



2022 Systemwide Safety and Capacity Study

June 30, 2023



Presented By:



82 Running Hill Road, Suite 201
South Portland, ME 04106

This page Intentionally left blank.



June 30, 2023



Maine Turnpike Authority
2360 Congress Street
Portland, ME 04102

Ladies and Gentlemen,

We are pleased to submit the 2022 Systemwide Safety and Capacity Study of the Maine Turnpike. This study sets forth our findings regarding existing safety and future capacity along the Maine Turnpike and provides prioritized short- and long-term improvement recommendations with estimated construction costs for integration into the Authority's Capital Improvement Plan.

This document builds on the prior 2012 and 2016 Safety and Capacity Evaluations and utilizes corridor observations; historic volume and safety data; capacity modeling; and the latest industry standards to develop findings and recommendations.

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

Best regards,

A handwritten signature in blue ink that reads "Timothy R. Cote". The signature is stylized with a large, sweeping "T" and a cursive "Cote".

Timothy R. Cote, P.E.,
MTA GEC Program Manager, Vice President

Maine Turnpike

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

Authority Members

- Daniel E. Wathen, Chair
 - Michael J. Cianchette, Vice Chair
 - Jane L. Lincoln, Member
 - Thomas J. Zuke, CPA, Member
 - Andrew McClean, Member
 - Bettyann Sheats, Member
 - Bruce Van Note, Member, Ex-Officio
-

TABLE OF CONTENTS

E. Executive Summary	E1
E1. Existing Conditions	E1
E2. Future Conditions	E3
E3. Safety Evaluation	E4
1 Introduction	1
1.1 Importance of Safety on the Maine Turnpike	1
1.2 Study Approach	1
1.3 2016 Study Recommendations Update	2
1.4 Improvements Completed After the 2016 Study	5
2 Existing Conditions	6
2.1 Volume Trends	6
2.2 Transportation Demand Management and Traffic Management System Strategies	10
2.3 Volume Development	10
2.4 Analysis Approach	13
2.4.1 Analysis Programs Used in Evaluation	13
2.4.2 Analysis Inputs	13
2.4.3 Analysis Failure Criteria	14
2.4.4 Analysis Sections	15
2.5 Existing Conditions Analysis Results	16
3 Future Conditions	17
3.1 Historic Growth Trends	17
3.2 Ramp Capacity Needs	19
3.3 Merging and Diverging Movements	19
3.4 Mainline Capacity Needs	20
3.5 Toll Capacity Needs	21
4 Safety Evaluation	21
4.1 Data Collection	21
4.2 Comparison to State and National Crash Rates	22
4.3 General Safety Evaluation	23
4.4 Safety Programs in Place	26

4.5	High Crash Locations	27
4.5.1	Mainline Safety Evaluation	28
4.5.2	Toll Plaza Safety Evaluation	29
4.5.3	Turnpike Ramps	31
4.5.4	Merge and Diverge Points	32
4.5.5	Local Road Intersections.....	32
4.6	Geometric Evaluation	34
4.7	Updated Monitoring Recommended in the 2016 Study	35
5	Recommendations	37
5.1	Table of Capacity Recommendations and Cost	37
5.2	Prioritized Table of Safety Recommendations and Cost.....	38
5.3	Areas of additional study, Coordination and monitoring	39

Appendix A: AADT Summaries 2009 - 2021

Appendix B: Additional Capacity Summary Tables

Appendix C: Detailed Road Safety Audit Evaluations

LIST OF TABLES

Table E1: Capacity Analysis Results.....	E2
Table E2: Growth Rates.....	E3
Table E3: Anticipated Year of LOS E and Estimated Cost for Lane Widening	E4
Table E4: HCL Safety Review Results	E6
Table E5: Prioritized Safety Improvements.....	E7
Table 1: 2016 Study Recommended Capacity Improvements.....	3
Table 2: 2016 Study Recommended Safety Improvements	4
Table 3: Additional Research and Study	4
Table 4: Traffic Volume Data Collection	11
Table 5: Capacity Analysis Results	16
Table 6: Growth Rates.....	18
Table 7: Anticipated Year of LOS E.....	20
Table 8: Mainline Segments with a High Crash Location	27
Table 9: Toll Plaza High Crash Locations.....	29
Table 10: Ramp High Crash Location.....	30
Table 11: Merge and Diverge High Crash Locations	32
Table 12: Adjacent Intersection High Crash Locations	33
Table 13: Acceleration Lane Summary.....	35
Table 14: Pre and Post ORT Conversion Crash Data at New Gloucester Plaza.....	36
Table 15: Timing and Program Costs for Mainline Capacity Projects	37
Table 16: Prioritized Table of Safety Improvements	38
Table 17: Locations Warranting Additional Study, Monitoring and Coordination	39

LIST OF FIGURES

Figure E1: 2019 v. 2022 AADTs by Mainline Segment	E1
Figure E2: Total Crash Rate per Hundred Million Vehicle Miles (2012-2020)	E5
Figure 1: 2022 AADT Summary	7
Figure 2: Monthly Average Daily Traffic	8
Figure 3: 2019 v. 2022 AADTs by Mainline Segment	9
Figure 4: Turnpike Trips and Vehicle Miles Traveled (2001 - 2022)	10
Figure 5: Design Hour Volumes.....	12
Figure 6: Level of Service Illustration	15
Figure 7: Total Crash Rate per Hundred Million Vehicle Miles (2012-2020)	22
Figure 8: Fatal Crash Rate per Hundred Million Vehicle Miles (2012 - 2020)	23
Figure 9: Turnpike Crashes per Hundred Million Vehicle Miles (2012-2021)	24
Figure 10: Percentage of Turnpike Crashes per Month	25
Figure 11: Turnpike Crash Distribution by Time of Day (2012 - 2021)	25

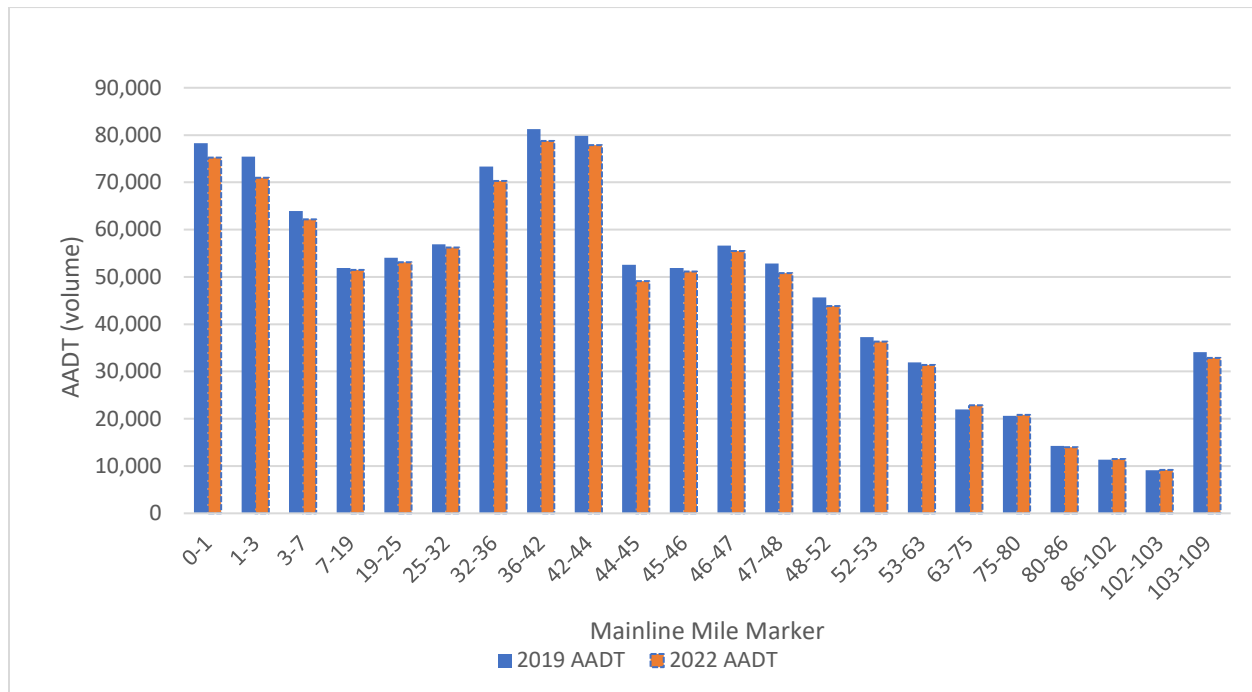
E. EXECUTIVE SUMMARY

The 2022 Systemwide Safety and Capacity Study (Study) details a comprehensive analysis of safety and capacity conditions of both current and future Maine Turnpike (Turnpike) traffic operations between Exit 1 in Kittery and Exit 109 in Augusta. Mainline sections, ramps, toll plazas and intersections along the Turnpike were evaluated. This Study provides current and projected safety and capacity needs on the Turnpike over the next 30 years. The recommendations provided herein are intended for planning purposes. Where recommendations are provided, the actual time frame for implementation may be adjusted as needed based on engineering judgment, actual traffic operations, and as finances allow.

E1. EXISTING CONDITIONS

Traffic on the Maine Turnpike has largely rebounded from the reductions recorded at the peak of the COVID-19 pandemic. A comparison of 2019 and 2022 average annual daily traffic for each mainline segment is shown in **Figure E1: 2019 v. 2022 AADTs by Mainline Segment**. Generally, traffic volumes on the Turnpike have rebounded the strongest along the more rural sections of the roadway while traffic volumes in urban areas have rebounded more slowly. For 2022 the total traffic carried by the Turnpike was within 2.5% of the record volume recorded in 2019.

Figure E1: 2019 v. 2022 AADTs by Mainline Segment



Existing conditions, also known as “no build or baseline conditions” representing the conditions on the Turnpike using 2019 data are presented in **Table E1: Capacity Analysis Results: Capacity Analysis Results**. These are used to calibrate models and to compare against projected future roadway conditions. Each segment or ramp movement is assigned a letter grade from A-F, known as Level of Service (LOS) that indicates the overall operations of the design element. A LOS of D or better is generally considered acceptable whereas an LOS of E or F is generally considered at or nearing a ‘failing’ condition. The existing conditions analysis was completed separately for the Northbound (NB) and Southbound (SB) lanes. The analysis indicates there is generally sufficient capacity on the mainline once current construction projects are complete but that growing needs will require widening as demand grows. Future capacity needs are summarized in **Section E2: Future Conditions**.

Table E1: Capacity Analysis Results¹

	NB	SB	NB Ramp Movements		SB Ramp Movements	
	Mainline		Exiting	Entering	Entering	Exiting
0-1	D	D			B	
1-2	D	D	B		D	
2-3	D					
3-7	E	D	D	C		D
7-19	D	D	D	B	D	D
19-25	C	C	C	B	E	C
25-32	C	C	C	B	B	C
32-35	C	C	C	B	B	C
35-36	C	C				
36-42	C	D	C	C	C	C
42-44	C	C	C	B	B	C
44-45*	C	B	B		B	
45-46*	C	B	A	B	A	B
46-47*	C	B	B	B	B	B
47-48*	C	B	C	B	B	C
48-52	C	D	B	B	B	B
52-53	D	C	C	C	C	C
53-63	C	B	C	B	C	B
63-75	B	B	B	B	B	A
75-80	B	A	B	A	B	A
80-86	A	A	A	A	A	A
86-102	A	A	A	A	A	A
102-103	A	A	A		A	
103-109	C	C		A		B

¹ Analysis assumes 3 lanes of traffic through mile marker 49

E2. FUTURE CONDITIONS

Based on historical growth rates, the average annual growth for Turnpike is expected to vary from 1.0% to 1.8%, depending on location, with the region north of Gray seeing growth at a lower rate than the southerly regions. Estimates of future traffic volumes were developed using the assumed growth rates shown in **Table E2: Growth Rates**.

Table E2: Growth Rates

Segment	Annual Growth by Segment
State Line to Exit 7	1.4% ²
Exit 7-32	1.5%
Exit 32-42	1.8%
Exit 42-53	1.5%
Exit 53-63	1.4%
Exit 63-109	1.0%

A planning-level examination of ramp capacity was completed to identify ramps that may require an additional lane in the next 30 years. The SB Off and NB On Ramps at both Exit 32 and Exit 36 were identified as potentially requiring additional lanes within the next 10 years. These locations are the subject of ongoing construction or planning projects aimed at addressing congestion. In addition, the Exit 45 SB off ramp is projected to require an additional ramp lane approximately 20 years in the future. However, no immediate action is required.

A separate evaluation of ramp traffic merging and diverging operations concluded several locations will reach LOS E in the next 20 to 30 years. These locations include the Exit 19 NB Off ramp diverge (2050), the Exit 42 SB Off ramp diverge (2045), the Exit 53 SB On ramp merge (2043), and NB Off ramp diverge (2050). The continued assessment of these locations in future safety and capacity studies is recommended.

Estimates of when each mainline section will first reach LOS E were developed considering mainline traffic volumes and turbulence associated with merging and diverging ramp traffic. Mainline segments where capacity additions may be needed in the next 30 years are provided in **Table E3: Anticipated Year of LOS E and Estimated Cost for Widening** and include estimated program cost (including construction, contingency, engineering and construction inspection). Except as noted, all projects include adding a fourth lane in each direction to the mainline. The date provided represents the earliest that capacity improvements would normally be considered for implementation. The inclusion of these capacity adding projects in the 30-year asset model should be considered as traffic dictates and finances allow.

² Adjusted to account for reduced growth related to the Piscataqua River Bridge.

Table E3: Anticipated Year of LOS E and Estimated Cost for Lane Widening

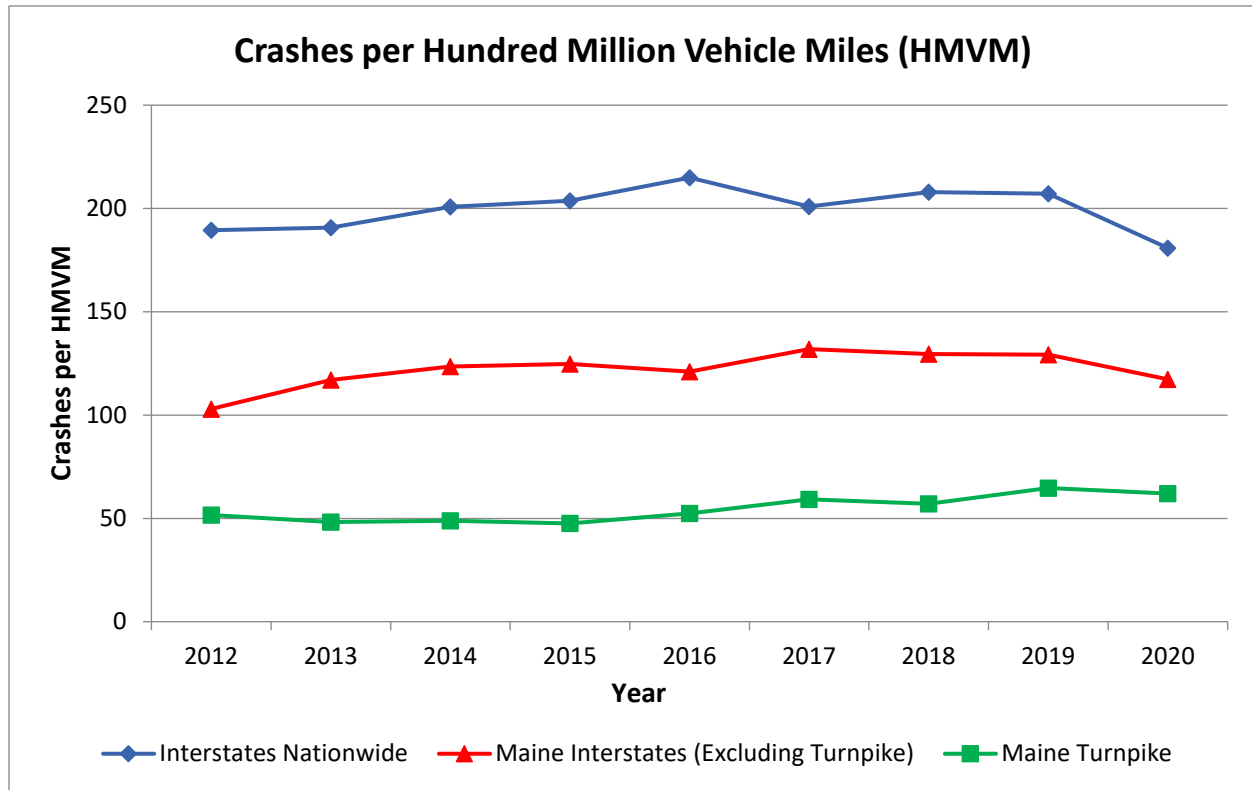
Location	Year of LOS E	Cost	Notes
MM 0-7	2029	\$148M	Further study of PTSU required to refine when LOS E will be reached
MM 7-19	2038	\$169M	
MM 19-25	2042	\$93M	
MM 25-32	2042	\$87M	
MM 32-36	2026	\$62M	Recommend monitoring traffic operations at new Exit 35/36 interchange prior to widening
MM 36-44	2029	\$72M	
MM 52-53	2038	\$40M	Addition of 3 rd lane
MM 53-63	2053	\$195M	
MM 63-103	>2053	-	No estimate developed, beyond study horizon
MM 103-109	>2053	-	No estimate developed, beyond study horizon

Toll plazas were also assessed to determine if they will present capacity constraints in the future. The assessment concluded no plazas are expected to operate at more than 80% of capacity in the next ten years. In the longer-term, two toll plaza movements are predicted to operate at 80% to 85% of capacity in the next thirty years. These include the York Toll Plaza northbound cash lanes and Exit 19 northbound EZ Pass lanes. Both plazas should be monitored, but no immediate action is required.

E3. SAFETY EVALUATION

The comparison of Turnpike crash rates to other interstates across Maine and the nation was completed by comparing the total number of crashes per hundred million vehicle miles (HMVM) traveled. As shown in **Figure E2: Total Crash Rate per Hundred Million Vehicle Miles (2012 – 2020)**, the Maine Turnpike has a crash rate that is approximately one third the national average and one half the State of Maine average. On the Turnpike the severity of crashes has decreased over the past decade with the personal injury rate decreasing from 12.2% in 2012 to 9.4% in 2021. In addition, the Turnpike continues to have a fatal crash rate that's roughly 80% less than the national average. Furthermore, after peaking in 2017, the fatal crash rate on the Turnpike has been slowly declining.

Figure E2: Total Crash Rate per Hundred Million Vehicle Miles (2012-2020)



The top 3 types of crashes for 2012- 2021 included vehicles going off the road followed by rear-end/ sideswipe crashes and collisions with animals. The most common contributing factors included driving too fast for conditions (typically seen during inclement weather), following too closely (typically seen in periods of congestion), and failure to stay in lane. The primary recommendations to further reduce crashes include re-evaluating locations of 45 mph signs to ensure areas are appropriately covered, adding capacity where needed to reduce congestion, and performing an updated animal crossing study.

The systemwide safety review also included a review of High Crash Locations (HCLs) identified by Maine Department of Transportation (MaineDOT) since the prior Safety and Capacity study in 2016. The review was broken into five pieces: mainline sections, merge and diverge movements, ramps, toll plazas and local road connections. Analysis results are summarized in **Table E4: HCL Safety Review Results**.

Table E4: HCL Safety Review Results

Analysis	Locations	Notes
Mainline Sections	Locations throughout the Turnpike	Recommendations include re-evaluating locations of 45 mph signs to ensure areas are appropriately covered, adding capacity where required to reduce congestion, and performing an updated animal crossing study.
Merge and Diverge Movements	Exit 44 NB Diverge, Exit 3 SB Diverge, and Exit 2 SB Merge	Recent or ongoing projects at all three locations involve modifications to pavement, striping and signing. Ongoing monitoring of these locations is recommended to assess how crash rates change following construction.
Ramps	Exits 2, 19, 32, and 36	This Study provides site-specific recommendations ranging from improved signage at Exit 2 to more holistic interchange modifications at Exits 19 and 32. The ongoing Saco Interchange project is expected to relieve the congestion that's driving current crash patterns.
Toll Plazas	York Barrier, Exits 45, 53 and Gardiner I-295 Barrier New Gloucester Barrier	These toll plazas have been recently reconstructed or improved. Ongoing monitoring of these locations is recommended to assess how crash rates change following construction.
	Exits 19 and 32	Both toll plazas are programmed for modification in MTA's Capital Program.
	Exit 48	Local and State coordination for the holistic Exit 48 area is recommended.
Local Road Connections with Ramps @	Exits 25, 32, and 42	Recent improvements have been made to these intersections. Ongoing monitoring is recommended to assess how crash rates change following construction.
	Exits 2, 7, 48, 63, and 75	Coordination with the local and state agencies responsible for these intersections is suggested to determine future improvement needs.

Based on the safety assessment, a prioritized listing of safety improvements was prepared and is included in **Table E5: Prioritized Safety Improvements**. Short-term improvements are those that can be completed with relative ease or have been assessed as more significant safety concerns. Mid-term improvements are more substantial improvements that require additional study to execute. Long-term improvements are significant projects intended to address less pressing safety needs as well as capacity constraints. In addition to these site-specific improvements, stakeholder coordination at non-MTA owned intersections that are HCLs to strategize needed improvements, a review of 45-mph signs, and an updated animal crossing study is recommended.

Table E5: Prioritized Safety Improvements

Timeframe	Improvement	Location	Cost
Short Term (0-5 years)	Enhanced Signage	Exit 2 NB Off Ramp	\$15,000
	Signal Timing & Phasing Review	Exit 63 Intersection	\$20,000
	Enhanced Yield Signage	Cumberland Service Plaza	\$5,000
	Intersection Improvements	Exit 7 SB Ramps Intersection	\$5M*
	Complete Study & Implementation of Wrong Way Driver Countermeasures	Entirety of Turnpike	\$150,000
	Enhance Overhead Signage	Exit 44 NB Diverge	\$10,000
Mid-Term (5-10 years)	Interchange Reconfiguration	Exit 19	\$19M
	Route 111 Connection	Exit 32	\$21M
	Intersection Improvements	Exit 75 Intersection	\$6M
Long-Term (10+ years)	Interchange Reconfiguration	Exit 32	\$59M

* Study of Improvements Currently in Progress

1 INTRODUCTION

The 2022 Systemwide Safety and Capacity Study (Study) details a comprehensive analysis of safety and capacity conditions of both current and future Maine Turnpike (Turnpike) traffic operations between Exit 1 in Kittery and Exit 109 in Augusta. Mainline sections, ramps, toll plazas and intersections along the Turnpike were evaluated. This Study provides current and projected safety and capacity needs on the Turnpike over the next 30 years. The recommendations provided herein are intended for planning purposes. The actual time frame for implementation may be adjusted as needed based on engineering judgment, actual traffic operations, and as finances allow.

1.1 IMPORTANCE OF SAFETY ON THE MAINE TURNPIKE

The original 45-mile Maine Turnpike, opened in 1947, was designed to provide relief to the congested Route 1 corridor. More than 75 years later, it has become an integral connection between towns and cities across the state, spanning 109 miles from Kittery to Augusta. As part of the National Highway System (NHS), the Turnpike is recognized as a vital part of the State of Maine's economy and mobility.

From its conception, innovation in design and safety has been a priority along the Turnpike corridor. For example, the grass median that divides the highway was introduced as a modern safety design element to reduce the likelihood of head-on collisions and the uncommon choice of asphalt was selected as the roadway material to provide better traction and skid resistance for users. Today, the Turnpike continues to be a leader in design innovation for future safety and capacity improvements, providing upgrades such as concrete median barriers, emergency vehicle ramps, Sonic Nap Alert Patterns (SNAPs) on the shoulders, interchange upgrades, capacity improvements, toll plaza and toll equipment upgrades, and a comprehensive inspection program. The MTA also hosts a robust public information system providing information to travelers through notification and tracking systems such as New England 511, highway advisory radios, television, and a strong, well-designed social media presence.

1.2 STUDY APPROACH

The safety and capacity of the Turnpike is routinely evaluated to support the MTA's mission of providing safe and efficient travel for Turnpike users who make more than 90 million vehicle trips annually – equating to an annual travel of more than 1.6 billion miles. The Study is organized in four sections:

- Existing Conditions
- Future Conditions
- Safety Evaluation
- Recommendations

Existing conditions serve as the foundation for all Study analyses. Large-scale planned improvements that are not yet contracted for construction are not included as part of the current conditions, but projects under construction are included in the existing conditions analysis.

Future conditions are based on growth developed from historic trends and provide insight into anticipated future corridor operations. Existing and future conditions analyses are compared to provide

recommendations that include a prioritized implementation timeline and anticipated construction costs through 2055 in support of refinements to the MTA's 30-year Capital Improvement Plan.

The need for capacity improvements for both existing and future conditions are determined using industry standard metrics that define operational "failure." Each segment or ramp movement is assigned a letter grade from A-F, known as Level of Service (LOS) that indicates the overall operations of the design element. A LOS of D or better is generally considered acceptable whereas an LOS of E or F is generally considered at or nearing a 'failing' condition. A failure condition occurs when the density of vehicles is high enough that congestion-based crashes are more likely and unplanned factors such as weather or crashes can cause backups, delays, and secondary crashes. The years when failure is anticipated provided in the study are intended to guide the prioritized improvements for planning purposes and are only one set of criteria that is used to determine when and how a project is programmed for design and construction. It should also be noted the most detailed understanding of needs are in the near-term, a critical piece of the MTA's 4-year Capital Improvement Plan; however, long-term needs are estimations based on historic trends. Because many potential factors can influence the exact timing, solutions and required funding for long-term projects, regular re-evaluation of the corridor is important.

Safety improvements are proposed along the Turnpike and at adjacent assets, including toll plazas and adjacent intersections. In addition to general safety and crash trends, detailed road safety evaluations have been performed for sites that have been identified as High Crash Locations (HCLs) during the most recent 10-year period (2012 - 2021) by the Maine Department of Transportation (MaineDOT). These evaluations provide a systematic approach for evaluating existing conditions and are used to develop potential mitigation strategies with implementation timelines and costs.

This Study is provided as a planning document and does not intend to take the place of more focused, comprehensive area studies that provide detailed improvements and alternatives assessments, nor as a substitute for the Standard Transportation Policy Act (STPA)³ that seeks to use the capacity of our highway system most effectively. As such, it includes recommendations for more detailed assessments and identification of additional opportunities for coordination with other transportation agencies, regional planning authorities and local municipalities.

1.3 2016 STUDY RECOMMENDATIONS UPDATE

The most recent Turnpike safety and capacity study was completed in 2016. This section provides a summary of recommendations developed as part of the 2016 Safety and Capacity Study and their current implementation status as shown in **Table 1: 2016 Study Recommended Capacity Improvements**.

³ "Sensible Transportation: Implementing Maine's Sensible Transportation Policy Act through Coordinated Transportation and Land Use Planning", June 2008.

Table 1: 2016 Study Recommended Capacity Improvements

Location	Year	Status
Exit 44 I-295 Scarborough SB On-Ramp	2016	Construction complete
Exit 36 Saco – NB On-Ramp	2021	Under construction (Exit 35/36)
Exit 32 Biddeford SB Off-Ramp		Exit 32 SB Off Ramp deceleration extended.; additional off-ramp currently under evaluation as part of the Exit 32 Connection Study
Jetport to Westbrook – NB Mainline	2023	Under construction
NH State Line to Kittery Exit 2 – NB and SB Mainline	2025	Part-Time Shoulder Use (PTSU) under construction
I-295 Scarborough to Jetport – NB Mainline	2026	Under construction
Exit 32 Biddeford – NB On-Ramp		Currently under evaluation with the Exit 32 Connection Study
Exit 36 Saco to Exit 42 Scarborough – SB Mainline	2032	Currently programmed in the 30-year Asset Model
I-295 Scarborough to Exit 48 Westbrook – SB Mainline		Under construction
Exit 48 Westbrook to Exit 52 Falmouth – NB Mainline		In design
Exit 36 SB Off-Ramp		Under construction

As shown in **Table 2: 2016 Study Recommended Safety Improvements**, the status of recommended improvements after 2023 as identified in the 2016 Safety and Capacity Study are as follows:

- Addressing capacity constraints from the state line through Exit 2 has been deferred into the future due to the future implementation (summer 2023) of Part-Time Shoulder Use (PTSU) during peak periods and constraints of the Piscataqua River Bridge.
- The Portland area mainline widening is underway based on the results of the 2018 Portland Area Mainline Needs Assessment.

Table 2: 2016 Study Recommended Safety Improvements

Approximate MM	Recommendation	Status
1	Consider additional cameras (NB)	Under Construction
PRB	Add RWIS to provide advanced warning and roadway condition monitoring during storms	Completed
6		Completed
7	Replace York Toll Plaza (NB and SB)	Completed
33	Install "Reduced Speed When Flashing" Sign (NB)	Under review
36	Consider installation of additional cameras NB and (SB)	Under review (Exit 35/36 Project)
	Evaluate ramp capacity improvements through intersection improvements (NB and SB)	Completed
	Consider updated pavement marking to reduce sideswipe crashes (from I-95 SB to I-195 Exit 1 SB)	Reviewed (Exit 35/36 Project)
45	Consider separating Maine Mall Road vehicles from Route 703 WB and additional clearing	Exit 45 under Construction

Additional studies for the Gorham Connector, the Saco/Biddeford Area and the Portland Area were also recommended, as summarized in **Table 3: Additional Research and Study**, showing the status of each.

Table 3: Additional Research and Study

Study	Status
Capacity needs on the Piscataqua River Bridge	PTSU under construction
Improvements on I-195 Exit 1	Exit 35/36 Improvements under construction
Portland Area Widening (MM 44 to 49)	Under construction
Exit 45/Maine Mall Area Improvements (including toll plaza, interchange bridge and accommodation of potential Gorham Connector)	Exit 45 area under construction designed to accommodate potential future connections.
Relocation of the York Toll Plaza	Construction completed
Gorham East-West Corridor Feasibility Study	Underway

Several additional monitoring recommendations were identified that are addressed in this 2016 Study. These include large animal collisions between MM 56 and MM 57.

- The impact of Open Road Tolling (ORT) toll plaza conversion on safety at New Gloucester and West Gardiner Toll Plazas

- Hydroplaning crash frequency with new pavement southbound in Augusta

Results of this review are included in **Section 4.5.1: Updated Monitoring Recommendations**.

1.4 IMPROVEMENTS COMPLETED AFTER THE 2016 STUDY

Since the 2016 study, numerous projects have been completed or are under construction. To account for this, all analyses include the following improvements:

- Part-Time Shoulder Use through Exit 2/3 (to be complete Fall 2023)
- York Toll Plaza relocation from MM 7 to MM 10 with ORT lanes and expanded cash collection
- Exit 19 Toll Plaza updates; intersection updates
- Exit 25 signals and rest area reconfiguration/upgrades
- Exit 32 intersection, plaza, and signal upgrades; extension of SB deceleration lane
- Exit 36 plaza upgrades, EB lane reconfiguration at intersection
- Exit 42 intersection improvements, ramp safety improvements
- Exit 44 SB On and NB Off-ramp widening to two lanes; plaza improvements
- Exit 44-49 mainline widening (to be complete Fall 2023)
- Exit 45 interchange reconfiguration and toll plaza upgrade (to be complete Fall 2023)
- Exit 46 additional toll lane NB and ramp widening
- Exit 47 new signalized intersection and intersection improvements
- Exit 48 Toll Plaza upgrades, exit lane widening, signalized intersection improvements
- Exit 52 ORT lanes
- Exit 53 new plaza and exit lane
- Exit 63 signal improvements, interchange improvements
- Exit 75 toll system improvements and some lane widening, installation of delineators on the ramp to prevent head on collisions
- Exit 86 toll upgrades
- MM 102 ORT plaza

2 EXISTING CONDITIONS

This section looks at general volume trends and existing corridor operations. General comparisons to volumes and corridor operations pre- and post-COVID are also provided to understand how they have been affected by the pandemic.

2.1 VOLUME TRENDS

Volumes along the Turnpike vary regionally, seasonally, by time of day and by day of the week. Understanding these trends is foundational to future planning along the corridor. This section provides a planning review of trends based on metrics developed using traffic volume data collected by the radar count stations and toll systems described in **Section 2.3: Volume Development**.

Several industry standard metrics will be used to discuss the overall Turnpike trends throughout the region. These include:

- **Average Annual Daily Traffic (AADT):** the average daily traffic volume for a road segment for the entire year provides a comparison with other roadways to develop an understanding of a road segment's traffic operation. A listing of AADTs by Turnpike segment is included in **Figure 1: 2022 AADT Summary**.
- **Average Daily Traffic (ADT):** the average daily volume for a particular period other than a year is used to compare difference time periods on the same segment, such as a monthly or weekly ADT.
- **Trips:** This represents the number of physical times a vehicle makes a one-directional trip entering and exiting the Turnpike. Due to the high volume of trips on the Turnpike, this value is often presented in millions of trips. This is not to be confused with the number of transactions at toll plazas – which is used for financial analysis purposes.
- **Vehicle Miles Traveled (VMT):** This metric estimates the number of miles traveled by vehicles on the Turnpike. The value is calculated by multiplying the average trip length by the number of trips at each location on the Turnpike.

Figure 1: 2022 AADT Summary provides average annual daily traffic for each interchange and mainline section along the Turnpike. According to the data, the most utilized interchange is Exit 36 in the Saco area, followed by Exit 44 in Scarborough, and Exit 32 in Biddeford. The mainline section with the highest AADT volume is between Exits 36 and 42, followed by the mainline section between Exits 42 and 44, and finally the mainline section between the New Hampshire State line and Exit 1.

Figure 1: 2022 AADT Summary

[illegible]

Figure 2: Monthly Average Daily Traffic provides average daily traffic volumes along various sections of the Maine Turnpike and highlights the seasonal traffic variations. A comparison of 2019 to 2022 volumes is also provided. To simplify the presentation of the data, the following three representative segments of the Turnpike were selected.

- York to Wells (Exit 7 to 19) – representing the southern region where seasonal traffic variations are the most significant
- Jetport to Rand Road (Exit 46 to 47) – representing the central region, and the most urban portion of the Turnpike
- Gray to Auburn (Exit 63 to 75) – representing the northerly region

As shown, the average monthly traffic in the southern region represented by the segment between Exits 7 and 19 nearly doubles during the summer months. By comparison, traffic along the northerly section represented by the segment between Exits 63 and 75 is least affected by tourism. For the segment between Exit 63 and 75 traffic volumes for 2022 exceeded 2019 levels for 11 out of 12 months.

