will drop from 55% in 2016 to 25% in 2019 to 1% in 2022. With more frequent

light treatments, it is projected that rutting will not be a safety concern for any portion of the interstate system beginning in 2023.

Looking at Figure 2 you will notice that future years do not require all the funds. It is anticipated that after 2020, the Interstate can enter more of a cycle paving approach with limited mill & fill. It is currently estimated that 10 miles of mill & fill, 30 miles of UTBWC, and 30 miles of heavier scope UTBWC will be accomplished each year beginning in 2021 for an estimated annual cost of \$16 million.

## Bridges

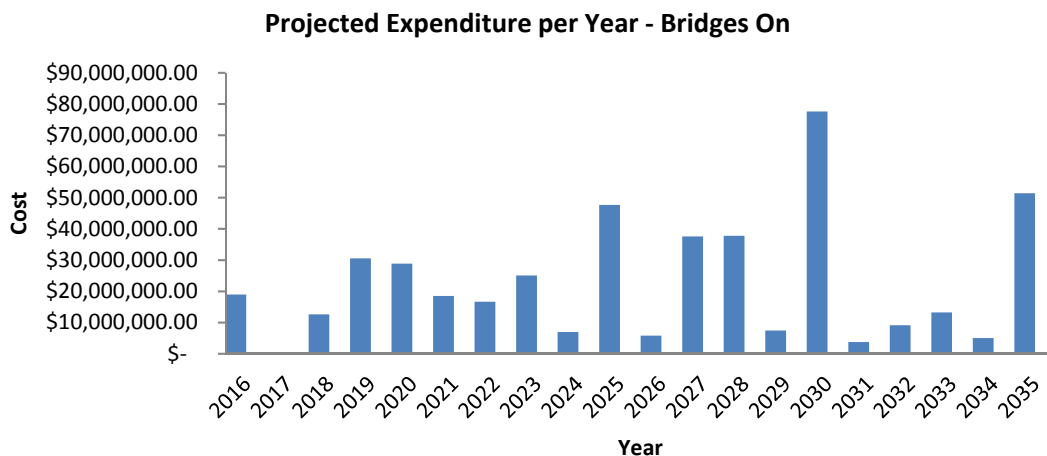
A team was developed to evaluate the condition of the system and estimate the required work for the next 20 years. The team consisted of members from Bridge Management, Bridge Program, Bridge Maintenance, and the Regional Bridge TOM. The team reviewed every structure by looking at past inspection reports and photos and individual strategies were developed. The estimates developed are square foot construction estimates based on historical data.

The strategies developed follow the methodologies and guidelines discussed in “Keeping Our Bridges Safe 2014 Report.” A high level of attention was given to preservation activities in order to keep the 94% of the Interstate inventory in good and fair condition. The preservation scopes include both one time activities and cyclical preventative maintenance. In addition to the preservation projects, several deck replacements will be due in the next 20 years. The projected work, estimates, and time frames are charted for each corridor and can be found in the KOBs report.

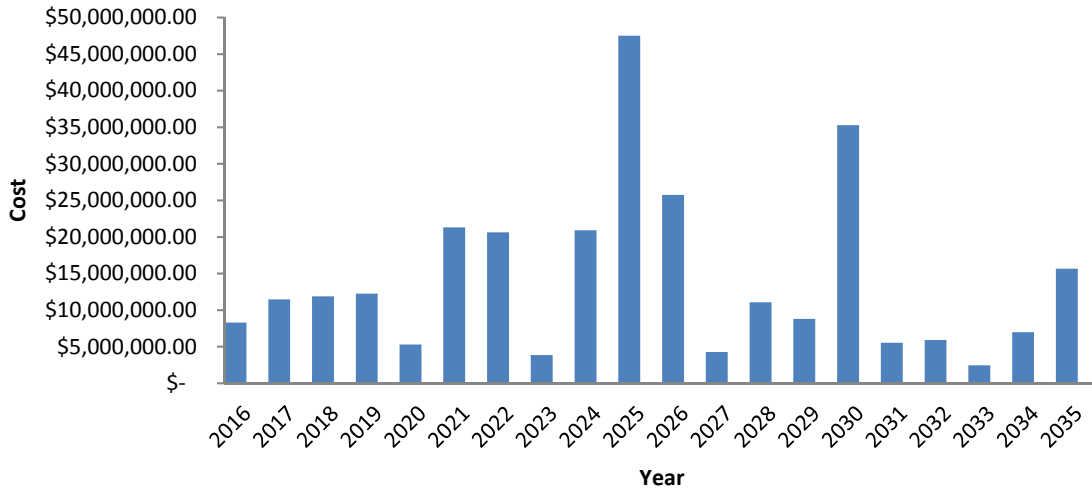
Both capital and maintenance activities were included in the report. Who does what work can be determined later. The report focused on the following

- Do the right thing at the right time to cost-effectively maximize the life of the bridges.
- Meet our MAP21 goals
- Meet our Customer Service Levels

To meet these goals, it is estimated that \$739.4 million will need to be spent on the bridges on and over the Interstate system. This averages to \$36.8 million a year. The distribution of funds is shown in the graph below.



### Projected Expenditure per Year - Bridges Over



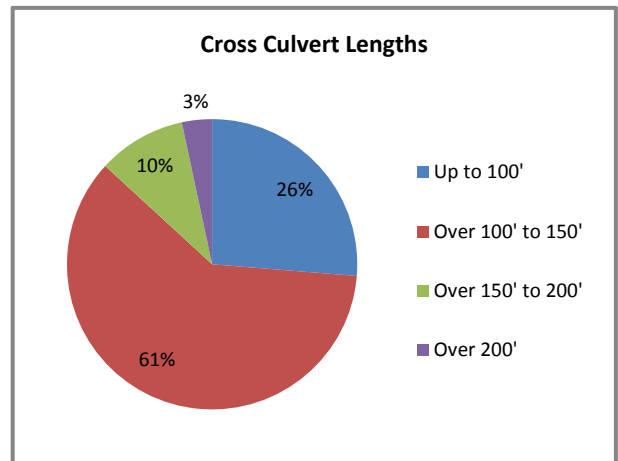
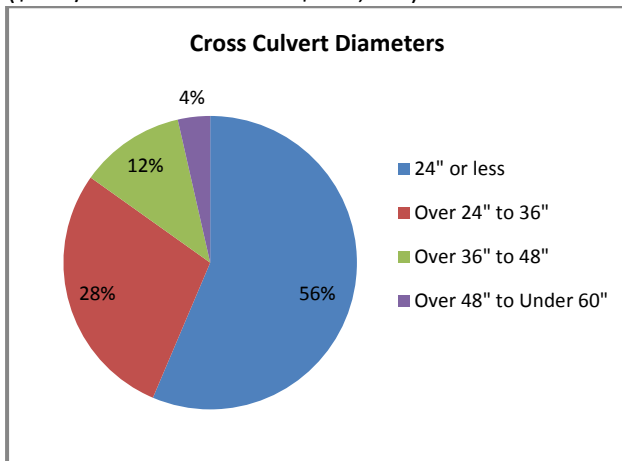
The spikes in expenditure are a result of a few large projects. The large capital projects are as follows:

- Bangor – Hogan Road, \$24.5 million in 2025
- Portland – Tukey’s Bridge, \$52.5 million in 2030
- Bangor/Brewer – Veterans Remembrance, \$38.5 million in 2035
- Kittery – I95 over Piscataqua River, MaineDOT’s share is \$13.5 million of a \$27 million project in 2018

### Culverts

In consideration of the current interstate large culvert types and conditions, it is presently estimated that an average of **3 large culverts should be replaced, relined or rehabilitated each year at an estimated average total cost of roughly \$3,000,000 per year**. This accounts for the existing large culverts that are currently metal and a percentage of culverts that will become large culverts when replaced due to environmental and hydrological restraints.

Culverts under 5 feet are estimated to require a replacement/rehabilitation rate of approximately **26 to 27 per year, at an estimated total annual cost of \$650,000**. This is based upon the fact that the vast majority of culverts are 36” or less in diameter and that the average culvert length is just over 120 feet. ( $\$200/LF \times 120 LF \times 27 = \$650,000$ )





## Highway Lighting

Current Best Practices dictate that we can expect Standard Lighting to last 30 years, and High Mast Tower Lighting to last 40 years.

### Replacement Plan Specifics (Current and Recommended)

By replacing an average of two interchanges per year, we can replace our Interstate Lighting as it reaches the end of its intended life. Each interchange costs approximately \$500,000 to replace, for an **annual cost of \$1,000,000**. This is consistent with the amount we currently have programmed. This is the amount needed in the Capital Program, maintenance costs are not included and are currently adequately funded.

Town	Asset Type	Name	Condition	Year
Pittsfield	Standard	Exit 150	1975	2016
Fairfield	Standard	Exit 133	1975	2016
Sherman	Standard	Exit 264	1975	2016
Yarmouth	Standard	Exit 17	1975	2017
Newport	Standard	Exit 157	1975	2018
South Portland	Tower/Standard	Exit 4	1985	2018
Smyrna	None	Exit 286	N/A	2018
Freeport	Standard	Exit 22	1975	2019
Lincoln	Standard	Exit 227	1975	2019
Orono	Standard	Exit 193	1975	2020
Freeport	Standard	Exit 24	1985	2020
Howland	Standard	Exit 217	1980	2021
Brunswick	Standard	Exit 28	1990	2021
Bangor	Standard	Exit 2	1990	2022
Brewer	Standard	Exit 4	1990	2022
Island Falls	Standard	Exit 276	1985	2023
Brewer	Standard	Exit 5	1990	2024
Brewer	Standard	Exit 6	1990	2024
Portland	Tower	Exit 5	1985	2025
Portland	Tower	Exit 6	1985	2025
South Portland	Tower	Exit 3	1985	2026
Portland	Tower	Exit 7	1985	2026
Orono	Standard	Exit 191	NB 1996 SB older	2027
Portland	Tower	Exit 8	1985	2027
South Portland	Tower	Exit 1	1985	2028
Portland	Tower	Exit 9	1985	2028
South Portland	Tower	Exit 2	1985	2028
Augusta	Standard	Exit 112	2000	2029
Medway	Tower	Medway Rest Areas	1985	2029
Hampden	Standard	Exit 180	2000	2030

Houlton	Standard	Exit 302	2000	2030
Falmouth	Tower	Exit 10	1988	2030
Falmouth	Tower	Exit 11	1988	2030
Waterville	Tower	Exit 127	1990	2031
Waterville	Tower	Exit 130	1990	2031
Bangor	Standard	Exit 182	2002	2031
Houlton	Standard	Exit 305	2000	2031
Bangor	Standard	Exit 183	2002	2032
Bangor	Standard	Exit 184	2002	2032
Saco	Tower	Exit 1	1990	2032
Saco	Tower	Exit 2	1990	2032
Bangor	Standard	Exit 185	2002	2033
Bangor	Standard	Exit 186	2002	2033
Bangor	Standard	Exit 187	2002	2033
Clinton	None	Exit 138	N/A	
Augusta	Standard	Exit 109	2009	
Augusta	Standard	Exit 113	2013	

### Sign Trusses

As we become aware of potentially dangerous structures through our inspection program, each situation will need to be addressed individually, in a very short time span. When action is required, an assessment will be done to analyze which signs are necessary, and if they need to be overhead; some trusses may be removed and replaced with roadside signs, which are less expensive and easier to maintain.

Our long-term goal will be to replace 3 to 4 trusses each year (including non-interstate trusses), so structures are not pushed beyond their design life; aligning truss projects with nearby bridge or highway projects, is desirable. New span or cantilever trusses cost approximately \$1500/LF, this includes design, fabrication, and installation; new overpass trusses cost approximately \$6000 per sign to install, this includes design, fabrication, and installation. There is a PE cost of 20% and CE cost of 15% for the design, fabrication, and installation of each type of truss. The removal of an existing span or cantilever truss is roughly \$6000 per structure, while the removal of an existing overpass truss is approximately \$1000 per sign.

There has been very little maintenance performed on trusses up to this point. Going forward, foundations should be coated with a concrete sealer (silane, boiled linseed oil, or similar product) every 5 years, prolonging the life of these foundations. Sealing a structure costs approximately \$200 per application, not including traffic control. Other maintenance will be on an as needed basis and may include patching, tightening bolts, and cold galvanizing; these processes are relatively inexpensive, but traffic control will quickly run up costs.

### Plan Specifics

To replace span and cantilever structures steadily over the next 20 years (to keep pace with a 50 year design life), the cost will be approximately \$3,888,000 (\$194,400 annually), not including traffic control. Traffic control will be an additional \$250,000 (roughly) (\$12,500 annually).

To replace overpass structures steadily over the next 20 years (to keep pace with a 25 year design life), the cost will be approximately \$394,200 (\$19,700 annually), not including traffic control. Traffic control will be an additional \$136,000 (roughly) (\$6,800 annually).

According to preliminary estimates, interstate truss inspection will cost approximately \$520,000 (\$26,000 annually), and an additional \$640,000 (\$32,000 annually) for traffic control when inspections are run on a six year cycle. Currently \$125,000 is annually budgeted for scheduled and emergency inspections and analysis for both on and off interstate trusses, we estimate approximately \$75,000 will be used for interstate trusses. During the accelerated inspection cycles in 2016 and 2017, annual cost estimates are \$200,000.

Sealing all of the truss foundations every 5 years for the next 20 years will cost approximately \$60,000 (\$3000 annually), and an additional \$100,000 (\$5000 annually) for traffic control.

### Signs

We will initially, in 2016, attempt to accomplish this with all State Crews, both making and installing signs. Our Sign Shop in Augusta will make all of the signs. Our Sign Crew will install all mainline signs, as well as extruded signs on ramps and crossroads. A second sign crew, using 2 Paint Crew Members, will replace non extruded signs on ramps and cross roads, at 7 interchanges per year.