Figure 2: Monthly Average Daily Traffic

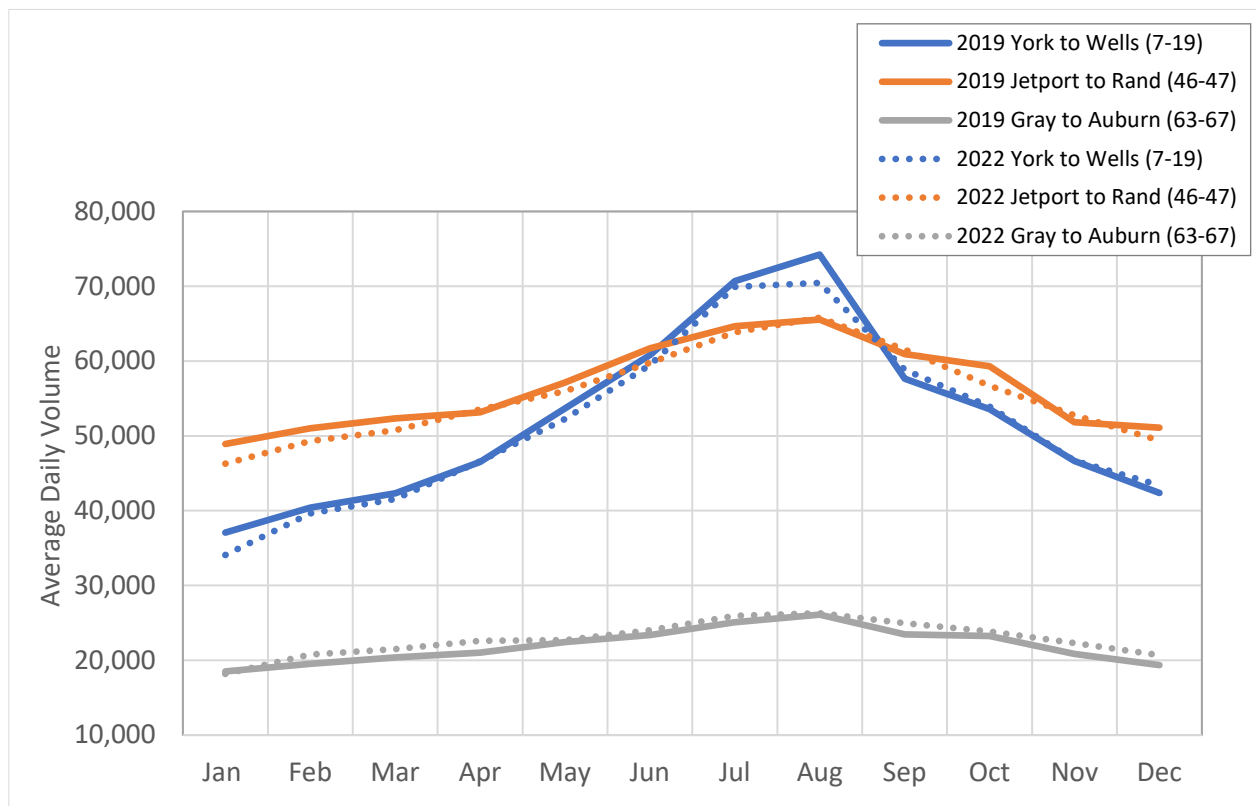
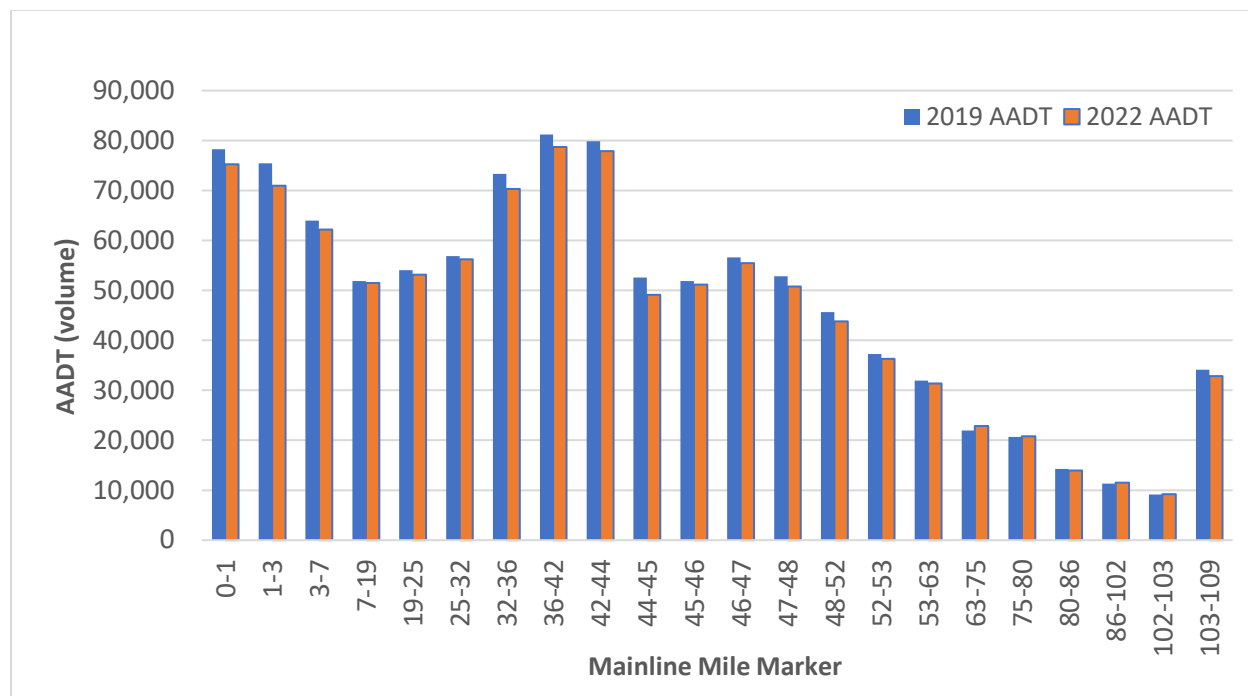


Figure 3: 2019 v. 2022 AADTs by Mainline Segment provides a summary of AADT by mainline segment and compares 2019 traffic volumes to 2022. The figure illustrates that the more rural sections of the Turnpike have realized the greatest recovery in traffic volumes and are nearly back to, or are exceeding, their pre-pandemic traffic volumes. Conversely, the recovery of traffic volumes on the more urban sections are lagging somewhat. Overall, traffic volumes across the Turnpike system have recovered to

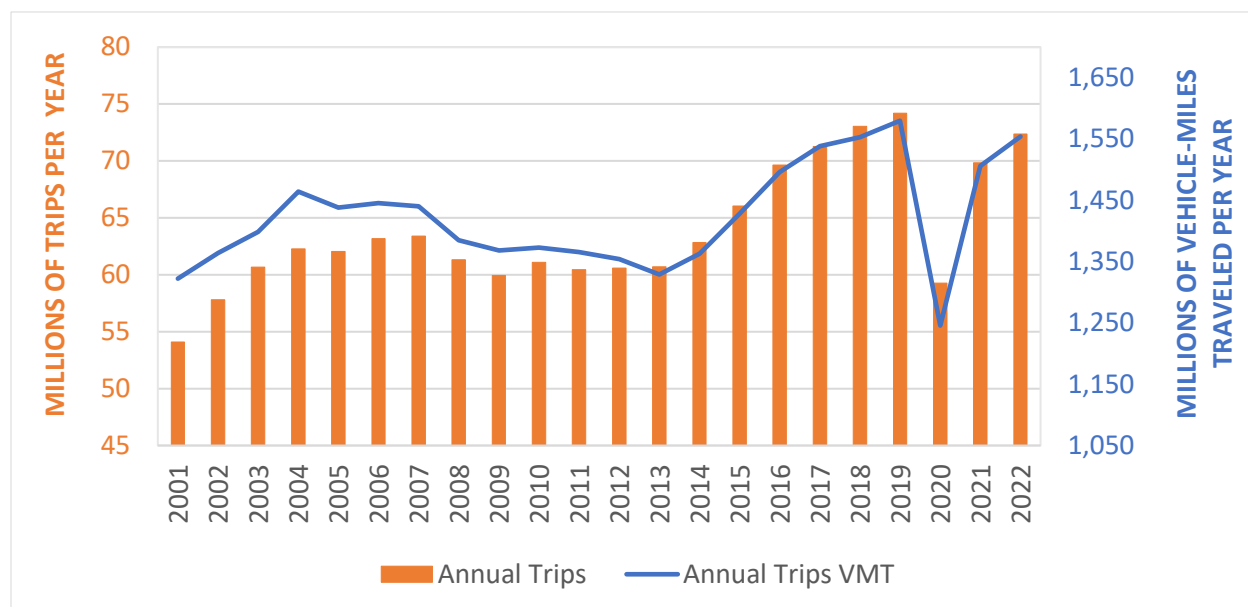
within 2.5% of the record volumes recorded in 2019. AADT summaries from 2009 through 2022 can be found in **Appendix A**.

Figure 3: 2019 v. 2022 AADTs by Mainline Segment



A more granular review of hourly traffic data indicates that urban areas also have the biggest reduction in peak hour travel. For instance, in the Portland area, which has the largest percentage of commuter traffic, the morning and afternoon peak travel hours are reduced while midday traffic volumes have increased.

The final figure describing volume trends, **Figure 4: Turnpike Trips and Vehicle Miles Traveled (2001 - 2022)**, shows the continued rebound in traffic volumes following the COVID pandemic but shows a decrease in average trip length. An assessment of this data concludes the average trip length along the Turnpike continues to decrease over time, from 24.5 miles in 2001, to 21.6 miles in 2022. This trend indicates that drivers are increasingly utilizing the Turnpike to complete shorter, local trips.

Figure 4: Turnpike Trips and Vehicle Miles Traveled (2001 - 2022)

2.2 TRANSPORTATION DEMAND MANAGEMENT AND TRAFFIC MANAGEMENT SYSTEM STRATEGIES

In a continued commitment to best utilize available resources and mitigate widening needs, the MTA has implemented and supported multiple approaches to address capacity, congestion concerns and matters relating to safety. These approaches fall into two categories: Transportation Demand Management (TDM) and Transportation System Management (TSM).

TDM tools seek to lower Vehicle Miles Traveled (VMT) and redistribute remaining demand more evenly throughout the day. TDM methods utilized by Turnpike motorists include the GO Maine rideshare program, the Zoom Express public transit route, Park & Ride lots, the Eastern Trail pedestrian and bike system, and the Wells Transportation Center.

TSM strategies are systems-based solutions that help optimize the flow of vehicles through the corridor. The MTA Transportation Management and Communication Center (TMCC) manages TSM technology-based Intelligent Transportation System (ITS) solutions including Highway Advisory Radios (HAR), flashing 45 MPH signs, Closed Circuit Television (CCTV) cameras, radar count stations, Road Weather Information Systems (RWIS), and Variable Message Signs (VMS). Several of these devices are shared with other agencies including New Hampshire Department of Transportation (NHDOT) and Maine Department of Transportation (MaineDOT). These are integrated through the tri-state New England 511 Compass management system and include the Part-Time Shoulder Use (PTSU) through Kittery which will be implemented in the near future.

2.3 VOLUME DEVELOPMENT

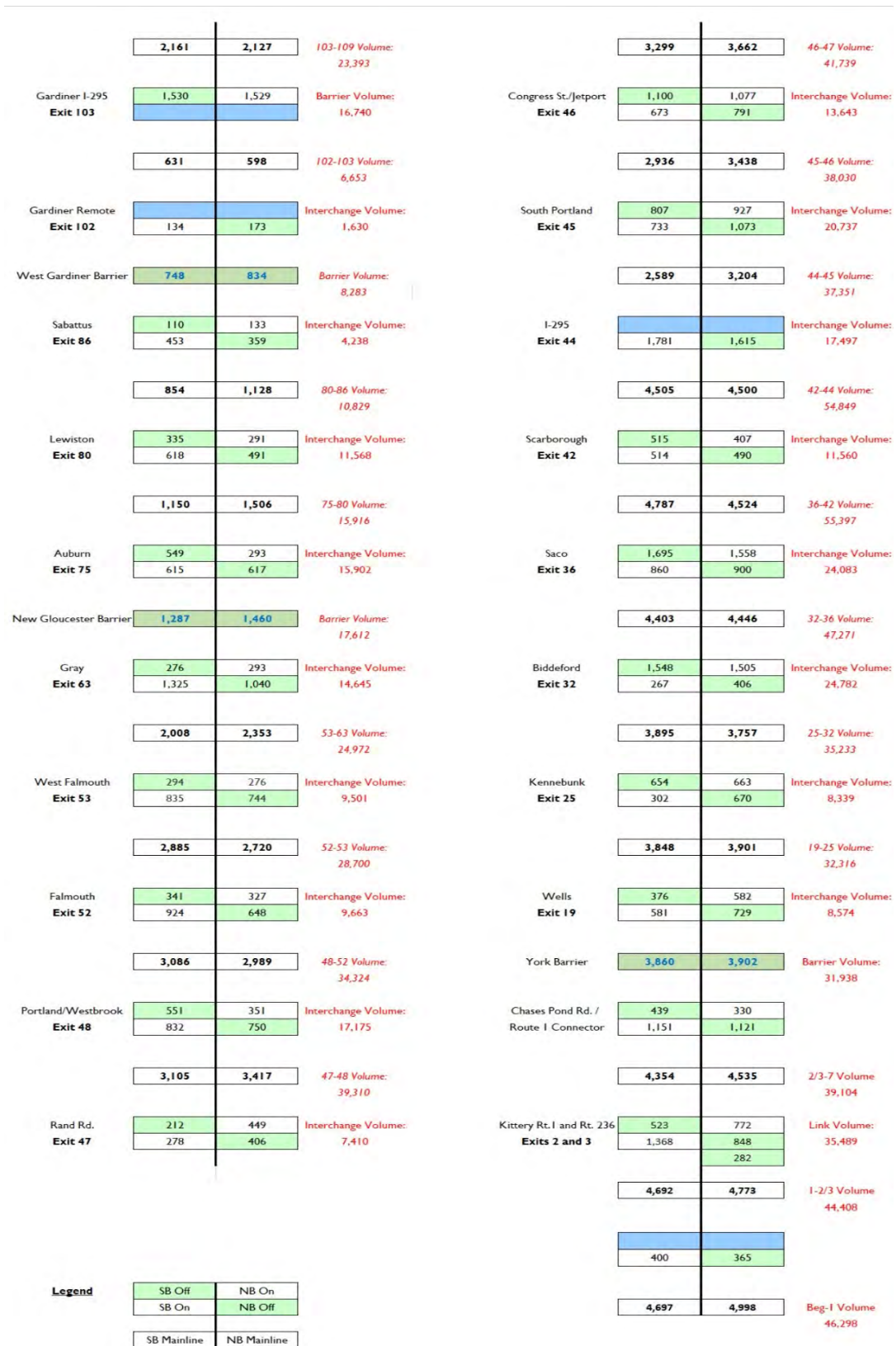
The Turnpike continues to make significant investments in physical and digital data collection systems that support a robust understanding of traffic operations and, in turn, strong transportation planning. The traffic data collected and utilized in the development of this Safety and Capacity Evaluation is derived from a number of sources as outlined in **Table 4: Traffic Volume Data Collection**.

Table 4: Traffic Volume Data Collection

Data Type	Purpose
Radar Count Stations	Continuous hourly traffic count data for mainline, ramps and rest areas
Toll Plaza Data	Anonymized continuous hourly count data at toll points
Peak Hour Video Counts	12-hour weekday counts to validate radar count stations and adjacent intersections
Hand Counts	Park & Ride occupancy counts conducted weekdays between 8am and 4pm
Anonymized cell phone data (Streetlight Data)	Data providing information regarding general traffic trends and travel patterns

Designing roadways to accommodate the heaviest travel volume experienced in any given year to avoid all motorist delays is neither prudent nor economically feasible. Therefore, the industry looks to the general point where volumes begin to stabilize while still meeting motorist needs and sets this point as the “Design Hour Volume” (DHV). The industry standard for this point on an Interstate type facility is the 30th highest hour – the 30th busiest travel hour out of all 8,760 hours in a given year. **Figure 5: Design Hour Volumes** provides a summary of the DHV for each interchange and mainline segment. These values were used as the basis of the capacity analyses completed in this Study.

Figure 5: Design Hour Volumes



2.4 ANALYSIS APPROACH

This Study utilizes a combination of spreadsheet level analysis tools and FREEVAL, a freeway analysis tool developed through the Volume 4 of the Highway Capacity Manual (HCM) – the industry accepted method for evaluating capacity. Each mainline section and interchange of the Turnpike is looked at individually and holistically to determine the need for future capacity improvements. The analysis considers all mainline sections, including merge and diverge areas, as well as the capacity through toll plaza facilities.

Mainline widenings and interchange reconfigurations are some of the most expensive capital investments undertaken by the Turnpike. Because of this, understanding current and future traffic operations, and the anticipated timing of future capacity improvements, play an important role in the development of the MTA's 30-year Asset Model.

Mainline capacities are influenced by a variety of factors including traffic volume, roadway geometrics, adjacent interchanges, and additional factors discussed in **Section 2.4.2: Analysis Inputs**. Similarly, ramp capacities are influenced by the ramp geometry and how the ramp connects to the mainline and local road networks. However, specific analyses of the capacity and operations of the adjacent intersections directly connected to the Turnpike system were beyond the scope of this Study and, therefore, were not completed.

Interchange ramp merge and diverge lengths affects both operations and safety. Therefore, an evaluation of available merge and diverge lengths is included in **Section 4.6: Geometric Evaluation**.

2.4.1 Analysis Programs Used in Evaluation

To account for the interactive nature of freeway operations, sections of the mainline, as described in **Section 2.4.4: Analysis Sections**, were modeled using FREEVAL Analysis Software. FREEVAL is a freeway evaluation program developed in conjunction with the Transportation Research Board's Highway Capacity Manual and is included in the digital "Volume 4" portion of the manual. This software platform allows for understanding each component's capacity constraints as well as the effect of adjacent corridor elements.

For toll plazas, spreadsheet level evaluation tools were used to provide planning level evaluations. The purpose of this analysis was to determine if, and when, capacity improvements are needed to maintain traffic flow through mainline barrier plazas, and whether side toll plazas have sufficient capacity to accommodate increasing demands. Historic capacities through open road tolling lanes and cash lanes were used to determine the number of lanes required at plaza locations.

2.4.2 Analysis Inputs

In addition to geometric inputs, a variety of factors included in the FREEVAL evaluations influence the results of analysis. These include:

- **Peak Hour Factors (PHF):** This is the ratio of the highest 15-minute interval to the hour. This factor allows the analysis to include the effect of a strong peak within the design hour. For instance, shift changes at major employment centers such as the Portsmouth Naval Shipyard can cause notable variations in traffic volume over the course of the design hour. The PHF allows these variations to be recognized and reflected in the analysis. A PHF of 1.0 indicates a uniform distribution of vehicles over the course of the design hour. The estimated peak hour factor for each segment of

mainline and ramp is included in analysis and was measured using video count data at selected times and locations.

- **Percentage of Heavy Vehicles:** This value represents what percentage of the total traffic on a roadway is large trucks. A higher percentage of heavy vehicles reduces the capacity of the roadway. Heavy vehicle percentages obtained from anonymized toll plaza traffic data were used as inputs for analyses.
- **Terrain:** The Highway Capacity Manual assigns values for the effect of terrain on each segment of road. Flat terrain with wide open site distance has a greater capacity than hilly terrain with tight curves. An example of terrain causing limitations to the capacity of a segment adjacent to the Turnpike is the Piscataqua River Bridge due to the geometry of the bridge.
- **Driver Familiarity:** This factor provides increased capacity for sections where the design hour is based on commuting traffic - drivers who are familiar with the roadway and typically more comfortable with less headway between vehicles or higher speeds, like the Portland Area. Conversely, segments like those in Kittery where design hours are driven by tourism, where drivers are less familiar with the area, typically have reduced capacity.

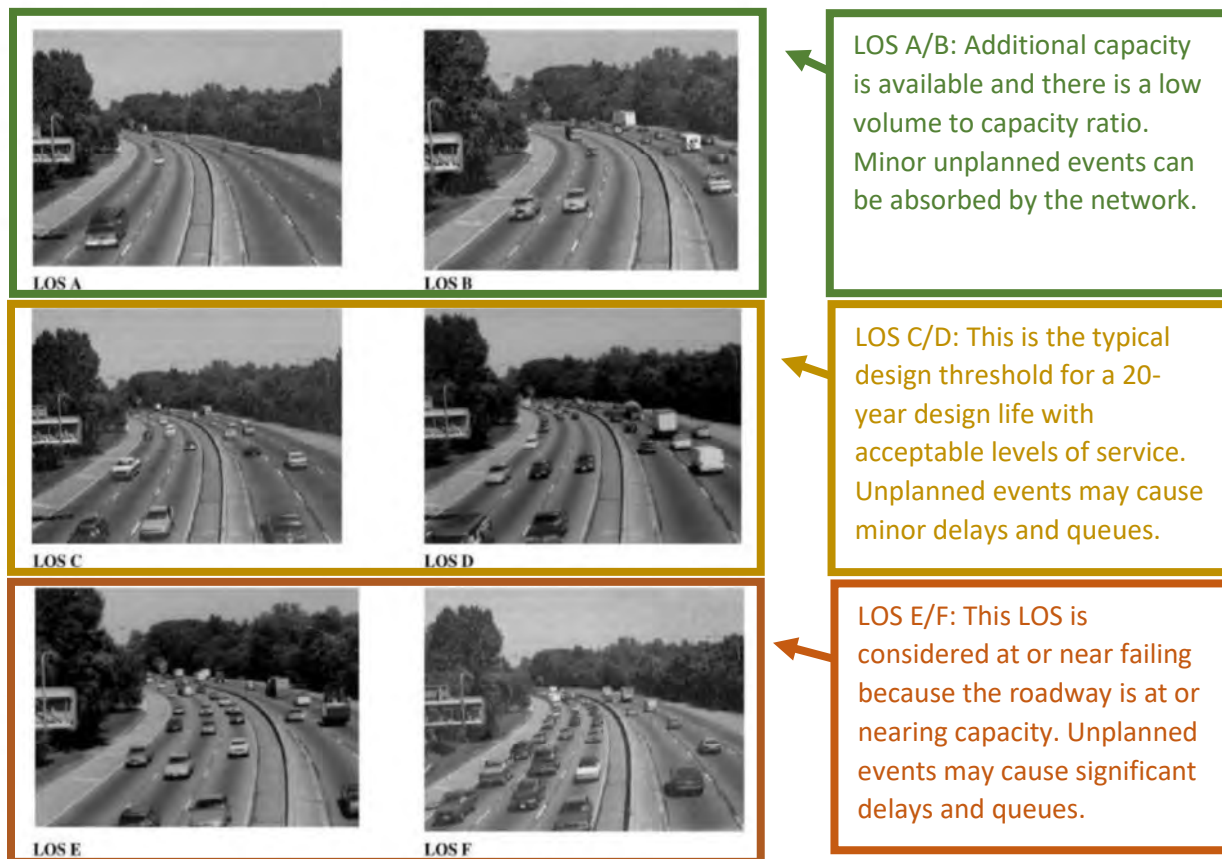
The spreadsheet level evaluation for toll plaza capacities does not consider these factors explicitly. Instead, the analysis uses historic thresholds to understand if, and when, a toll plaza will reach capacity. The analysis uses design hour volumes. Consideration is given to current EZ-Pass penetration rates, while also accounting for an increasing percentage of EZ-Pass users each year. The analysis recognizes the ability to change EZ-Pass and Cash Lane designations and reports toll plazas that approach 80% capacity utilizing all lanes. Historic criteria are applied as follows:

- Cash Lane: 370 vph
- EZ Pass Only Lane: 1,150 vph
- ORT Lane: 1,750 vph

A table summarizing anticipated plaza utilization in 2055 is included in **Appendix B**. All locations have available capacity for all methods of collection. The actual impact to operations is excluded for this analysis.

2.4.3 Analysis Failure Criteria

There are several metrics used to assess corridor operations, like high volume to capacity ratios, free-flow speeds, and queues, all of which are connected to a single metric known as “Level of Service” (LOS). This metric, defined by the Highway Capacity Manual, provides a grading scale to the operations of the roadway, assigning a letter grade ranging from A to F to reflect the overall traffic operations. **Figure 6: Level of Service Illustration** provides a visual example of the traffic condition corresponding to each letter grade.

Figure 6: Level of Service Illustration

The year of failure reported in this study is when the Turnpike element reaches LOS E. At this point, traffic has entered the realm of undesirable levels of service for customers. At this point, congestion begins to occur, incidents that occur are more likely to cause delays/queues and secondary crashes, and construction activities become more restricted and expensive.

2.4.4 Analysis Sections

As previously described, the Turnpike was divided into sections for evaluation. The sections were grouped together based on operational characteristics and proximity. Sections are grouped as follows:

- MM 0 - 19: The Kittery/York Area
- MM 19-32: The Wells/Kennebunk Area
- MM 32-42: The Biddeford/Saco Area
- MM 42-53: The Portland Area
- MM 53-75: The Gray Area
- MM 63 - 80: The Auburn Area
- MM 80-86: The Lewiston Area
- MM 86-103: The Gardiner Area

Several volume scenarios were evaluated for each section to determine capacity needs. This is because the design hour of the ramp rarely occurs at the same time as the design hour of the mainline and treating the two as such would lead to an overly conservative design. Therefore, a volume scenario for the design hour of each element of the section was created and the results included in this report indicate the worst-case scenario of these evaluations. Evaluation results are reported by individual design elements.

2.5 EXISTING CONDITIONS ANALYSIS RESULTS

Existing conditions, also known as “no build or baseline conditions” represent the conditions on the Turnpike using 2019 data, as 2022 was not complete when analysis began, and 2021 data was too variable. These are used to calibrate models and to compare against projected future roadway conditions. Preliminary Turnpike conditions show that no toll plazas reach the 85% threshold requiring further study. Mainline and interchange LOS results follow in **Table 5: Analysis Results**.

Table 5: Capacity Analysis Results⁴

	NB	SB				
	Mainline		NB Ramp Movements		SB Ramp Movements	
			Exiting	Entering	Entering	Exiting
0-1	D	D			B	
1-2	D	D	B		D	
2-3	D		D	C		D
3-7	E	D	D	B	D	D
7-19	D	D	C	B	E	C
19-25	C	C	C	B	B	C
25-32	C	C	C	B	B	C
32-35	C	C				
35-36	C	C	C	C	C	C
36-42	C	D	C	B	B	C
42-44	C	C	B		B	
44-45 ⁴	C	B	A	B	A	B
45-46 ⁴	C	B	B	B	B	B
46-47 ⁴	C	B	C	B	B	C
47-48	C	B	B	B	B	B
48-52	C	D	C	C	C	C
52-53	D	C	C	B	C	B
53-63	C	B	B	B	B	A
63-75	B	B	B	A	B	A
75-80	B	A	A	A	A	A
80-86	A	A	A	A	A	A
86-102	A	A	A		A	
102-103	A	A				
103-109	C	C		A		B

⁴ Analysis assumes 3 lanes of traffic in each direction through mile marker 49

There are few things to note from the existing conditions analysis:

- The projects noted in **Section 1.4** apply as the existing condition.
- Exit 1 NB Off is assumed closed to replicate the existing conditions during PTSU as this will be active during the DHV.

As previously mentioned, this evaluation does not include the effects of adjacent intersections to the Turnpike. Several intersections will be discussed in **Section 4.5.5: Local Road Intersections** related to their safety including the following locations. These are identified because the outcomes of road safety evaluations and ongoing studies have the potential to affect the operations of adjacent ramps. Changes at the following intersections have the greatest potential to influence traffic operations:

- Exit 7 and Spur Road Intersections
- Exit 19 and Sanford Road (Route 109) Intersection
- Exit 32 and Alfred Road (Route 111) Intersection
- Exit 46 and Skyway Drive Intersections
- Exit 48 and Riverside Street Intersection
- Exit 63 and Gray Route (Route 4) Intersections
- Exit 75 and Washington Street (Route 100/202) Intersections

3 FUTURE CONDITIONS

This section provides the basis for capacity improvement recommendations based on calculated ramp and mainline capacities and predicted traffic volumes. In some instances, differences occur in the levels of service between the northbound and southbound lanes of a given segment. These variations are attributed to several factors including differences in design hour volumes, roadway geometry, and the presence of interchange ramps, among other factors.

3.1 HISTORIC GROWTH TRENDS

The following sections detail the calculations and assumptions used to establish the growth rate used for future forecasts. The forecasted traffic volume and corresponding LOS in the future year condition is also provided.

Historically, traffic growth rates have varied along the length of the Turnpike and vary from 1.0% to 1.8%. Generally, the region north of Gray has experienced growth at a slower rate than the southern regions. The growth rates were developed for each section based on historic traffic data collected between 2009 and 2019. The resulting growth rates used in the study are summarized in **Table 6: Growth Rates**.

Table 6: Growth Rates

Segment	2009	2019	Annual Growth by Segment
State Line - Exit 7	53,656	62,220	1.4% ⁵
Exit 7-19	43,046	50,160	1.5%
Exit 19-25	44,902	52,322	
Exit 25-32	47,801	55,161	
Exit 32-36	59,813	71,600	1.8%
Exit 36-42	66,247	79,496	
Exit 42-44	64,806	78,127	1.5%
Exit 44-45	44,548	50,834	
Exit 45-46	42,170	50,165	
Exit 46-47	47,237	54,868	
Exit 47-48	44,000	51,096	
Exit 48-52	38,950	43,912	
Exit 52-53	32,634	35,530	
Exit 53-63	28,925	30,204	1.4%
Exit 63-75	20,241	20,229	1.0%
Exit 75-80	18,867	18,918	
Exit 80-86	13,287	12,527	
Exit 86-102	11,055	9,594	
Exit 102-103	9,335	7,400	
Exit 103-109	28,920	32,364	1.0%

Three major projects are under construction, or in the project development stages, which will influence future widening needs on the mainline. These projects include:

- Part-Time Shoulder Use from the New Hampshire state line north through Exit 3.** This will provide additional capacity during peak periods. This project remains in construction and no similar facilities are operational in the State. Therefore, no local and historical data is available regarding the additional volume the Part-Time Shoulder Use will carry. Therefore, for the purpose of this Study, analyses have been completed assuming the shoulder use will provide about half the volume carried by a traditional travel lane. Additional monitoring and documentation of actual shoulder utilization will be used in future studies to refine capacity and LOS calculations.

⁵ Value reduced to account for capacity constraints at the Piscataqua River Bridge.

- **Opening of new Exit 35 Interchange and addition of southbound collector-distributor road between Exits 35 and 36.** The completed project is estimated to relieve congestion and, in doing so, draw additional traffic to this section of mainline. Projected increases in traffic have been developed based on preliminary analyses completed during project development. The actual change in traffic volumes will not be fully understood until the project has been open for several years. The estimated future needs of this area will be revised in future Safety & Capacity updates following completion of the project.
- **The Gorham Connector.** This proposed connector is being studied. If constructed, the project will provide a tolled highway connection from Exit 45 west to Gorham. The completed project is expected to increase mainline volumes through the Portland area. However, because this project is not approved for construction, its effects are not included in this analysis.

3.2 RAMP CAPACITY NEEDS

A planning level review of ramps was conducted to understand if any areas are likely to need an additional lane. The analysis assumes a typical threshold capacity of 1650 vehicles per hour. Based on this examination, traffic volumes at the following two locations currently exceed the threshold. At both locations efforts are underway to provide additional capacity.

- **Exit 32 SB Off and NB On Ramps:** A detailed study of this interchange is ongoing to identify opportunities to increase interchange capacity and relieve congestion.
- **Exit 36 SB Off and NB On Ramps:** Traffic volumes on the Exit 36 interchange are expected to be relieved by the opening of the new Exit 35 interchange.

The analysis concluded the Exit 46 SB Off Ramp may require a second lane, but that any such need is estimated to be more than 20 years in the future. The off ramp is currently constrained by an existing signal system located along Skyway Drive and Congress Street. Discussions are underway between MaineDOT, the City of Portland, and the Turnpike to study the signal systems with the goal of improving traffic operations and relieving congestion.

No other ramp locations are expected to require additional lanes over the next thirty years. A full summary of the interchange ramp analysis results is provided in **Appendix B**.

3.3 MERGING AND DIVERGING MOVEMENTS

In addition to evaluating the capacity of the unconstrained sections of interchange ramps, the merge and diverge zones were evaluated using FREEVAL evaluation methods to examine the interaction of merging and diverging movements with the mainline. The evaluation assumed traffic growth was not constrained by factors such as adjacent intersections. The evaluation concludes several locations will reach LOS E in the next 30 years. These include the Exit 19 NB Off Ramp diverge (2050), the Exit 42 SB Off Ramp diverge (2045), and the Exit 53 SB On Ramp merge (2043) and NB Off Ramp diverge (2050). A summary of the merge and diverge analysis results is provided in **Appendix B**.

3.4 MAINLINE CAPACITY NEEDS

This section examines mainline capacity and the interaction of interchange movements to determine when each mainline segment first reaches LOS E. This is generally the earliest date that capacity improvements would be considered. **Table 7: Anticipated Year of LOS E** provides summary of the results.

Table 7: Anticipated Year of LOS E

Segment	Anticipated Year of LOS E	
	NB	SB
0-1	TBD ⁶	TBD ⁴
1-2		
3-7	2030	2029
7-19	2040	2036
19-25	2043	2041
25-32	2043	2041
32-35	2027	2025
35-36	2027	2025
36-42	2030	2028
42-44	2030	2028
44-45	Lane Widening Underway. Completion Expected in 2023.	
45-46		
46-47		
47-48		
48-52	2030	2029
52-53	2038	2038
53-63	2050+	2050+
63-75	2055+	2055+
75-80		
80-86		
86-102		
102-109	2050+	

⁶ Timing of when LOS E is reached between Mile 0 and Mile 3 is heavily influenced by the planned implementation of Part-Time Shoulder Use. However, LOS E is not expected prior to next Safety & Capacity Study in five years. An updated estimate will be provided in the next study once Part-Time Shoulder Use effects are more clearly understood.

3.5 TOLL CAPACITY NEEDS

As previously discussed, toll plaza capacity has the potential to impact operations. An examination of all toll plazas was conducted to understand potential areas of concern. For the purposes of analysis, all lanes within a plaza were adjusted to either “EZ-Pass” or “Cash” as needed to best satisfy demand, with the understanding that at least one cash lane must be maintained at each location. Plazas where traffic volumes exceeded 80% of capacity have been flagged for continued monitoring.

No plazas are expected to operate at 80% of capacity in the next ten years. However, two toll plaza movements are predicted to be at 80% to 85% of capacity in the next thirty years. These include the York Toll Plaza northbound cash lanes and Exit 19 northbound EZ Pass lanes. Both plazas should be monitored, but no immediate action is required or recommended. Future changes to toll collection methods and technology, as well as future interchange improvements at Exit 19, may change future needs.

4 SAFETY EVALUATION

This safety analysis included a comparison of crash rates on the Turnpike with other interstates in Maine and across the nation. Additionally, a review of vehicle crash data for individual Turnpike elements was also completed.

The crash data review included mainline sections, interchanges, ramps, and toll plazas on the Maine Turnpike, as well as intersections adjacent to the Turnpike. The review periods included the most recent 10-years of crash data and allowed for a systematic look at recent and historic crash trends. For locations deemed to be High Crash Locations (HCLs) by MaineDOT, potential mitigation measures are provided with the goal of alleviating the number and severity of crashes.

4.1 DATA COLLECTION

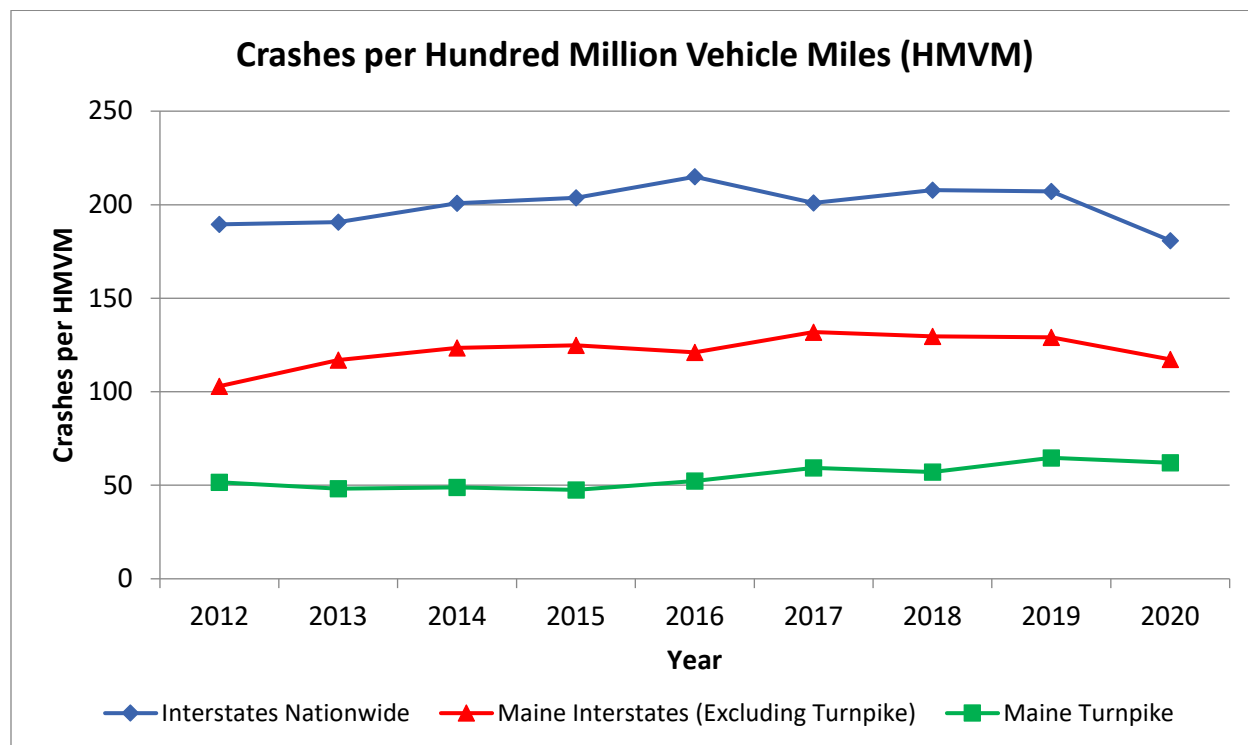
Multiple data resources were utilized to compile safety data. These resources provide local crash rate data, serve as the foundation for identifying areas of concern, and allowed the Study team to identify corridor-wide trends.

- MaineDOT Crash Map Viewer: Used to provide detailed historic crash information
- MaineDOT Map Viewer: Used to research historic HCL locations with crash diagrams

4.2 COMPARISON TO STATE AND NATIONAL CRASH RATES

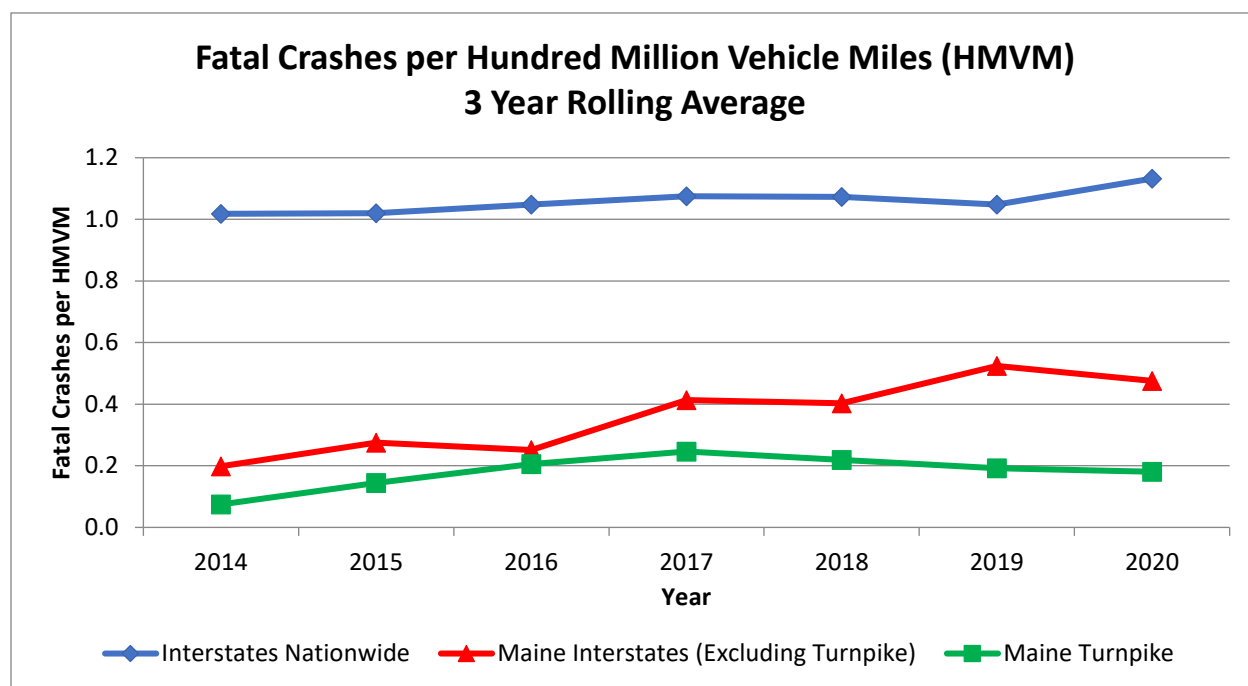
The comparison of Turnpike crash rates to other interstates across Maine and the nation was completed by comparing the total number of crashes per hundred million vehicle miles (HMVM) traveled. Data from the National Highway Traffic Safety Administration (NHTSA) was used as the basis for overall crash rates, as well as crashes with fatalities. As shown in **Figure 7: Total Crash Rate per Hundred Million Vehicle Miles (2012-2020)**, the Maine Turnpike has a crash rate that is approximately one third the national average for interstates, and one half the State of Maine average.

Figure 7: Total Crash Rate per Hundred Million Vehicle Miles (2012-2020)



Further, the NHTSA estimated that 42,915 people died in interstate crashes nationally in 2021⁷, continuing a dangerous trend of increasing deaths (up 10.5% over 2020) on our nation's roads and most nearly matching the record crash rate of 1.34 fatalities per 100 million VMT set in 2020. **Figure 8: Fatal Crashes per Hundred Million Vehicle Miles (2012 - 2020)** compares interstate fatality rates on the Turnpike to other National and Maine interstates. The Turnpike continues to have a lower fatal crash rate – well below the national average. Additionally, the fatal crash rate on the Turnpike has declined steadily since 2017.