Depending on how successful that effort is, future years may or may not involve contracting out some of the installation work. The MDOT Sign Shop should be able to make all the signs without contracting out.

All LOGO Sign replacement will be contracted out separately and paid for from LOGO fees.

### 10 Year Plan Specifics

2016 - Section 1 – 95 NB Augusta to Newport - replace everything 2004 and older (so we would be replacing some signs that are only 12 years old).

Sign Type	Number	Cost Each	Total Cost
Overhead Signs	5	10,000	50,000
Extruded - 1 Post	21	1225	25,725
Extruded - 2 Post	35	4200	147,000
Extruded - 3 Post	4	5600	22,400
Non-Extruded	100	360	36,000
<b>TOTAL</b>	<b>165</b>		<b>281,125</b>

(E = Extruded, 1, 2, and 3 refer to number of posts, NE = Non-Extruded)

(PLUS 14 EXTRUDED SIGNS OFF MAINLINE, ON RAMPS AND CROSS ROADS, \$17,150)

(PLUS 154 NON EXTRUDED SIGNS OFF MAINLINE, ON RAMPS AND CROSS ROADS, \$55,440)

**TOTAL COST 2016 = \$353,715**

2017 – Section 2 – 95 NB from Newport to Old Town- replace everything 2004 and older (so we would be replacing some signs that are only 13 years old).

2018 – Section 3 95 NB from Old Town to New Limerick- replace everything 2004 and older (so we would be replacing some signs that are only 14 years old).

2019 – Section 4 – 95 NB and start 95 SB - replace everything 2004 and older.

2020 – Section 5 – 95 SB - replace everything 2005 and older.

2021 – Section 6 – 95 SB - replace everything 2006 and older. Sign crew replaces all signs over 15 years old in Sections 1-4.

2022 – Section 7 – 95 SB and 295 SB - replace everything 2007 and older. Sign crew replaces all signs over 15 years old in Sections 1-5.

2023 – Section 8 – 295 SB - replace everything 2008 and older. Sign crew replaces all signs over 15 years old in Sections 1-6.

2024 – Section 9 – 295 NB - replace everything 2009 and older. Sign crew replaces all signs over 15 years old in Sections 1-7.

2025 – Section 10 – 295 NB and 195/395 - replace everything 2010 and older. Sign crew replaces all signs over 15 years old in Sections 1-8.

### **TOTAL 10 YEAR COST \$3.54 MILLION**

This is the amount needed for the 10 year plan to get our deficient signs to zero. Could be done by maintenance crews, through the Capital Program, or some combination of the two.

2026 – Sign crew replaces all signs over 15 years old each year.

### **General Sign Cost and Age Information**

#### Cost of Signs

60% are Non-Extruded (contract price of 18SFx\$20= \$360)

13% are Single Post Extruded (contract price of 35 SFx\$35= \$1225)

27% are Double Post Extruded (contract price of 120SFx\$35= \$4200)

#### Age of Signs

1030 signs are Year 2000 or older = 48%

(1641 signs are 2004 or older = 77%)

1672 signs are 2005 or older = 78%

1882 are 2010 or older = 88%

## Changeable Message Signs (CMS) / ITS and Variable Speed Signs

Our long-range goal is to move away from the Variable Speed Signs replace them with CMS. This would give us significantly increased ability to relay important messages to the travelling public, beyond just lowering the speed limit. The expected life of a CMS is 10 years. For more complete information please refer to the Department’s Mobility Report.

### Replacement Plan Specifics (Current and Recommended)

CMS would be purchased over a 3-year period starting in 2018, with approximately 20 units purchased and installed per year. We would use portable signs but at fixed locations to save money (the cost of a larger permanently mounted sign is approximately \$150,000). Cost per unit is \$25,000 for a cost per year of \$500,000, and **\$1.5 Million over the 3-year purchase period**. This would give us the ability to relate traffic control and informational messages to the travelling public at most of our interchanges. We will start with I-295 in 2018 as this is our most heavily travelled corridor. This is the amount needed in the Capital Program, maintenance activities are currently adequately funded.

### Highway Noise Barriers

The estimated costs, in 2014 dollars, to rehabilitate and reconstruct the Exit 185 barrier in Bangor, as currently configured, are:

- Cost to rehabilitate: \$150,000 – \$250,000
- Cost to reconstruct: \$650,000

MaineDOT’s goal is to remain compliant with the State of Maine/ Federal Highway Administration jointly approved Highway Noise Policy that must be renewed or updated every two years. The highway essentially requires MaineDOT to perform a noise analysis on any new highway capacity projects. Mitigation is only required when warranted and feasible such as a large number of parcels adversely impacted by highway noise. Based on potential new Interstate capacity projects, The likelihood of additional investment in noise barriers on the interstate system is presented in Table 1:

*Table 1: Likelihood of additional Noise Barriers over the next 20 years*

Town	Location	Recommendation	Likelihood of noise abatement		Estimated Barrier Cost
			Somewhat Likely	Very Likely	
Portland	I-295 Exit 5-6 NB	Consider auxiliary lane	X		\$ 1,188,000.00
Portland	I-295 Exit 5-6 SB	Consider auxiliary lane		X	\$ 1,188,000.00
Bangor	I-95 Exit 183 SB On-Ramp	Extend acceleration lane	X		\$ 718,000.00
Bangor	I-95 Exit 183 NB On-Ramp	Extend acceleration lane	X		\$ 1,238,000.00
Bangor	I-95 Exit 184 NB Off-Ramp	Extend deceleration lane		X	\$ 594,000.00
Bangor	I-95 Exit 184 SB On-Ramp	Extend acceleration lane	X		\$ 421,000.00
Bangor	I-95 Exit 185 SB On-Ramp	Extend acceleration lane	X		\$ 792,000.00
<b>Total</b>					\$ 6,139,000.00

MaineDOT does not fund retrofits to existing sections of highway where abutters express concern over noise levels. MaineDOT conforms with federal requirements in planning, policy development and implementation. MaineDOT keeps existing structures at least in adequate conditions and new structures will only be constructed if required.

### **Traffic Monitoring Sites**

Currently, the Department installs 3 basic types of permanent vehicle count sites on the interstate:

- Volume Sites – these locations include installation of loop sensors in the pavement and placement of a traffic cabinet to house all the data collection and communication equipment. Estimated cost for equipment, installation and lane control is \$12,000.
- Axle Based Classification Sites – these sites include installation of loop and axle sensors in the pavement as well as placement of the traffic cabinet. Estimated cost for equipment, installation and lane control is \$12,500.
- Length Based Classification Sites – sensors are mounted alongside the road and require only shoulder closures. Placement of the traffic cabinet is needed. High volume, high speed highways are reviewed for safety concerns and the non-intrusive technologies provide an alternative solution to data collection. Additionally, the sensor life is significantly increased as pavement deterioration is not a consideration. However, these sensors may require an AC power source. Estimated cost associated with these sites various based on the sensor - \$10,000 to \$24,000.

Mill and fill projects (and occasionally, ditching operations) destroy in-pavement sensors, so site installations tend to coincide with paving projects. Installation of in-pavement sensors is generally done several months after paving, to allow for settling. This costs about \$2100 per lane in traffic control, but greatly improves the longevity of the sensor.

Monthly fees include communication costs from \$25 to \$40 depending on type of phone service available for that area. Power bills may be necessary for certain non-intrusive sensors.

Maintenance costs vary over time. Pavement sensors require periodic sealing as the grout tends to break up and sensors are exposed. This activity involves two days of work as well as lane closures at an approximate cost of \$5,000. The life expectancy for these in-ground sensors is 5 to 7 years. The non-intrusive technologies require little maintenance. The overall life is rated for 10 to 15 years. Since these sensors were first installed in 2014, we have no experience to backup these claims.

### **Replacement Plan Specifics**

Volume and axel based classification sites will be replaced in Freeport, Brunswick, and Sidney during the 2016 and 2017 construction seasons, due to paving projects in the area. One future installation for length based classification on the Interstate is planned, on I-95 in Bangor between Exits 184 and 185.

20 years of site installations will cost about \$363,500; cost for maintenance and fees will be approximately \$554,800.

Currently, the budget for interstate traffic monitoring sites is included in the budget with all traffic monitoring sites, and it is exceedingly difficult to separate interstate data from off interstate data. The

current budget does meet all needs for interstate traffic monitoring site installation, maintenance, and fees.

### **Weigh in Motion Systems**

Transportation Analysis would like to collect (and continue to collect) weight data (northbound and southbound) along the following corridors:

- I-95, Kittery, near the New Hampshire state line
- I-295, between the Falmouth Spur and the US 1 Connector in Brunswick
- I-95, between the Third Bridge in Augusta and Waterville
- I-95, between Rt 139 in Fairfield and I-395 in Bangor
- I-95, between Route 16 in Old Town and US 1 in Houlton

WIM sites have a life expectancy of about 5 years, but the Department will continue to collect data beyond that date, as long as the site is still operational. Paving projects destroy WIM sites, therefore sites must be replaced whenever a paving project goes through the area. It is best for WIMs to be installed as part of a paving project, the site will last longer and money is saved on traffic control. For this reason, an effort is being made to install 2 WIM sites every year (either on or off interstate) as part of a paving project.

To install one WIM site, the cost is \$14,500 per location for cabinet and equipment and \$25,000 per lane for loops and sensors, with a PE cost of 5% and CE cost of 15%; traffic control is taken care of by the paving project.

The yearly maintenance cost for interstate WIMs is approximately \$5300 for calibration (personnel and calibrated flatbed truck) and \$1500 for repair (personnel only, all components are culled from non-operational sites).

Though WIM sites are calibrated, no check is run to confirm that the site is classing vehicles correctly. To mend this situation would require one person to travel to the WIM location and compare the vehicles on the road to the data being collected in real time. This check would cost approximately \$200 per site, and should be performed at least once over the lifetime of each installation.

Currently, when a WIM site ceases to collect reliable data, it is abandoned, but none of the equipment is removed. Generally, components are only removed from non-operational WIM sites on an as-needed basis, to repair operational WIM sites. Rather than leave these components in non-operational WIM sites, it would be better to collect the salvageable parts, send them out for repair, and have the software updated to the latest version; a rough cost estimate to retrieve, repair, and update these materials is \$1000 per site, all abandoned equipment is presently located off the interstate.

### **Replacement Plan Specifics**

New WIM sites will be installed along the I-295 Falmouth to Brunswick in and I-95 Augusta to Bangor corridors during the 2016 and 2017 construction seasons; another site will be installed along the I-95

Old Town to Houlton corridor before 2020. All replacements will be scheduled to coincide with interstate paving projects.

WIM calibrations and maintenance will continue to be done, with the addition of the vehicle class checks in 2016.

20 years of new WIM installations (without traffic control) will cost about \$2,640,000; cost for maintenance, calibration, fees, and vehicle class checks will be \$198,800.

### Road Weather Information Systems (RWIS)

In general, we have not had enough of these stations to be useful as a statewide snow fighting tool, nor have we utilized them to guide our operations during storm events. Recently, Idaho DOT has installed a \$23 million Statewide system with new Grip Sensor technology and has utilized RWIS as an in storm tool to time salting operations. They determined they have saved \$15 million on the Operations side, and another \$25 million in accident reduction. It is Maine’s goal to duplicate this success in the three interstate areas that currently have RWIS stations with the Grip Sensors and, if successful, increase the number of RWIS and Grip Sensors across the remaining nine crew areas.

### Replacement Plan Specifics (Current and Recommended)

Based on this study, Maine DOT would potentially increase the RWIS Network to provide one complete setup in each Interstate Crew Area. This would consist of one new Grip Sensor and eight complete RWIS Stations at a total **estimated cost of \$650,000**. Ongoing annual maintenance costs would also increase at a corresponding additional rate of \$40,000 per year.

### Interstate Retaining Walls

A standard has not been developed for retaining walls to this date. MaineDOT’s goals for retaining walls on the Interstate will be to inspect and maintain to the level of service, treat all concrete retaining walls with Silane, and address all retaining walls on I 395 as part of an Interstate 395 Corridor Study.

Currently there are no monetary allocations dedicated to retaining walls on the interstate.

Road	Town	Location	Type	Replacement Year	Replacement Cost
I-295	Portland	Exit 6A ramp	Bin Wall	2021	\$300,000
I-295	Portland	Under I295 Overpass NB Exit 8	Timber	2028	\$750,000
I-295	Portland	Next to NB I295, Exit 8	Timber	2028	\$100,000
I-295	Portland	Next to NB I295 Before Tukey’s Bridge	Bin Wall	Beyond 20 years	Too Far Out
I-395	Bangor	Exit 3A Ramp, EB	Concrete Panel	Beyond 20 years	Too Far Out
I-395	Bangor	Exit 3B ramp, EB	Concrete Panel	Beyond 20 years	Too Far Our
I-395	Bangor	On Ramp Exit 3 Towards WB	Concrete	2031	\$500,000

In order to meet the above, it is estimated that \$1.65 million will need to be spent on the retaining walls on the Interstate system over a 20 year period.



## Interstate Ramp Safety Needs

MaineDOT's goal is that one highway fatality is one too many. Therefore, MaineDOT strives to build and maintain the safest highway system possible, given available resources. The following table illustrates a \$21 million need over the next 20 years to achieve this goal.