⁷ [NHTSA's 2021 Estimate of Traffic Deaths Shows 16-Year High](#)

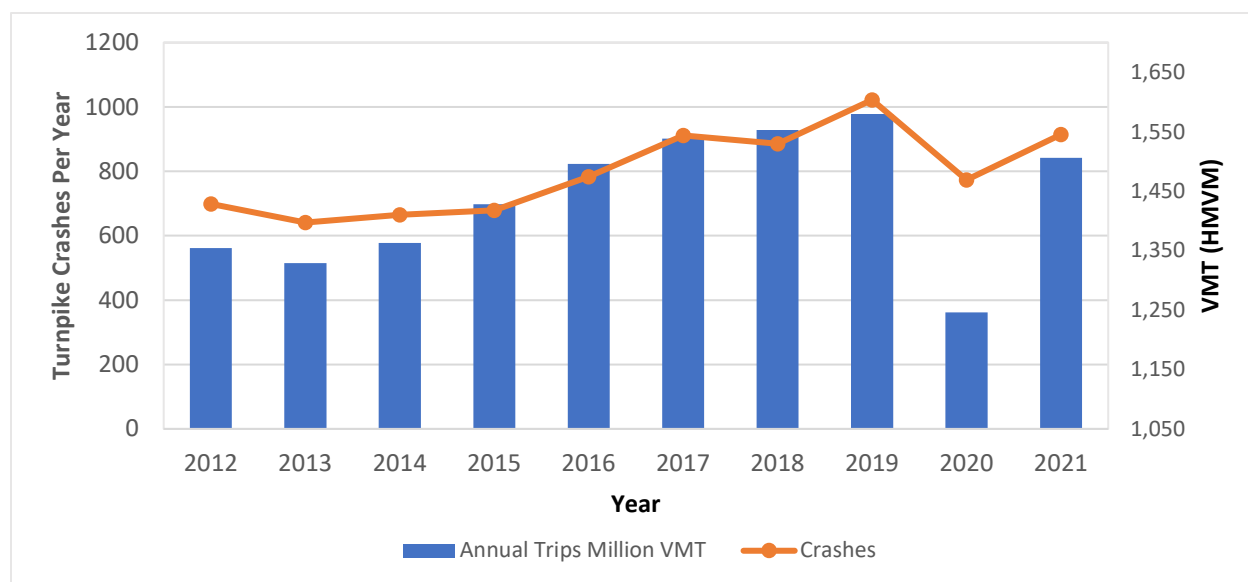
Figure 8: Fatal Crash Rate per Hundred Million Vehicle Miles (2012 - 2020)

A review of fatal crashes on the Turnpike concluded that, generally, sections with higher volumes had a higher number of fatal crashes. The three most common types of crashes involving fatalities were:

1. Went off road (14),
2. Rear end – sideswipe (5), and
3. Victims outside of a vehicle (5).

4.3 GENERAL SAFETY EVALUATION

As shown in **Figure 9: Turnpike Crashes per Hundred Million Vehicle Miles (2012-2021)**, overall crashes follow a similar trend to fatal crashes, with the crash rate (number of crashes per VMT), peaking during the pandemic like the rest of the country. In general, the average crash rate on the Turnpike is approximately 1 crash for every 2 hundred million vehicle miles traveled.

Figure 9: Turnpike Crashes per Hundred Million Vehicle Miles (2012-2021)

While the number of crashes has been increasing, the severity of those crashes remains relatively steady. Crashes resulting in injuries decreased from 12.2% in 2012 to 9.4% in 2021. For the 2012-2021 period the top five types of crashes were:

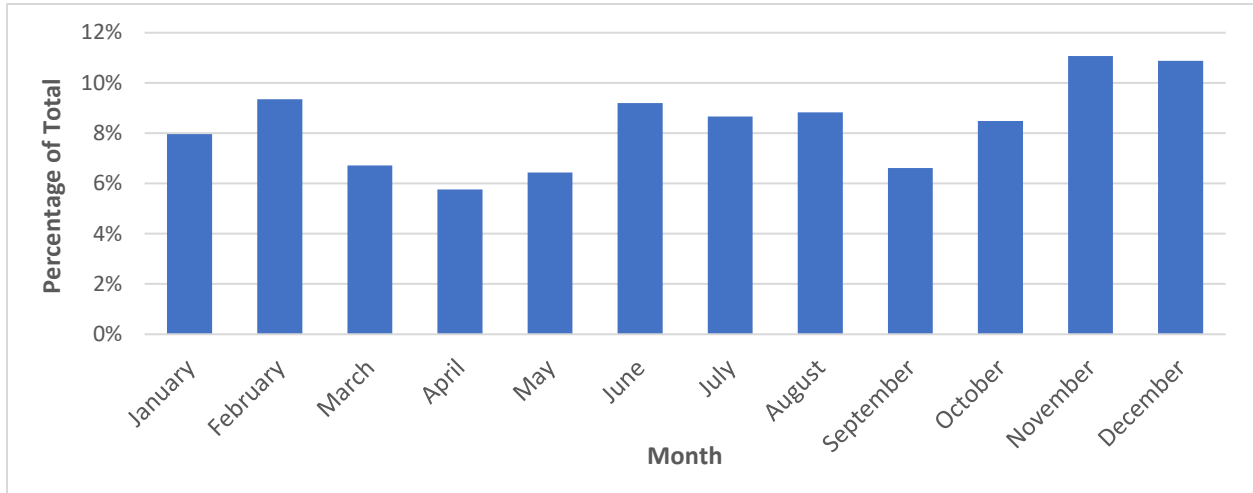
- (1) Went off the road (2,948)
- (2) Rear-end/Sideswipe (2,752)
- (3) Collision with animal (1,357)
- (4) Object in the road (391)
- (5) Other (167)

Additionally, the top five causes for these crashes, representing nearly 80% of all crashes includes:

- (1) No contributing action (such as an animal strike) – 36%
- (2) Driving too fast for conditions (typically seen in crashes with inclement weather) – 21%
- (3) Following too closely (typically seen during periods of congestion) – 9%
- (4) Failure to stay in lane – 7%
- (5) Run off the roadway – 6%

The crash data shows that 64% of crashes reported on the Turnpike between 2012 and 2021 occurred with dry road surface conditions with approximately 16% occurring with wet road surface conditions. The remaining 20% of crashes occurred during periods of snow, slush, and icy road conditions.

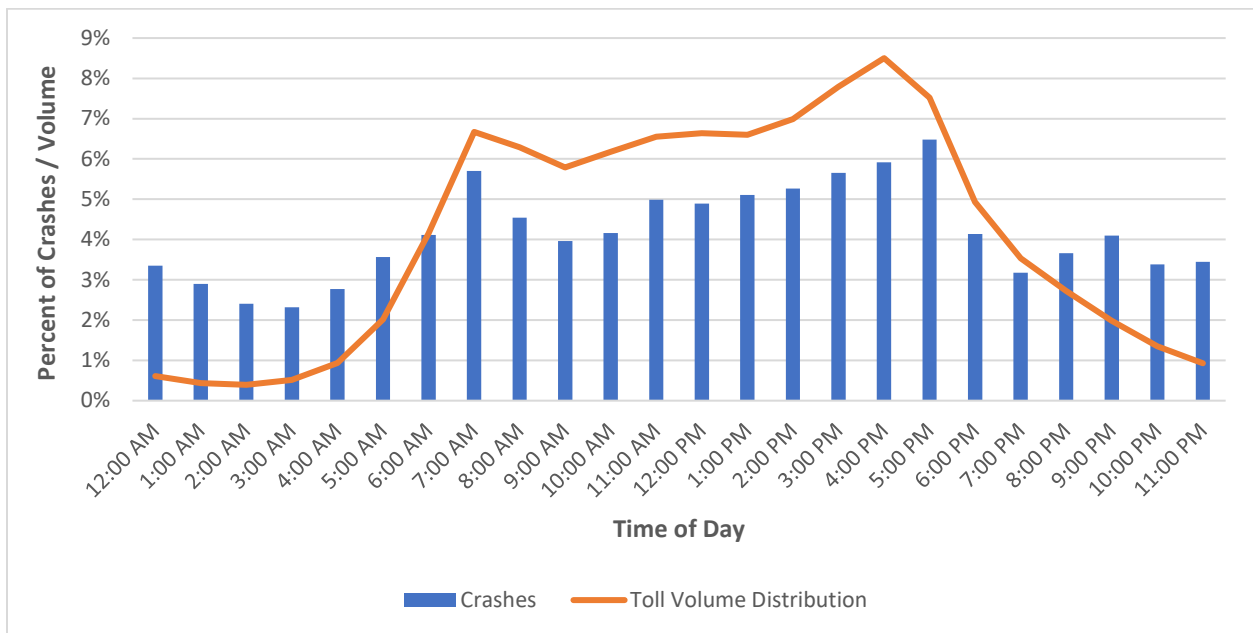
The following figures examine when crashes occur, both in terms of the time of the year, and time of day. **Figure 10: Percentage of Turnpike Crashes per Month** reveals that crash rates do not follow volume trends. A higher proportion of total crashes occurs during the winter months when traffic volumes are reduced, which is attributed to winter weather conditions.

Figure 10: Percentage of Turnpike Crashes per Month

Furthermore, the data show deer crashes account for more than one third of crashes occurring between June and November.

Figure 11: Turnpike Crash Distribution by Time of Day (2012 - 2021) illustrates that the number of crashes on the Turnpike system follows a typical AM and PM peak hour, correlating with common commute times.

Additionally, although there is significantly less traffic between the hours of 8 PM and 5 AM, the crash rate during this period is several times higher than during daylight hours. This increased crash rate may be attributed to a variety of factors that are more prevalent during overnight hours including reduced visibility, more active animal movements, and an increase in the number of impaired drivers (either lack of sleep or substance use).

Figure 11: Turnpike Crash Distribution by Time of Day (2012 - 2021)

As part of the safety and capacity study, a review of existing crash data was conducted to assess the frequency of crashes attributed to wrong-way drivers and to identify potential trends. Crash reports spanning a 12-year period, spanning from 2011 to 2022, were analyzed. A total of 18 crashes were identified.

The data indicates a sharp increase in wrong-way crashes over time, although some of this change is likely attributed to the addition of a specific “wrong way driver” code in police reports that occurred in roughly 2015. Specifically, two crashes occurred during the four-year period from 2011 to 2014, five crashes occurred from 2015 to 2018, and 11 crashes occurred from 2019 to 2022. The data also shows wrong-way crashes have a greater tendency to result in personal injury compared to non-wrong-way crashes reported on the Turnpike system. Lastly, impaired driving was reported as the most frequent contributing factor in wrong-way crashes, accounting for seven of the 18 crashes. Confused/disoriented drivers accounted for two of the 18 crashes.

A separate study is underway to identify potential entry points for wrong-way drivers on the Turnpike system. The study will assess the need for additional signage or countermeasures to further mitigate the risk of wrong-way driver incidents.

4.4 SAFETY PROGRAMS IN PLACE

In addition to TSM solutions presented in **Section 2.2**, the MTA employs several safety programs throughout the Turnpike including:

- **State Police Troop G:** The primary mission of Troop G is the safety of motorists on the Maine Turnpike. The Troop is headquartered within the MTA Headquarters in Portland.
- **MTA Safety Patrol:** Currently sponsored by GEICO, this free service keeps vehicles moving by providing services such as changing flat tires, jump-starting vehicles, providing lockout assistance, and moving disabled vehicles to the shoulder.
- **MTA Traffic Management and Communications Center (MTA TMCC):** This center provides both emergency and non-emergency services throughout the Turnpike and hosts information systems to the public. It also has a direct line for Turnpike drivers to report incidents - #999.
- **Public Information Campaigns:** These communicate timely information relating to matters of Toll Plaza Safety, Work Zone Awareness, and Highway/Winter Safety.
- **Maintenance and Operations:** The MTA oversees an inspection of the entire Turnpike at least once a year with inspection findings documented in an annual operation and maintenance report. Visual inspections are conducted along the entire Turnpike to assess pavement, cut sections, embankments, bridges, roadway lighting, drainage structures, signs, pavement markings, toll plazas, utility buildings, service areas, maintenance areas, and other facilities. Maine Turnpike maintenance crews address deficiencies where possible, respond to vehicle crashes to assist with cleanup, conduct critical winter maintenance activities, and support the overall efficient and safe movement of people and goods along the Turnpike.

4.5 HIGH CRASH LOCATIONS

MaineDOT identifies HCLs as intersections or predefined segments that have 8 or more crashes during a three-year period and have a Critical Rate Factor (CRF) greater than 1.0. CRFs are a metric developed to compare crash rates of similar locations in the state. A CRF greater than 1.0 indicates that the area has more crashes than the average comparable location in the state. The year of a HCL refers to the third year of evaluation – for instance, a HCL in 2021 is based on data from 2019, 2020, and 2021.

The following sections examine HCLs on the Turnpike, ramps, and adjacent intersections to local roads. HCLs that have developed since the prior study have been evaluated using road safety evaluations to identify crash patterns and identify potential mitigation. These detailed evaluations are included in **Appendix C**. Prioritized recommendations with costs are included in **Section 5**.

4.5.1 Mainline Safety Evaluation

Table 8: Mainline Segments with a High Crash Location examines mainline HCLs identified in the prior study (2012-2014), current HCLs (2019 - 2021) and segments that have qualified as an HCLs since the completion of the last study. The purpose of this comparison is to identify crash patterns with the goal of identifying actionable strategies for improvement. The most recent CRF, percent injury and the total number of crashes during the study period are provided. No recommendations are made for segments that have not been a HCL since the prior study. Each segment between interchanges is further broken into nodes as developed by MaineDOT so there could be more than one HCL in each segment identified. Further discussion of exact locations is provided in **Appendix C** for each HCL.

Table 8: Mainline Segments with a High Crash Location

	Segment (MM - MM)	HCL at Time of Prior Study (2012-2014)	Current HCL (2019- 2021)	No. Years as an HCL (2015- 2021)	CRF	% Injury	Total Crashes
NB	0-1		✓	1	1.08	30.8	26
	19-25			0	-	-	-
	25-32		✓	2	1.44	38.5	13
	32-36	✓		0	1.05	37.5	16
	36-42		✓	2	1.06	31	71
	42-44		✓	3	1.12	27.3	11
	46-47		✓	3	1.39	20.6	34
	53-63	✓		3	1.13	50	10
	63-75		✓	4	1.32	38.5	19
	75-80		✓	2	1.17	10	20
	80-86	✓		4	1.17	0	8
	86-102	✓	✓	3	1.74	16.7	18
SB	109 - 102	✓		0	1.1	40	15
	102 - 86			1	-	-	-
	80 - 75			2	1.07	0	15
	75 - 63	✓		0	1	53.8	13
	63 - 53			2	1.23	37.5	29
	53 - 52			2	1	0	9
	52 - 48		✓	2	1.25	33.3	15
	48 - 47			2	1.23	16.7	30
	44 - 42		✓	2	1.16	20.5	39
	42 - 36			2	1.02	23.1	26
	32 - 25			0	1.21	11.1	9
	19 - 7	✓		0	1.69	0	8
	3 - 2		✓	1	1.22	31.8	22
	1 - 0			1	1.09	44.8	29

There are currently more HCLs than there were from 2012 - 2014. Several areas are consistently HCLs, particularly NB from Scarborough north. All CRFs are less than 2.0. Causes of crashes throughout the corridor are generally similar and follow the general trends discussed previously. Based on an analysis, the following recommendations are made:

- Several areas have had or are undergoing mainline or interchange capacity improvements to improve safety and mobility. These sections should be re-evaluated in the next study. This includes mainline HCL segments that will be affected by the implementation of PTSU in the Kittery area, and the addition of a third lane in each direction in the Portland area. Capacity needs should continue to be re-evaluated cyclically to understand congestion areas.
- The following two separate safety studies are recommended based on these findings:
 - Updated animal crossing study: Animal collisions are the predominate crash cause for HCLs north of Portland and the #3 cause of crashes overall
 - Reduced speed sign study: A review of 45mph sign locations is recommended to ensure all areas of the Turnpike are covered appropriately, and to encourage motorists to travel at prudent speeds during periods of inclement weather, thereby reducing crash rates.

4.5.2 Toll Plaza Safety Evaluation

There are 8 toll plazas that have been an HCLs since the prior study as shown in **Table 9: Toll Plaza High Crash Locations**. Locations include the old mainline toll plaza at York (now removed), New Gloucester ORT Plaza, and West Gardiner I-295 plaza. Drivers making lane changes while approaching and departing the toll plazas is the primary factor contributing to crashes at these locations.

Table 9: Toll Plaza High Crash Locations

Exit	HCL at Time of Prior Study (2012-2014)	Current HCL (2019-2021)	No. Years as an HCL (2015-2021)	CRF	% Injury	Total Crashes
Old York Barrier Toll Plaza (Removed 2021)	✓	✓	3	3.94	13	46
19			2	1.72	37.5	8
32		✓	7	2.05	0	13
Old Exit 45 Plaza (Removed 2022)		✓	5	1.43	33.3	9
48		✓	4	3.38	8.3	12
53 (Updated 2017)			2	2.36	11.1	9
New Gloucester Barrier Toll Plaza		✓	7	1.01	38.5	13
Gardiner Barrier Toll Plaza			1	1.11	37.5	8

There are several areas where construction has been implemented to improve conditions at toll plazas with HCLs. Continued monitoring and updates will be included in the next study to assess how the work has affected crash rates. The following locations have ongoing, or recently completed, improvements:

- York Toll Plaza replacement (completed 2021) –change in location and configuration of the toll plazas to include open road tolling;
- Exit 45 Toll Plaza replacement (completed 2022) – both change in location and configuration of the toll plazas; and
- Exit 53 Toll Plaza Modifications (completed 2017).

Additional recommendations for safety improvements at toll plazas include:

- Separation of the Exit 19 On Ramps to minimize weaving movements, driver confusion, and last-minute lane changes;
- Implementation of Exit 32 interchange improvements to reduce congestion; and
- Installation of rumble strips in gore areas prior to the ORT and toll plaza split at barrier plazas.

Exit 48 should be included as part of a larger coordination effort between the Turnpike, MaineDOT, and local stakeholders to evaluate options for increasing the capacity of the Riverside Street intersection while also improving safety by minimizing weaving and last-minute lane changes approaching and departing the toll plaza.

4.5.3 Turnpike Ramps

As is shown in **Table 10: Ramp High Crash Locations**, no ramps are currently classified as HCLs. Four have been HCLs at least once since the prior study was completed, including ramps at Exits 2, 18, 32, and 36.

Table 10: Ramp High Crash Locations

Exit #	HCL at Time of Prior Study (2012-2014)	Current HCL (2019-2021)	No. Years as an HCL (2015-2021)	CRF	% Injury	Total Crashes
2			2	3.87	50	8
19	✓		1	1.79	12.5	8
25	✓		0	-	-	-
32	✓		2	1.06	12.5	8
36			1	1.18	33.3	9
48	✓		0	-	-	-
52	✓		0	-	-	-

Of these locations, Exit 2 had the highest CRF when it was classified as a HCL. With a CRF more than 3x similar locations in the state and a 50% injury rate, this area also has HCLs at its adjacent intersections which will be discussed in **Section 4.5.5**. As many of the crashes involve hitting the guardrail along the sharply curving ramp while merging with Route 236, short-term recommendations include enhanced signage to provide motorists with additional advance warning of the curve at this location.

The other three locations that have been HCLs since the last safety analysis include ramps for Exit 19, 32, and 36. All are high congestion areas. Specific recommendations for these include:

- Separation of the Exit 19 NB and SB On Ramps as the main crash pattern for the Exit 19 NB Off Ramp is related to the sharp curve where the on and off ramps join. Separating the ramps will improve the geometry for this movement;
- Following recommendations outlined in the Exit 32 Connections Study intended to reduce congestion and crash rates;
- No additional actions are recommended at Exit 36 since the ongoing interchange improvement project is expected to resolve congestion and lead to a lower crash rate.

4.5.4 Merge and Diverge Points

There were no prior HCLs at merge and diverge points. Since the 2016 Study, three locations have developed: the Exit 44 NB and Exit 3 SB diverge and the Exit 2 SB On Merge as shown in **Table 11: Merge and Diverge High Crash Locations**.

Table 11: Merge and Diverge High Crash Locations

	Segment (Exit #)	Merge/ Diverge	HCL at Prior Study (2012- 2014)	Current HCL (2019- 2021)	No. Years as an HCL (2015- 2021)	CRF	% Injury	Total Crashes
NB	44	Diverge		✓	1	1.04	33.3	9
SB	2	Merge		✓	3	2.2	11.1	9
SB	3	Diverge (to C/D)		✓	1	1.22	31.8	22

The Exit 44 diverge has been a HCL since 2015. Nearly all crashes involve following too closely and lane changes. The Portland Area Widening (PAW) project is widening the Turnpike to three lanes through this area and includes roadway modernization, striping and sign modifications. These changes are anticipated to be complete by the end of 2023 and are expected to improve traffic operations and reduce crashes at this location.

Exits 2 and 3 in the Kittery are within the area of proposed PTSU during peak hours. Additional signing and striping are being installed at Exits 2 and 3 as part of the project. This changing travel pattern should be monitored to understand impact on safety. Additional recommendations will be made once data is available regarding the effect of PTSU on crash patterns.

4.5.5 Local Road Intersections

Connections to local roads are a critical element to safe and efficient operation of the Turnpike. **Table 12: Adjacent Intersection High Crash Locations** summarizes HCLs at these locations. Unlike the other elements that affect the Turnpike, some adjacent intersections and associated signal systems are not owned or operated by the Turnpike. While these intersections are not necessarily the responsibility of the Turnpike, they are included for completeness since crashes at intersections adjacent to the Turnpike can lead to congestion and additional crashes on the Turnpike system. Information regarding the ownership and signal system operations at these intersections is indicated in the table.

Table 12: Adjacent Intersection High Crash Locations

Exit #	HCL in Prior Study (2012-2014)	Current HCL (2019-2021)	No. Years as an HCL (2015-2021)	CRF	% Injury	Total Crashes	Intersection Owner	Signal System Operator
2	✓		3	2.04	25	8	MaineDOT	N/A
7		✓	6	5.33	25	12	MaineDOT	N/A
19	✓		0	-	-	-	MaineDOT	MTA
25			6	2.27	25	8	MTA	MTA
32		✓	7	1.73	32.9	85	MTA	MTA
42		✓	5	1.13	16.7	30	MTA	MTA
48	✓	✓	7	1.29	35.3	42	City of Portland	City of Portland
63		✓	4	1.07	14.3	35	MTA	MTA
75		✓	6	7.88	57.1	27	MaineDOT	MaineDOT
102	✓		0	13.7	30.8	13	MaineDOT	MaineDOT

The following high crash locations have undergone recent improvements to improve operations. Continued monitoring of these locations is recommended.

- Exit 25 with Alewife Park Road: This intersection previously had a predominate crash pattern involving angle crashes. This previously stop-controlled intersection was recently converted to a signalized intersection.
- Exit 32 with Route 111: This intersection has a pattern of rear-end collisions (predominately on the Route 111 approaches) and angle crashes from all approaches. This intersection was the subject of a planning study examining opportunities to improve safety and operations. Based on that study, short-term improvements have been made to maximizing the capacity of the intersection through signal and geometric changes. Long-term improvements remain the subject of ongoing study.
- Exit 42 with Payne Road: This intersection previously had a predominate rear-end collision pattern – particularly coming from the Exit 42 ramps and Haigis Parkway. Intersection improvements including the addition of lanes and changes in lane designations, together with new signal system timing, was recently implemented.
- Exit 102 with Route 126: This intersection was previously stop controlled with a predominant angle crash pattern from vehicles exiting the Exit 102 ramp. Since the reconfiguration of the intersection to a roundabout in 2016, the location has not been an HCL.

Additional recommendations for consideration include:

- Exit 7 Ramps Intersection with Spur Road: These intersections have crash patterns consisting of almost exclusively crashes related to turning movements. The difficulty that users experience in taking a left off of the SB Off Ramp onto Spur Road has created a condition in which many vehicles utilize alternate routes of either Chases Pond Road or U-Turns at the Park and Ride to be able to travel EB on Spur Road. Similar challenges exist with other left turn movements in the area. A study and alternatives analysis of this area is currently ongoing to determine potential mitigation efforts.
- Exit 63 with Route 202 and 26A: This intersection's predominant crash pattern is related to the right turn from Route 202 to Route 26A followed by rear-end collisions and general angle crashes. Continued improvements including regional, signal, and geometric improvements have not removed this location from the HCL list. Continued coordination with MaineDOT and local municipalities is recommended to identify additional opportunities for improvement.
- Exit 75 with Route 202: This intersection is consistently an HCL and has the highest CRF of all intersections adjacent to the Turnpike. Adjacent weaving movements with Route 202 and channelized right turning movements contribute to the increased crash rate, particularly for southbound traffic on Route 202 entering the Turnpike. A reconfiguration of the intersection with updated signal timing and phasing to reduce upstream weaving movements is recommended for consideration.
- Exit 2 NB Off with Route 236: Crash patterns are driven by the merging/weaving movement of ramp traffic merging with Route 236. Evaluate opportunities to reduce crashes.

The following locations require coordination with MaineDOT and local stakeholders as MTA does not own or operate these intersections:

- Exit 7 SB with Spur Road: Crash patterns are driven by left turning vehicles from the ramp onto Old Post Road and from Old Post Road onto the ramp. The intersection is unsignalized.
- Exit 48 with Riverside Drive: Crash patterns involve angle crashes and following too closely.

4.6 GEOMETRIC EVALUATION

A comprehensive geometric evaluation of all merges, diverge and interchange locations on the Turnpike was conducted using the American Association of State Highway and Transportation Officials (AASHTO) Tables 10-4 (*Minimum Acceleration Lane Lengths for Entrance Terminals with Flat Grades of Less Than 3 Percent*) and 10-6 (*Minimum Deceleration Lane lengths for Exit Terminals with Flat Grades of Less Than 3 Percent*). The evaluation concluded that several locations have acceleration or deceleration lengths less than recommended by current AASHTO design standards. In many cases the substandard ramp lengths are the result of changing AASHTO standard, or the introduction of increased speed limits after construction.

The intention of this evaluation is to identify areas where substandard acceleration or deceleration ramps align with HCLs. Extending the existing ramp lengths may be a viable solution to reduce crash rates at these locations.

The analysis concluded all deceleration lengths meet AASHTO standards. Several acceleration lanes are less than AASHTO recommended values. The findings of the analysis are included in **Table 13: Acceleration Lane Summary**, along with their required and actual lengths.

Table 13: Acceleration Lane Summary

Location	Required Acceleration Lane Length (ft)	Actual Acceleration Lane Length (ft)	% Of Acceleration Length Met	Notes
York Weigh Station NB	1,560	1,515	97%	Monitoring suggested
Exit 19 SB	1,350	1,237	92%	Interchange improvements planned
Exit 19 NB	1,350	1,217	90%	
Exit 32 SB	1,350	1,255	93%	Limited Interchange improvements completed. Additional evaluation ongoing.
Exit 36 SB	1,350	967	72%	Monitoring suggested
Exit 42 SB	1,350	1,187	88%	Monitoring suggested
Exit 42 NB	1,350	1,123	83%	Monitoring suggested
Exit 52 NB	910	475	52%	Interchange improvements planned
Exit 63 NB	1,350	845	63%	HCL in 2019 Monitoring suggested
Exit 75 SB	1,230	770	63%	Monitoring suggested
Exit 102 SB	1,420	925	65%	Monitoring suggested

A review of crashes indicates none of the on-ramp locations listed in Table 13 are currently classified as high crash locations. Whereas these locations are judged to operate acceptably, no changes are recommended at this time.

4.7 UPDATED MONITORING RECOMMENDED IN THE 2016 STUDY

As indicated in **Section 1.3** there were three safety areas recommended for further monitoring. This section addresses those areas in greater detail and provides updated information and recommendations.

Large Animal Collisions

Large animal collisions between MM 56 and 57 have increased since the 2016 study. Based on a 5-year rolling average animal crashes have increased fourfold from approximately one animal collision every two years to two animal collisions every year. An update to the large animal study is recommended to identify options for improvement since animal crashes are the third leading cause of crashes on the Turnpike.

Comparison of Safety at Open Road Tolling Plazas to Cash Plazas

A review of crash data at barrier toll plazas was completed to compare the crash rate at the plazas following their conversion to Open Road Tolling to the crash rate at the plaza before their conversion. The New Gloucester Toll Plaza was used for this evaluation since it's the oldest ORT plaza and, therefore, allows for the evaluation of a reasonably long time period following its conversion to Open Road Tolling.

As shown in **Table 14: Pre and Post ORT Construction Crash Data**, in the three years prior to the construction of the ORT toll plaza, the plaza averaged 6.3 crashes per year with an injury rate of 29%. In the 9 years since completing the conversion the average crash rate has been 4.5 crashes per year with a 28% injury rate.

Table 14: Pre and Post ORT Conversion Crash Data at New Gloucester Plaza

Average	Injury %	Total Crashes
Post ORT Construction	28%	4.44
Prior to ORT Construction	29%	6.33

Hydroplaning crash frequency

Hydroplaning is a known issue and contributes to crashes. The Turnpike's capital improvement program is developed to resurface pavement on a 12-year cycle in an effort to eliminate excessive pavement rutting and the hydroplaning that can result when pavement ruts prevent water from draining away from the roadway. The MTA's capital plan is reviewed annually against pavement conditions and rutting data. When appropriate, adjustments to the paving program are made to address areas of concern.

5 RECOMMENDATIONS

The recommendations provided in this section have been developed based on a review of safety and capacity analyses of the Turnpike identified in Sections 3 and 4. These recommendations are intended for planning purposes, recognizing that time frames may be adjusted as needed based on actual conditions, engineering judgment and financial considerations.

5.1 TABLE OF CAPACITY RECOMMENDATIONS AND COST

Table 15: Timing and Program Costs for Mainline Capacity Projects includes a list of mainline widening improvements, their recommended implementation time and program cost (including construction, contingency, engineering, and construction inspection). Except as noted, all projects include adding a fourth lane in each direction to the mainline.

The cost for capacity additions from MM 0-7 includes replacement of the Route 236 bridge. However, the estimate does not include reconstruction of the Route 236 interchange. This work is expected to occur well in the future and construction costs have not yet been established. A separate study is recommended to further evaluate the improvements and costs necessary at the Route 236 interchange to support addressing both safety and capacity constraints.

Table 15: Timing and Program Costs for Mainline Capacity Projects

Location	Year of LOS E	Cost	Notes
MM 0-7	2029	\$148M	Further study of PTSU required to refine when LOS E will be reached
MM 7-19	2038	\$169M	
MM 19-25	2042	\$93M	
MM 25-32	2042	\$87M	
MM 32-36	2026	\$62M	Recommend monitoring traffic operations at new Exit 35/36 interchange prior to widening
MM 36-44	2029	\$72M	
MM 52-53	2038	\$40M	Addition of 3 rd lane
MM 53-63	2053	\$195M	

5.2 PRIORITIZED TABLE OF SAFETY RECOMMENDATIONS AND COST

Safety improvement recommendations discussed in Section 4, and included in detail in **Appendix B**, are included in **Table 16: Prioritized Table of Safety Improvements**. Short-term improvements are improvements that can either be completed immediately or are intended to address more pressing safety concerns. Mid-term improvements are substantial projects that require additional study and planning to complete, but that address notable safety concerns. Long-term improvements are known needs based on safety evaluations, but their implementation can be deferred for some time. As capacity and congestion increases, long-term improvements will become more urgent.

Table 16: Prioritized Table of Safety Improvements

Timeframe	Improvement	Location	Cost
Short Term (0-5 years)	Enhanced Signage	Exit 2 NB Off Ramp	\$15,000
	Signal Timing & Phasing Review	Exit 63 Intersection	\$20,000
	Enhanced Yield Signage	Cumberland Service Plaza	\$5,000
	Evaluate Overhead Signage	Exit 44 NB Diverge	\$10,000
Mid-Term (5-10 years)	Interchange Reconfiguration	Exit 19	\$19M
	Route 111 Connection	Exit 32	\$21M
	Intersection Improvements	Exit 75 Intersection	\$6M
Long-Term (10+ years)	Interchange Reconfiguration	Exit 32	\$59M

5.3 AREAS OF ADDITIONAL STUDY, COORDINATION AND MONITORING

Locations warranting additional study, monitoring or stakeholder coordination are included in **Table 17: Locations Warranting Additional Study, Monitoring and Coordination**. Intersections not owned by the Turnpike that have identified capacity constraints or high incidences of crashes are flagged for coordination.

Table 17: Locations Warranting Additional Study, Monitoring and Coordination

Action	Topic
Studies	Systemwide Large Animal Crossing Study
Locations to Monitor with the next Safety and Capacity Study	Develop Post-Construction Traffic Volumes at Exit 35/36
	Monitor PTSU Operations in Kittery
	Adjacent Intersection Capacities
	Existing HCLs Currently Under Construction
Stakeholder Coordination	Exit 7 Connection with Spur Road
	Exit 45 Intersection with Maine Mall Road/703 Connections
	Exit 46 intersections with Congress Street
	Exit 48 intersections with Riverside Drive
	Exit 63 intersections with Route 115
	Exit 75 intersection with Route 202

Appendix A:

AADTs

Maine Turnpike Authority 2009 Average Annual Daily Traffic

	14,451	14,470	103-109 Volume: 28,920		24,756	22,481	46-47 Volume: 47,237
Gardiner I-95 Exit 103	9,496	10,089	Barrier Volume: 19,585	Congress St./Jetport Exit 46	5,536	4,874	Interchange Volume: 15,755
					2,478	2,866	
	4,955	4,380	102-103 Volume: 9,335		21,697	20,472	45-46 Volume: 42,170
Gardiner Remote Exit 102			Interchange Volume: 1,720	South Portland Exit 45	5,376	5,235	Interchange Volume: 23,600
	772	949			4,765	8,224	
West Gardiner Barrier	5,726	5,329	Barrier Volume: 11,055		21,086	23,462	44-45 Volume: 44,548
Sabattus Exit 86	510	476	Interchange Volume: 4,202	I-295 Exit 44			Interchange Volume: 20,258
	1,696	1,521			11,398	8,860	
	6,913	6,374	80-86 Volume: 13,287		32,484	32,322	42-44 Volume: 64,806
Lewiston Exit 80	1,585	1,485	Interchange Volume: 11,719	Scarborough Exit 42	2,378	2,268	Interchange Volume: 10,733
	4,571	4,079			3,074	3,014	
	9,899	8,968	75-80 Volume: 18,867		33,179	33,068	36-42 Volume: 66,247
Auburn Exit 75	3,860	3,563	Interchange Volume: 16,221	Saco Exit 36	7,846	7,788	Interchange Volume: 24,833
	4,571	4,227			4,571	4,629	
New Gloucester Barrier	10,610	9,631	Barrier Volume: 20,241		29,904	29,908	32-36 Volume: 59,813
Gray Exit 63	1,521	1,526	Interchange Volume: 14,777	Biddeford Exit 32	8,549	8,615	Interchange Volume: 22,317
	5,923	5,808			2,531	2,622	
	15,011	13,914	53-63 Volume: 28,925		23,886	23,916	25-32 Volume: 47,801
West Falmouth Exit 53	1,701	1,613	Interchange Volume: 10,336	Kennebunk Exit 25	2,966	2,991	Interchange Volume: 9,014
	3,528	3,494			1,530	1,528	
	16,839	15,795	52-53 Volume: 32,634		22,450	22,453	19-25 Volume: 44,902
Falmouth Exit 52	1,254	1,508	Interchange Volume: 11,840	Wells Exit 19	3,781	3,863	Interchange Volume: 13,433
	5,150	3,928			2,829	2,959	
	20,735	18,215	48-52 Volume: 38,950	York Barrier	21,497	21,549	Barrier Volume: 43,046
Portland/Westbrook Exit 48	3,532	2,962	Interchange Volume: 18,037	Chases Pond Rd. / Route 1 Connector	1,708	1,665	
	5,783	5,760			7,067	6,916	
	22,986	21,014	47-48 Volume: 44,000		26,856	26,800	
Rand Rd. Exit 47	1,106	1,350	Interchange Volume: 8,150	Legend	SB Off	NB On	
	2,876	2,817			SB On	NB Off	
					SB Mainline	NB Mainline	

Total Recorded Trips/Day: **164,249**
 Northbound Trips: **81,754**
 Southbound Trips: **82,494**
 Total Trips for the Year: **59,950,727**

Tolled Locations:

	2009	2008	
NB:	102,453	104,798	-2.2%
SB:	102,189	103,630	-1.4%
Total:	204,642	208,428	-1.8%

Maine Turnpike Authority 2010 Average Annual Daily Traffic

	14,766	15,065	103-109 Volume: 29,831		24,943	23,134	46-47 Volume: 48,078
Gardiner I-95 Exit 103	10,376	10,730	Barrier Volume: 21,106	Congress St./Jetport Exit 46	5,693	5,191	Interchange Volume: 16,370
	4,391	4,335	102-103 Volume: 8,726		21,789	20,890	45-46 Volume: 42,678
Gardiner Remote Exit 102	738	942	Interchange Volume: 1,680	South Portland Exit 45	5,372	5,246	Interchange Volume: 23,796
West Gardiner Barrier	5,128	5,277	Barrier Volume: 10,405		21,154	24,085	44-45 Volume: 45,238
Sabattus Exit 86	498	463	Interchange Volume: 4,149	I-295 Exit 44	11,818	8,892	Interchange Volume: 20,710
	6,316	6,316	80-86 Volume: 12,632		32,971	32,977	42-44 Volume: 65,948
Lewiston Exit 80	1,541	1,468	Interchange Volume: 11,629	Scarborough Exit 42	2,390	2,288	Interchange Volume: 10,916
	9,334	8,908	75-80 Volume: 18,242		33,740	33,768	36-42 Volume: 67,507
Auburn Exit 75	3,830	3,583	Interchange Volume: 16,363	Saco Exit 36	8,195	8,104	Interchange Volume: 25,624
New Gloucester Barrier	10,136	9,643	Barrier Volume: 19,779		30,172	30,361	32-36 Volume: 60,533
Gray Exit 63	1,527	1,504	Interchange Volume: 14,824	Biddeford Exit 32	8,537	8,752	Interchange Volume: 22,405
	14,577	13,965	53-63 Volume: 28,541		24,135	24,225	25-32 Volume: 48,360
West Falmouth Exit 53	1,754	1,784	Interchange Volume: 10,505	Kennebunk Exit 25	3,019	3,025	Interchange Volume: 9,248
	16,401	15,568	52-53 Volume: 31,969		22,719	22,801	19-25 Volume: 45,520
Falmouth Exit 52	1,204	763	Interchange Volume: 11,525	Wells Exit 19	3,829	3,906	Interchange Volume: 13,675
	20,746	18,813	48-52 Volume: 39,559	York Barrier	21,789	21,936	Barrier Volume: 43,724
Portland/Westbrook Exit 48	3,706	3,086	Interchange Volume: 18,603	Chases Pond Rd. / Route 1 Connector	1,778	1,739	
	23,012	21,566	47-48 Volume: 44,578		27,061	27,076	
Rand Rd. Exit 47	968	1,340	Interchange Volume: 8,114				
	2,899	2,908					