### 20 Year Interstate Ramp Safety Needs

Interstate	Exit	Town name	Percent Injury Crashes	Total Crashes 2014-2016	Recommended Scope	Cost
I-195	2	Saco			Update existing signals at Route 1 to new signal heads w/reflective backer plates and overhead lane designation signs.	\$ 150,000
I-295	1	South Portland	52%	21	Extend NB on-ramp acceleration length	TBD
I-295	3	South Portland	22%	49	Monitor and reassess based on available funding	TBD
I-295	4	South Portland	27%	59	SB I-295 access from Route 1	\$ 2,400,000
I-295	5	Portland	23%	84	Realign northbound off-ramp to Congress to 90 degrees with concrete truck apron. Construct parallel acceleration lane at northbound onramp when bridge #6294 deck replacement occurs (2038 forecast).  Consider auxiliary lane from Exit 6 to Exit 5 SB  Consider auxiliary lane from Exit 5 to Exit 6 NB	\$ 1,150,000  \$ 750,000  \$ 750,000
I-295	7	Portland	17%	29	Franklin Street reconstruction from I-295/Exit 7 to Oxford Street Install auxiliary lane from Exit 7 to Exit 6 SB	\$ 7,300,000 \$ 500,000
I-295	8	Portland	25%	75	Monitor and reassess based on available funding	TBD
I-295	10	Portland	22%	23	Extend on-ramp acceleration and off-ramp deceleration lengths, NB and SB	\$500,000
I-295	11	Falmouth	25%	16	Re-align NB on-ramp to allow for Exit 10 NB on-ramp extension	TBD
I-296	15	Yarmouth	20%	25	Exit NB on-ramp acceleration length	TBD
I-295	17	Yarmouth	21%	52	Extend SB on-ramp acceleration length	\$ 60,000
I-295	20	Freeport	21%	29	Possible signal synchronization w/Route 1 signal.  Extend SB on-ramp acceleration length	\$ 25,000  TBD
I-295	28	Brunswick	26%	19	Extend NB on-ramp acceleration length	TBD
I-95	109A	Augusta			Install flashing Yield signs w/ "Yield To All Incoming Traffic" signs at southbound onramp weave section.	\$ 20,000

I-95	112	Augusta			Realign both NB and SB off-ramps to T-up to Route 27.	\$ 1,500,000
I-95	182	Bangor			Install overhead lane designation signage on I-95. Extend acceleration lane at northbound on-ramp.	\$ 800,000
I-95	183	Bangor			Consider northbound parallel acceleration lane	\$ 800,000
I-95	184	Bangor			Install traffic-actuated digital warning signs at southbound crossover ramps.	\$ 60,000
I-95	185	Bangor			Intersection improvement at the intersection of Broadway, Earl Street and I-95 north bound on-ramp.	TBD
I-95	186	Bangor			Extend southbound acceleration lane during southbound overpass bridge replacement.	\$ 800,000
I-95	187	Bangor			Convert existing interchange to a diverging diamond interchange (DDI)	\$ 5,000,000
<b>Total</b>						\$ <b>22,065,000</b>

MaineDOT currently does not differentiate between Interstate HCLs and HCLs on the rest of the public transportation system. MaineDOT considers crash number, crash severity, crash solutions and costs of solutions. Based upon a data-driven cost-benefit-analysis, MaineDOT selects project to realize the greatest safety gain given available resources.

In the past 5 years, MaineDOT has spent \$1.7 million annually on Interstate ramp safety needs compared to an annual average project need of just over \$1 million depicted in the chart above.

### Concrete Median Barriers

A standard has not been developed for concrete barrier to this date. MaineDOT's goals for concrete barrier on the Interstate will be to inspect and maintain to the level of service, treat all concrete barriers with Silane on a regular cycle, and address barriers when other projects are in the area.

Currently there are no monetary allocations dedicated to concrete barrier on the Interstate. The Bangor I-395 barrier will be replaced during the redecking of Veterans Remembrance Bridge in 2035 at a cost of \$0.5 million. The Portland I-295 barrier will be replaced during the Veranda Street Bridge replacement project in 2019 at a cost of \$2.0 million. This totals an estimated \$1.65 million will need to be spent on the median concrete barrier on the Interstate system over a 20 year period.

### Park & Ride Facilities

MaineDOT's Park & Ride facilities promote environmentally sound commuting practices and could be component of a strategy to reduce congestion without cost prohibitive highway widening. MaineDOT strives to maintain existing Park & Ride facilities in at least adequate condition and considers new facilities primarily through a demand response approach or as part of new facilities such as Yarmouth Exit 17 construction. MaineDOT typically evaluates partnering with existing facilities such as churches or large retail stores that may have excess parking capacity during commuting times before constructing new facilities.

Park & Ride improvements are typically cyclical and consist of off-site signage, on-site signage, pavement rehabilitation, gravel surface maintenance, striping, drainage repair, lighting, bike racks summer and winter maintenance.

MaineDOT staff has identified an approximate **annual \$215,000 need** over the next years compared to the approximate \$100,000 annual Work Plan figure for recent years.

### Guardrail/ Right-Of-Way Fencing

Currently guardrail needs are reviewed with each pavement preservation project and any needed work is included in the contract. Right-of-Way fencing is not reviewed or updated.

Currently the Department does not fund any guardrail upgrades separately and they are included in pavement preservation funding. It is anticipated that upgrading the Interstate guardrail to the MASH standards will require approximately \$30 million and would be funded and constructed separately from preservation.

There is no plan to upgrade the Right-of-Way fencing at this time. Replacing the existing fencing would cost approximately \$20 million.

## 5 Year Detailed Investment by HASS (2016 through 2020)

The following tables list projects selected for inclusion in the 2016 through 2020 work plan years for our interstate assets.

I-95 AUGUSTA WESTERN AVE TO NEWPORT						
WIN	NB/SB	TOWNS	SCOPE	TOTAL_FUND	YEAR	LEGEND
018129.10	Both	Waterville	New Construction	\$ 5,944,389	2016	Capital
018875.00	Both	Palmyra	Lighting	\$ 620,000	2017	Capital
022274.00	Both	Augusta	Bridge Painting	\$ 350,000	2019	Capital
020854.00	NB	Augusta, Sidney, Waterville	Mill and Fill	\$ 7,609,500	2016	Capital
022622.00	NB	Pittsfield	Bridge Deck Replacement	\$ 1,500,000	2016	Capital
022640.00	NB	Pittsfield	Bridge Deck Replacement	\$ 1,250,000	2016	Capital
022628.00	NB	Pittsfield	Bridge Deck Replacement	\$ 1,000,000	2016	Capital
022645.00	NB	Newport, Palmyra, Pittsfield	Mill and Fill	\$ 5,358,000	2017	Capital
021741.00	NB	Pittsfield	Bridge Rehabilitation	\$ 550,000	2018	Capital
022855.00	NB	Fairfield	Guardrail	\$ 130,000	2018	Capital
022306.00	NB	Fairfield	Bridge Painting	\$ 800,000	2019	Capital
022272.00	NB	Augusta	Bridge Painting	\$ 350,000	2019	Capital
021900.00	NB	Waterville	Bridge Improvements	\$ 250,000	2019	Capital
023607.00	NB	Pittsfield	Bridge Deck Replacement	\$ 1,000,000	2020	Capital
020882.00	SB	Sidney, Waterville	Mill and Fill	\$ 3,800,000	2016	Capital
022609.00	SB	Benton, Clinton, Pittsfield	Bridge Wearing Surface Replacement	\$ 100,000	2016	Capital
020889.00	SB	Augusta, Oakland, Sidney, Waterville	Ultra Thin Bonded Wearing Surface	\$ 2,017,600	2017	Capital
020382.00	SB	Benton, Burnham, Clinton, Pittsfield	Mill and Fill	\$ 5,876,000	2018	Capital
020382.10	SB	Fairfield, Waterville	Cold-in-Place Recycle	\$ 3,063,853	2018	Capital
021894.00	SB	Waterville	Bridge Improvements	\$ 250,000	2019	Capital
023611.00	SB	Benton	Bridge Strengthening	\$ 200,000	2020	Capital
023613.00	SB	Pittsfield	Bridge Rehabilitation	\$ 3,600,000	2020	Capital
023603.00	SB	Pittsfield	Bridge Deck Replacement	\$ 2,500,000	2020	Capital
023609.00	SB	Pittsfield	Bridge Rehabilitation	\$ 2,200,000	2020	Capital

**I-95 NEWPORT TO BANGOR I-395**

WIN	NB/SB	TOWNS	SCOPE	TOTAL_FUND	YEAR	LEGEND
021764.00	Both	Bangor, Carmel, Etna, Hampden, Howland, Newburgh, Newport, Old Town, Orono, Palmyra, Pittsfield, Plymouth, T2 R8 Nwp	Bridge Protective Coating	\$ 1,674,063	2018	Capital
018967.00	NB	Bangor	Bridge Substructure Rehabilitation	\$ 375,000	2017	Capital
021728.00	NB	Hampden	Bridge Replacement	\$ 3,350,000	2019	Capital
021729.00	NB	Hampden	Bridge Replacement	\$ 3,350,000	2019	Capital
021730.00	NB	Hampden	Bridge Replacement	\$ 3,100,000	2019	Capital
021673.10	NB	Hampden	Bridge Replacement	\$ 5,800,000	2020	Capital
018966.00	SB	Bangor	Bridge Substructure Rehabilitation	\$ 375,000	2017	Capital
021673.00	SB	Hampden	Bridge Replacement	\$ 5,800,000	2020	Capital
021728.10	SB	Hampden	Bridge Replacement	\$ 3,900,000	2020	Capital
021729.10	SB	Hampden	Bridge Replacement	\$ 3,900,000	2020	Capital
021730.10	SB	Hampden	Bridge Replacement	\$ 3,900,000	2020	Capital

**I-95 BANGOR I-395 TO MEDWAY**

WIN	NB/SB	TOWNS	SCOPE	TOTAL_FUND	YEAR	LEGEND
023014.00	Both	T2 R8 Nwp	Lighting	\$ 625,000	2018	Capital
022276.00	Both	Bangor	Bridge Improvements	\$ 300,000	2020	Capital
018723.00	NB	Bangor	Bridge Rehabilitation	\$ 250,000	2016	Capital
022694.00	NB	Bangor	Safety Improvements	\$ 690,000	2018	Capital
020855.00	NB	Alton, Bangor, Old Town, Orono, Veazie	Ultra Thin Bonded Wearing Surface	\$ 2,208,000	2018	Capital
022402.00	NB	Argyle Twp, Edinburg, Howland	Mill and Fill	\$ 6,072,000	2019	Capital
023597.00	NB	Howland, Mattamiscontis Twp, Medway,	Ultra Thin Bonded Wearing Surface	\$ 4,233,600	2020	Capital
020811.00	SB	Bangor	Ramp Improvements	\$ 450,000	2018	Capital
023681.00	SB	Alton, Argyle Twp, Edinburg, Howland, Ma	Ultra Thin Bonded Wearing Surface	\$ 7,928,000	2020	Capital

**I-95 MEDWAY TO CANADA**

WIN	NB/SB	TOWNS	Scope	TOTAL_FUND	YEAR	LEGEND
021675.00	Both	Benedicta Twp, Herseytown Twp, Houlton	Bridge Wearing Surface Replacement	\$ 1,300,000	2017	Capital
021765.00	Both	Crystal, Houlton, Island Falls, Medway, Oa	Bridge Protective Coating	\$ 1,400,000	2018	Capital
022470.00	NB	Benedicta Twp, Crystal, Dyer Brook, Herse	Ultra Thin Bonded Wearing Surface	\$ 7,833,600	2019	Capital
022352.00	NB	Smyrna	Bridge Painting	\$ 550,000	2019	Capital
023679.00	NB	Medway, T1 R6 Wels	Mill and Fill	\$ 5,080,000	2020	Capital
022633.00	SB	Island Falls	Bridge Wearing Surface Replacement	\$ 630,000	2016	Capital
020428.00	SB	Crystal, Island Falls, Sherman	Mill and Fill	\$ 4,288,000	2017	Capital
020425.00	SB	Dyer Brook, Island Falls	Mill and Fill	\$ 4,100,000	2017	Capital
018797.00	SB	Benedicta Twp, Herseytown Twp, Medwa	Mill and Fill	\$ 8,018,500	2018	Capital
018824.00	SB	Herseytown Twp	Large Culvert Rehabilitation	\$ 120,000	2018	Capital
022354.00	SB	Smyrna	Bridge Painting	\$ 550,000	2019	Capital

**I-295 SOUTH PORTLAND I-95 TO FALMOUTH SPUR**

WIN	NB/SB	TOWNS	Scope	TOTAL_FUND	YEAR	LEGEND
020535.00	Both	South Portland	Bridge Culvert Rehabilitation	\$ 86,000	2017	Capital
PSN 74221	Both	Portland	Bridge Rehabilitation	\$ 500,000	2018	Capital
021745.00	Both	Portland	Bridge Replacement	\$ 11,500,000	2019	Capital
023599.00	Both	South Portland	Bridge Painting	\$ 350,000	2020	Capital
022702.00	NB	Falmouth, Portland	Signing	\$ 500,000	2016	Capital
022420.00	NB	Portland, Scarborough, South Portland	Mill and Fill	\$ 3,975,000	2019	Capital
022394.00	NB	Portland	Highway Improvements	\$ 250,000	2019	Capital
023601.00	NB	South Portland	Bridge Culvert Rehabilitation	\$ 250,000	2020	Capital
012800.30	SB	South Portland	Highway Improvements	\$ 424,004	2017	Capital
023605.00	SB	South Portland	Bridge Painting	\$ 350,000	2020	Capital

**I-295 FALMOUTH SPUR TO BRUNSWICK**

WIN	NB/SB	TOWNS	Scope	TOTAL_FUND	YEAR	LEGEND
021762.00	Both	Brunswick, Falmouth, Freeport, Portland, South Portland, Yarmouth	Bridge Protective Coating	\$ 1,400,000	2017	Capital
020860.00	Both	Brunswick	Mill and Fill	\$ 629,682	2018	Capital
023663.00	both	Brunswick, Cumberland, Falmouth, Freeport, Topsham, Yarmouth	Safety Improvements	\$ 1,000,000	2020	Capital
020863.00	NB	Brunswick, Cumberland, Falmouth, Freeport, Yarmouth	Ultra Thin Bonded Wearing Surface	\$ 3,745,600	2017	Capital
022871.00	NB	Freeport	Lighting	\$ 625,000	2018	Capital
021760.00	NB	Yarmouth	Bridge Painting	\$ 350,000	2018	Capital
022382.00	NB	Yarmouth	Bridge Rehabilitation	\$ 3,000,000	2019	Capital
018783.00	SB	Brunswick, Cumberland, Falmouth, Freeport, Portland, Yarmouth	Ultra Thin Bonded Wearing Surface	\$ 3,440,000	2016	Capital
018940.00	SB	Brunswick	Bridge Painting	\$ 300,000	2016	Capital
021731.00	SB	Yarmouth	Bridge Painting	\$ 350,000	2018	Capital