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Total Recorded Trips/Day: **167,400**
 Northbound Trips: **83,170**
 Southbound Trips: **84,229**
 Total Trips for the Year: **61,100,827**

Tolled Locations:

	2009	2008	
NB:	103,973	104,798	-0.8%
SB:	103,582	103,630	0.0%
Total:	207,555	208,428	-0.4%

Maine Turnpike Authority 2011 Average Annual Daily Traffic

	14,642	14,989	103-109 Volume: 29,631		24,770	23,514	46-47 Volume: 48,284
Gardiner I-95 Exit 103	10,271	10,618	Barrier Volume: 20,889		5,442	4,980	Interchange Volume: 15,948
	4,370	4,371	102-103 Volume: 8,742		21,865	21,523	45-46 Volume: 43,388
Gardiner Remote Exit 102	744	940	Interchange Volume: 1,685		5,419	5,435	Interchange Volume: 23,990
West Gardiner Barrier	5,115	5,312	Barrier Volume: 10,427		4,781	8,355	
Sabattus Exit 86	491	463	Interchange Volume: 3,961		21,227	24,444	44-45 Volume: 45,671
	1,590	1,417			11,715	8,376	Interchange Volume: 20,091
	6,214	6,266	80-86 Volume: 12,480		32,942	32,820	42-44 Volume: 65,762
Lewiston Exit 80	1,507	1,423	Interchange Volume: 11,286		2,312	2,297	Interchange Volume: 10,899
	4,430	3,926			3,196	3,093	
	9,137	8,769	75-80 Volume: 17,906		33,826	33,616	36-42 Volume: 67,442
Auburn Exit 75	3,691	3,503	Interchange Volume: 15,866		8,220	8,158	Interchange Volume: 25,610
	4,444	4,229			4,573	4,659	
New Gloucester Barrier	9,891	9,496	Barrier Volume: 19,387		30,179	30,117	32-36 Volume: 60,296
Gray Exit 63	1,490	1,472	Interchange Volume: 14,552		8,864	8,861	Interchange Volume: 22,866
	5,897	5,692			2,508	2,633	
	14,298	13,716	53-63 Volume: 28,014		23,823	23,889	25-32 Volume: 47,712
West Falmouth Exit 53	1,800	1,838	Interchange Volume: 10,612		2,959	2,989	Interchange Volume: 9,226
	3,593	3,380			1,645	1,632	
	16,091	15,258	52-53 Volume: 31,349		22,509	22,531	19-25 Volume: 45,041
Falmouth Exit 52	1,218	792	Interchange Volume: 11,769		3,627	3,929	Interchange Volume: 13,486
	5,558	4,201			2,930	3,000	
	20,431	18,667	48-52 Volume: 39,098		21,812	21,602	Barrier Volume: 43,415
Portland/Westbrook Exit 48	3,376	989	Interchange Volume: 15,503		1,767	1,750	
	5,775	5,362			7,533	7,344	
	22,831	23,040	47-48 Volume: 45,871		27,578	27,196	
Rand Rd. Exit 47	1,089	2,640	Interchange Volume: 9,872				
	3,028	3,114					

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Total Recorded Trips/Day: **165,577**
 Northbound Trips: **81,989**
 Southbound Trips: **83,588**
 Total Trips for the Year: **60,435,771**

Tolled Locations:

2011	2010	
NB: 102,514	103,973	-1.4%
SB: 103,115	103,582	-0.5%
Total: 205,630	207,555	-0.9%

Maine Turnpike Authority 2012 Average Annual Daily Traffic

	14,606	14,587	103-109 Volume: 29,193		24,093	22,847	46-47 Volume: 46,939
Gardiner I-95 Exit 103	10,246	10,488	Barrier Volume: 20,734	Congress St./Jetport Exit 46	5,527	4,848	Interchange Volume: 15,974
	4,360	4,099	102-103 Volume: 8,459		21,197	20,965	45-46 Volume: 42,163
Gardiner Remote Exit 102	771	976	Interchange Volume: 1,747	South Portland Exit 45	5,219	5,145	Interchange Volume: 23,463
West Gardiner Barrier	5,131	5,075	Barrier Volume: 10,207		20,912	23,985	44-45 Volume: 44,897
Sabattus Exit 86	509	494	Interchange Volume: 4,081	I-295 Exit 44	11,949	8,519	Interchange Volume: 20,467
	6,249	6,033	80-86 Volume: 12,282		32,861	32,504	42-44 Volume: 65,365
Lewiston Exit 80	1,504	1,416	Interchange Volume: 11,162	Scarborough Exit 42	2,317	2,390	Interchange Volume: 11,097
	9,063	8,539	75-80 Volume: 17,602		33,732	33,315	36-42 Volume: 67,047
Auburn Exit 75	3,779	3,615	Interchange Volume: 15,717	Saco Exit 36	8,134	8,007	Interchange Volume: 25,591
New Gloucester Barrier	9,530	9,002	Barrier Volume: 18,532		30,364	29,993	32-36 Volume: 60,357
Gray Exit 63	1,507	1,441	Interchange Volume: 14,771	Biddeford Exit 32	9,074	8,886	Interchange Volume: 22,993
	14,016	13,390	53-63 Volume: 27,406		23,745	23,686	25-32 Volume: 47,431
West Falmouth Exit 53	1,663	1,686	Interchange Volume: 10,172	Kennebunk Exit 25	3,032	2,945	Interchange Volume: 9,468
	15,679	15,200	52-53 Volume: 30,879		22,465	22,482	19-25 Volume: 44,947
Falmouth Exit 52	1,207	1,315	Interchange Volume: 12,282	Wells Exit 19	3,400	3,981	Interchange Volume: 13,343
	19,749	18,368	48-52 Volume: 38,116	York Barrier	21,887	21,642	Barrier Volume: 43,529
Portland/Westbrook Exit 48	3,221	2,513	Interchange Volume: 16,803	Chases Pond Rd. / Route 1 Connector	1,829	1,780	
	22,129	21,323	47-48 Volume: 43,452		27,279	26,954	
Rand Rd. Exit 47	1,024	1,501	Interchange Volume: 8,537				
	2,987	3,025					

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Total Recorded Trips/Day: **165,563**
 Northbound Trips: **82,313**
 Southbound Trips: **83,250**
 Total Trips for the Year: **60,596,022**

Tolled Locations:

	2011	2010	
NB: 102,426		102,514	-0.09%
SB: 102,862		103,115	-0.25%
Total: 205,287		205,630	-0.17%

Maine Turnpike Authority 2013 Average Annual Daily Traffic

	14,279	14,537	103-109 Volume: 28,815		23,511	21,912	46-47 Volume: 45,423
Gardiner I-95 Exit 103	10,510	10,768	Barrier Volume: 21,278	Congress St./Jetport Exit 46	5,420	4,796	Interchange Volume: 15,873
	3,768	3,768	102-103 Volume: 7,537		20,746	20,119	45-46 Volume: 40,865
Gardiner Remote Exit 102	837	882	Interchange Volume: 1,720	South Portland Exit 45	5,299	5,062	Interchange Volume: 23,869
West Gardiner Barrier	4,606	4,650	Barrier Volume: 9,256		20,612	23,399	44-45 Volume: 44,011
Sabattus Exit 86	490	503	Interchange Volume: 4,182	I-295 Exit 44	12,638	9,342	Interchange Volume: 21,980
	5,710	5,743	80-86 Volume: 11,453		33,250	32,741	42-44 Volume: 65,991
Lewiston Exit 80	1,457	1,360	Interchange Volume: 10,890	Scarborough Exit 42	2,365	2,400	Interchange Volume: 11,449
	8,470	8,240	75-80 Volume: 16,710		34,252	33,657	36-42 Volume: 67,909
Auburn Exit 75	3,701	3,663	Interchange Volume: 15,220	Saco Exit 36	8,204	8,069	Interchange Volume: 26,316
New Gloucester Barrier	8,769	8,434	Barrier Volume: 17,203		31,106	30,573	32-36 Volume: 61,679
Gray Exit 63	1,457	1,369	Interchange Volume: 14,353	Biddeford Exit 32	9,419	9,135	Interchange Volume: 23,464
	13,102	12,802	53-63 Volume: 25,904		24,093	23,940	25-32 Volume: 48,034
West Falmouth Exit 53	1,522	1,490	Interchange Volume: 9,768	Kennebunk Exit 25	3,112	3,025	Interchange Volume: 9,790
	14,962	14,685	52-53 Volume: 29,647		22,799	22,750	19-25 Volume: 45,549
Falmouth Exit 52	523	1,238	Interchange Volume: 10,358	Wells Exit 19	3,601	4,000	Interchange Volume: 13,238
	19,220	17,264	48-52 Volume: 36,484	York Barrier	21,960	21,626	Barrier Volume: 43,585
Portland/Westbrook Exit 48	3,162	2,692	Interchange Volume: 17,504	Chases Pond Rd. / Route 1 Connector	1,769	1,756	
	21,955	20,324	47-48 Volume: 42,279		27,507	26,529	
Rand Rd. Exit 47	1,427	1,463	Interchange Volume: 8,925				
	2,983	3,051					

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Total Recorded Trips/Day: **166,289**
 Northbound Trips: 82,660
 Southbound Trips: 83,629
 Total Trips for the Year: **60,695,305**

Tolled Locations:

	2013	2010	
NB:	102,007	102,426	-0.41%
SB:	102,308	102,862	-0.54%
Total:	204,316	205,287	-0.47%

Maine Turnpike Authority 2014 Average Annual Daily Traffic

	14,681	14,781	103-109 Volume: 29,462		24,113	22,893	46-47 Volume: 47,006
Gardiner I-95 Exit 103	10,835	11,112	Barrier Volume: 21,947	Congress St./Jetport Exit 46	5,451	4,974	Interchange Volume: 16,042
	3,846	3,669	102-103 Volume: 7,516		21,270	20,928	45-46 Volume: 42,198
Gardiner Remote Exit 102	802	912	Interchange Volume: 1,714	South Portland Exit 45	5,358	5,247	Interchange Volume: 24,352
West Gardiner Barrier	4,648	4,581	Barrier Volume: 9,230		21,164	24,176	44-45 Volume: 45,340
Sabattus Exit 86	500	531	Interchange Volume: 4,279	I-295 Exit 44	13,367	9,791	Interchange Volume: 23,158
	5,775	5,672	80-86 Volume: 11,447		34,530	33,967	42-44 Volume: 68,497
Lewiston Exit 80	1,402	1,406	Interchange Volume: 10,625	Scarborough Exit 42	2,467	2,485	Interchange Volume: 11,843
	8,426	8,031	75-80 Volume: 16,457		35,518	34,918	36-42 Volume: 70,437
Auburn Exit 75	3,636	3,561	Interchange Volume: 15,421	Saco Exit 36	8,305	8,479	Interchange Volume: 27,633
New Gloucester Barrier	8,936	8,548	Barrier Volume: 17,484		32,718	31,784	32-36 Volume: 64,502
Gray Exit 63	1,575	1,477	Interchange Volume: 14,650	Biddeford Exit 32	10,148	9,703	Interchange Volume: 24,882
	13,297	12,733	53-63 Volume: 26,029		25,011	24,672	25-32 Volume: 49,683
West Falmouth Exit 53	1,405	1,408	Interchange Volume: 10,308	Kennebunk Exit 25	3,281	3,083	Interchange Volume: 9,869
	15,619	15,092	52-53 Volume: 30,711		23,515	23,308	19-25 Volume: 46,823
Falmouth Exit 52	1,054	1,349	Interchange Volume: 11,220	Wells Exit 19	3,951	4,141	Interchange Volume: 14,331
	19,452	17,672	48-52 Volume: 37,124	York Barrier	22,567	22,402	Barrier Volume: 44,969
Portland/Westbrook Exit 48	3,100	2,722	Interchange Volume: 18,201	Chases Pond Rd. / Route 1 Connector	1,881	1,844	
	22,544	21,138	47-48 Volume: 43,681		27,987	26,833	
Rand Rd. Exit 47	1,550	1,525	Interchange Volume: 9,475				
	3,119	3,280					

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Total Recorded Trips/Day: **172,191**
 Northbound Trips: 85,606
 Southbound Trips: 86,585
 Total Trips for the Year: **62,849,711**

Tolled Locations:

	2013	2010	
NB:	105,482	102,007	3.41%
SB:	106,313	102,308	3.91%
Total:	211,794	204,316	3.66%

Maine Turnpike Authority 2015 Average Annual Daily Traffic

	15,315	15,347	103-109 Volume: 30,663		25,292	23,881	46-47 Volume: 49,173
Gardiner I-95 Exit 103	11,313	11,534	Barrier Volume: 22,847	Congress St./Jetport Exit 46	5,771	5,228	Interchange Volume: 17,117
	4,003	3,813	102-103 Volume: 7,816		22,308	21,985	45-46 Volume: 44,293
Gardiner Remote Exit 102	789	971	Interchange Volume: 1,761	South Portland Exit 45	5,633	5,689	Interchange Volume: 25,648
West Gardiner Barrier	4,792	4,784	Barrier Volume: 9,576		22,064	25,233	44-45 Volume: 47,296
Sabattus Exit 86	568	565	Interchange Volume: 4,395	I-295 Exit 44	14,129	10,565	Interchange Volume: 24,694
	5,900	5,805	80-86 Volume: 11,705		36,193	35,797	42-44 Volume: 71,990
Lewiston Exit 80	1,562	1,655	Interchange Volume: 11,955	Scarborough Exit 42	2,657	2,723	Interchange Volume: 12,607
	8,747	8,479	75-80 Volume: 17,226		37,162	36,673	36-42 Volume: 73,836
Auburn Exit 75	3,659	3,669	Interchange Volume: 15,823	Saco Exit 36	8,898	9,049	Interchange Volume: 29,116
	9,384	9,008	Barrier Volume: 18,392		33,842	33,217	32-36 Volume: 67,059
Gray Exit 63	1,660	1,572	Interchange Volume: 15,412	Biddeford Exit 32	10,327	10,106	Interchange Volume: 25,601
	13,851	13,489	53-63 Volume: 27,341		26,016	25,777	25-32 Volume: 51,793
West Falmouth Exit 53	1,397	1,492	Interchange Volume: 10,719	Kennebunk Exit 25	3,461	3,237	Interchange Volume: 10,532
	16,441	15,839	52-53 Volume: 32,280		24,438	24,491	19-25 Volume: 48,929
Falmouth Exit 52	1,181	1,444	Interchange Volume: 11,960	Wells Exit 19	4,144	4,171	Interchange Volume: 14,993
	20,394	18,595	48-52 Volume: 38,990	York Barrier	23,662	23,632	Barrier Volume: 47,293
Portland/Westbrook Exit 48	3,263	2,829	Interchange Volume: 18,747	Chases Pond Rd. / Route 1 Connector	2,007	1,948	
	23,562	21,990	47-48 Volume: 45,551		29,059	28,308	
Rand Rd. Exit 47	1,578	1,610	Interchange Volume: 9,998				
	3,309	3,501					

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Total Recorded Trips/Day: **180,941**
 Northbound Trips: 90,206
 Southbound Trips: 90,734
 Total Trips for the Year: 66,043,399

Tolled Locations:

	2015	2014	
NB: 111,303	105,482	5.52%	
SB: 111,212	106,313	4.61%	
Total: 222,515	211,794	5.06%	

Maine Turnpike Authority 2016 Average Annual Daily Traffic

	16,021	16,078	103-109 Volume: 32,099		26,737	25,073	46-47 Volume: 51,810
Gardiner I-95 Exit 103	11,841	12,124	Barrier Volume: 23,965		5,727	5,399	Interchange Volume: 17,649
	4,180	3,953	102-103 Volume: 8,133		23,974	23,231	45-46 Volume: 47,206
Gardiner Remote Exit 102	815	1,019	Interchange Volume: 1,834		6,334	6,319	Interchange Volume: 27,136
West Gardiner Barrier	4,995	4,972	Barrier Volume: 9,968		22,955	26,079	44-45 Volume: 49,034
Sabattus Exit 86	618	599	Interchange Volume: 4,726		14,772	11,197	Interchange Volume: 25,969
	6,283	5,976	80-86 Volume: 12,259		37,727	37,277	42-44 Volume: 75,004
Lewiston Exit 80	1,630	1,389	Interchange Volume: 11,883		2,927	2,946	Interchange Volume: 13,231
	9,183	8,920	75-80 Volume: 18,103		38,527	37,963	36-42 Volume: 76,490
Auburn Exit 75	4,031	4,007	Interchange Volume: 17,268		9,313	9,452	Interchange Volume: 30,619
	4,681	4,549			5,954	5,900	
New Gloucester Barrier	9,832	9,462	Barrier Volume: 19,294		35,168	34,412	32-36 Volume: 69,579
Gray Exit 63	1,768	1,686	Interchange Volume: 16,042		10,479	10,446	Interchange Volume: 26,700
	6,340	6,248			2,693	3,082	
	14,404	14,024	53-63 Volume: 28,428		27,382	27,048	25-32 Volume: 54,430
West Falmouth Exit 53	1,613	1,502	Interchange Volume: 11,595		3,718	3,540	Interchange Volume: 11,343
	4,263	4,216			2,013	2,072	
	17,054	16,738	52-53 Volume: 33,792		25,677	25,580	19-25 Volume: 51,257
Falmouth Exit 52	1,261	1,531	Interchange Volume: 12,857		4,378	4,369	Interchange Volume: 15,981
	5,555	4,511			3,599	3,636	
	21,348	19,718	48-52 Volume: 41,066		24,898	24,848	Barrier Volume: 49,746
Portland/Westbrook Exit 48	3,296	2,966	Interchange Volume: 19,341		2,125	2,086	
	6,730	6,349			7,556	6,916	
	24,782	23,100	47-48 Volume: 47,882		30,329	29,678	
Rand Rd. Exit 47	1,499	1,724	Interchange Volume: 10,374				
	3,454	3,697					

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Total Recorded Trips/Day: **190,179**
 Northbound Trips: **94,847**
 Southbound Trips: **95,332**
 Total Trips for the Year: **69,605,418**

Tolled Locations:
2016
 NB: 117,308
 SB: 116,608
 Total: 233,915

Maine Turnpike Authority 2017 Average Annual Daily Traffic

	16,364	16,495	103-109 Volume: 32,859		28,091	26,499	46-47 Volume: 54,590
Gardiner I-95 Exit 103	11,948	12,308	Barrier Volume: 24,256	Congress St./Jetport Exit 46	5,901	5,531	Interchange Volume: 18,299
					3,018	3,850	
	4,416	4,187	102-103 Volume: 8,603		25,208	24,818	45-46 Volume: 50,026
Gardiner Remote Exit 102			Interchange Volume: 1,929	South Portland Exit 45	6,780	6,849	Interchange Volume: 28,061
	867	1,062			5,277	9,155	
West Gardiner Barrier	5,283	5,249	Barrier Volume: 10,532		23,705	27,125	44-45 Volume: 50,830
Sabattus Exit 86	619	609	Interchange Volume: 4,955	I-295 Exit 44			Interchange Volume: 26,391
	2,055	1,672			14,961	11,429	
	6,718	6,313	80-86 Volume: 13,031		38,666	38,554	42-44 Volume: 77,221
Lewiston Exit 80	1,690	1,323	Interchange Volume: 12,172	Scarborough Exit 42	3,029	3,093	Interchange Volume: 13,727
	4,696	4,464			3,877	3,727	
	9,724	9,454	75-80 Volume: 19,178		39,514	39,188	36-42 Volume: 78,703
Auburn Exit 75	4,207	4,155	Interchange Volume: 18,064	Saco Exit 36	9,881	9,839	Interchange Volume: 31,648
	4,954	4,748			6,047	5,880	
New Gloucester Barrier	10,470	10,047	Barrier Volume: 20,518		35,680	35,229	32-36 Volume: 70,909
Gray Exit 63	1,872	1,674	Interchange Volume: 16,428	Biddeford Exit 32	10,655	10,683	Interchange Volume: 27,300
	6,510	6,371			2,658	3,304	
	15,108	14,744	53-63 Volume: 29,852		27,683	27,850	25-32 Volume: 55,532
West Falmouth Exit 53	1,686	1,528	Interchange Volume: 11,819	Kennebunk Exit 25	3,889	3,687	Interchange Volume: 11,770
	4,323	4,283			2,122	2,072	
	17,745	17,498	52-53 Volume: 35,243		25,916	26,234	19-25 Volume: 52,150
Falmouth Exit 52	1,299	1,549	Interchange Volume: 13,563	Wells Exit 19	4,315	4,574	Interchange Volume: 16,179
	5,859	4,855			3,655	3,635	
	22,305	20,804	48-52 Volume: 43,109		25,256	25,294	Barrier Volume: 50,550
Portland/Westbrook Exit 48	3,233	2,940	Interchange Volume: 19,769	Chases Pond Rd. / Route 1 Connector	2,141	2,077	
	6,996	6,600			7,792	7,275	
	26,067	24,464	47-48 Volume: 50,531		30,907	30,492	61,398
Rand Rd. Exit 47	1,589	1,809	Interchange Volume: 10,855	Kittery Rt. I and Rt. 236 Exits 2 and 3	3,603	4,138	
	3,613	3,845			11,127	8,211	3,745
					38,431	38,311	
			Total Recorded Trips/Day: Northbound Trips: Southbound Trips: Total Trips for the Year:	195,297 97,447 97,850 71,283,368			76,742
Legend	SB Off	NB On			4,179	3,557	
	SB On	NB Off					
	SB Mainline	NB Mainline			42,610	41,868	84,478

Maine Turnpike Authority 2018 Average Annual Daily Traffic

	16,702	16,829	103-109 Volume: 33,530		29,856	27,300	46-47 Volume: 57,156
Gardiner I-95 Exit 103	12,018	12,447	Barrier Volume: 24,465	Congress St./Jetport Exit 46	6,170	5,768	Interchange Volume: 19,121
					3,140	4,043	
	4,684	4,382	102-103 Volume: 9,066		26,827	25,575	45-46 Volume: 52,403
Gardiner Remote Exit 102			Interchange Volume: 2,033	South Portland Exit 45	7,051	7,268	Interchange Volume: 28,809
	908	1,125			5,360	9,131	
West Gardiner Barrier	5,592	5,506	Barrier Volume: 11,099		25,135	27,439	44-45 Volume: 52,574
Sabattus Exit 86	642	659	Interchange Volume: 5,094	I-295 Exit 44			Interchange Volume: 26,209
	2,117	1,675			14,733	11,475	
	7,066	6,522	80-86 Volume: 13,589		39,869	38,914	42-44 Volume: 78,783
Lewiston Exit 80	1,710	1,287	Interchange Volume: 12,492	Scarborough Exit 42	3,213	3,283	Interchange Volume: 14,187
	4,895	4,600			3,913	3,778	
	10,251	9,835	75-80 Volume: 20,086		40,568	39,410	36-42 Volume: 79,978
Auburn Exit 75	4,332	4,242	Interchange Volume: 18,449	Saco Exit 36	10,482	9,641	Interchange Volume: 32,629
	5,009	4,866			6,573	5,933	
New Gloucester Barrier	10,929	10,458	Barrier Volume: 21,387		36,659	35,702	32-36 Volume: 72,361
Gray Exit 63	1,923	1,604	Interchange Volume: 16,565	Biddeford Exit 32	11,180	10,739	Interchange Volume: 27,970
	6,838	6,201			2,709	3,343	
	15,844	15,055	53-63 Volume: 30,899		28,187	28,306	25-32 Volume: 56,493
West Falmouth Exit 53	1,685	1,522	Interchange Volume: 12,189	Kennebunk Exit 25	4,080	3,738	Interchange Volume: 12,093
	4,551	4,430			2,170	2,106	
	18,710	17,962	52-53 Volume: 36,672		26,277	26,674	19-25 Volume: 52,951
Falmouth Exit 52	1,412	1,705	Interchange Volume: 14,981	Wells Exit 19	4,312	4,736	Interchange Volume: 16,496
	6,493	5,371			3,687	3,761	
	23,791	21,629	48-52 Volume: 45,419		25,652	25,699	Barrier Volume: 51,351
Portland/Westbrook Exit 48	3,327	3,030	Interchange Volume: 20,361	Chases Pond Rd. / Route 1 Connector	2,137	2,111	
	7,083	6,920			8,475	7,474	
	27,547	25,518	47-48 Volume: 53,065		31,990	31,062	63,052
Rand Rd. Exit 47	1,595	1,936	Interchange Volume: 11,154	Kittery Rt. I and Rt. 236 Exits 2 and 3	3,784	4,612	
	3,905	3,718			10,323	7,407	
						3,391	
					38,530	37,248	
			Total Recorded Trips/Day: Northbound Trips: Southbound Trips: Total Trips for the Year:	200,090 99,304 100,786 73,032,793			75,778
Legend	SB Off	NB On					
	SB On	NB Off					
	SB Mainline	NB Mainline					80,791
					41,244	39,546	

Maine Turnpike Authority 2019 Average Annual Daily Traffic

	16,941	17,156	103-109 Volume: 34,096		29,720	26,880	46-47 Volume: 56,600
Gardiner I-95 Exit 103	12,279	12,686	Barrier Volume: 24,964	Congress St./Jetport Exit 46	6,325	5,904	Interchange Volume: 19,755
	4,662	4,470	102-103 Volume: 9,132		26,587	25,310	45-46 Volume: 51,897
Gardiner Remote Exit 102	975	1,219	Interchange Volume: 2,194	South Portland Exit 45	6,679	6,994	Interchange Volume: 28,015
West Gardiner Barrier	5,637	5,689	Barrier Volume: 11,326		25,825	26,741	44-45 Volume: 52,566
Sabattus Exit 86	727	680	Interchange Volume: 5,747	I-295 Exit 44	14,828	12,465	Interchange Volume: 27,293
	7,119	7,140	80-86 Volume: 14,259		40,653	39,206	42-44 Volume: 79,859
Lewiston Exit 80	1,796	1,799	Interchange Volume: 13,581	Scarborough Exit 42	3,459	3,281	Interchange Volume: 14,849
	10,456	10,194	75-80 Volume: 20,650		41,189	40,038	36-42 Volume: 81,228
Auburn Exit 75	4,338	4,314	Interchange Volume: 18,615	Saco Exit 36	10,654	9,998	Interchange Volume: 33,409
New Gloucester Barrier	11,173	10,789	Barrier Volume: 21,961		37,143	36,190	32-36 Volume: 73,332
Gray Exit 63	2,134	2,037	Interchange Volume: 18,316	Biddeford Exit 32	11,380	10,891	Interchange Volume: 28,102
	16,281	15,655	53-63 Volume: 31,936		28,520	28,374	25-32 Volume: 56,893
West Falmouth Exit 53	1,810	1,763	Interchange Volume: 12,473	Kennebunk Exit 25	4,079	3,805	Interchange Volume: 12,929
	18,734	18,528	52-53 Volume: 37,262		26,648	27,406	19-25 Volume: 54,054
Falmouth Exit 52	1,634	1,973	Interchange Volume: 15,597	Wells Exit 19	4,603	4,852	Interchange Volume: 16,747
	23,731	21,913	48-52 Volume: 45,644	York Barrier	25,749	26,143	7-19 Volume: 51,892
Portland/Westbrook Exit 48	3,720	3,279	Interchange Volume: 21,183	Chases Pond Rd. / Route 1 Connector	2,583	2,263	Interchange Volume: 21,752
	27,181	25,646	47-48 Volume: 52,828		32,262	31,690	3-7 Volume: 63,952
Rand Rd. Exit 47	1,350	1,929	Interchange Volume: 10,332	Kittery Rt. 1 and Rt. 236 Exits 2 and 3	4,142	5,018	Interchange Volume: 29,792
					10,952	6,929	
					2,751		
					39,073	36,353	1-3 Volume: 75,426
					1,213	1,626	Interchange Volume: 2,838
					40,286	37,979	D-1 Volume: 78,264
Total Recorded Trips/Day: 205,044 Northbound Trips: 102,328 Southbound Trips: 102,716 Total Trips for the Year: 74,840,888				Tolled Locations: 2018 NB: 127,799 SB: 125,171 Total: 252,970			
Legend SB Off NB On SB On NB Off SB Mainline NB Mainline							

Maine Turnpike Authority 2020 Average Annual Daily Traffic

	12,879	13,118	103-109 Volume: 25,997		22,609	21,101	46-47 Volume: 43,710
Gardiner I-295 Exit 103	9,649	10,001	Barrier Volume: 19,650		4,284	4,225	Interchange Volume: 13,648
	3,230	3,117	102-103 Volume: 6,347		20,542	19,796	45-46 Volume: 40,339
Gardiner Remote Exit 102	1,306	1,402	Interchange Volume: 2,708		5,433	5,345	Interchange Volume: 20,930
West Gardiner Barrier	4,536	4,519	Barrier Volume: 9,055		19,649	20,063	44-45 Volume: 39,712
Sabbatus Exit 86	640	780	Interchange Volume: 5,111		11,304	9,752	Interchange Volume: 0
	5,798	5,528	80-86 Volume: 11,325		30,953	29,815	42-44 Volume: 60,769
Lewiston Exit 80	1,513	1,753	Interchange Volume: 12,507		2,794	2,605	Interchange Volume: 11,943
	8,922	8,380	75-80 Volume: 17,303		31,491	30,424	36-42 Volume: 61,914
Auburn Exit 75	4,036	3,719	Interchange Volume: 16,254		8,517	7,673	Interchange Volume: 27,472
New Gloucester Barrier	9,207	8,841	Barrier Volume: 18,047		5,684	5,597	
Gray Exit 63	2,121	1,797	Interchange Volume: 15,491		28,658	28,347	32-36 Volume: 57,005
	12,900	12,801	53-63 Volume: 25,701		10,166	8,776	Interchange Volume: 23,574
West Falmouth Exit 53	1,344	1,245	Interchange Volume: 9,261		2,154	2,478	
	14,979	14,806	52-53 Volume: 29,784		20,645	22,050	25-32 Volume: 42,695
Falmouth Exit 52	1,079	1,321	Interchange Volume: 10,815		3,023	2,965	Interchange Volume: 9,414
	18,462	17,338	48-52 Volume: 35,800		1,738	1,688	
Portland/Westbrook Exit 48	3,403	3,015	Interchange Volume: 17,776		19,360	20,773	19-25 Volume: 40,133
	20,536	20,203	47-48 Volume: 40,739		2,458	3,810	Interchange Volume: 12,139
Rand Rd. Exit 47	1,115	1,623	Interchange Volume: 8,446		2,922	2,949	
	3,187	2,521			19,824	19,912	Barrier Volume: 39,735

Total Recorded Trips/Day: 161,964
 NB Trips (York & N): 80,565
 SB Trips (York & N): 81,399
 Total Trips for the Year: 59,278,688

Legend

SB Off	NB On
SB On	NB Off
SB Mainline	NB Mainline

Maine Turnpike Authority 2021 Average Annual Daily Traffic

	15,229	15,419	103-109 Volume: 30,648		27,346	24,997	46-47 Volume: 52,342
Gardiner I-295 Exit 103	11,296	11,668	Barrier Volume: 22,964		5,514	5,165	Interchange Volume: 16,990
	3,933	3,751	102-103 Volume: 7,684		24,438	23,536	45-46 Volume: 47,974
Gardiner Remote Exit 102	1,543	1,629	Interchange Volume: 3,172		5,886	5,961	Interchange Volume: 23,625
West Gardiner Barrier	5,476	5,380	Barrier Volume: 10,856		23,931	23,975	44-45 Volume: 47,906
Sabattus Exit 86	748	803	Interchange Volume: 5,515		13,715	12,787	Interchange Volume: 26,503
	6,824	6,444	80-86 Volume: 13,268		37,646	36,762	42-44 Volume: 74,409
Lewiston Exit 80	1,708	2,059	Interchange Volume: 14,109		3,547	3,276	Interchange Volume: 14,486
	10,242	9,602	75-80 Volume: 19,843		3,794	3,869	
Auburn Exit 75	4,304	4,102	Interchange Volume: 18,614		37,894	37,355	36-42 Volume: 75,249
	5,105	5,103			9,813	9,829	Interchange Volume: 31,497
New Gloucester Barrier	11,043	10,603	Barrier Volume: 21,646		5,847	6,008	
Gray Exit 63	2,641	2,223	Interchange Volume: 18,021		33,928	33,533	32-36 Volume: 67,461
	6,586	6,570			10,457	9,497	Interchange Volume: 26,164
	14,988	14,950	53-63 Volume: 29,938		3,139	3,071	
West Falmouth Exit 53	1,673	1,554	Interchange Volume: 11,037		26,610	27,107	25-32 Volume: 53,717
	3,934	3,876			3,787	3,420	Interchange Volume: 11,312
	17,249	17,271	52-53 Volume: 34,520		2,084	2,021	
Falmouth Exit 52	895	1,504	Interchange Volume: 13,182		24,907	25,708	19-25 Volume: 50,614
	5,847	4,936			3,896	4,453	Interchange Volume: 15,665
	22,201	20,704	48-52 Volume: 42,906		3,751	3,564	
Portland/Westbrook Exit 48	3,746	3,281	Interchange Volume: 20,152		24,761	24,818	Barrier Volume: 49,579
	6,436	6,689					
	24,891	24,112	47-48 Volume: 49,003				
Rand Rd. Exit 47	1,212	1,815	Interchange Volume: 9,395				
	3,667	2,700					

Total Recorded Trips/Day: 191,314
 NB Trips (York & N): 95,430
 SB Trips (York & N): 95,885
 Total Trips for the Year: 69,829,768

Legend	SB Off	NB On
	SB On	NB Off
	SB Mainline	NB Mainline

Maine Turnpike Authority 2022 Average Annual Daily Traffic

	16,332	16,534	103-109 Volume: 32,866		28,855	26,598	46-47 Volume: 55,453
Gardiner I-295 Exit 103	11,626	12,038	Barrier Volume: 23,663	Congress St/Jetport Exit 46	6,019	5,599	Interchange Volume: 18,918
					2,749	4,552	
	4,706	4,497	102-103 Volume: 9,203		25,585	25,551	45-46 Volume: 51,136
Gardiner Remote Exit 102			Interchange Volume: 2,308	South Portland Exit 45	6,047	6,668	Interchange Volume: 23,413
	1,075	1,233			4,916	5,781	
West Gardiner Barrier	5,782	5,730	Barrier Volume: 11,511		24,454	24,663	44-45 Volume: 49,118
Sabattus Exit 86	854	914	Interchange Volume: 5,988	I-295 Exit 44			Interchange Volume: 28,759
	2,023	2,197			14,607	14,152	
	6,951	7,013	80-86 Volume: 13,964		39,061	38,815	42-44 Volume: 77,876
Lewiston Exit 80	1,640	2,016	Interchange Volume: 14,173	Scarborough Exit 42	3,624	3,427	Interchange Volume: 14,946
	5,349	5,169			3,949	3,946	
	10,660	10,165	75-80 Volume: 20,825		39,387	39,335	36-42 Volume: 78,722
Auburn Exit 75	4,432	4,160	Interchange Volume: 19,178	Saco Exit 36	9,914	10,368	Interchange Volume: 32,160
	5,399	5,187			5,757	6,121	
New Gloucester Barrier	11,627	11,192	Barrier Volume: 22,819		35,229	35,087	32-36 Volume: 70,316
Gray Exit 63	2,612	2,218	Interchange Volume: 18,220	Biddeford Exit 32	9,800	10,231	Interchange Volume: 25,979
	6,725	6,666			2,822	3,125	
	15,739	15,641	53-63 Volume: 31,380		28,252	27,981	25-32 Volume: 56,233
West Falmouth Exit 53	1,765	1,767	Interchange Volume: 12,012	Kennebunk Exit 25	3,850	3,500	Interchange Volume: 11,597
	4,039	4,441			2,172	2,076	
	18,013	18,315	52-53 Volume: 36,328		26,574	26,558	19-25 Volume: 53,131
Falmouth Exit 52	1,560	1,713	Interchange Volume: 14,024	Wells Exit 19	4,447	4,511	Interchange Volume: 16,265
	6,032	4,718			3,647	3,660	
	22,485	21,320	48-52 Volume: 43,805		25,774	25,706	Barrier Volume: 51,480
Portland/Westbrook Exit 48	3,466	3,093	Interchange Volume: 20,111	Chases Pond Rd. / Route 1 Connector	2,314	1,825	Interchange Volume: 19,001
	7,040	6,512			7,443	7,418	
	26,060	24,739	47-48 Volume: 50,799		30,902	31,299	23-7 Volume: 62,201
Rand Rd. Exit 47	1,201	1,729	Interchange Volume: 10,514	Kittery Rt. 1 and Rt. 236 Exits 2 and 3	3,938	4,515	Link Volume: 25,650
	3,996	3,588			8,658	5,754	2,784
					35,622	35,321	1-23 Volume: 70,943
							Interchange Volume: 4,290
					2,310	1,980	
					37,932	37,301	Beg-1 Volume: 75,233
Legend	SB Off	NB On					
	SB On	NB Off					
	SB Mainline	NB Mainline					
Total Recorded Trips/Day:			York North 198,288	NH Line North 234,635			
Northbound Trips:			99,658	117,593			
Southbound Trips:			98,630	117,041			
Total Trips for the Year:			72,374,974	85,641,701			

Appendix B:

Additional Data

Ramp		LOS E Year	
		NB	SB
Exit 1	On Ramp	-	Beyond 2055
	Off Ramp	Beyond 2055	-
Exit 2	On Ramp	-	Beyond 2055
	Off Ramp	Beyond 2055	-
Exit 3	On Ramp	Beyond 2055	-
	Off Ramp	Beyond 2055	Beyond 2055
Exit 7	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 19	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 25	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 32	On Ramp	2022	Beyond 2055
	Off Ramp	Beyond 2055	2022
Exit 36	On Ramp	2022	Beyond 2055
	Off Ramp	Beyond 2055	2022
Exit 42	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 44	On Ramp	-	Beyond 2055
	Off Ramp	Beyond 2055	-
Exit 45	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 46	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	2047
Exit 47	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 48	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 52	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 53	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 63	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 75	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 80	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 86	On Ramp	Beyond 2055	Beyond 2055
	Off Ramp	Beyond 2055	Beyond 2055
Exit 102	On Ramp	-	Beyond 2055
	Off Ramp	Beyond 2055	-
Exit 103	On Ramp	Beyond 2055	-
	Off Ramp	-	Beyond 2055