**I-295 BRUNSWICK TO WEST GARDINER**

WIN	NB/SB	TOWNS	Scope	TOTAL_FUND	YEAR	LEGEND
018927.00	Both	Gardiner, Richmond, West Gardiner	Large Culvert Replacement	\$ 1,865,000	2017	Capital
018729.00	NB	Topsham	Bridge Painting	\$ 1,250,000	2016	Capital
018931.00	NB	Topsham	Bridge Painting	\$ 300,000	2016	Capital
018934.00	NB	Topsham	Bridge Painting	\$ 300,000	2016	Capital
021868.00	NB	Bowdoin, Bowdoinham, Gardiner, Richmond, Topsham, West Gardiner	Ultra Thin Bonded Wearing Surface	\$ 3,926,200	2017	Capital
016874.00	SB	Brunswick	Bridge Painting	\$ 1,250,000	2016	Capital
018937.00	SB	Brunswick	Bridge Painting	\$ 400,000	2016	Capital
018932.00	SB	Topsham	Bridge Painting	\$ 300,000	2016	Capital
018933.00	SB	Topsham	Bridge Painting	\$ 300,000	2016	Capital
021866.00	SB	Bowdoin, Bowdoinham, Gardiner, Richmond, Topsham, West Gardiner	Ultra Thin Bonded Wearing Surface	\$ 3,468,800	2017	Capital

**I-195 - SACO - I-95 TO ROUTE 1**

WIN	EB/WB	TOWNS	SCOPE	TOTAL_FUND	YEAR	LEGEND
021747.00	Both	Saco	Bridge Wearing Surface Replacement	\$ 1,200,000	2018	Capital

**I-395 BANGOR TO BREWER**

WIN	EB/WB	TOWNS	SCOPE	TOTAL_FUND	YEAR	LEGEND
022644.00	Both	Bangor, Brewer	Mill and Fill	\$ 5,250,000	2016	Capital
022278.00	Both	Bangor, Brewer	Bridge Rehabilitation	\$ 1,500,000	2020	Capital
018915.00	Both	Brewer, Eddington, Holden	Highway Improvements	\$ 8,750,000	2020	Capital

**MISC INTERSTATE PROJECTS**

WIN	NB/SB	TOWNS	SCOPE	TOTAL_FUND	YEAR	LEGEND
021763.00	Interstate 95/295 Bridges	Augusta, Benton, Bowdoinham, Clinton, Fairfield, Gardiner, Richmond, Waterville, West Gardiner	Bridge Protective Coating	\$ 1,300,000	2018	Capital
019270.00	I-95 Both	Kittery - I-95/ Piscataqua River Bridge	Bridge Wearing Surface Replacement	\$ 27,948,755	2018	Capital

## Other Corridor Planning Considerations

### Animal/Vehicle Crash Reduction and Wildlife Connectivity

Inventory:

Maine currently only collects animal vehicle collision information for reported crashes. These are crashes with injury; or property damage over \$1,000. Crashes are categorized by species, separating

out crashes with moose, deer, black bear, and wild turkey. Crash data has found that there are several crash ‘Hot Spot’ areas (see below) for these animals.

Locations/ Hot Spots of increased vehicle/wildlife interactions

Location	Mileposts- 295	Notes
South Portland-	3	ME Audubon Roadwatch Hotspot
Portland	8.5	ME Audubon Roadwatch Hotspot
Portland	9.5	Presumpscot River Bridge ME Audubon Roadwatch area
Falmouth Bucknum road Exit	10.5	ME Audubon Roadwatch Hotspot #2
Falmouth Northerly of Johnson Road	11.5	White tail
Falmouth	12.5	Quarter mile ME Audubon Roadwatch
Yarmouth Exit 15	15	One mile High density ME Audubon Roadwatch #2
Yarmouth Power crossing near Exit 15 area	15.5	White tail
Yarmouth- Royal River	16	Quarter mile ME Audubon Roadwatch Hotspot
Yarmouth Exit 17 ramp areas	17	Quarter mile ME Audubon Roadwatch
Yarmouth Freeport Salt Marsh	19 to 20	Whitetail
Yarmouth Freeport Salt Marsh and northerly	20 to 21	ME Audubon Roadwatch Hotspot #4
Freeport	20 to 22	One mile High density ME Audubon Roadwatch #3
Brunswick	27.5 to 28.5	ME Audubon Roadwatch Hotspot #5
Topsham- Androscoggin River Bridge	29.5 to 31.5	One mile High density ME Audubon Roadwatch #4
Topsham- Androscoggin River Bridge	30	Wood turtle
Topsham Powerline Crossing	33 and 34	Whitetail
Topsham Powerline Crossing	32.5 and 33	Quarter mile ME Audubon Roadwatch Area
Topsham Bowdoin	35.2	Wood Turtle and mink Block connectors
Bowdoin	37- 38.5	Quarter mile ME Audubon Roadwatch Hotspots #6
Bowdoinham	38 to 39	High crash location at Millay road
Topsham- Androscoggin River Bridge	38.5.5 to 39.5	One mile High density ME Audubon Roadwatch #5
Bowdoinham	40 to 41	Connectivity corridors for Amphibians mapped
Bowdoinham	40 and 41	Quarter mile ME Audubon Roadwatch Hotspots
Bowdoinham Richmond	42.5 to 44.5	ME Audubon Roadwatch Hotspot #7
Richmond	45.5 to 46.5	One mile High density ME Audubon Roadwatch #6
Gardiner	48	ME Audubon Roadwatch Hotspot #8
Location	Mileposts I-95	Notes
Sidney	119.4 to 120	Deer 2 moose
Waterville	128 and 129	Deer crashes
Fairfield Benton	133 to 135	ME Audubon Roadwatch Hotspot #9 Kennebec River
Waterville/Fairfield	134.5	Kennebec River Bridge Mapped as a block connector
Clinton	141	Whitetail
Clinton	141 to 142	ME Audubon Roadwatch Hotspot #10
Pittsfield	152.2	Stream crossing- mink block connector
Newport	157 to 158 block	Block connectors for aquatic wildlife
Hampden	177 to 179	Soabsdacook riparian area wildlife crossings
Bangor	186 to 188.5	ME Audubon Roadwatch Hotspot # 11

Orono	192 to 193	ME Audubon Roadwatch Hotspot # 12
Alton	200 to 201	Open bog
Howland- North		
T2 R9	235 to 236	High Moose area
Medway	242 245	Whitetail, moose
Medway	242 to 245	Eagles in roadway feeding on carrion
T1 R 6	248 to 251	Moose
Sherman	263 to 266	Many whitetail- moose
Sherman	263 to 266	Eagles in roadway feeding on carrion
Smyrna area	284 to 287	Moose/ Deer
Ludlow	291 to 296	Moose and Deer
Location	Mileposts I-395	Notes
Bangor-Brewer	2?	Peregrine Falcons on Penobscot River Bridge

Tree clearing and bridge projects work can be done anywhere along the system and specific locations are not identified in Table 2.

**Goals:**

MaineDOT strives to reduce crashes to the extent possible. Strategies to reduce animal crashes typically involve animal or human behavior modification or creating separate structures for animals and vehicles.

**Philosophy/ Recommendations:**

MaineDOT should consider options to reduce vehicle animal crashes during Work Plan synergy meetings when projects are proposed in the vicinity of each of the above hot spots. MaineDOT should also consider latest technologies and best practices during normal maintenance and sign replacement efforts.

**Vegetation Management**

**Introduction**

The interstate corridor is maintained in accordance with MaineDOT’s Vegetation Management Level of Service Policy. This policy addresses each of the vegetation management categories discussed herein. Roadside areas of interstate corridor consist of mowed inslopes and backslopes, drainage ditches, unmowed areas behind guardrail and in backslope areas, and natural forested areas typically adjacent to the outer edges of the right-of-way. Ongoing maintenance is required to maintain roadside vegetated areas to an adequate safety level.

**Condition**

In general and from the perspective of safety, roadside vegetated areas of the interstate corridor are in good condition. However, each Region with interstate should be inspecting vegetated areas each year to determine safety concerns and planning mitigation for unsafe conditions. Examples include excessive shading from trees close to the roadway, hazard trees that may fall into the roadway, dense edge growth that may provide shelter to large animals, and plants that may obscure visibility or present health risks to workers picking litter, or repairing, maintaining, and inspecting infrastructure.

**Philosophy**

Interstate corridors need to be maintained to a high safety standard. Roadsides adjacent to the travel way must be free, to the extent possible, from obstructions that would increase property damage and

personal injury should a vehicle leave the road surface. At a minimum, inslopes should meet or exceed the design standard at the time of construction. Slope angles of 3:1 or steeper may not allow for vehicles to recover and return to the road surface. Errant vehicles may travel to the top of slope or beyond. Therefore, maintaining inslopes and backslopes, wherever possible by yearly, mowing is critical to provide an adequate level of safety for vehicles departing the road. Integrated vegetation management has been, and will continue to be, a critical aspect of the long term maintenance of our interstate system.

#### Current vs. Need

Mowing takes place each year for all inslopes within safety clear zone areas of the interstate system. Backslope areas currently in grass and forbs are maintained each year either by mowing or other methods to keep trees from establishing. Interchanges are also mowed at the same time. In urban areas, such as Portland and Bangor, interchanges are typically mowed with increased frequency to maintain adequate sight distance and aesthetics. Litter removal is done prior to the commencement of mowing each year and litter is also removed prior to each mowing cycle. Areas behind guardrail and other areas inaccessible to mowing are normally treated with sustainable vegetation or other strategies described herein to control tree growth.

Tree encroachment is addressed through periodic cycles of removal that either align with capital projects or occur through specific maintenance efforts. When capital projects include the removal of trees, such removal will normally occur within a distance of 30 feet from edge of pavement and hardwood stumps are treated with herbicide to prevent re-sprouting. Maintenance efforts will also include clearing, selective thinning, brush cutting, and the use of herbicides as necessary for hazard tree removal, reducing shading of the road surface, improving sign visibility or improving visibility of large animals that may be approaching the highway. The department works to reduce tree encroachment in areas identified as high crash areas. Brush hog mulching is a strategy that may also be used following tree clearing to reclaim or establish grass areas that are capable of being maintained with mowing.

Guardrail and median cable barrier systems may be treated with herbicides to keep them relatively free of vegetation within 3 to 4 feet of the rail. Treatments are performed every other year unless a particular issue such as invasive species dictates more frequent treatment. Selective formulas are currently used to keep weeds from growing while allowing grasses to establish. Much attention has been directed at reducing the presence of weeds considered to be invasive or potentially poisonous presenting health risks to workers. Other benefits of treatment include improved sheet flow reducing rill erosion and water ponding on surfaces; reduction in time spent cleaning winter sand; and improved large animal visibility. Controlling weed growth on inslopes may be necessary if weeds continually grow to a height obscuring visibility or become so dense that mowing becomes difficult.

Vegetation may also be planted within the interstate corridor to address a variety of needs. Sustainable vegetation is used to prevent tree growth behind guardrail and in other inaccessible areas. Living snow fence is established wherever needed to reduce drifting due to open stretches adjacent to the west side of the interstate corridor. Plantings may also be used to stabilize slopes or to reduce the effects of wind tunneling under bridge structures as warranted.

Annual cost for interstate mowing and litter removal ranges from \$325,000 to \$350,000 per year. Herbicide treatments for brush, guardrail, and weed control average from \$50,000 to \$75,000 per year. Brush maintenance using mechanical methods such as brush mulchers, brush hogs, or brush mulcher/subsoilers averages around \$200,000 per year and over seeding of these areas averages from



\$50,000 to \$75,000. Hazard tree removal was common from 2000 to 2010 when federal funds were available for this practice. At the time, single tree removal cost averaged from \$75,000 to \$100,000 per year. Installation of sustainable vegetation is now limited to living snow fence with an average cost of \$20,000 to \$30,000 per year. Average annual cost for vegetation management in interstate roadside areas averages from \$625,000 to \$730,000 per year. This cost rises from \$675,000 to \$805,000 if annual single tree removal is included.

Over the next 15 to 25 years, an anticipated increase in large tree removal will take place as the need to push back the existing tree line increases and larger trees present a risk to the roadway. The anticipated need will increase the budget to at least 1 to 1.5 million per year.

### **Maine State Police – weigh stations**

In the next 20 years, the Maine State Police would like to partner for circulation improvements and construction of a modular structure for state police operations at I-95 Northbound, Pittsfield (former rest area) estimated at \$750,000. Enforcement of heavy truck weight limits is extremely important to preserve the life of Maine’s highways.

### **Utilities**

#### *Inventory*

There are currently several aerial and underground utilities crossing the Interstate system. The utility agreements since 2000 can be found in the location and opening permits database and prior to that they are located in TEDOCs.

#### *Condition*

The maintenance and capital improvements of utilities crossing the Interstate are not the responsibility of the Department. The Regions only review the requests to use the right of way to cross.

#### *Philosophy*

The rules applying to utilities on the interstate system are found in MaineDOT’s Utility Accommodation Rules 17-229 CMR Chapter 210. Section 12 Controlled Access Highways discuss the rules for the Interstate system.

#### *Current vs. Need*

The Department has no current expenditure. The only future need would be allowing clearing within the right of way to accommodate utility.