Location		LOS E Year	
		NB	SB
Exit 1	Merge	-	Beyond 2055
	Diverge	Beyond 2055	-
Exit 2	Merge	-	Beyond 2055
	Diverge	Beyond 2055	-
Exit 3	Merge	Beyond 2055	-
	Diverge	Beyond 2055	Beyond 2055
Exit 7	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 19	Merge	Beyond 2055	Beyond 2055
	Diverge	2050	Beyond 2055
Exit 25	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 32	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 36	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 42	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	2045
Exit 44	Merge	-	Beyond 2055
	Diverge	Beyond 2055	-
Exit 45	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 46	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 47	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 48	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 52	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 53	Merge	Beyond 2055	2043
	Diverge	2050	Beyond 2055
Exit 63	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 75	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 80	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 86	Merge	Beyond 2055	Beyond 2055
	Diverge	Beyond 2055	Beyond 2055
Exit 102	Merge	-	Beyond 2055
	Diverge	Beyond 2055	-
Exit 103	Merge	Beyond 2055	-
	Diverge	-	Beyond 2055

Toll Plaza Capacity

			Cash Percent Cap.	EZ & ORT Percent Cap.
7	NB	ML	83.84%	73.95%
	SB	ML	51.93%	68.71%
19	NB	Off	29.53%	83.19%
25	NB	On	8.95%	28.02%
	SB	On	7.78%	24.34%
32*	Both	On	61.50%	64.17%
36*	Both	On	65.40%	68.24%
42	Both	On	26.50%	41.48%
44	NB	Off	34.23%	26.50%
	SB	On	54.63%	42.29%
45	NB	On	34.60%	54.16%
	SB	On	22.70%	35.53%
46	NB	On	33.60%	52.59%
	SB	On	22.28%	69.73%
47	Both	On	20.05%	31.38%
48	Both	On	41.65%	65.19%
52	Both	On	35.50%	44.07%
	Both	Off	52.00%	64.55%
53	Both	On	39.48%	61.79%
63	SB	On	37.78%	53.22%
67	NB	ML	35.99%	78.18%
	SB	ML	26.83%	58.28%
102	NB	ML	36.81%	36.56%
	SB	ML	38.63%	38.36%
103	NB	On	43.78%	31.13%
	SB	Off	77.41%	55.04%

Appendix C:

Road Safety Audits

Mainline High Crash Location: MM 0-1 NB & SB

Nodes 57544 to 58864: I-95 NB: NH SL to Exit 1 NB Off Ramp

Nodes 58846 to 71373: I-95 SB Exit 1 SB On Ramp to NH SL

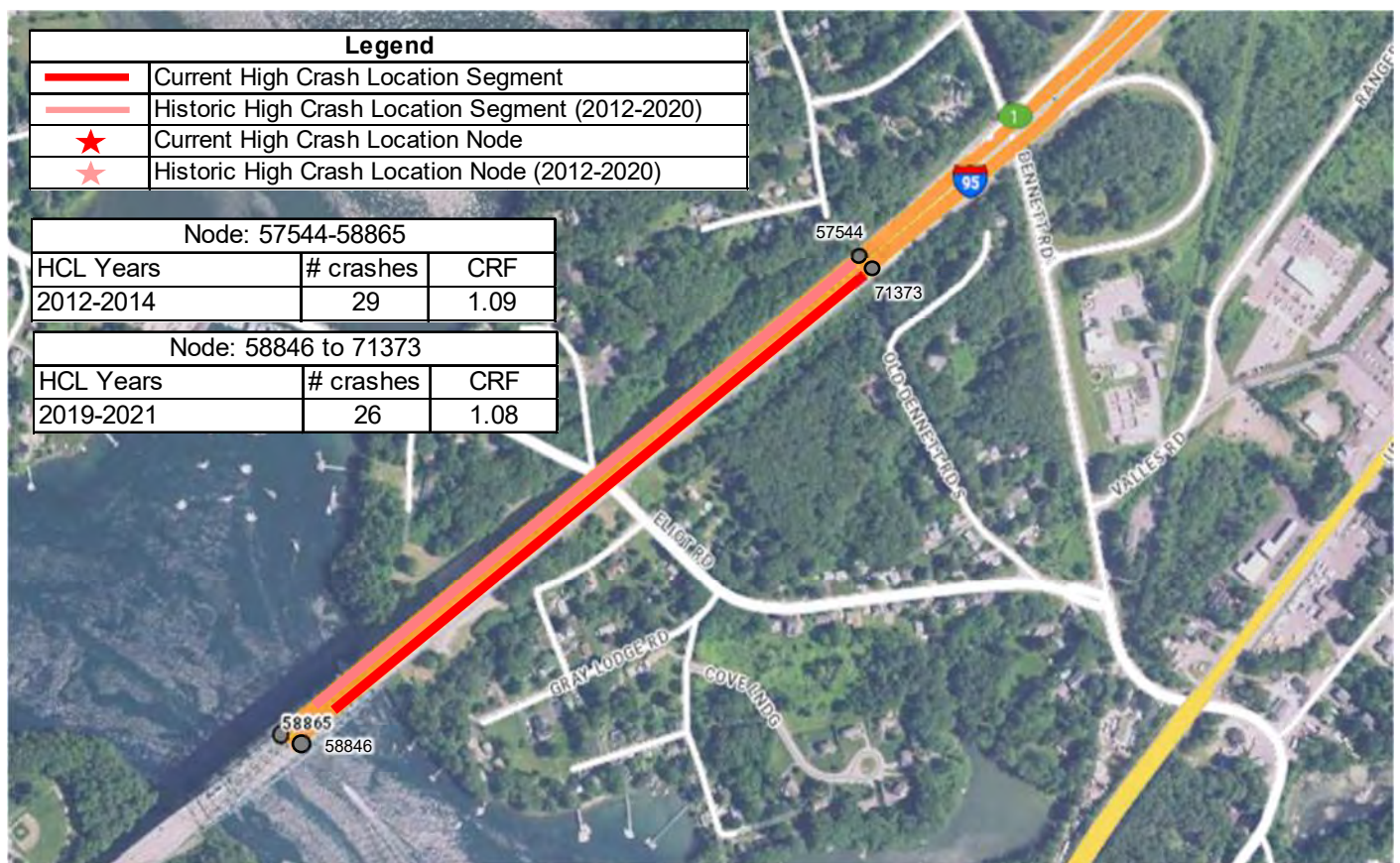
Introduction

There are two HCLs for the segment of mainline for MM 0-1 along I-95 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**:

- Between the New Hampshire State Line (NH SL) and Exit 1 NB off
- Between the NHSL and Exit 1 SB On

This segment of mainline is located in the municipality of Kittery, in York County. It is an urban interstate consisting of three mainline travel lanes with shoulders in each direction. There is a steep slope from the state line to the bridge abutment. The area is currently completing construction activities to provide a fourth lane of travel in the shoulder for part-time use during peak periods of congestion, set to open Spring 2023. The first half of this segment from the Maine/New Hampshire State Line to the bridge abutment belongs to the MaineDOT and from Exit 1 north (through MM 109) is owned by Maine Turnpike Authority.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

This section of road has been subject to additional traffic due to closed adjacent crossings or subject to construction for the majority of the last 10-year study period. The section served as a de facto detour during the construction of two other Maine-New Hampshire crossings:

- Memorial Bridge: July 2011 to August 2013
- Sarah Mildred Long Bridge: January 2015 to March 2018

In addition, the area was under construction to provide rehabilitation efforts to both adjacent bridges (dates are approximate):

- Dennett Road Bridge of I-95: March 2018 – August 2018
 - Exit 1 SB On Ramp closed 1 month
 - Exit 1 NB Off Ramp closed the duration of the project
- Piscataqua River Bridge: June 2019 - Current
 - Exit 1 SB On Ramp closed: June 2019 – October 2021
 - Exit 1 NB Off Ramp closed: October 2019 – October 2021
 - Includes ITS and striping improvements for Part-Time Shoulder Use (PTSU)

General Mobility Observations

There are significant seasonal fluctuations in traffic volume throughout the year for this segment. During the peak travel months from April to October, evening Friday (NB), midday Saturday (NB/SB) and Sunday (SB) peaks dictate the need for additional capacity. Pinch points including the Hampton Toll Plaza and the geometry of the Piscataqua River Bridge both meter northbound and reduce southbound capacity. On busy weekends, failing levels of service and queues cause severe congestion from the Hampton Toll Plaza through the Wells and Kennebunk interchanges. Flow north of the site should be improved from the newly installed York Toll Plaza with open road tolling and increased cash collection toll plazas.

Demographics

The segment has a 2021 AADT¹ of 34,780 (NB) and 30,186 (SB). The speed limit, previously posted at 65mph has been reduced to 55mph to most nearly meet AASHTO guidelines during the implementation of part-time shoulder use (PTSU). Exit 1 NB Off will be closed during operations.

Corridor Characteristics

The segment is a three-lane section with shoulders on either side and newly installed median barrier. The outside shoulders have concrete barrier through the bridge abutment and guardrail through the remainder of the segment. Rumble strips are present on both sides. Highway lighting and signage were upgraded as part of PTSU. Newly installed closed circuit television cameras provide additional security and there is a road weather information system present.

¹ 2021 AADT Summary Created by HNTB for MTA

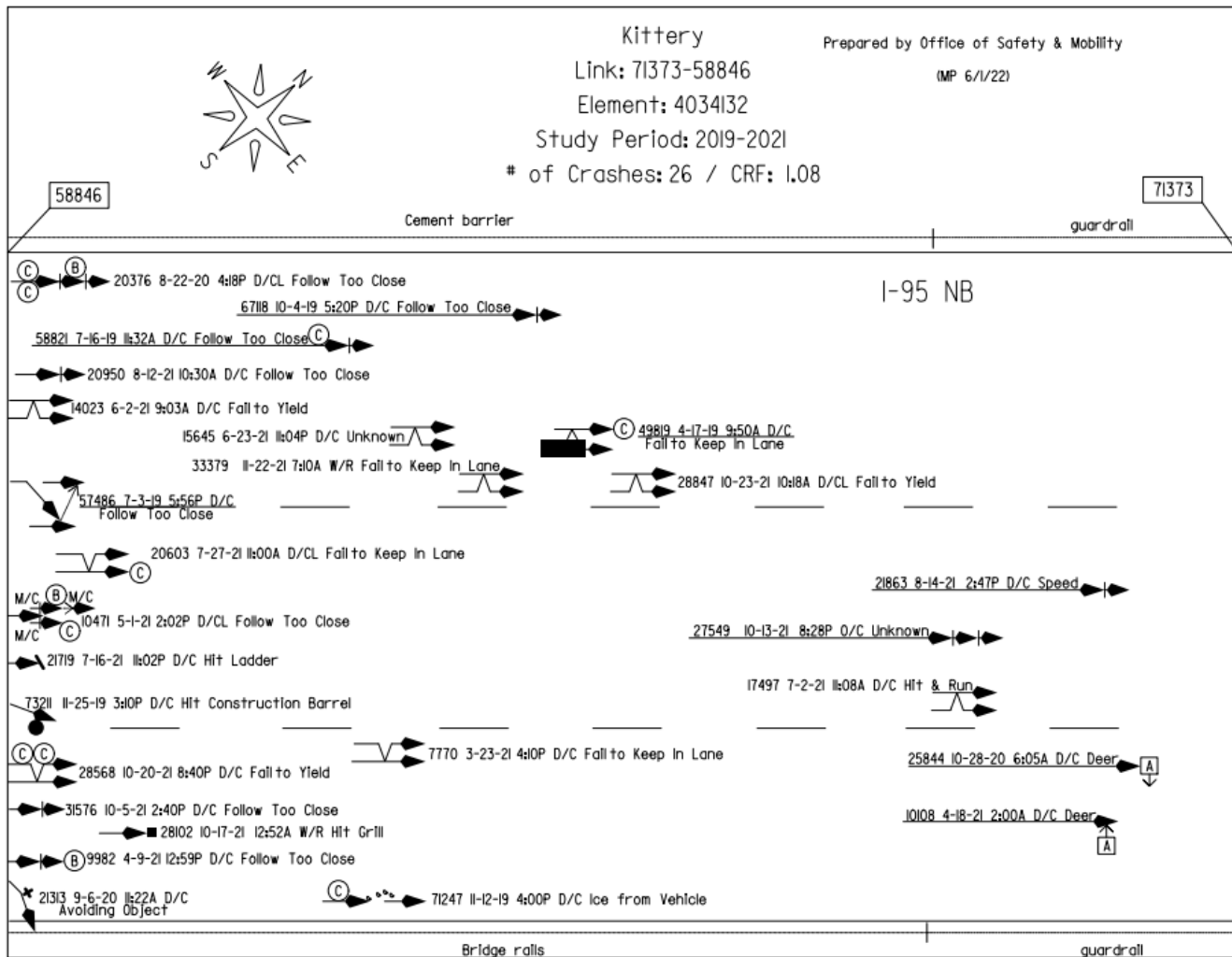
Crash analysis

As noted in **Figure 1**, both northbound and southbound segments have been an HCL during the past 10 years: I-95 NB is a current HCL (2021) and I-95 SB most recently in 2015.

I-95 Northbound

Figure 2: 2019 – 2021 Northbound MM 0-1 Crash Diagram depicts the northbound segment crash pattern for the high crash location. It should be noted that the only time in which this location was an HCL in the most recent 10-year analysis period overlapped with the rehabilitation efforts of the Piscataqua River Bridge.

Figure 2: 2019 – 2021 NB Crash Diagram



As shown in **Figure 2**, there were 26 crashes resulting in a 30.8% injury rate during this analysis period.

- Nearly 70% of the crashes occurred in 2021, during the peak summer and fall months when volumes were highest
- 73% of crashes were rear-end – sideswipe type crashes
- Of the recorded causes, crashes were most often a result of vehicles following too closely (7), not staying in their lane (4), and failing to yield (3)
- Injury crashes in this location follow the same patterns as overall crashes, with the most severe crashes caused by vehicles following too closely

Photo 1: 1-95 NB MM 0-1 (2019) captured by Google Maps September 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

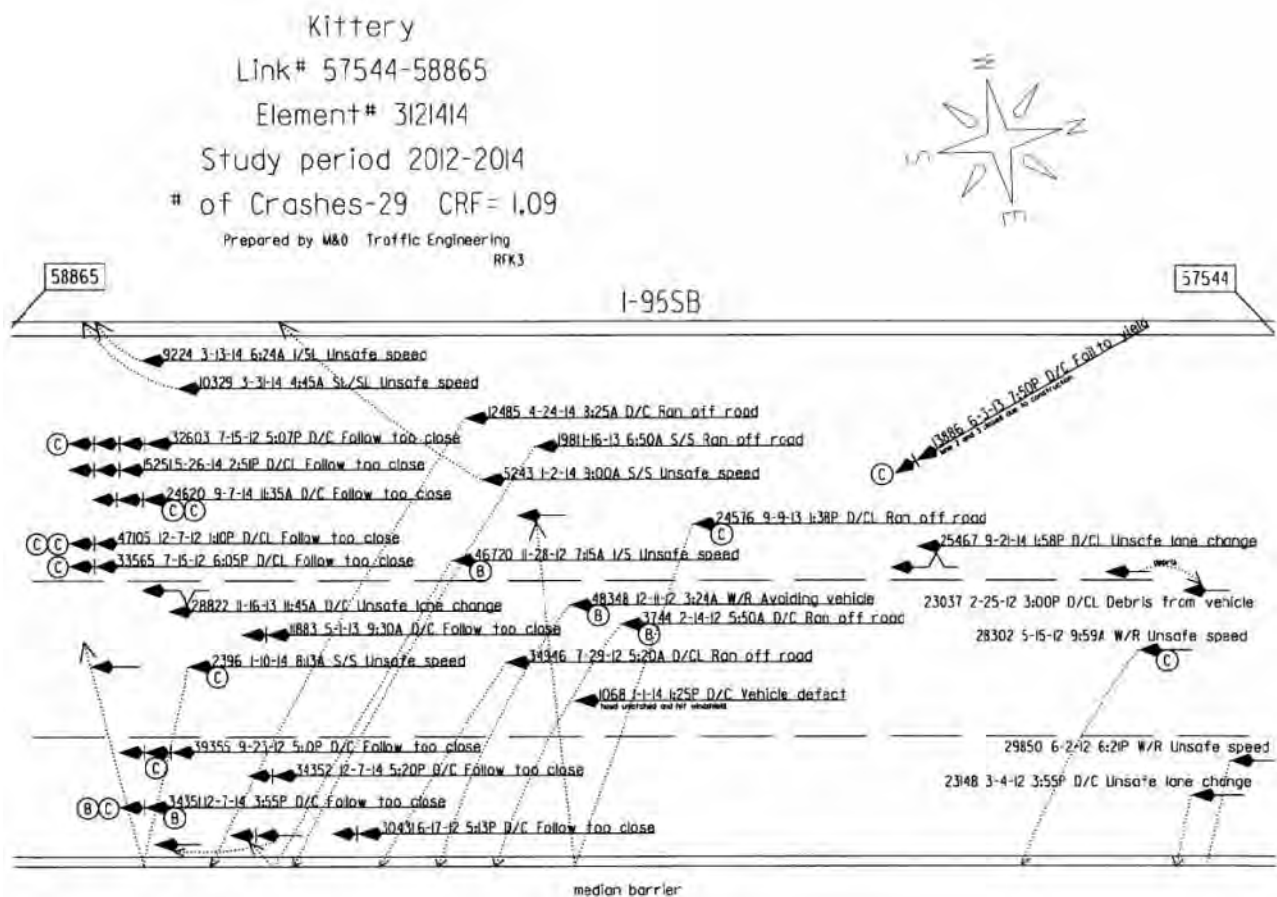
Photo 1: I-95 NB MM 0-1 (2019)



I-95 Southbound

Figure 3: 2012 – 2014 Southbound MM 0-1 Crash Diagram depicts the southbound segment crash pattern for the high crash location for the most recent year available. It should be noted that the only time in which this location was an HCL in the most recent 10-year analysis period overlapped with the rehabilitation efforts of the Piscataqua River Bridge.

Figure 3: 2012 – 2014 SB Crash Diagram



As shown in the diagram, there were 29 crashes resulting in a 44.8% injury rate during this analysis period.

- 34% of crashes occurred on a Sunday
- 52% of crashes were rear-end – sideswipe type crashes
- Of the recorded causes, crashes were most often a result of vehicles following too closely (10), unsafe speed (6), and running off the road (4)
- Injuries were most frequent in crashes caused by vehicles following too closely

Photo 2: 1-95 SB MM 0-1 (2015) captured by Google Maps October 2015 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: I-95 SB MM 0-1 (2015)



Findings and Observations

Existing Road Audit ²	
Road alignment and Cross Section	Site distance is adequate. During standard operation, the design speeds are adequate for these and adjacent segments. During PTSU the I-95 Exit 1 NB off Ramp will be closed and the I-95 SB On Ramp will most nearly meet AASHTO Green Book requirements and will be monitored to ensure safe operation. The high tourism base during the summer coupled with the presence of RVs often reduces the capacity during the peak summer period. Cross-sections meet minimum requirements and there are no significant drainage or slope concerns. Side slopes are not recoverable because of the bridge and barrier/guardrail is in place for protection.
Lighting	New lighting is present on the Piscataqua River Bridge and near the interchange.

² [Post-construction Phase: Prompt List 6 – Existing Road Audit | FHWA \(dot.gov\)](#)

General Sign Issues	All signage has been recently evaluated and updated as part of the PTSU project.
Marking and Delineation	Pavement markings have been recently updated as part of the PTSU design project. They are maximized to provide the longest on-ramp possible for the I-95 SB On Ramp merge.
Barriers and Clear Zones	New median barriers have been installed and median/guardrail protects all slide slopes.
Bridges and Culverts	Adjacent bridges are in good condition, both have recently had significant maintenance projects performed on them.
Pavement	Pavement is in good condition. No concerns regarding skidding, ponding, icing of snow accumulation are present.
Heavy Vehicles	It is assumed that pavement shoulder quality has been evaluated as part of PTSU implementation. This area has a high heavy vehicle percentage, particularly with recreational vehicles who may be less experienced large vehicle drivers.

Conclusions

This area has been the focus of strong safety and capacity improvements over the past three years which seek to provide great benefit to the corridor. However, this location has been under construction or a detour route for other construction projects for the last decade. Monitoring will be key to understanding how new patterns evolve.

Following too closely is the most significant safety concern both northbound and southbound throughout this roadway segment. It is likely caused by congestion in this location combined with seasonally high volumes of unfamiliar drivers and a high percentage of heavy vehicles (RVs, trailers, etc.).

PTSU will provide some additional capacity and should be monitored when implemented to understand safety concerns and the potential life of this improvement. Because there are no pull off areas, MTA service patrol will need to be present during PTSU activities to ensure mobility is maximized. This will not replace the need for future widening at this location.

Photo 3: PTSU³



³ Images from Google Maps Street View, accessed December 16, 2022

Recommendations

- Short-Term Solutions:
 - Implement and monitor PTSU during peak congestion periods, ensure MTA Patrol is active when PTSU is in use, monitor corridor speeds/develop baseline capacities.
- Mid-Term Solutions:
 - Develop plans for corridor widening.

Interchange High Crash Location: Exit 2 NB Off/Merge

Nodes 58849 to 58964: I-95 NB: NH SL to Exit 1 NB Off Ramp

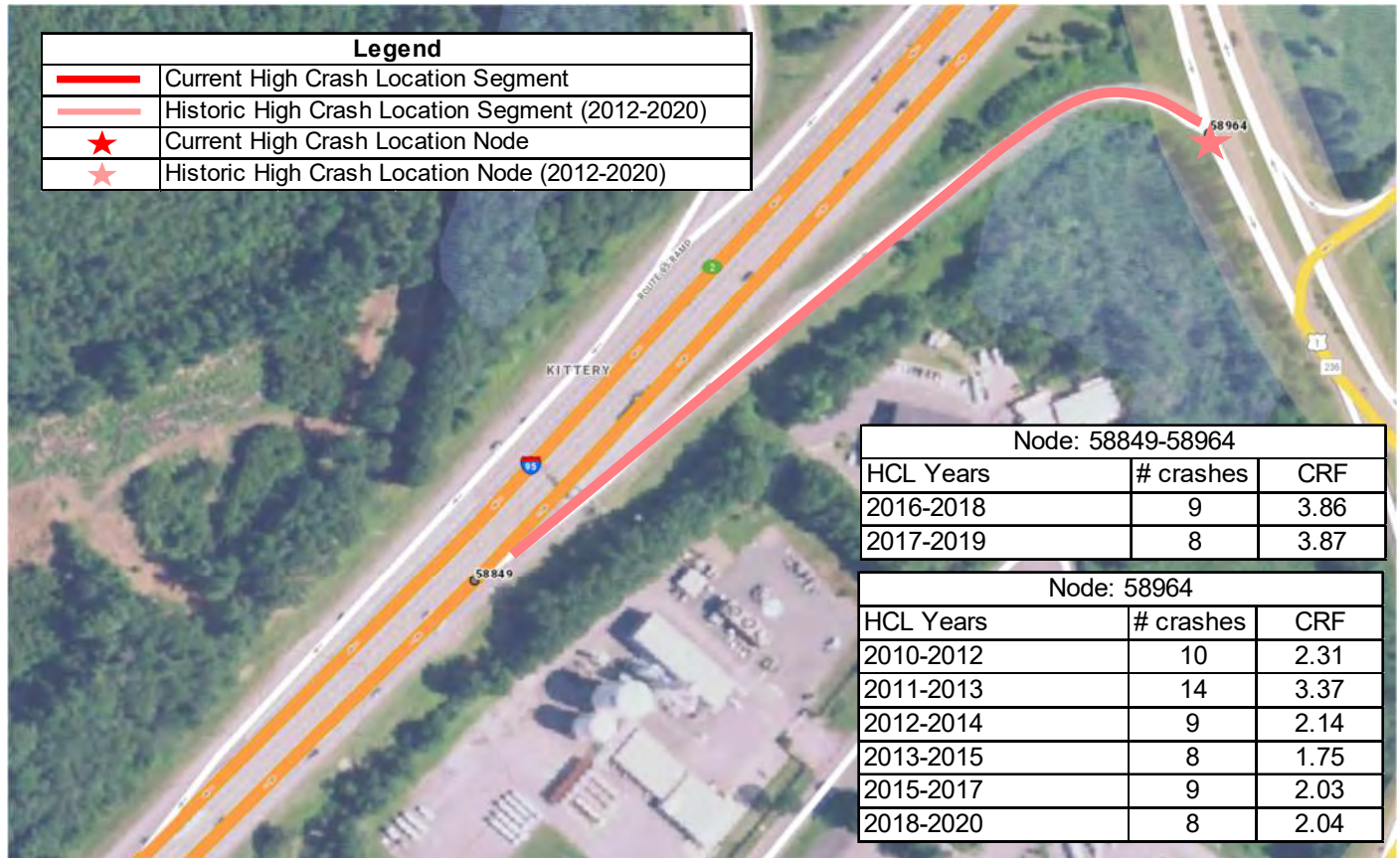
Nodes 58964: I-95 SB Exit 1 SB On Ramp to NH SL

Introduction

There are two HCLs in the area of the Exit 2 interchange – the I-95 Exit 2 NB Off Ramp and point where the ramp merges with Route 236 eastbound during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

This segment of ramp is located in the municipality of Kittery, in York County. It is an urban interstate ramp consisting of one lane with shoulders and chevrons warning about the sharp turn before the “merge/weave” with Route 236. While traffic may enter its own lane, entering vehicles to change lanes in less than 500 feet continue on Route 236 and traffic on Route 236 is changing lanes to enter Route 1 South. This ramp may see additional volumes during PTSU when the I-95 Exit 1 NB off is closed.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

There were closures to the Exit 1 NB Off Ramp during recent bridge rehab activities for Dennett Road Bridge and the Piscataqua River Bridge that likely increased the volumes on the ramp. In addition, closures during the construction of Sarah Mildred Long, likely increased use of the exit as a means for vehicles to get to Route 1.

- Sarah Mildred Long Bridge: January 2015 to March 2018
- Dennett Road Bridge of I-95: March 2018 – August 2018
 - Exit 1 NB Off Ramp closed for portions of the project
- Piscataqua River Bridge: June 2019 - Current
 - Exit 1 NB Off Ramp closed: October 2019 – October 2021
 - Includes ITS and striping improvements for Part-Time Shoulder Use (PTSU)

General Mobility Observations

Due to the ramp's geometry, drivers generally exit at a high rate of speed and slow down quickly when reaching the sharp curve in the ramp before it joins Route 236 eastbound. Once vehicles reach Route 236, they must quickly and aggressively change lanes against traffic trying to weave to remain on Route 236 and entering traffic from other ramps

Demographics

The segment has a 2022 AADT¹ of 2,784 (Ramp) and 9,516 (Route 236 EB). The ramp has an advisory speed of 15 mph through the curve to prevent rollover and while Route 236 is posted at 25 mph, the prevailing speed is much higher.

Corridor Characteristics

The I-95 Exit 2 NB Off Ramp is a single lane with chevrons that enters Route 236 with a yield sign into its own lane. Route 236 is a two-lane corridor that weaves with the I-95 Exit 2 NB Off Ramp and entering traffic. The ramp is flanked with guardrail for the entirety of the ramp. Route 236 has guardrail on the passenger lane.

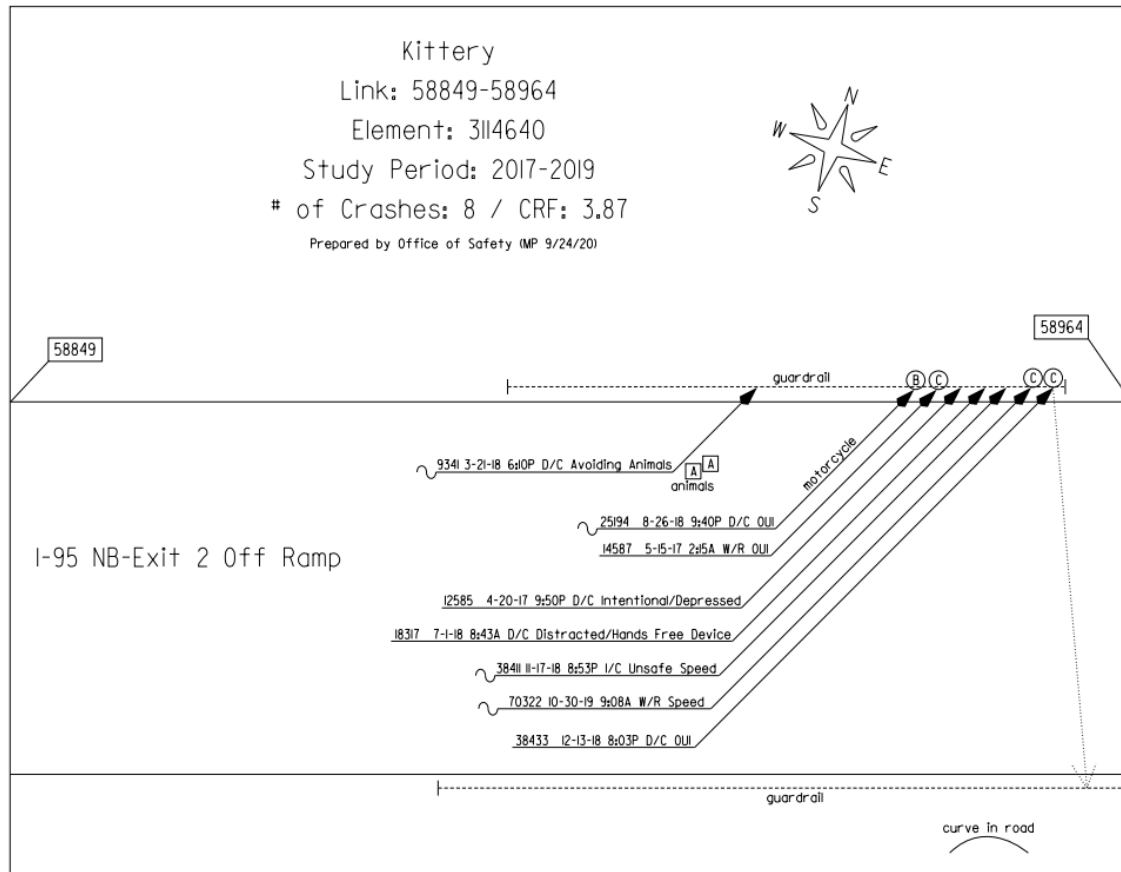
No lighting was observed for either location. Pavement was observed to be in poor condition with cracking and drainage concerns. There are no rumble strips.

¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Figure 2: 2017 – 2019 I-95 Exit 2 NB Off Ramp Crash Diagram depicts the ramp high crash location. It should be noted this crash pattern, the only time this location was an HCL in the most recent 10-year period occurred overlapped with the rehabilitation efforts of the Piscataqua River Bridge.

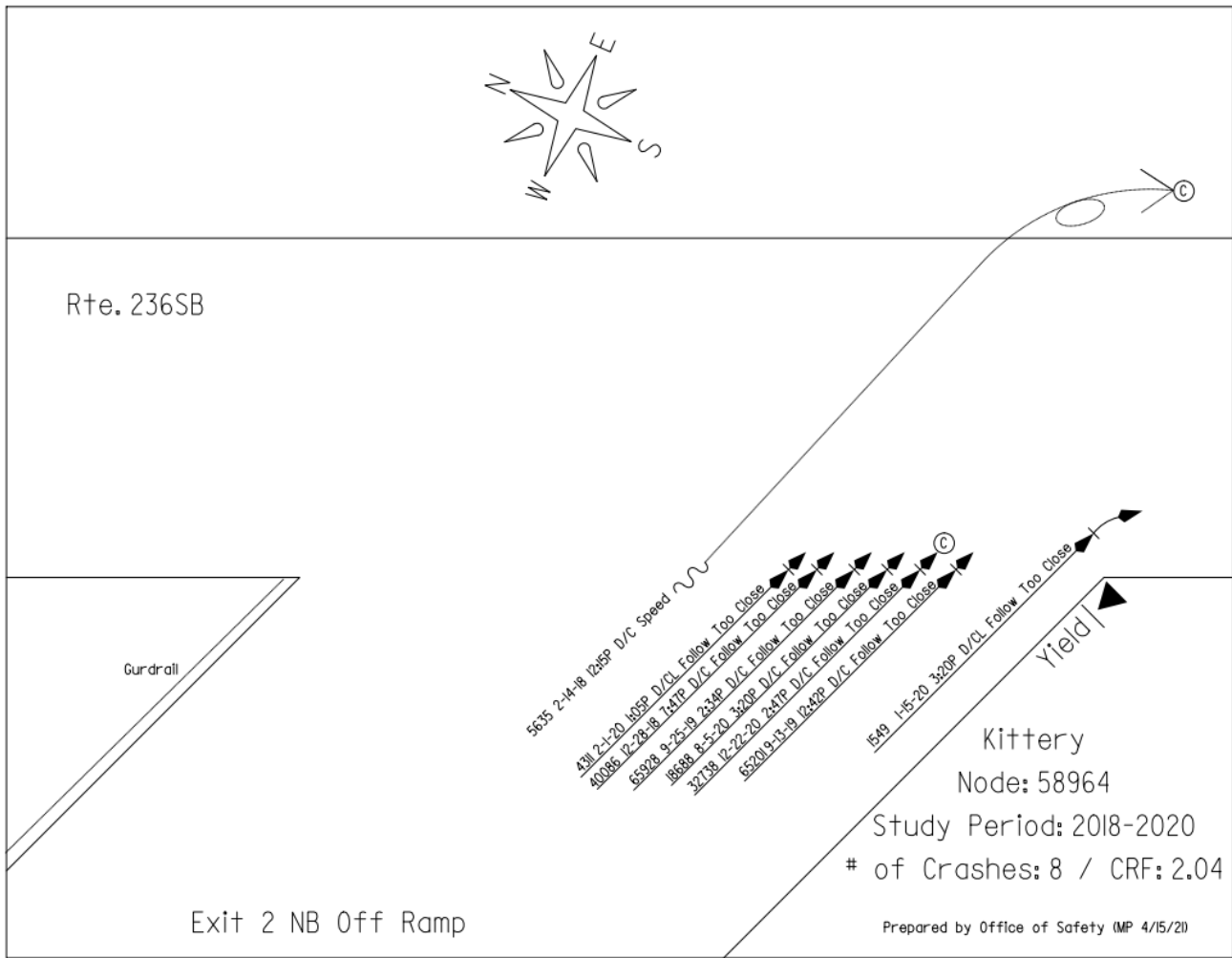
Figure 2: 2017 – 2019 NB Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 50% injury rate.

- Most crashes occurred on the curve of the ramp hitting guardrail on the outside of the curve
- Crashes were mostly human contributions – 3 OUIs, 1 distracted driving, and 1 intentional crash; 2 crashes were related to unsafe speeds
- Of those crashes, drivers are most likely to have an injury when OUIs were the cause.
- Most crashes occurred at night

Figure 3: 2018 – 2020 NB Crash Diagram



As shown in **Figure 3**, there were 8 crashes resulting in a 12.5% injury rate.

- All crashes but one were caused by vehicles following to close trying to enter Route 236.
- All crashes but one were rear-end – sideswipe type crashes

Photos 1 and 2 captured by Google Maps September 2019 depicts the condition during the most recent high crash location designation.

Photo 1: I-95 Exit 2 NB Off



Photo 2: I-95 Exit 2 NB Off “Merge”



Photo 3 captured by Google Maps October 2020 provides an overall aerial showing the interaction of movements.

Photo 3: I-95 NB Exit 2 Area Aerial



Findings and Observations

Existing Road Audit ²	
Road alignment and Cross Section	Site distance and competing movements makes the movement joining Route 236 difficult. Reduced speeds are adequate for design, but vehicles often travel faster than the posted speed, particularly on Route 236. The road alignment of the weave where the ramp joins Route 236 is poor. Some drainage structures are in poor condition. Guardrail is in place for protection on the ramp and passenger side of Route 236.
Lighting	There is little to no lighting.
General Sign Issues	Signage should be re-evaluated.
Barriers and Clear Zones	Guardrail protects all slide slopes.
Pavement	Pavement is in poor condition.

Conclusions

This area has most recently been a high crash location during adjacent mainline and bridge construction activities, particularly when the I-95 Exit 1 NB Off Ramp has been closed, which may increase volumes using this ramp.

Users brake late on the ramp and must make aggressive movements when joining Route 236.

Human contributions were responsible for most crashes on the ramp, while following too closely when joining Route 236 is the cause. This is likely caused by vehicles getting ready to make aggressive movements and stopping.

² [Post-construction Phase: Prompt List 6 – Existing Road Audit | FHWA \(dot.gov\)](#)

Recommendations

- Short-Term Solutions:
 - Implement and monitor PTSU during peak congestion periods, ensure MTA Patrol is active when PTSU is in use, monitor corridor speeds/develop baseline capacities.
 - Implement enhanced chevrons on the curve and 'merge' sign with Route 236.
- Mid-Term Solutions:
 - Work together with state and municipal stakeholders to look at long-term improvement options for the region

Mainline High Crash Location: Exit 2 SB

Nodes 58350 to 58856: Just Before C-D Split SB

Node 58862: Exit 3 SB On Ramp Merge Point

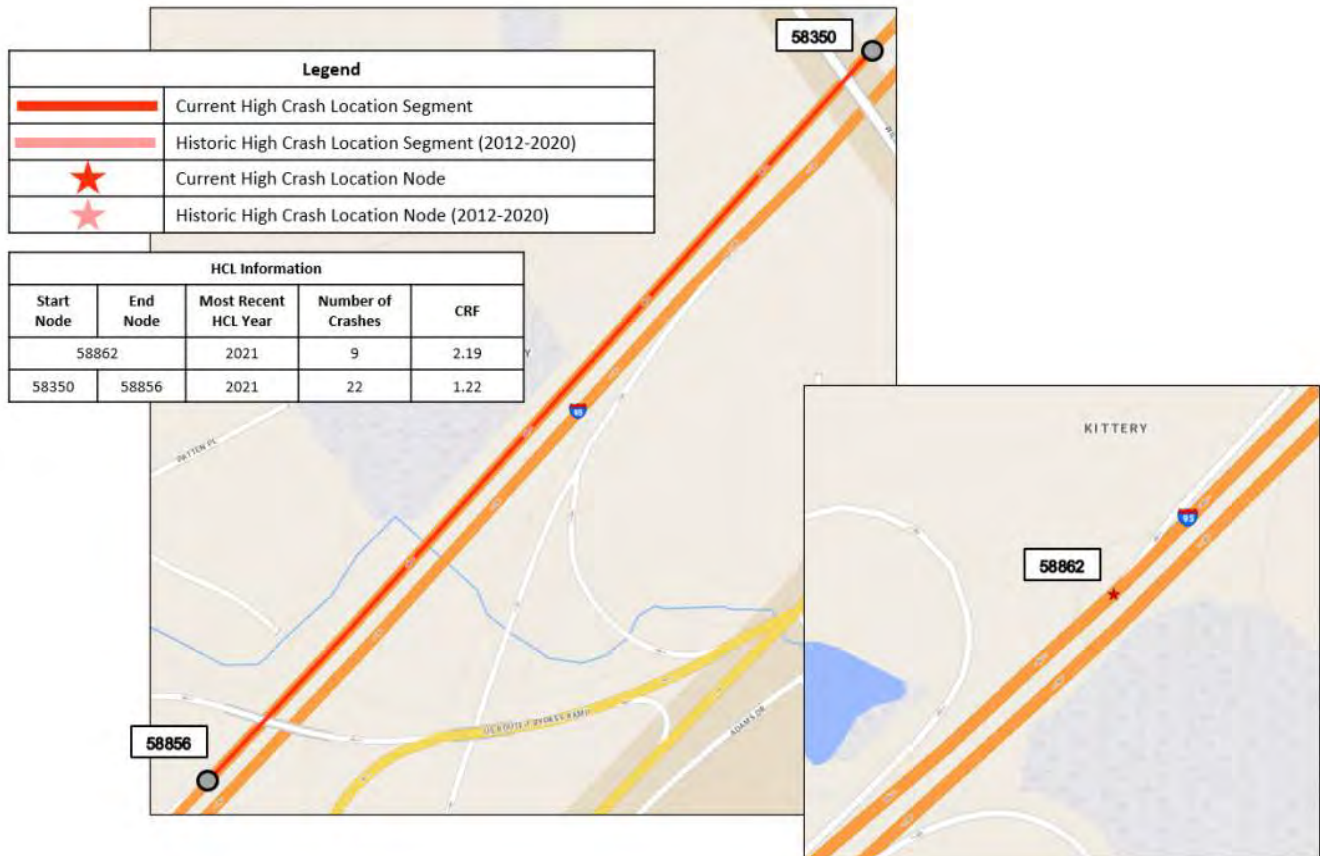
Introduction

There are two HCLs for the merge and diverge surrounding the collector-distributor (C-D) for Exits 2 and 3 Southbound during the most recent 10-year period as shown in **Figure 1: HCL Location Map**:

- At the merge point for the Exit 2 SB On Ramp
- Between Exits 3 and 7, just north of the C-D split

This segment of mainline is located in the municipality of Kittery, in York County. It is an urban interstate consisting of three mainline southbound travel lanes with a shoulder. The area is currently completing construction activities to provide a fourth lane of travel in the shoulder for part-time use during peak periods of congestion, set to open Spring 2023. The entirety of the mainline segment is owned by the Maine Turnpike Authority.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

This section of road has been subject to additional traffic due to closed adjacent crossings or subject to construction for the majority of the last 10-year study period. The section served as a de facto detour during the construction of two other Maine-New Hampshire crossings:

- World War 1 Memorial Bridge: July 2011 to August 2013
- Sarah Mildred Long Bridge: January 2015 to March 2018

In addition, the area was under construction to provide rehabilitation efforts to both adjacent bridges (dates are approximate):

- Dennett Road Bridge of I-95: March 2018 – August 2018
 - Exit 1 SB On Ramp closed 1 month
 - Exit 1 NB Off Ramp closed the duration of the project
- Piscataqua River Bridge: June 2019 - Current
 - Exit 1 SB On Ramp closed: June 2019 – October 2021
 - Exit 1 NB Off Ramp closed: October 2019 – October 2021
 - Includes ITS and striping improvements for Part-Time Shoulder Use (PTSU)

General Mobility Observations

There are significant seasonal fluctuations in traffic volume throughout the year for this segment. During the peak travel months from April to October, midday Saturday and Sunday peaks dictate the need for additional capacity. During these peak hours, this location experiences some of the highest traffic volumes of the entirety of the Turnpike. Pinch points including the Hampton Toll Plaza and the geometry of the Piscataqua River Bridge reduce southbound capacity. This location also tends to experience turbulence as a result of the close proximity to the Exit 1 interchange.

Demographics

The segment has a 2022 AADT¹ of 30,902 (North of the C-D Interchange) and 35,622 (south of the C-D Interchange). The speed limit, previously posted at 65mph has been reduced to 55mph to meet AASHTO guidelines most nearly during the implementation of PTSU.

Corridor Characteristics

This location is a three-lane section with shoulders on either side and a newly installed median barrier. The northbound and southbound barrels are separated by guardrail until the 236 overpass where it transitions to concrete barriers. Rumble strips are present along both the outside and inside shoulders. Highway lighting and signage were upgraded as part of PTSU. Newly installed closed circuit television cameras provide additional security and there is a road weather information system present. The northern HCL in this area is immediately prior to the Exit 3 Off Ramp diverge, while the southern is immediately following the Exit 2 On Ramp merge and is in close proximity to the Exit 1 interchange. The merge and diverge lengths in this location maximize available pavement width without widening using striping as a part of PTSU implementation efforts.

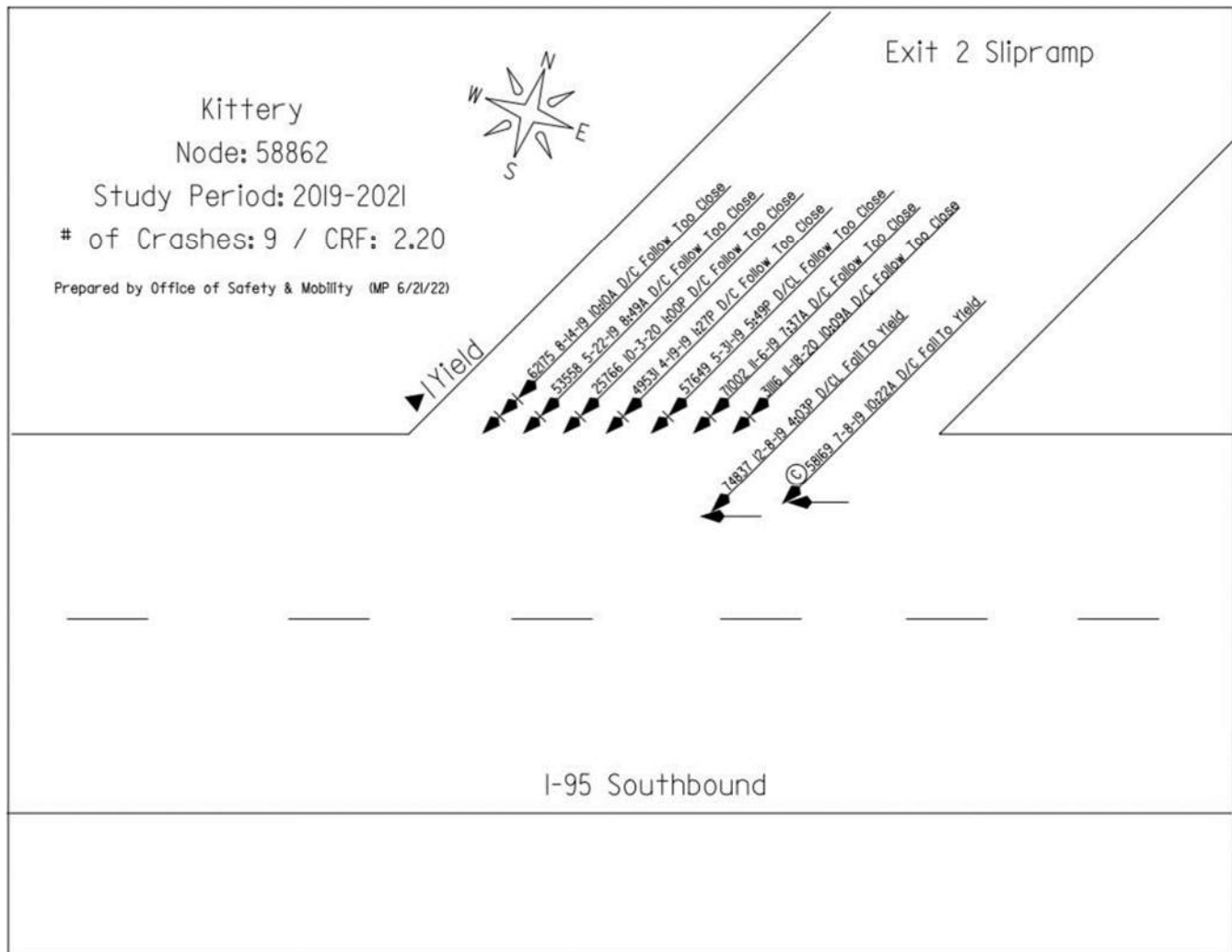
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Exit 2 SB On Ramp Merge Point

Figure 2: 2019-2021 Southbound Exit 2 On Ramp Merge Crash Diagram depicts the southern HCL in this area which is located at the merge point of the Exit 2 slip ramp with the I-95 southbound mainline. The slip ramp is yield-controlled while users of the Turnpike have the right of way and are free flowing.

Figure 2: 2019-2021 Southbound Exit 2 On Ramp Merge Crash Diagram



As shown in **Figure 2**, there were 9 crashes resulting in a 11.1% injury rate during this analysis period.

- The crashes during the most recent HCL period were almost exclusively as a result of following too close along the slip ramp (9 crashes)
- The other two crashes were a result of failure to yield
- These crash types are typical in areas of high congestion such as this, especially at yield-controlled movements where vehicles are trying to identify mainline gaps.
- One of these crashes resulted in injury
- While it was nearly an even split between crashes at this location occurring during the morning or afternoon, lighting does not appear to be an impacting factor as all crashes occurred during typical daylight hours

Photo 1: Exit 2 SB On Ramp Merge Point (July 2022) captured by Google Maps² in July of 2022 depicts the condition of this location at the time that it was most recently noted as an HCL.

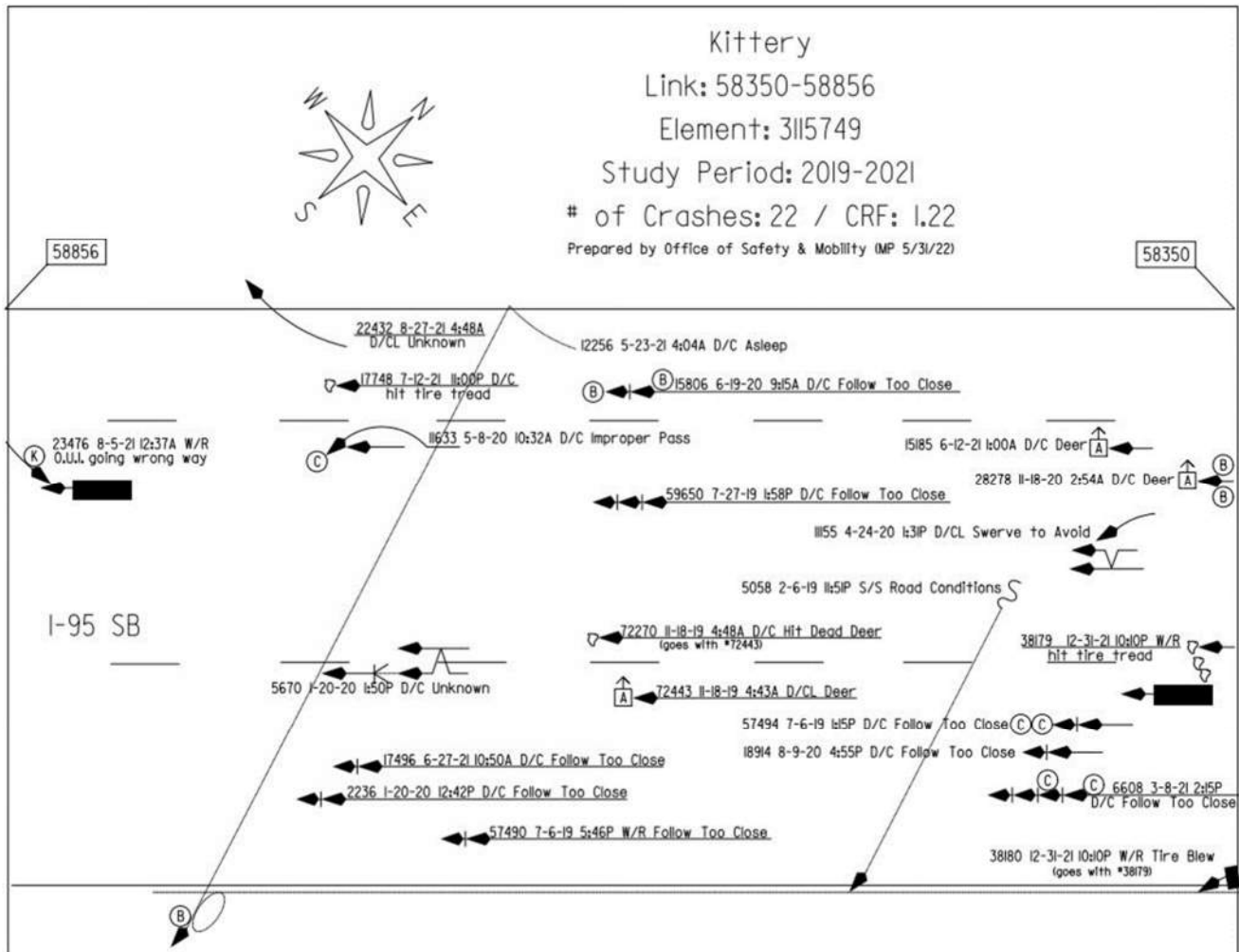
Photo 1: Exit 2 SB On Ramp Merge Point (July 2022)



² Google Maps accessed March 13, 2023

Figure 3: 2019-2021 I-95 SB Just North of C-D Split Crash Diagram depicts the northern HCL in this location, which is just north of the C-D split. This is a current (2021) HCL.

Figure 3: 2019-2021 I-95 SB Just North of C-D Split Crash Diagram



As shown in **Figure 3**, there were 22 crashes resulting in a 31.8% injury rate during this analysis period.

- 8 of the crashes included in the diagram (36%) were a result of vehicles following too close, which is a typical crash cause in locations of high congestion
- 6 crashes (27%) were a result of drivers hitting animals or debris in the roadway
- There was 1 fatality included in this HCL diagram, which was caused by a driver under the influence driving the wrong way on the Turnpike
- The majority of these crashes occurred during the summer months which is when there is the highest percentage of unfamiliar drivers traveling for recreational purposes

Photo 2: I-95 SB Just North of C-D Split (July 2022) captured by Google Maps³ in July of 2022 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: I-95 SB Just North of C-D Split (July 2022)



Findings and Observations

Existing Road Audit ⁴	
Road alignment and Cross Section	Sight distance is adequate. During standard operation, the design speeds are adequate for these and adjacent segments. Speeds were reduced through the PTSU area, which was a change implemented in 2022. The high tourism base during the summer coupled with the presence of RVs often reduces the capacity during the peak summer period. No significant slope of drainage concerns are present in this area. Barrier and guardrail is in place for protection.
Lighting	New lighting is present in this area, especially at the C-D interchange.
General Sign Issues	All signage has been recently evaluated and updated as part of the PTSU project.

³ Google Maps accessed March 13, 2023

Marking and Delineation	Pavement markings have been recently updated as part of the PTSU design project. They are maximized to provide the longest acceleration/deceleration lengths.
Barriers and Clear Zones	New median barriers have been installed and median/guardrail protects the southbound mainline from the northbound.
Bridges and Culverts	Adjacent bridges are in good condition, both have recently had significant maintenance projects performed on them.
Pavement	Pavement is in good condition. No concerns regarding skidding, ponding, icing of snow accumulation are present.
Heavy Vehicles	It is assumed that pavement shoulder quality has been evaluated as part of PTSU implementation. This area has a high heavy vehicle percentage, particularly with recreational vehicles such as RVs who may be less experienced large vehicle drivers.

Conclusions

This area has been the focus of strong safety and capacity improvements over the past three years which will provide great benefit to the corridor. However, this location has been under construction or a detour route for other construction projects for the last decade. Monitoring will be key to understanding how new patterns evolve.

Following too closely was the primary crash cause along both HCLs in this area. This is likely a result of congestion in this location combined with seasonally high volumes of unfamiliar drivers and a high percentage of heavy vehicles, some of which are RVs and trailers being used by individuals who do not commonly operate these types of vehicles.

Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

PTSU will provide some additional capacity and should be monitored when implemented to understand safety concerns and the potential life of this improvement. Because there are no pull off areas, MTA service patrol will need to be present during PTSU activities to ensure mobility is maximized. This will not replace the need for future widening at this location.

- Short-Term Solutions:
 - Implement and monitor PTSU during peak congestion periods, ensure MTA Patrol is active when PTSU is in use, monitor corridor speeds/develop baseline capacities. Include this location in MTA's large animal study.
- Mid-Term Solutions:
 - Develop plans for corridor widening.

Intersection High Crash Location: Exit 7 Ramps Intersection

Node 58870: Exit 7 SB Ramps Intersection

Node 63313: Exit 7 NB Off Slip Ramp Lane Merge

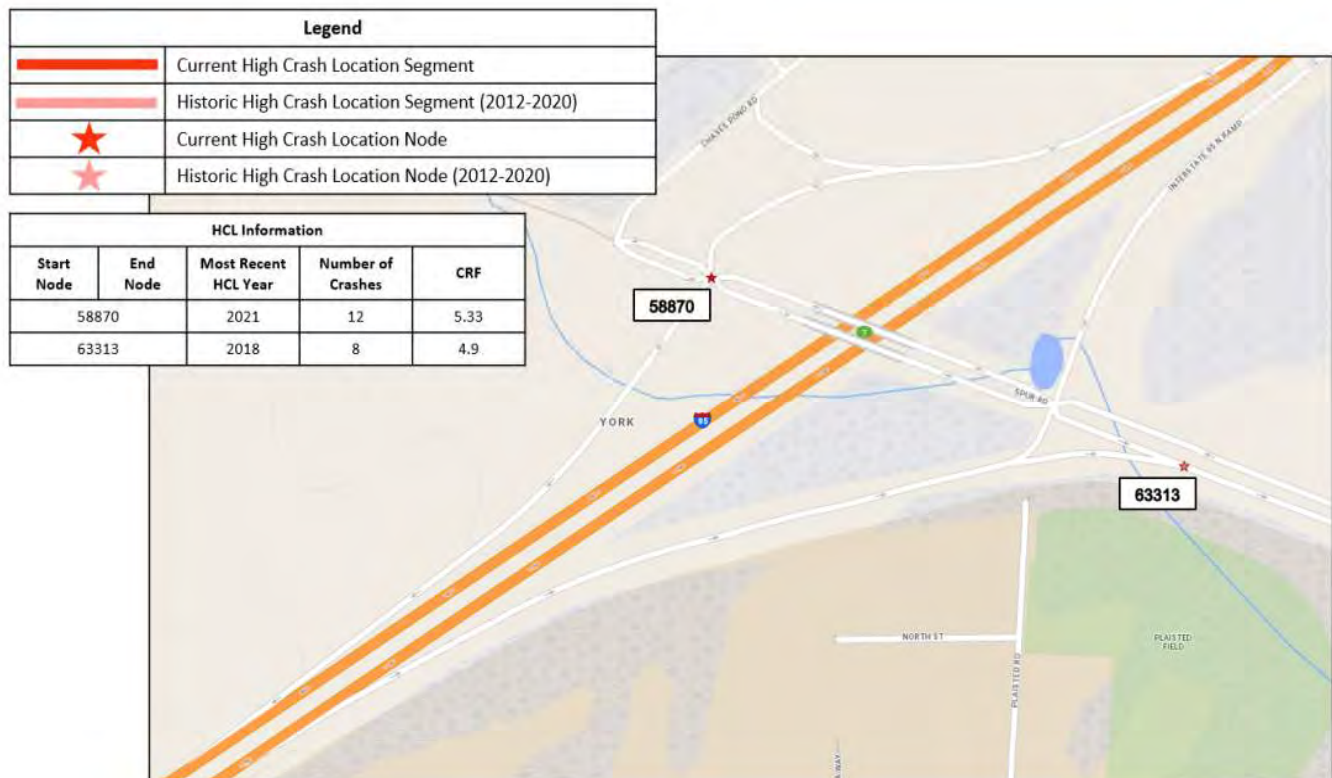
Introduction

There are two HCLs for the intersections adjacent to the Exit 7 ramps during the most recent 10-year period as shown in **Figure 1: HCL Location Map**:

- The intersection of Spur Road with the I-95 SB on and off ramps
- The intersection of Spur Road with the I-95 NB off ramp slip ramp

These intersections are located in the town of York in York County. The southbound ramps intersection is a four-legged intersection of Spur Road with the ramps, while the slip ramp from the northbound off ramp is a merge area between ramp users and vehicles traveling eastbound along Spur Road. All ramps involved in these intersections are single lane, while Spur Road has two travel lanes in each direction (as well as a left turning lane at both on ramp intersections). The ramps and Spur Road both have shoulders, and Spur Road also has a concrete median dividing the eastbound and westbound travel directions. The York Toll Plaza is along I-95, just north of the Exit 7 interchange.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

This section of road has been subject to additional traffic due to closed adjacent crossings or subject to construction for the majority of the last 10-year study period. The section served as a de facto detour during the construction of two other Maine-New Hampshire crossings:

- World War 1 Memorial Bridge: July 2011 to August 2013
- Sarah Mildred Long Bridge: January 2015 to March 2018

The York Toll Plaza is located just north of the Exit 7 interchange and impacts the capacity and flow of the surrounding areas. From 2018 to 2022, this toll plaza was under construction to relocate from mile marker 7.3 to mile marker 8.8 and implement ORT lanes and expanded cash collection.

General Mobility Observations

There are significant seasonal fluctuations in traffic volume throughout the year in this location. From April to October, there is an increased volume due to the high amount of tourism that occurs in this area. No capacity concerns currently exist along any of the ramps included in these intersections. The southbound ramp intersection provides access to the York Park and Ride, located to the west of the intersection.

Demographics

The posted speed limit along Spur Road is 40 MPH. The following AADTs have been identified for each ramp and roadway included in the intersections of interest:

Location	AADT ¹
Spur Road	3,967 (EB), 9,837 (WB) ²
Exit 7 NB Off Ramp	7,418
Exit 7 SB Off Ramp	2,314
Exit 7 SB On Ramp	7,443

Corridor Characteristics

The Exit 7 southbound ramp intersection is composed of Spur Road, the Exit 7 southbound On Ramp and the Exit 7 southbound Off Ramp. Each ramp is one lane, while Spur Road consists of two travel lanes in either direction as well as a left turn lane westbound for vehicles turning to access the southbound on ramp. There is a concrete median dividing the eastbound and westbound travel barrels along Spur Road, which breaks for the intersection to allow for left turning movements. The Exit 7 southbound off ramp movement is stop controlled, while all other movements are free.

The intersection at the Exit 7 NB Off Ramp works as a merge point between the ramp and Spur Road eastbound. There is no break in the concrete barrier to allow for vehicles exiting via the slip ramp to make a left turning movement, and the ramp is yield-controlled giving the Spur Road vehicles the right of way. At the slip ramp, a third lane is added to Spur Road which acts as a short weaving movement before a signalized intersection between Spur Road and Route 1 approximately 1,100 feet from the end of the slip ramp.

¹ Unless otherwise noted, AADT from 2022 Summary Prepared by HNTB for MTA

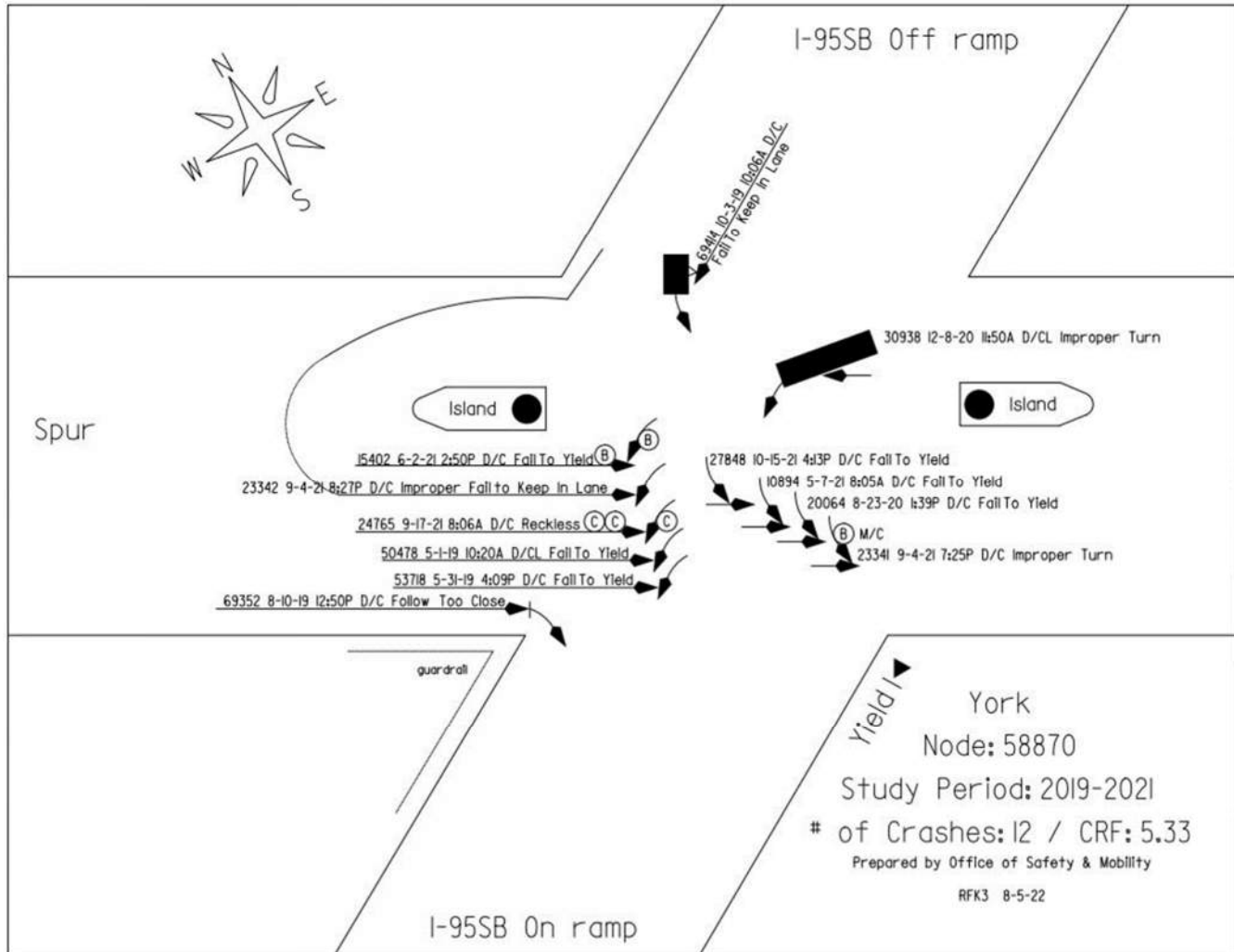
² Collected from MaineDOT Map Viewer

Crash analysis

Exit 7 SB Ramps Intersection

Figure 2: 2019-2021 Exit 7 Southbound Ramps Intersection Crash Diagram depicts the most recent HCL crash diagram for the location. This location has been identified as an HCL during 5 other time periods over the past 10 years.

Figure 2: 2019-2021 Exit 7 Southbound Ramps Intersection Crash Diagram



As shown in **Figure 2**, there were 12 crashes resulting in a 25% injury rate during this analysis period.

- All crashes displayed in the diagram were a result of turning movements
- 50% (6 crashes) were a result of failure to yield
 - Half of these were between vehicles traveling eastbound on Spur Road and vehicles turning left towards the on ramp, while the other half were between vehicles traveling eastbound on Spur Road and vehicles turning left off of the off ramp
- Two of the crashes at this location involved heavy vehicles
- 7 of these crashes (58%) occurred between August and October

Photo 1: Spur Road at I-95 SB Exit 7 Ramps (June 2019) and **Photo 2: Exit 7 Ramps Intersection from SB On Ramp (September 2019)** captured by Google Maps³ depict the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Spur Road at I-95 SB Exit 7 Ramps (June 2019)



Photo 2: Exit 7 Ramps Intersection from SB On Ramp (September 2019)

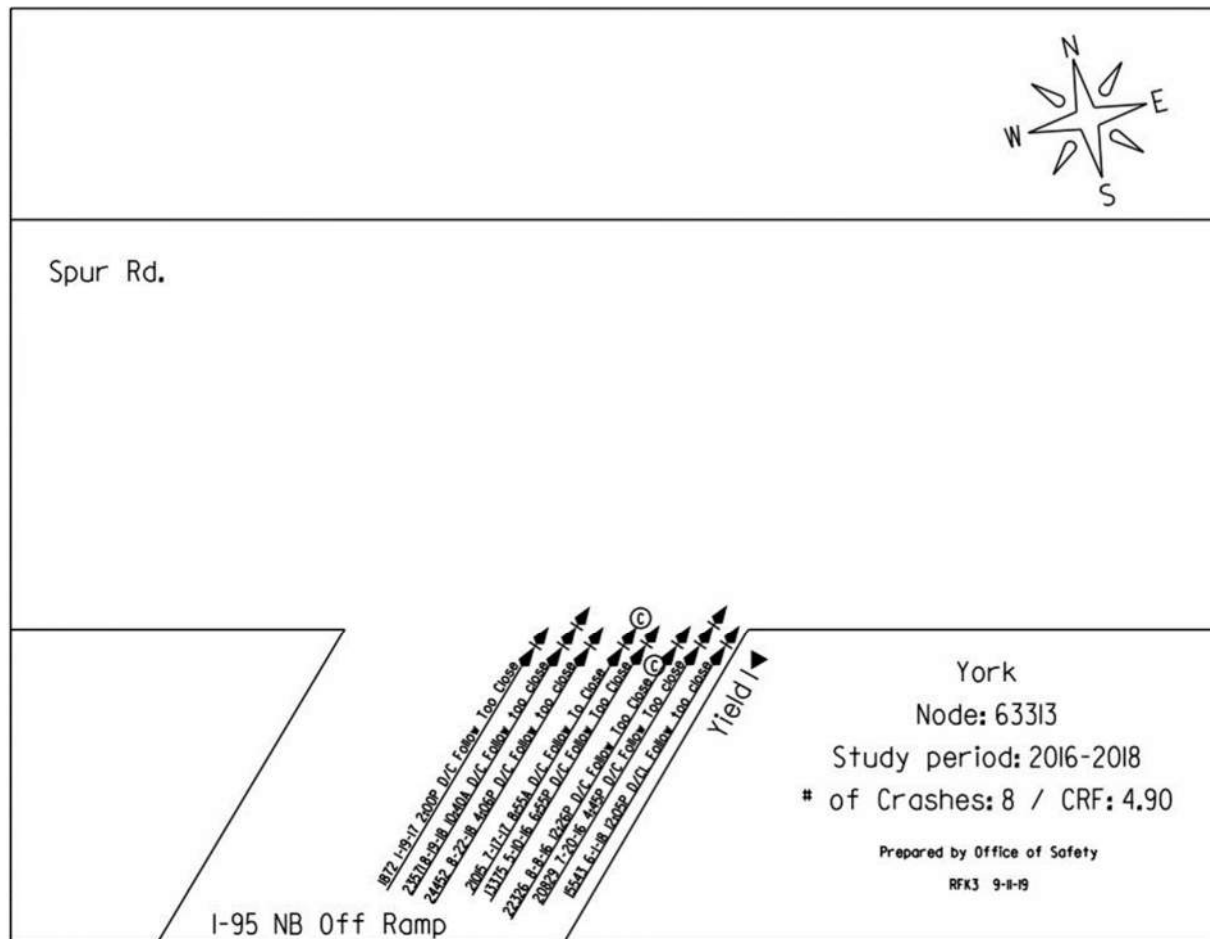


³ Google Maps accessed March 13, 2023

Exit 7 NB Off Slip Ramp Lane Merge

Figure 3: 2016-2018 Exit 7 Northbound Off Slip Ramp Lane Merge Crash Diagram depicts the most recent available crash diagram for the location. It should be noted that the last time period in which this location was identified as an HCL was during the construction of the Sarah Mildred Long bridge, and the location was noted as an HCL during three other time periods over the past 10 years.

Figure 3: 2016-2018 Exit 7 Northbound Off Slip Ramp Lane Merge Crash Diagram



As shown in **Figure 3**, there were 8 crashes resulting in a 25% injury rate during this analysis period.

- The crashes represented in this diagram were exclusively a result of vehicles following too close, which is common in areas of high congestion, especially in locations under yield conditions
- 6 of these crashes (75%) occurred between the months of June and August

Photo 3: Slip Ramp Intersection from Spur Road (November 2022) captured by HNTB in November of 2022 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 3: Slip Ramp Intersection from Spur Road (November 2022)



Findings and Observations

Existing Road Audit ⁴	
Road alignment and Cross Section	At the southbound ramps intersection, Spur Road has a straight alignment. The ramps do not line up exactly with each other at the intersection. Due to both of these intersections being one-directional, this does not appear to create any sight distance concerns at the intersection. The approach to the slip ramp merge is a curve with a large radius. While sight distance concerns are not present for vehicles traveling along Spur Road, the users of the slip ramp may endure some sight distance challenges as they attempt the merging movement within the weave that exists in the location. There are no apparent concerns with drainage at this location.
Lighting	Lighting is present at both locations.
General Sign Issues	There are no apparent signage concerns at these locations.
Marking and Delineation	Pavement markings along Spur Road are clear and visible, adequately separating lanes of travel.

Barriers and Clear Zones	Barriers exist within the clear zone along Spur Road and both ramps which appear to protect against steep side slopes.
Bridges and Culverts	The components of bridge 6254 along Spur Road over I-95 was most recently rated to be in satisfactory condition ⁵ .
Pavement	The roadways included in these HCLs have been given the following pavement condition ratings⁶: • I-95 Exit 7 NB Off Ramp Slip Ramp: C • Spur Road: C • I-95 Exit 7 SB Off Ramp: A • I-95 Exit 7 SB On Ramp: B
Heavy Vehicles	The ramps included in these locations have low percentages of heavy vehicles, all of which service 0% - 1% heavy vehicles.

Conclusions

At the southbound ramp intersection, failure to yield is the primary safety concern. This pattern is present for multiple left-turn movements throughout the intersection. Additionally, this location has been classified as an HCL for 5 of the last 10 years.

At the northbound off ramp slip ramp, following too closely is the primary safety concern, which is typically the result of congestion, although in this case it is also likely a result of the stop-and-go movements typically present at a yield as vehicles attempt to find an opening to safely enter Spur Road. This is likely emphasized by the fact that vehicles from the slip ramp are entering into a weaving movement where they may need to make several lane changes to access their desired lane at the signalized intersection located at the end of Spur Road.

Recommendations

- Short-Term Solutions:
 - Coordinate with MaineDOT to evaluate geometry of weave between slip ramp and signalized intersection at the end of Spur Road as well as potential signalization of the SB Off Ramp.

⁵ According to MaineDOT Map Viewer – Bridge Layer

⁶ MaineDOT Map Viewer – CSL Condition Data Simplified

Mainline High Crash Location: York Toll Plaza NB & SB

Node 57692: Old York Toll NB

Nodes 70944 to 57693: North of Old York Toll SB

Node 57693: Old York Toll SB

Nodes 57693 to 58871: South of Old York Toll SB

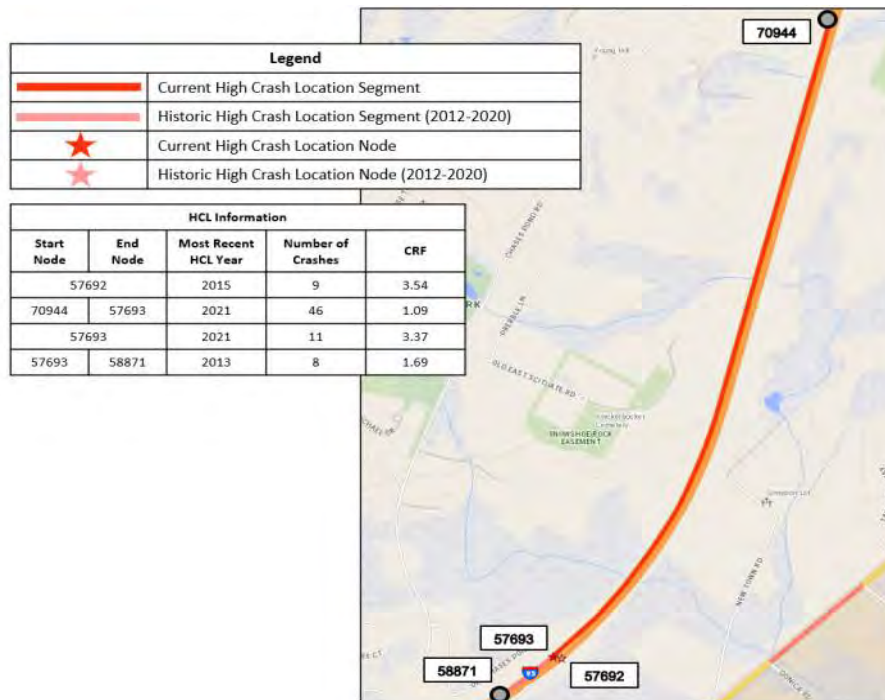
Introduction

There are 4 HCLs for the mainline segment around the old York Toll Plaza during the most recent 10-year period as shown in **Figure 1**:

- Old York Toll NB
- North of Old York Toll SB
- Old York Toll SB
- South of Old York Toll SB

This segment of mainline is located in the Town of York in York County. As of 2021, it consisted of a major barrier toll plaza with 7 collection lanes in each direction and 3 mainline travel lanes along the Turnpike north and south of the plaza. This area recently underwent major construction to move the toll plaza from mile marker 7.3 to mile marker 8.8 and convert some collection lanes to open road tolling (ORT). It should be noted that for the purpose of this road safety audit, evaluations occurred for road safety audits and conditions prior to the completion of this construction. It is anticipated that the implemented changes will have a significant impact on the area from both safety and capacity standpoints and should continue to be monitored accordingly.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The construction activity anticipated to have a significant impact on this location is the aforementioned shift and conversion of the toll plaza which was under construction between 2018 and 2022. As previously noted, the safety analyses included in this audit is not inclusive or representative of the area after the conclusion of the project's construction.

General Mobility Observations

There are significant seasonal fluctuations in traffic volume throughout the year in this area. During the peak travel months from April to October, evening Friday (NB), midday Saturday (NB/SB) and Sunday (SB) peaks dictate the need for additional capacity. On busy weekends, failing levels of service and queues cause severe congestion from the Hampton Toll Plaza through the Wells and Kennebunk interchanges, however the recently implemented changes to the toll plaza are anticipated to improve capacity through this area.

Demographics

This segment has a 2022 AADT¹ of 25,706 northbound and 25,774 southbound. The posted speed limit outside of the toll plaza area is 65 MPH. There was a posted speed limit of 35 MPH around the old toll plaza, and a posted 10 MPH speed limit through the toll itself.

Corridor Characteristics

The mainline on either side of the toll plaza consists of three lanes in both directions. Both northbound and southbound have outside and inside shoulders and the directions are separated by guardrail. While rumble strips used to be present along both the inside and outside shoulders, as of June 2022 these rumble strips are not present (this could be a result of incomplete construction causing them to not have yet been drilled out). Due to the recent constriction, the area has been recently paved and striped.

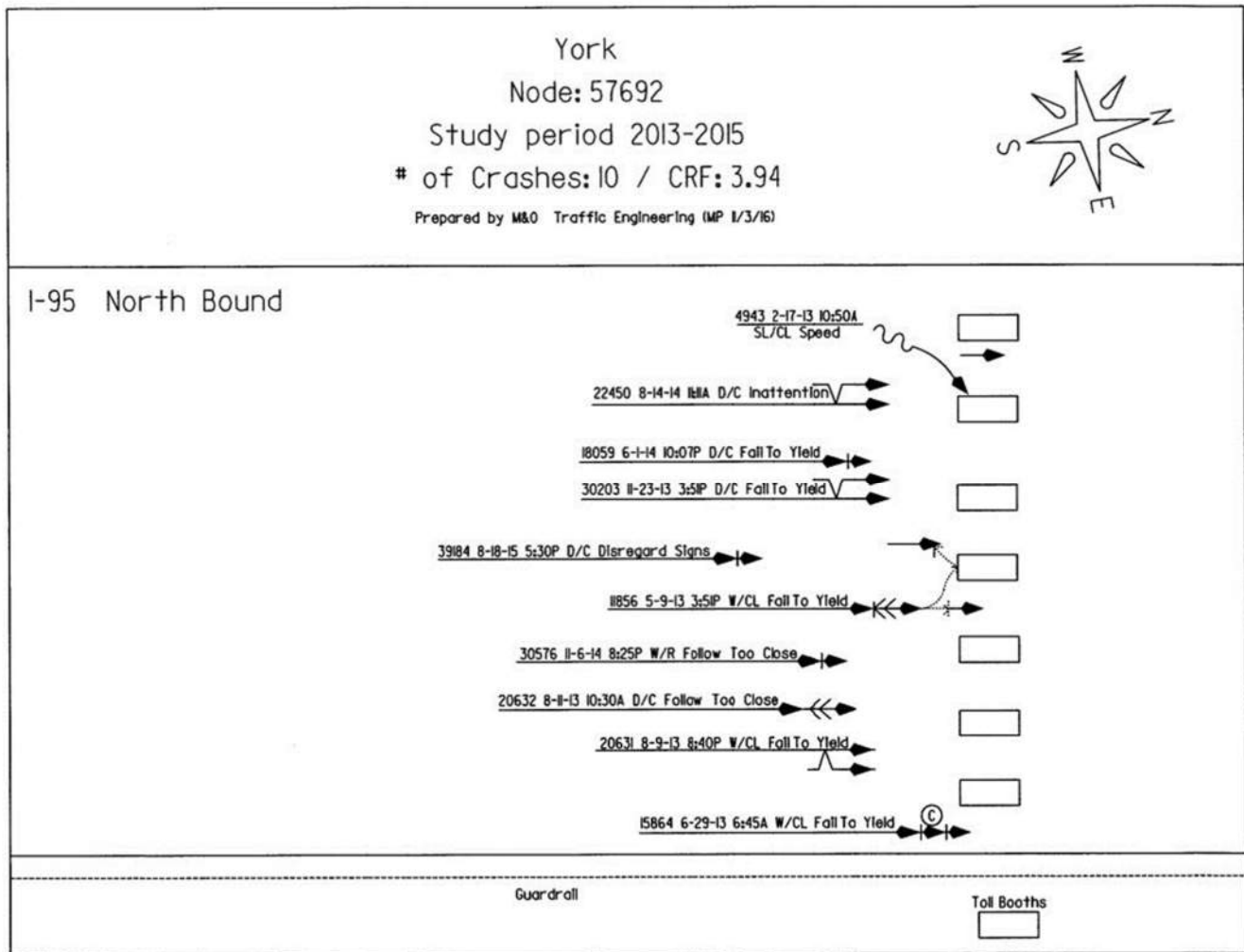
At the old toll plaza, there were 7 collection lanes in each direction. In the new configuration, each direction consists of 3 ORT lanes along the mainline and 3 additional lanes which split off to access 5 cash lanes.

¹ 2022 AADT Summary created by HNTB for MTA

Old York Toll NB

Figure 2: 2013-2015 Old York Toll NB Crash Diagram depicts the crash diagram for the old northbound toll plaza configuration for the most recent time period in which it was identified as an HCL (2013-2015). This location was identified as an HCL during 2 other time periods over the past 10 years.

Figure 2: 2013-2015 Old York Toll NB Crash Diagram



As shown in **Figure 2**, there were 10 crashes resulting in a 10% injury rate during this analysis period.

- The most common cause of crash at this location was failure to yield (5 crashes, 50% of the recorded crashes)
- The second most common cause was following too close
- 6 of the 10 crashes at this location occurred between the months of June and August which is the time that this area experiences an increased volume due to tourism
- There does not appear to be a strong correlation between time of day and crashes

Photo 1: Toll Plaza NB (2011) captured by Google Maps² in September of 2011 depicts the condition of this location at the time that it was most recently noted as an HCL. **Photo 2: Toll Plaza NB (2022)** displays the most recent

² Google Maps accessed March 16, 2023

available Google Street View imagery at the same location. In this photo, the toll plaza construction is active and the old plaza has been removed.

Photo 1: Toll Plaza NB (2011)

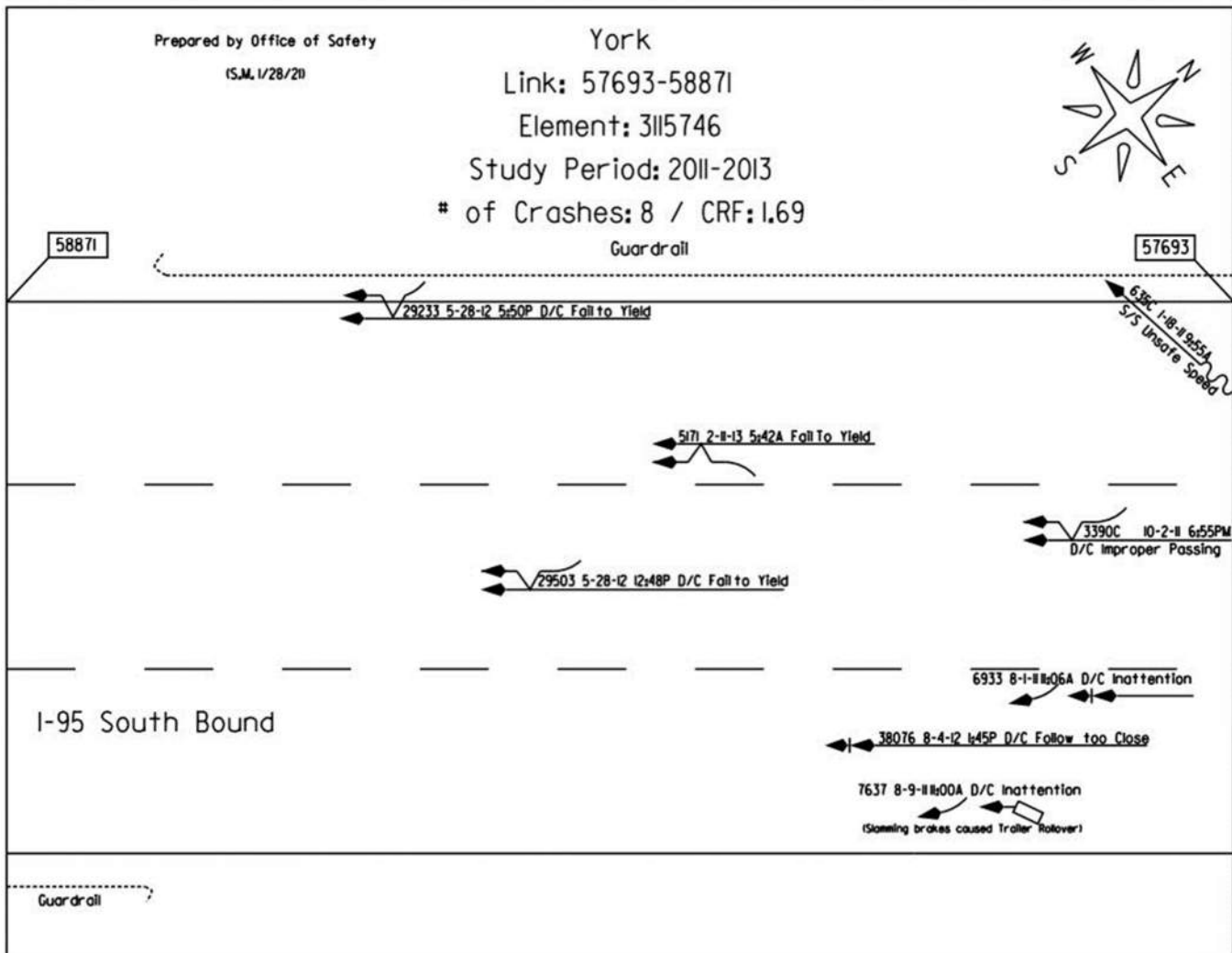


Photo 2: Toll Plaza NB (2022)



Figure 3: 2011-2013 South of Old York Toll Plaza SB Crash Diagram depicts the HCL diagram along the southbound mainline segment for which it was most recently noted as an HCL.

Figure 3: 2011-2013 South of Old York Toll Plaza SB Crash Diagram



As shown in **Figure 3**, there were 8 crashes resulting in a 0% injury rate during this analysis period.

- The primary cause of crash in this location during the most recent HCL period was failure to yield as a result of an attempted lane change (3 crashes)
- Inattention was the next leading cause for crashes in this location, causing 2 of the recorded crashes
- A heavy vehicle was involved in one of the recorded crashes
- While there is not a strong correlation between time of day or year and crash frequency at this location, all but 1 of the crashes that had weather and pavement conditions at time of crash listed occurred on dry pavement when the weather was clear
- None of these crashes resulted in injury

Photo 3: South of SB Toll Plaza (2011) captured by Google Maps³ in October of 2011 depicts the condition of this location at the time that it was most recently noted as an HCL.

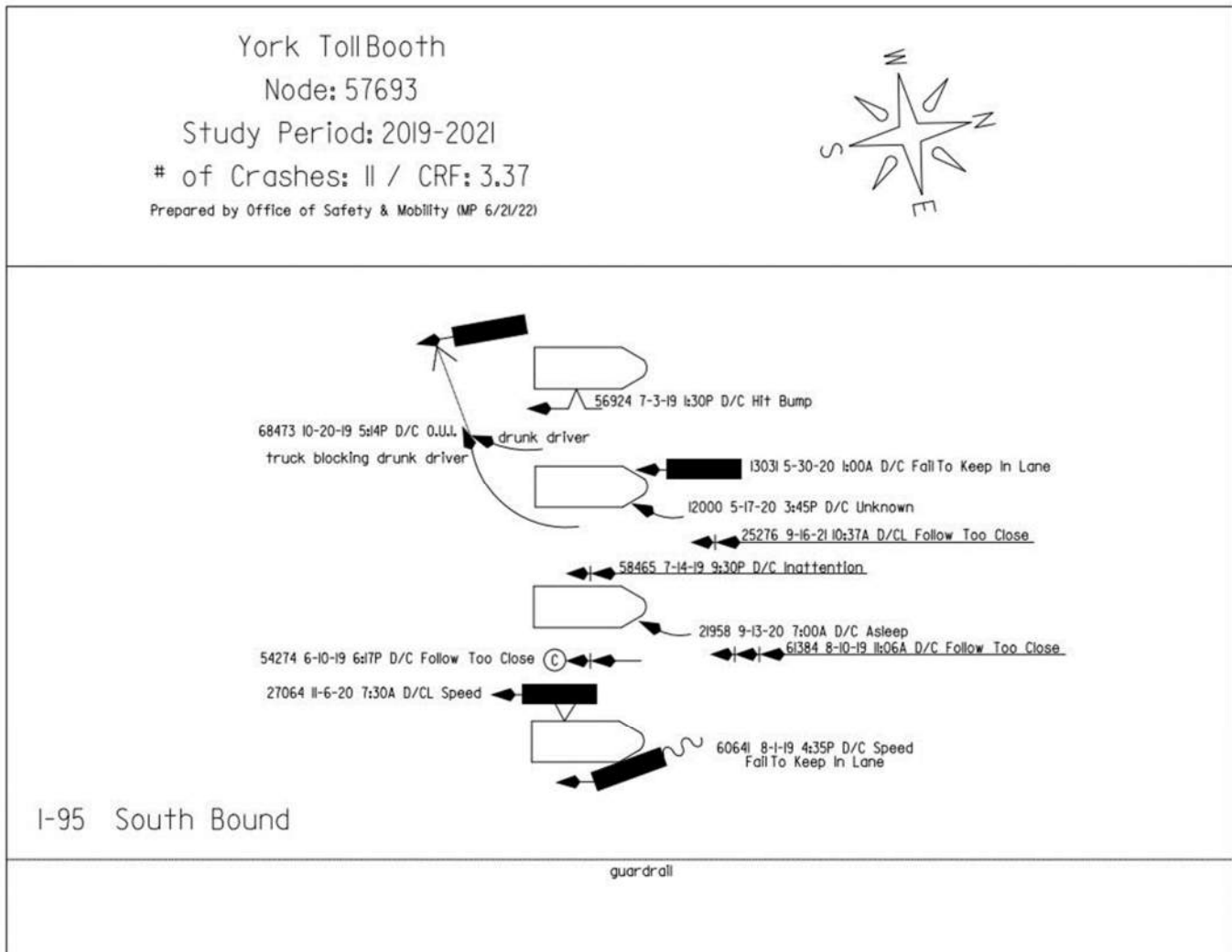
Photo 3: South of SB Toll Plaza (2011)



³ Google Maps accessed March 16, 2023

Figure 4: 2019-2021 Old York Toll SB Crash Diagram depicts the toll plaza in the southbound direction during the most recent period for which it was identified as an HCL. The location was also identified as an HCL during the prior two HCL analysis period.

Figure 4: 2019-2021 Old York Toll SB Crash Diagram



As shown in **Figure 4**, there were 11 crashes resulting in a 9.1% injury rate during this analysis period.

- 4 of these 11 crashes involved heavy vehicles
- Following too close was the most common cause for crashes in this location, causing 3 crashes, closely followed by speed which contributed to 2 crashes at this location
- 5 of these crashes occurred between July and September, which are some of the months in which this area experiences an increased volume and higher number of drivers unfamiliar with the area

Photo 4: SB Toll Plaza (2018) captured by Google Maps⁴ in October of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

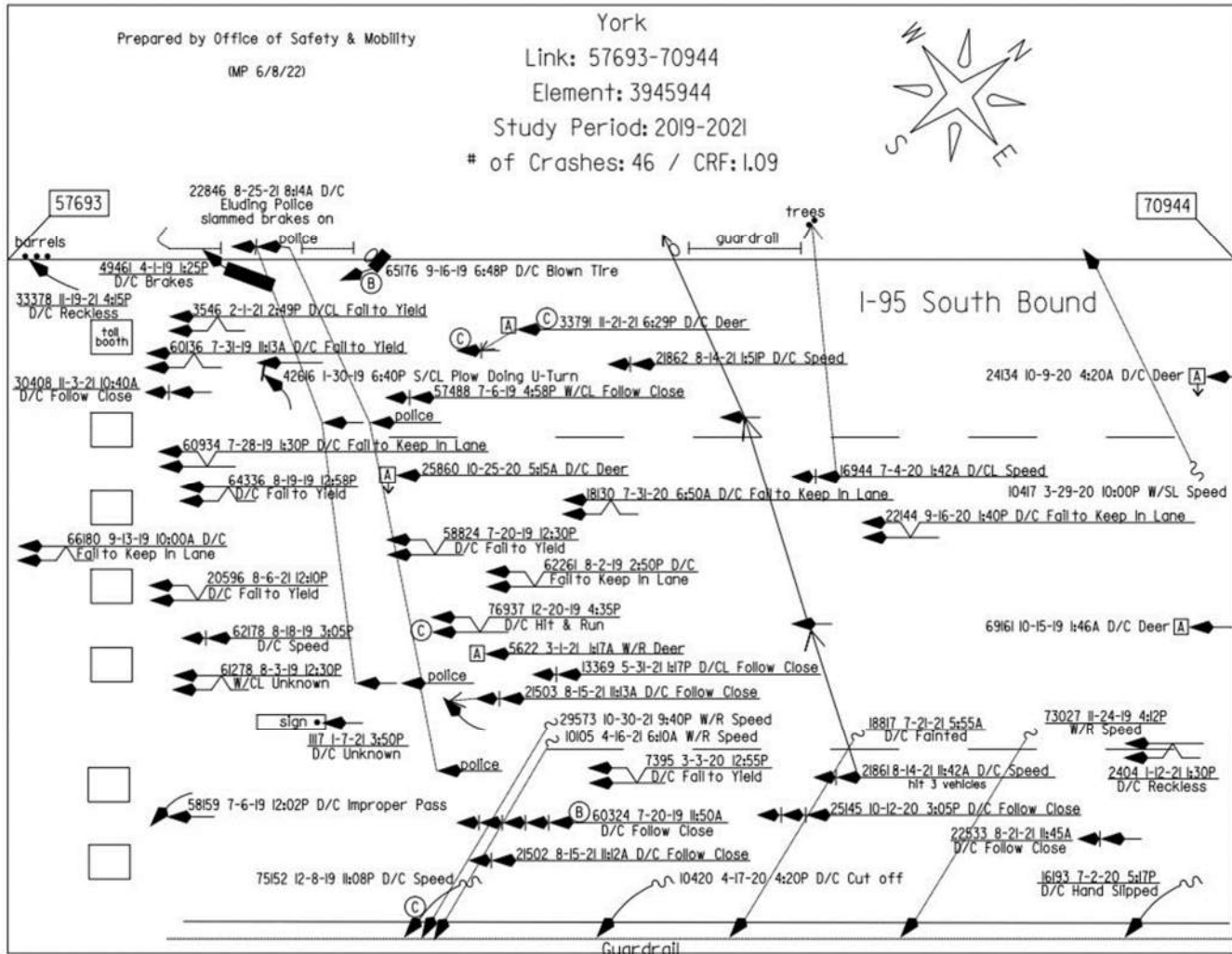
Photo 4: SB Toll Plaza (2018)



⁴ Google Maps accessed March 16, 2023

Figure 5: 2019-2021 South of Old York Toll Plaza Crash Diagram depicts the crash diagram for the most recent time period in which this location was noted as an HCL. This location was also identified as an HCL during the 2018-2020 and 2017-2019 time periods over the past 10 years.

Figure 5: 2019-2021 North of Old York Toll Plaza Crash Diagram



As shown in **Figure 5**, there were 46 crashes resulting in a 13% injury rate during this analysis period.

- This is an extremely significant location in regards to safety concerns based on the volume of crashes
- One of these crashes involved a heavy vehicle
- Failure to yield, failure to keep in lane, following too close and speed appear to be the prominent causes of crashes at this location, some of which are common at congested areas especially those such as toll plazas when lane changes are frequently being made
- Recklessness and collisions with animals are the next most observable causes at this location
- The majority of the crashes at this location occurred during the summer months in which there is increased volume and higher numbers of drivers who are unfamiliar with the area

Photo 5: North of SB Toll Plaza captured by Google Maps⁵ in October of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 5: North of SB Toll Plaza



Findings and Observations

Existing Road Audit ⁶	
Road alignment and Cross Section	The southbound approach to the old York Toll Plaza is a curve with a large enough radius that it does not present sight distance concerns. The toll plaza is along a straight segment of road in which the plaza itself is the only obstruction to sight distance. South of the toll plaza prior to the Exit 7 interchange is along a slight curve which does not create sight distance concerns.
Lighting	In both the old and the upgraded toll plazas, lighting is present along the approach and departure of the toll plaza, as well as at the plaza itself.
General Sign Issues	Signage for advance warning of the toll plaza exists at both the old and new toll plaza configuration. Signage also exists at the toll plaza itself indicating factors such as lane use designation, speed limits, etc.
Marking and Delineation	Adequate pavement markings exist along the approach and departure of the toll plaza, as well as at the plaza itself.
Barriers and Clear Zones	Barriers exist along this mainline segment to separate the northbound and southbound travel directions.
Bridges and Culverts	No bridges or culverts are identified by the MaineDOT Map Viewer within these locations.

⁵ Google Maps accessed on March 16, 2023

Pavement	The roadway along the entirety of these segments have been given a condition rating ⁷ of A.
Heavy Vehicles	This section of the mainline experiences significantly high percentages of heavy vehicles, ranging from 8% - 17%.

Conclusions

Many of the leading causes of crashes in the 4 locations observed as a part of this road safety audit are consistent with areas of congestion. This is compounded by the location being around and at a toll plaza in which many people are attempting lane changes and other similar movements, as well as the fact that this location experiences a high number of unfamiliar drivers and heavy vehicles, particularly during the summer months.

As previously noted, this toll plaza recently underwent significant changes. Since construction for this project concluded recently, the crash diagrams depicted in this audit are representative of pre-construction conditions. Because of this, the proposed solutions primarily revolve around monitoring the area to observe how the recently implemented changes impact the safety around the toll plaza.

Recommendations

- Short-Term Solutions:
 - Monitor the area to observe safety impacts as a result of the recently completed toll plaza relocation and ORT lane implementation.

⁷ MaineDOT Map Viewer – CSL Condition Data Simplified

Interchange High Crash Location: Exit 19 Plaza & Ramp

Nodes 58365 to 58877: Exit 19 Plaza Segment

Nodes 58876 to 58877: Exit 19 NB On Ramp

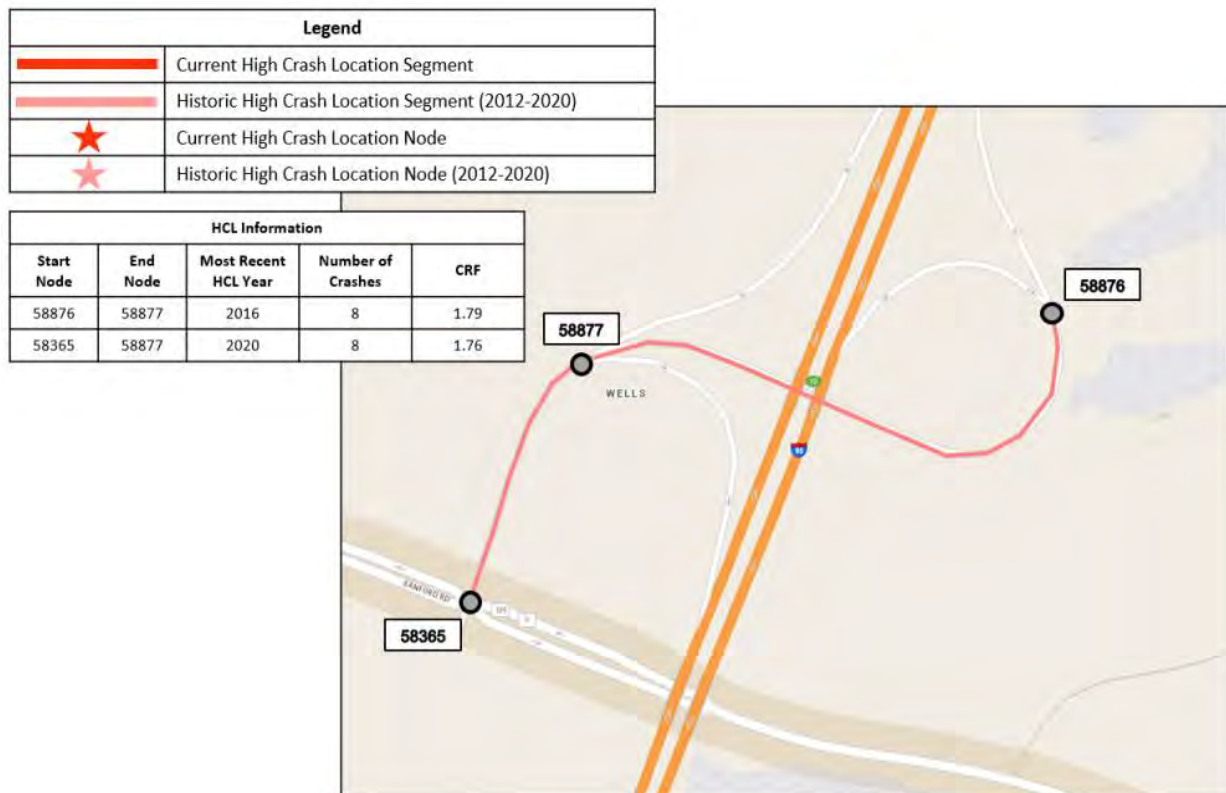
Introduction

There are 2 HCLs for the segment of the Exit 19 toll plaza and ramps during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 19 Plaza Segment
- Exit 19 NB On Ramp

These locations are both within the Exit 19 interchange, located in the Town of Wells, in York County. Located along the ramp is a toll plaza which collects from vehicles entering I-95 northbound. The ramp consists of two horizontal curves in opposing directions, each with a radius of approximately 250 feet¹. Each ramp (NB on, NB off, SB on and SB off) consist of one lane with shoulders. Just before the toll plaza, the northbound and southbound off ramps join to form a two lane segment that continues through the toll area and to the end of the ramp. At the termination of the ramp, there is a four-legged intersection consisting of the ramps southbound, Sanford Road (Route 109) eastbound and westbound, and park and ride access northbound.

Figure 1: HCL Location Map



¹ Radii measured in Google Earth

Existing Conditions Assessment

Construction Activities

Prior construction activities including intersection improvements occurred in 2015.

General Mobility Observations

This location experiences significant seasonal fluctuations in traffic volume. During the summer months there is an increase in recreational traffic which includes an increase in drivers who are less familiar with the area.

Demographics

This interchange has a 2022 AADT of 16,265 vehicles per day². The Exit 19 Northbound On Ramp, which is a specific segment of the ramp that has been classified as an HCL has a 2022 AADT of 4,511. All four ramps that make up the Exit 19 interchange have posted advisory speeds of 30 MPH.

Corridor Characteristics

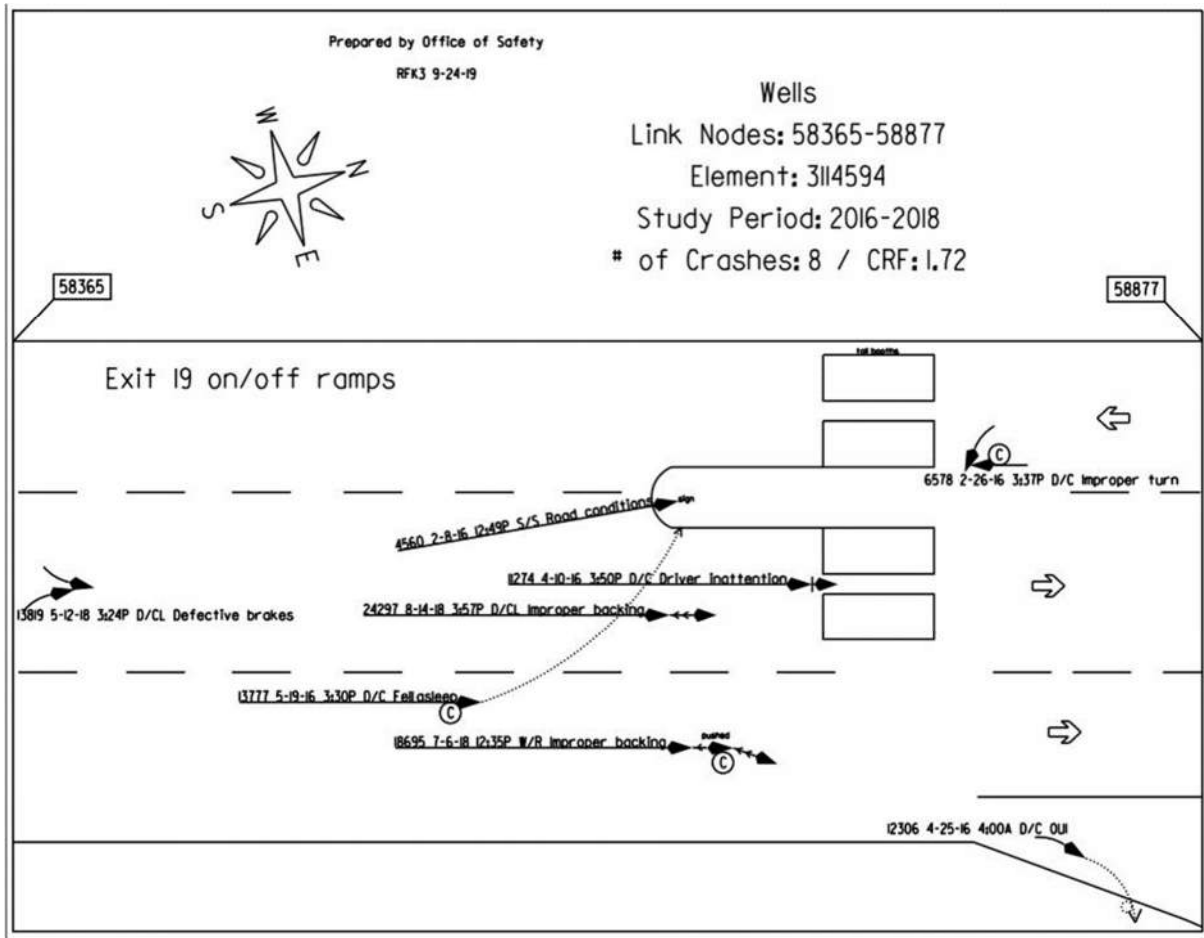
Exit 19 is a trumpet interchange with the northbound off ramp consisting of two long curves, each measuring approximately 250' in radius. Each ramp included in the interchange is made up of one lane with narrow shoulders on either side. Upon approaching the toll plaza, the off ramps join to create a two lane section before opening up to three lanes at the intersection located at the end of the ramps. The two on ramps are separated by a concrete median at the toll plaza, which continues until they break off towards their appropriate mainline directions and are separated by grass. The northbound and southbound directions are separated by guardrail which begins just north of the toll plaza. Guardrail is utilized throughout the interchange for both lane separation as well as protection against steep side slopes.

² 2022 AADT Summary Created by HNTB for MTA.

Toll Plaza near Exit 19 Ramp Intersection with Sanford Road:

Figure 2: 2016-2018 Exit 19 Toll Plaza Crash Diagram depicts the HCL diagram for the Exit 19 toll plaza. It should be noted that the most recent timespan for which this location was identified as an HCL was prior to the construction project which made changes to the toll plaza and adjacent intersection.

Figure 2: 2016-2018 Exit 19 Toll Plaza Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 37.5% injury rate during this analysis period.

- There are not many strong trends in causes of crash at this location
 - The most common type of crash at this location was improper backing, which contributed to 2 of the 8 recorded crashes at this location
 - Two of the recorded crashes at this location had contributing factors outside of the control of the vehicle operator (1 due to road conditions, 1 due to defective brakes)
- 5 of the 8 recorded crashes at this location happened during the hour of 3:00pm (3 of these 5 occurred during the weekend days of Friday – Sunday)
- All but 1 of the recorded crashes at this location occurred when the pavement was dry and the weather was clear

Photo 1: HCL 66 – Exit 19 Plaza Segment captured by Google Maps³ on August 2022, depicts the condition of this location at the time that it was most recently noted as an HCL. This picture shows the approach to the intersection after the plaza.

Photo 1: HCL 66 – Exit 19 Plaza Segment

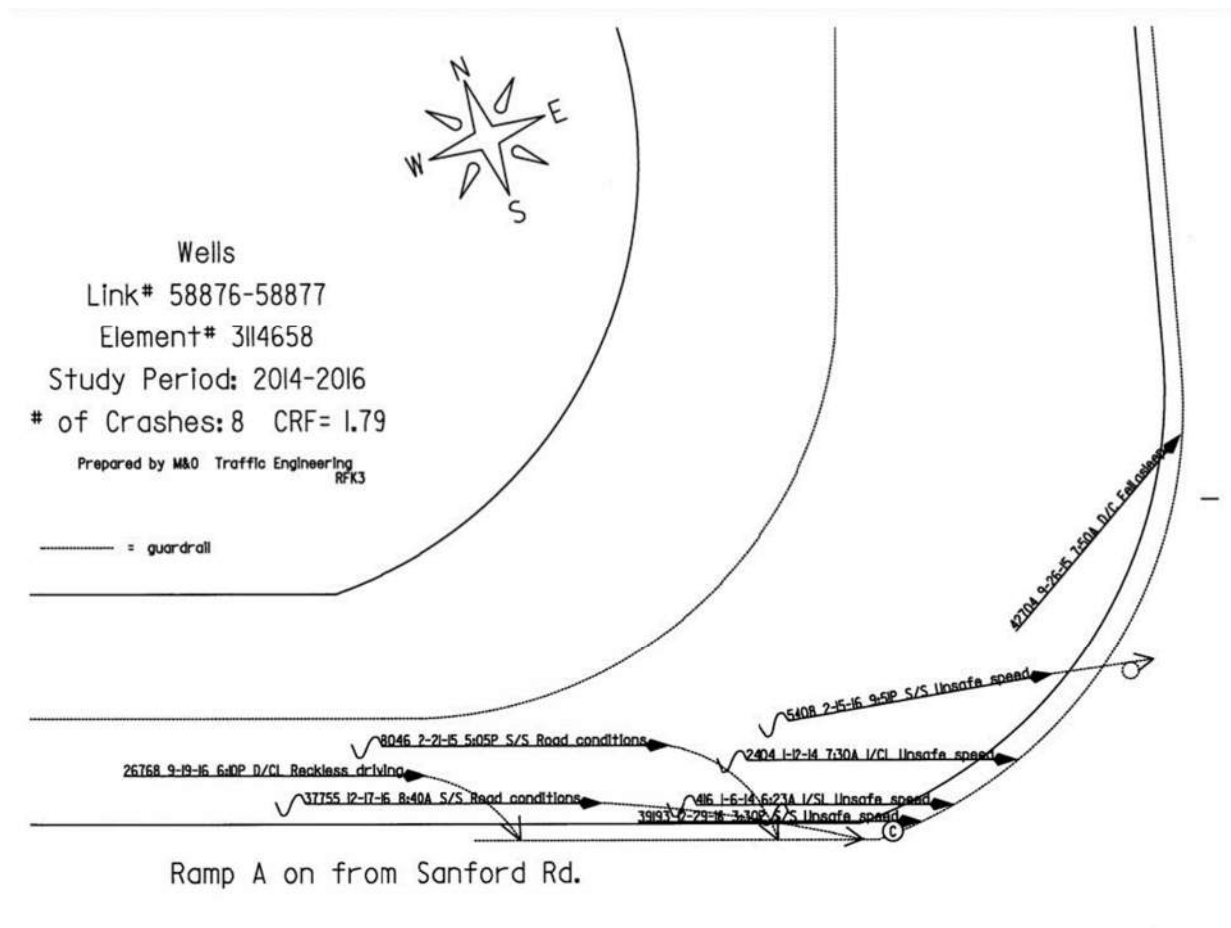


³ Google Maps accessed March 15, 2023

Northbound On Ramp just before Toll Plaza:

Figure 3: 2014-2016 Northbound on Ramp Crash Diagram depicts the HCL at the curve along the Northbound on ramp.

Figure 3: 2014-2016 Northbound on Ramp Crash Diagram



As shown in **Figure 3**, there were 8 crashes resulting in a 12.5% injury rate during this analysis period.

- All recorded crashes at this location involved colliding with the guardrail on the outside of the ramp's curve
- 4 of the crashes (50%) were a result of unsafe speed around the curve
- 2 of the crashes (25%) were due to road conditions
- 6 of the recorded crashes at this location occurred between the months of December – February, including both crashes that were a result of road conditions

Photo 2: HCL 78 – Northbound On-Ramp captured by Google Maps⁴ on August 2022 depicts the condition of this location at the time that it was most recently noted as an HCL. The picture shows the northbound on approach approaching the guardrail where most of the crashes occurred.

Photo 2: HCL 78 – Northbound On-Ramp



Findings and Observations

Existing Road Audit ⁵	
Road alignment and Cross Section	The roadway along the segment containing the toll plaza begins in a curve and is followed by a straight segment of road. The curve as well as the toll plaza itself pose as potential sight distance issues at this location. The location within the on ramp segment where all crashes occurred during the most recent HCL year was along a curve in the ramp with a radius of approximately 250'. This curve creates sight distance concerns along the ramp.
Lighting	Lighting exists around the ramp toll plaza. While there is lighting along the NB off ramp through the curve of the ramp, lighting is not present on the NB side of the ramp where the crashes occurred.
General Sign Issues	There is adequate signage upon the toll plaza approach as well as at the plaza which designate lane usage, speed limits, etc. An advisory speed sign exists immediately prior to the curve along the NB on ramp. No other curve warning signs exist prior to or within the curve.

⁴ Google Maps accessed March 15, 2023

Marking and Delineation	Pavement markings in this area are in good condition, making them effective in designating lane usage.
Barriers and Clear Zones	At the toll plaza, concrete medians are used to separate ramps and travel directions. Guardrail which separates the on ramp and off ramp exists along the entirety of the ramp. An additional run of guardrail exists along the outside of the curve to protect against steep side slopes.
Bridges and Culverts	The components of bridges 1480 and 1324 which carry I-95 over the NB on and off ramps were most recently rated to be in good and/or satisfactory condition ⁶ .
Pavement	The roadways included within these HCLs were given the following pavement condition ratings ⁷ : • Toll Plaza Ramp Segment: D • NB On Ramp: B • Sanford Road EB Approach: A • Sanford Road WB Approach: A
Heavy Vehicles	The percent of heavy vehicles throughout this interchange range from 2% to 8%.

Conclusions

The majority of the crashes at the Exit 19 toll plaza during the time in which it was most recently classified as an HCL were due to improper movement or driver recklessness. Separating the ramps is recommended to alleviate some of the confusion on the approach.

The curve of the northbound on ramp proved to be a significant area of safety concern based on **Figure 3**, specifically relating to driver speeds at the location and pavement conditions. The crash diagram also showed that this was most prevalent during winter months.

Recommendations

- Short-Term Solutions:
 - Separate the ramp movements to avoid confusion at the approach. Evaluate and implement improvements to the northbound on ramp geometry.

⁶ According to MaineDOT Map Viewer – Bridge Layer

⁷ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location: Exit 19 NB Merge

Nodes 58319 to 58320: Exit 19 NB On

Introduction

There is 1 HCL for the segment of the Exit 19 northbound on-ramp during the most recent 10-year period as shown in **Figure 1: HCL Location Map**:

- Just After Exit 19 Northbound On Ramp

This location is north of the Exit 19 interchange, located in the Town of Wells, in York County. The section is located north of the Exit 19 Northbound On Ramp. It is a straight section consisting of three lanes and shoulders. The HCL Diagram data package is not available for this location, however, data was obtained from the MaineDOT Crash Query Tool and included in this analysis.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

In 2015, the Route 109 intersection with the Exit 19 ramps underwent construction to implement changes to the toll plaza and intersection improvements.

General Mobility Observations

This location experiences significant seasonal fluctuations in traffic volume. During the summer months there is an increase in recreational traffic which includes an increase in drivers who are less familiar with the area.

Demographics

This location has a posted speed limit of 65 MPH and an AADT of 26,558¹

Corridor Characteristics

This segment consists of three mainline lanes with shoulders on both sides of the travel way. There are rumble strips along both the inside and outside shoulders. Median barrier separates the northbound and southbound travel directions and guardrail can also be found along the outside of the roadway at the northern and southern ends of the segment.

Crash analysis

As shown in **Figure 1**, the mainline adjacent to the Exit 19 NB on ramp merge was identified as an HCL during the past 10 years.

Just After Exit 19 Northbound On Ramp:

While there is not a crash diagram currently available for the 2009-2011 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
6/25/2009	7:15 PM	Injury	Rollover
7/18/2009	10:45 AM	Property Damage Only	Went Off Road
8/6/2009	3:35 PM	Property Damage Only	Went Off Road
9/2/2009	12:50 AM	Property Damage Only	Moose
12/27/2010	11:40 AM	Property Damage Only	Went Off Road
2/5/2011	9:57 PM	Property Damage Only	Went Off Road
2/25/2011	1:31 PM	Property Damage Only	Went Off Road
9/19/2011	12:24 PM	Property Damage Only	Rear End/Sideswipe
10/29/2011	10:30 PM	Property Damage Only	Went Off Road

It can be observed from this table that there were 9 crashes at this location with a 11.1% injury rate during this time period.

- 6 of these 9 crashes involved vehicles departing from the roadway
- There was 1 large animal collision
- There is not a strong correlation between time of day nor time of year and crash frequency at this location

¹ 2022 AADT Created by HNTB for MTA

Photo 1: HCL 8 – Northbound Mainline and NB On Merge captured by Google Streetview on July 2022 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Exit 19 Northbound Mainline and NB On Merge



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This section of roadway is straight and flat enough to not create sight distance concerns.
Lighting	Lighting exists along the southern end of this segment near the Exit 19 interchange.
General Sign Issues	The only signage along this segment is to notify drivers of the roadway and the direction in which they are travelling.
Marking and Delineation	Adequate pavement markings exist along this segment to separate travel lanes as well as shoulders.
Barriers and Clear Zones	Median barrier exists along the entirety of this segment to separate the northbound and southbound travel directions. Guardrail also exists along the outside of the roadway at the northern and southern ends of the segment.
Bridges and Culverts	Bridge 1325 carries Burnt Mill Road over I-95 at the northerly end of this segment and has components which have most recently been given condition ratings ² of good.
Pavement	The pavement along this roadway segment has most recently been given a pavement condition rating ³ of B.
Heavy Vehicles	The percentage of heavy vehicles through this segment tends to average from 8% to 17%.

Conclusions

This location has not been identified as a high crash location since 2011. For this reason, no recommendations are included at this time.

² According to MaineDOT Public Map Viewer – Bridges Layer

³ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified

Intersection High Crash Location: Exit 25 Interchange

Node 58373: Exit 25 SB Ramps Intersection

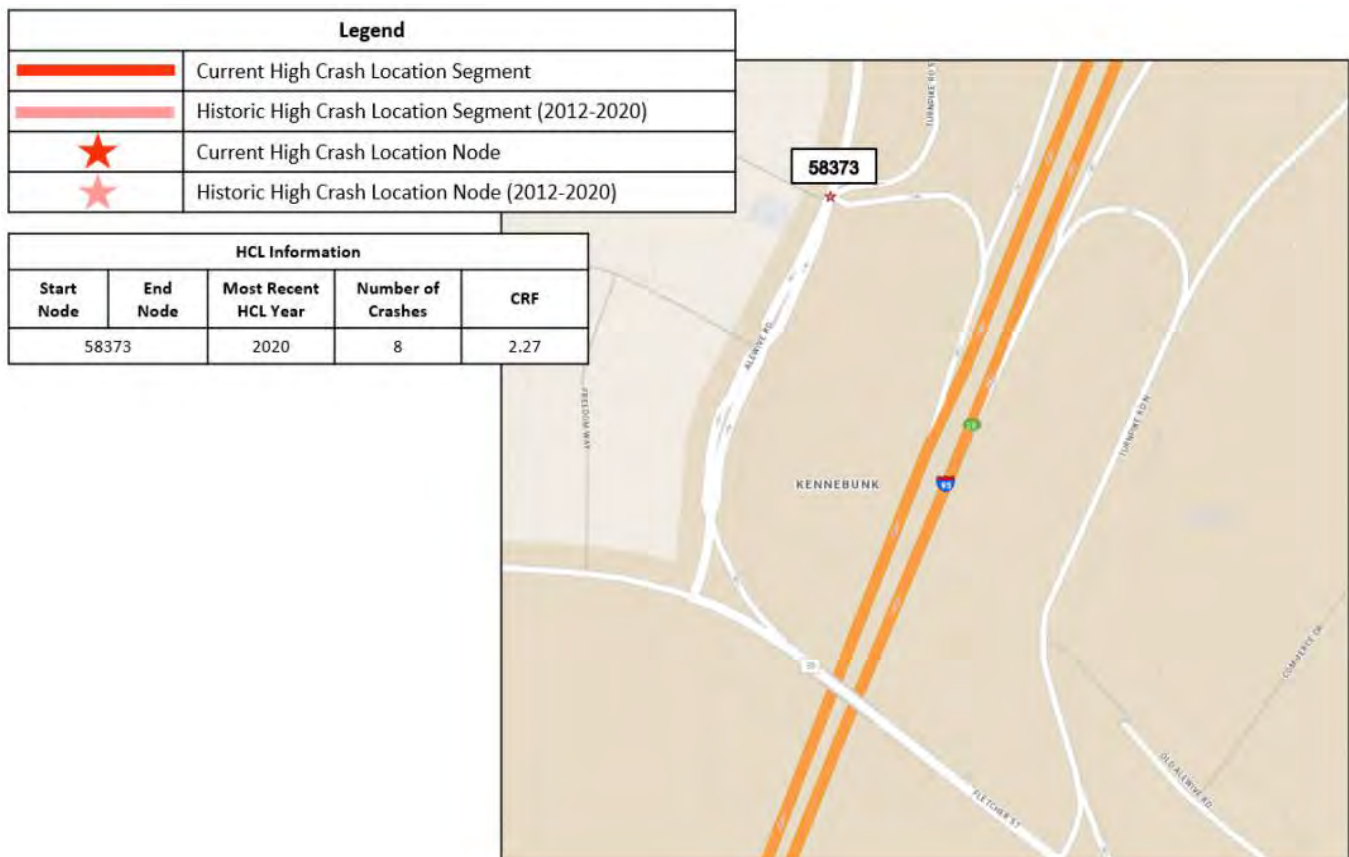
Introduction

There is 1 HCL at the Exit 25 SB interchange during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Southbound Ramps Intersection with Alewives Road

This interchange is located in the Town on Kennebunk in York County. It consists of on and off ramps in both directions. Directly adjacent to the ramps in both direction is the Kennebunk Service Plaza which is a popular service utilized by travelers of the Turnpike as well as heavy vehicles, as diesel stations and dedicated semi-truck parking are features of both rest areas. There are toll plazas located within the interchange which collects from vehicles entering I-95 northbound and southbound. At the end of the southbound side of the interchange, the southbound ramps meet Alewife Road (Route 35) and Alewife Park Road to create a four-legged intersection.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Since 2018 the Exit 25 interchange has undergone improvements including rest area reconfiguration and upgrades. This project also included signalization of the intersection included as the HCL of interest in this RSA.

General Mobility Observations

This location experiences significant seasonal fluctuations in traffic volume. During the summer months there is an increase in recreational traffic which includes an increase in drivers who are less familiar with the area, as well as operators of heavy vehicles such as RVs and trailers who may be inexperienced in driving these types of vehicles. Even without this seasonal variation, the Exit 25 area and interchange regularly experiences a significant percentage of heavy vehicles which can be attributed in part to the Kennebunk Service Plaza which is a part of this interchange.

Demographics

Alewive Drive has a posted speed limit of 35 MPH, while the same advisory speed is posted for the southbound off ramp. There is a posted 10 MPH speed limit at the entrance of the southbound on ramp toll plaza which is the same speed limit that Alewive Park Road is signed for. The AADT, measured in number of vehicles, at the southbound ramps intersection can be found below:

Location	AADT
Alewive Road SB	5,519 ¹
Exit 25 SB Off Ramp	3,850 ²
Exit 25 SB On Ramp	2,822 ²
Alewive Road NB	9,098 ¹

Corridor Characteristics

This intersection is made up of:

- I-95 SB On and Off Ramps (Eastern Approach)
- Alewive Road (Northern and Southern Approaches)
- Alewive Park Road (Western Approach)

The southbound off ramp approach of this intersection consists of two lanes; a left-thru and a right. Prior to reaching the intersection, the ramp is two-directional to allow for vehicles to enter and exit the Kennebunk Service Plaza. At the toll plaza, the southbound on ramp is two lanes before merging into one to enter the Turnpike. Alewive Road northbound has left-thru and right lanes at the intersection approach while the southbound direction has a left and a thru-right lane. Each of these directions has one single receiving lane. Both the ramps and Alewive Road consist of striping to include shoulders, and the off ramp has a curve immediately prior to the intersection. Alewive Park Drive is an unstriped dead end road which provides access to commercial drives and a park and ride. There is a pedestrian crossing present at this leg of the intersection.

While the lane configuration at this intersection has not changed, the intersection was stop-controlled with Alewive Road having the right of way at the time that this intersection was last classified as an HCL. Since then, it has become a signalized intersection.

¹ MaineDOT Map Viewer

² 2022 AADT Summary Created by HNTB for MTA

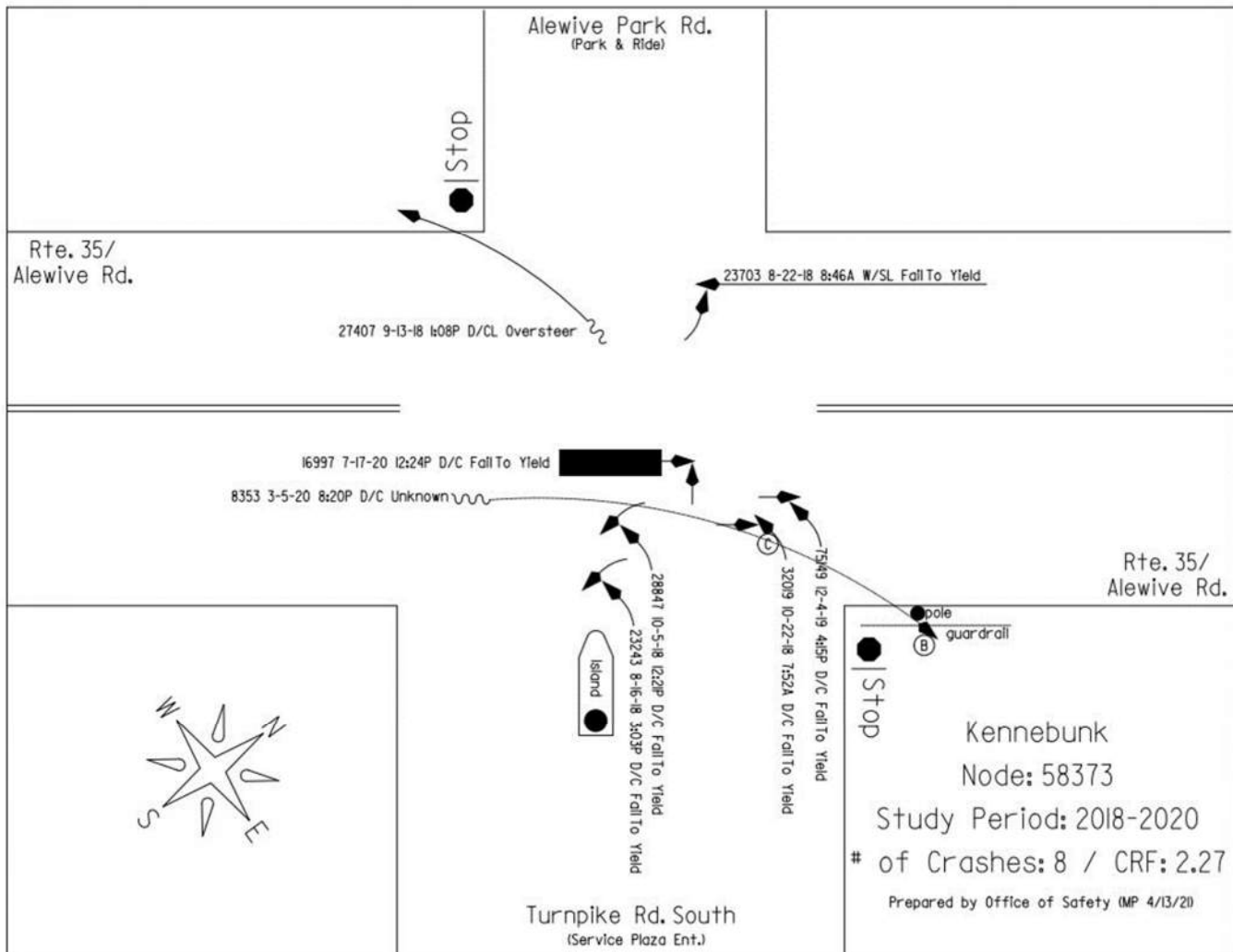
Crash analysis

As shown in **Figure 1**, the Exit 25 Southbound intersection with Alewives Road was identified as an HCL during the past 10 years. It should be noted that during the time for which this diagram was produced, the intersection had not yet been signalized.

Southbound Ramps Intersection with Alewives Road

Figure 2: 2018-2020 Exit 25 SB Ramps intersection Crash Diagram depicts the HCL at the Exit 25 southbound ramps intersection with Alewives Road.

Figure 2: 2018-2020 Exit 25 SB Ramps intersection Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 25% injury rate during this analysis period.

- 6 of these 8 crashes (75%) were intersection movement crashes resulting from failure to yield
 - 4 of these intersection movement crashed involved vehicles attempting to take a left off of the ramp to Alewife Road southbound
- All but 1 of these crashes occurred when the weather conditions were clear and the pavement was dry
- 1 of these crashes involved a heavy vehicle
- There is not a strong correlation between time of day nor time of year and crash frequency

Photo 1 captured by Google Maps³ in August of 2018 depicts the intersection as it existed at the time that it was most recently noted as an HCL, while **Photo 2**, captured by HNTB on November 23, 2022, depicts the intersection as it currently exists in its signalized condition.

Photo 1: Exit 25 SB Ramps Intersection – Unsignalized from Alewife Road SB



Photo 2: Exit 25 SB Ramps Intersection – Signalized from Alewife Road SB



³ Google Maps accessed March 15, 2023

Findings and Observations

Existing Road Audit ⁴	
Road alignment and Cross Section	The ramp approach to this intersection immediately follows a curve with a radius of approximately 125 feet ⁵ . Since this approach was stop controlled during the most recent HCL period, this should not have attributed to sight distance issues as the roadway straightens out upon reaching the intersection. The Alewife Road and Alewife Park Road approaches are straight enough to not create sight distance issues.
Lighting	Lighting exists at the intersection as well as at the toll plaza directly adjacent.
General Sign Issues	At the time in which this location was classified as an HCL, the intersection consisted of stop, do not enter, and directional guidance signs. Additional signs including lane use signs were implemented as a part of the intersection improvement construction.
Marking and Delineation	Adequate lane use markings and pedestrian cross walks exist under both the old and new intersection configurations.
Barriers and Clear Zones	No concrete barrier or guardrail exist as a part of this intersection, however, a concrete and asphalt median exists along the ramps leg to separate the off and on ramp lanes.
Bridges and Culverts	No bridges or culverts exist as a part of this intersection.
Pavement	The roadways included within this intersection were given the following pavement condition ratings ⁶ : • Ramps Approach: N/A (Condition Score of A) • Alewife Drive SB: A • Alewife Drive NB: B
Heavy Vehicles	The heavy vehicle percentages along the ramp leg of the intersection range from 0% to 5%

Conclusions

The main safety concern at this intersection according to **Figure 2** was failure to yield at turning movements. Since the intersection has since been signalized thus improving the ease and safety of turning at the location (and has not been noted as an HCL since), the solutions will be based around monitoring the location to ensure that it remains effective in providing adequate safety to roadway users.

Recommendations

- Short-Term Solutions:
 - Monitor the intersection to ensure that the implementation of a signal remains effective in maintaining safety at the location.

⁵ Measured in Google Earth

⁶ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Interchange High Crash Location: Just South of Exit 32

Nodes 70959 to 58332: Exit 32 NB Off Ramp Approach

Nodes 58380 to 58381: Segment after Exit 32 SB On Ramp

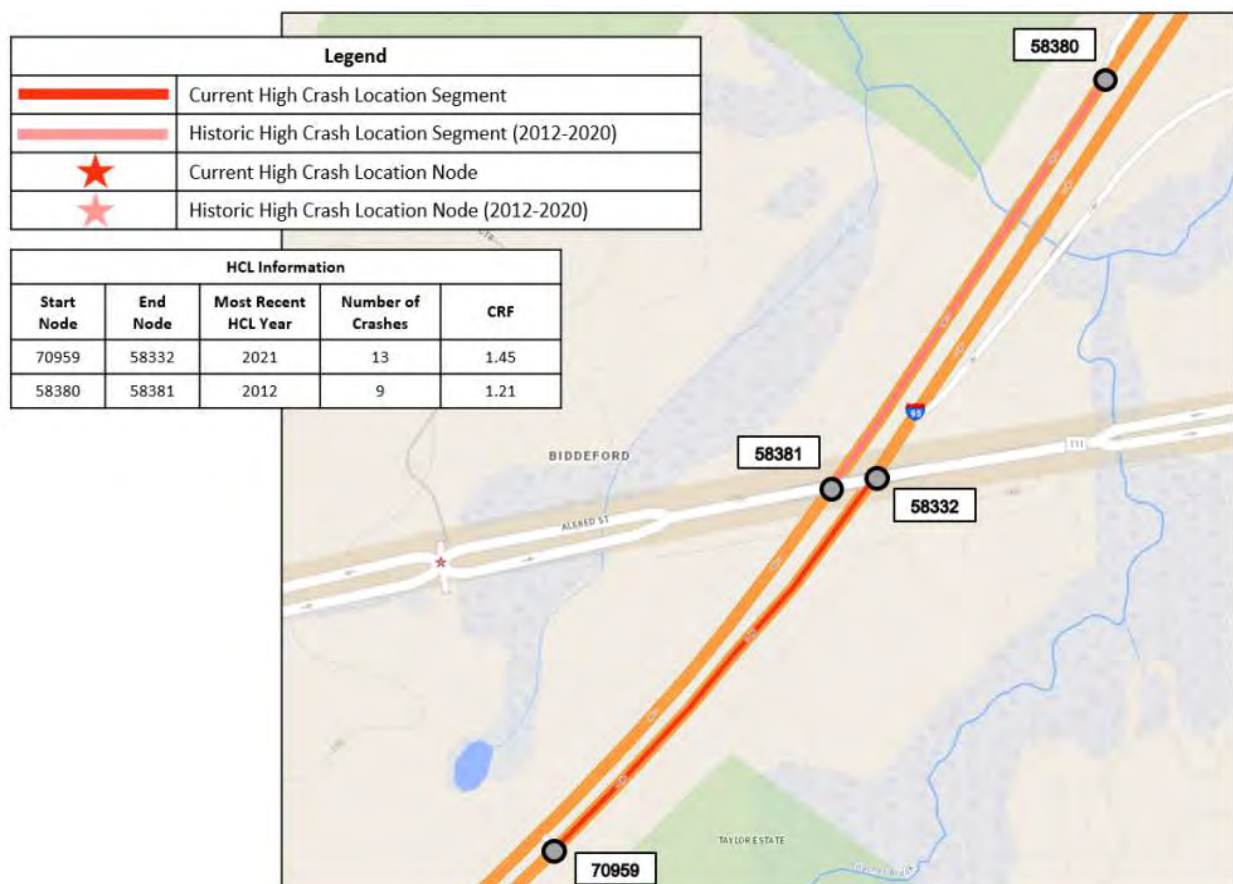
Introduction

There are 2 HCLs for the segment of mainline just south of the Exit 32 interchange during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Just South of the Exit 32 NB Off Ramp
- Just South of the Exit 32 SB On Ramp

These segments of mainline are located in the City of Biddeford in York County. The northbound and southbound directions consist of three mainline lanes in each direction. These mainline segments are both in close proximity to the interchange which provides access to Route 111 which allows access to many businesses and shopping plazas, the Biddeford Connector and the Biddeford Park and Ride. Both segments are adjacent to the Alfred Road (Route 111) overpass.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

A project to make alterations to the exiting Exit 32 interchange is currently in design. This includes changes to the ramps and a new connector road, as well as intersection and signal upgrades. This project, once implemented, is anticipated to have a significant impact on traffic volumes and travel patterns in the area.

General Mobility Observations

This area of the Turnpike experiences significant seasonal volume fluctuations. At the location of interest, this consists of an increase in traffic volumes during the months of June to September as a result of tourism in the area during summer. The park and ride at Exit 32 also contributes to added volume in these locations.

Demographics

The mainline of the Turnpike at this location has a posted 65 MPH speed limit. AADTs along the mainline segments as well as their adjacent ramps measured in number of vehicles can be found in the table below:

Location	AADT
Mainline Mile Marker 25 – 32 SB	28,252
Mainline Mile Marker 25 – 32 NB	27,981
Exit 32 NB Off Ramp	3,125
Exit 32 SB On Ramp	2,822

Corridor Characteristics

Each mainline segment at this location consists of three mainline lanes with shoulders on each side. Both the inside and outside shoulders have rumble strips along the entirety of the segments. The northbound and southbound directions are separated by guardrail. Guardrail also exists along the outside of the northbound segment near the Alfred Road (Route 111) overpass, which continues through the Exit 32 NB Off Ramp.

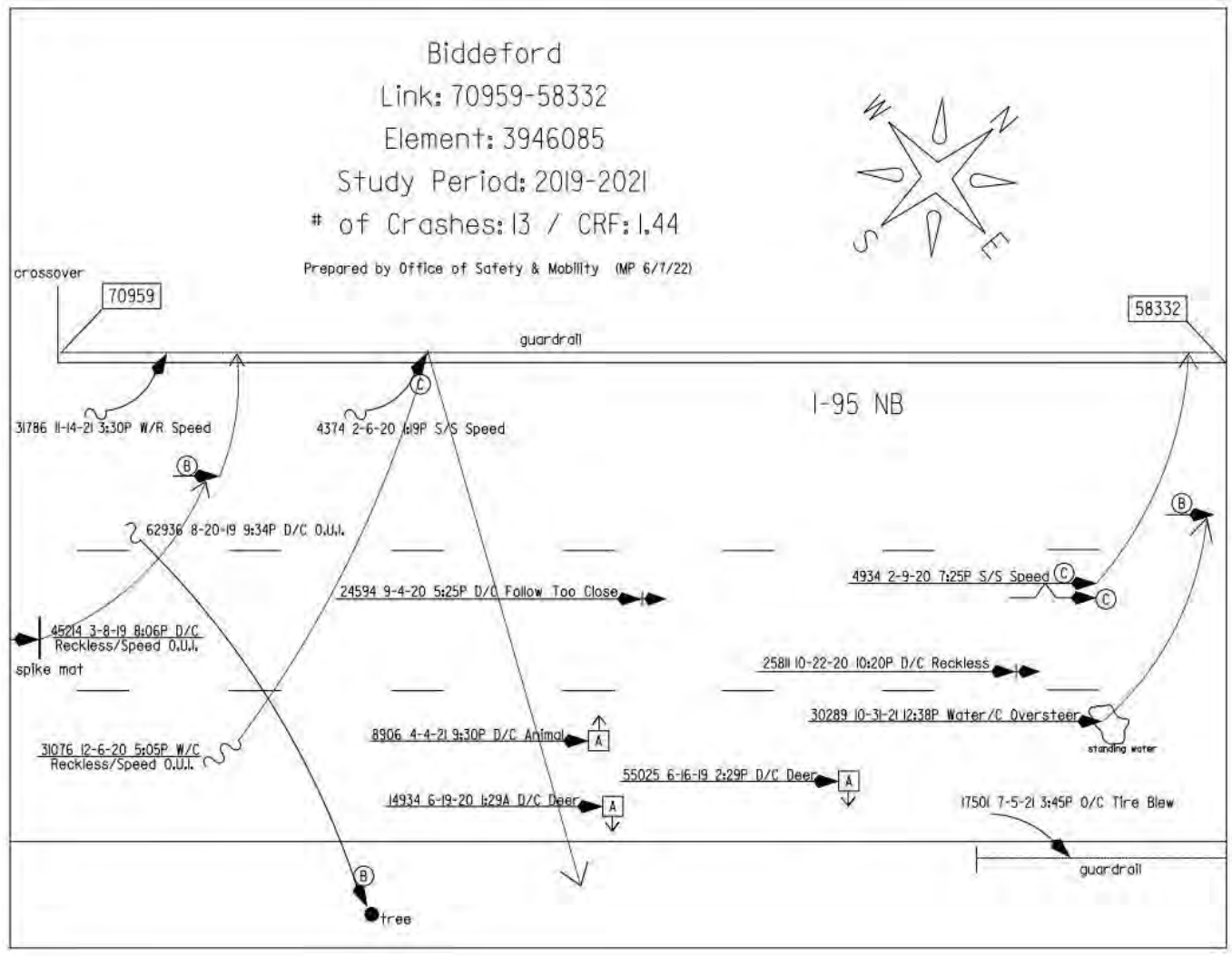
Crash analysis

As shown in **Figure 1**, the mainline segment just south of the Exit 32 NB Off Ramp is currently identified as an HCL.

Just South of the Exit 32 NB Off Ramp

Figure 1: (2019-2021) Exit 32 NB Off Ramp Approach Crash Diagram depicts the crash diagram for the location during the time period in which it was most recently identified as an HCL. This location was also classified as an HCL during the 2018-2020 time period.

Figure 1: (2019-2021) Exit 32 NB Off Ramp Approach Crash Diagram



As shown in **Figure 2**, there were 13 crashes resulting in a 38.5% injury rate during this analysis period.

- 5 of these 13 crashes (38%) had speed as a contributing factor
 - 2 of these 5 speed-related crashes also involved an O.U.I.
 - There was 1 additional O.U.I. crash in this location which did not have speed listed as a contributing factor
- The next most common contributor to crashes at this location was large animal collisions
- 5 of these crashes resulted in vehicles leaving the travel way and colliding with either guardrail or other objects
- One of these crashes involved standing water in the travel way
- 7 of these crashes occurred during the evening hours of 3:00pm – 10:30pm

- There does not appear to be a strong correlation between time of year and crash frequency

Photo 1: HCL 9 – Exit 32 NB Off Ramp Approach captured by Google Maps¹ on June 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Exit 32 NB Off Ramp Approach (2019)

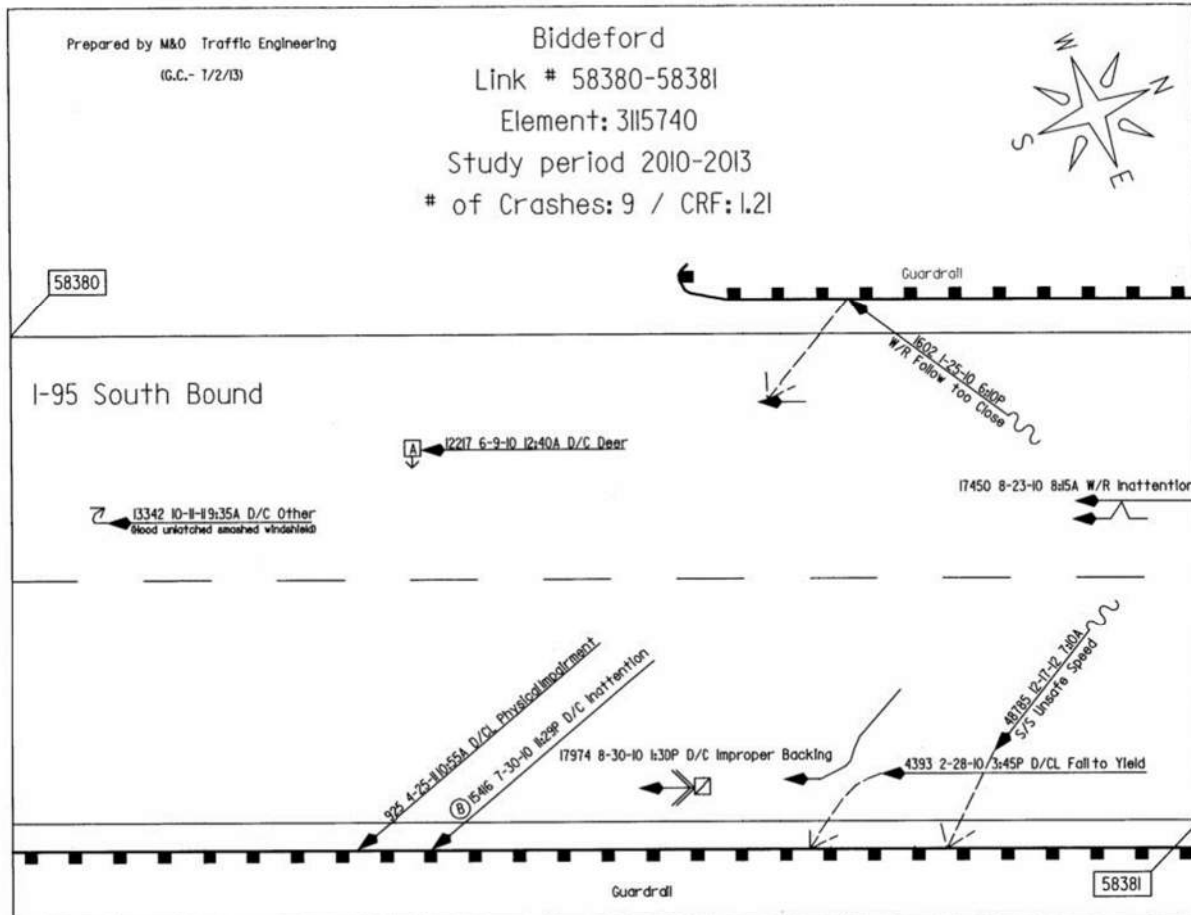


¹ Google Maps accessed March 15, 2023

Just South of the Exit 32 SB On Ramp

Figure 3: 2010-2013 Segment after Exit 32 SB On Ramp Crash Diagram depicts the HCL along the mainline just south of the Exit 32 southbound off ramp. This is the only time period over the last 10 years in which this location was identified as an HCL.

Figure 3: 2010-2013 Segment after Exit 32 SB On Ramp Crash Diagram



As shown in **Figure 3**, there were 9 crashes resulting in a 11.1% injury rate during this analysis period.

- The only cause that contributed to more than one crash at this location was inattention (contributed to 2 crashes)
- Other than inattention, all crashes recorded at this location had different causes including unsafe speed, following too close, improper backing, deer and physical impairment
- There does not appear to be significant correlation between time of day, time of year nor cause of crash and crash frequency at this location

Photo 2: Segment after Exit 32 SB On Ramp captured by Google Maps² on July 2011 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: Segment after Exit 32 SB On Ramp (2011)



Findings and Observations

Existing Road Audit ³	
Road alignment and Cross Section	The northbound mainline segment is along a slight curve. This curve has a large enough radius that it does not create any sight distance concerns. The southbound segment at this location is straight and does not contain any vertical curves or obstructions which would cause sight distance concerns.
Lighting	Lighting does not exist along the northbound segment, however, lighting does exist just north of the segment immediately following the Alfred Road overpass. There is lighting along the southbound segment along the outside of the roadway as can be seen in Photo 2.
General Sign Issues	Exit ramp signage exists along the northbound segment as can be seen in Photo 1 .
Marking and Delineation	Adequate pavement markings exist along the mainline segments to separate mainline lanes.
Barriers and Clear Zones	Guardrail is present along the median of the roadway with the purpose of separating the northbound and southbound travel directions. Guardrail

² Google Maps accessed March 15, 2023

	also exists along the outside of portions of both segments, protecting against bridge abutments and steep side slopes.
Bridges and Culverts	The components of bridge 1336 which carries Alfred Road over I-95 (and acts as endpoints for both of these segments) were most recently given ratings ⁴ of good and satisfactory.
Pavement	The Roadway segments included within this HCL location were given the following pavement condition ratings ⁵ : • Northbound Segment: B • Southbound Segment: A
Heavy Vehicles	The northbound segment has a percentage of heavy vehicles ranging from 5% - 13% on average, depending on time of day. The southbound segment consists of 10% heavy vehicles on average.

Conclusions

While there were more observable trends within the northbound segment than the southbound segment, neither HCL included in this audit had extremely strong correlations between cause of crash or time of year and crash frequency. Both segments had a large variety of causes amongst the recorded crashes.

Both segments had at least one (if not multiple) animal collision(s) included in their diagram. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

Since each segment included in this audit has only been noted as an HCL once in the past 10 years and do not appear to have strong correlations or trends related to crash frequency, no recommendations are made at this time.

⁴ According to MaineDOT Map Viewer – Bridge Layer

⁵ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Intersection/Interchange High Crash Location: Exit 32 Interchange & Adjacent Intersection

Node 58334: Exit 32 Intersection

Nodes 28334 to 58875: Exit 32 Plaza Ramps

Nodes 54182 to 58334: Alfred St Approach EB

Nodes 58886 to 58334: Alfred St Approach WB

Nodes 58874 to 58875: Exit 32 SB On Off Ramps

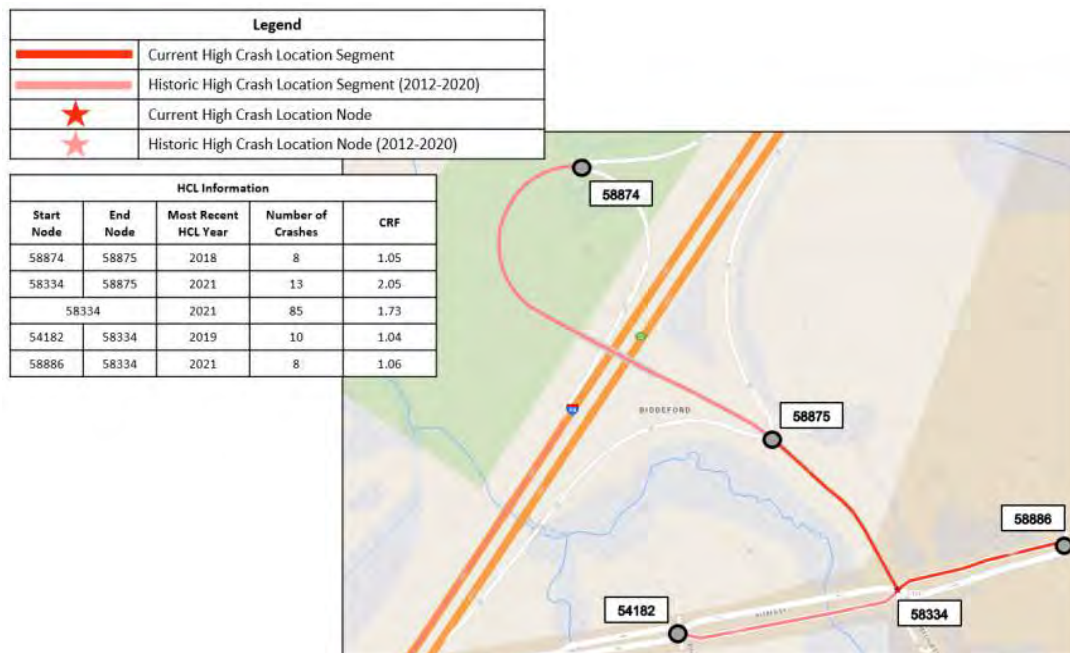
Introduction

There are 5 HCLs within the Exit 32 interchange and adjacent intersection during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 32 Ramps Intersection with Alfred Street
- Toll Plaza on Exit 32 Ramps
- Alfred Street EB Approach to Exit 32 Ramps Intersection
- Alfred Street WB Approach to Exit 32 Ramps Intersection
- Exit 32 SB Off Ramp

This interchange and the adjacent intersection are located in the City of Biddeford in York County. The interchange provides access from I-95 northbound and southbound to Route 111 which allows access to many businesses and shopping plazas, as well as the Biddeford Connector and the Biddeford Park and Ride. The interchange contains a toll plaza which collects from vehicles entering the Turnpike.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

A project to make alterations to the exiting Exit 32 interchange is currently in design. This includes changes to the ramps and a new connector road, as well as intersection and signal upgrades. This project, once implemented, will have a direct impact on the interchange and intersection being addressed as a part of this road safety audit.

General Mobility Observations

According to 2022 AADTs at all interchanges along the Turnpike, the Exit 32 interchange is one of the top five most used intersections along the entirety of the corridor. Some of the contributing factors to this include close proximity to a park and ride, as well as the access that the exit provides to major roadways and roadway networks in the surrounding area. While volumes at this interchange are significant throughout the year, the area experiences seasonal fluctuation with increased volumes from May through October. This can be attributed to increased tourism traffic during the summer months.

Demographics

Location	AADT
Exit 32 Off Ramps	12,925 ¹
Exit 32 On Ramps	13,054 ¹
Exit 32 SB Off Ramp	9,800 ¹
Alfred Road EB Approach	13,718 ²
Alfred Road WB Approach	13,373 ²
Biddeford Connector	7,588 ²

Corridor Characteristics

The Exit 32 SB Off Ramp is a single lane ramp with shoulders on both sides. Starting at the beginning of the curve, guardrail is present on both sides of the ramp; protecting against side slopes on the right and separating the on ramp and off ramp on the left. Towards the end of the ramp the guardrail protecting against side slopes ends and two lanes form before the northbound on ramp adds to this to create three lanes through the location of the toll plaza.

The intersection at the end of the Exit 32 Ramps is a four-legged signalized intersection which services the Exit 32 ramps, Alfred Road and the Biddeford Connector. The table below outlines how many lanes (both approach and receiving) each leg of the intersection provides:

Intersection Leg	Approach Lanes (#)	Receiving Lanes (#)
Exit 32 Ramps	5	2*
Alfred Road Eastbound	4	2
Alfred Road Westbound	4	2
Biddeford Connector	4	2

* These two lanes immediately split into four for toll plaza access

All legs of this intersection have a concrete median separating the approach and receiving lanes. Additionally, there are dashed guidance lines throughout the intersection to assist in vehicles maintaining their appropriate lane while maneuvering their movements.

¹ 2022 AADT Summary Created by HNTB for MTA

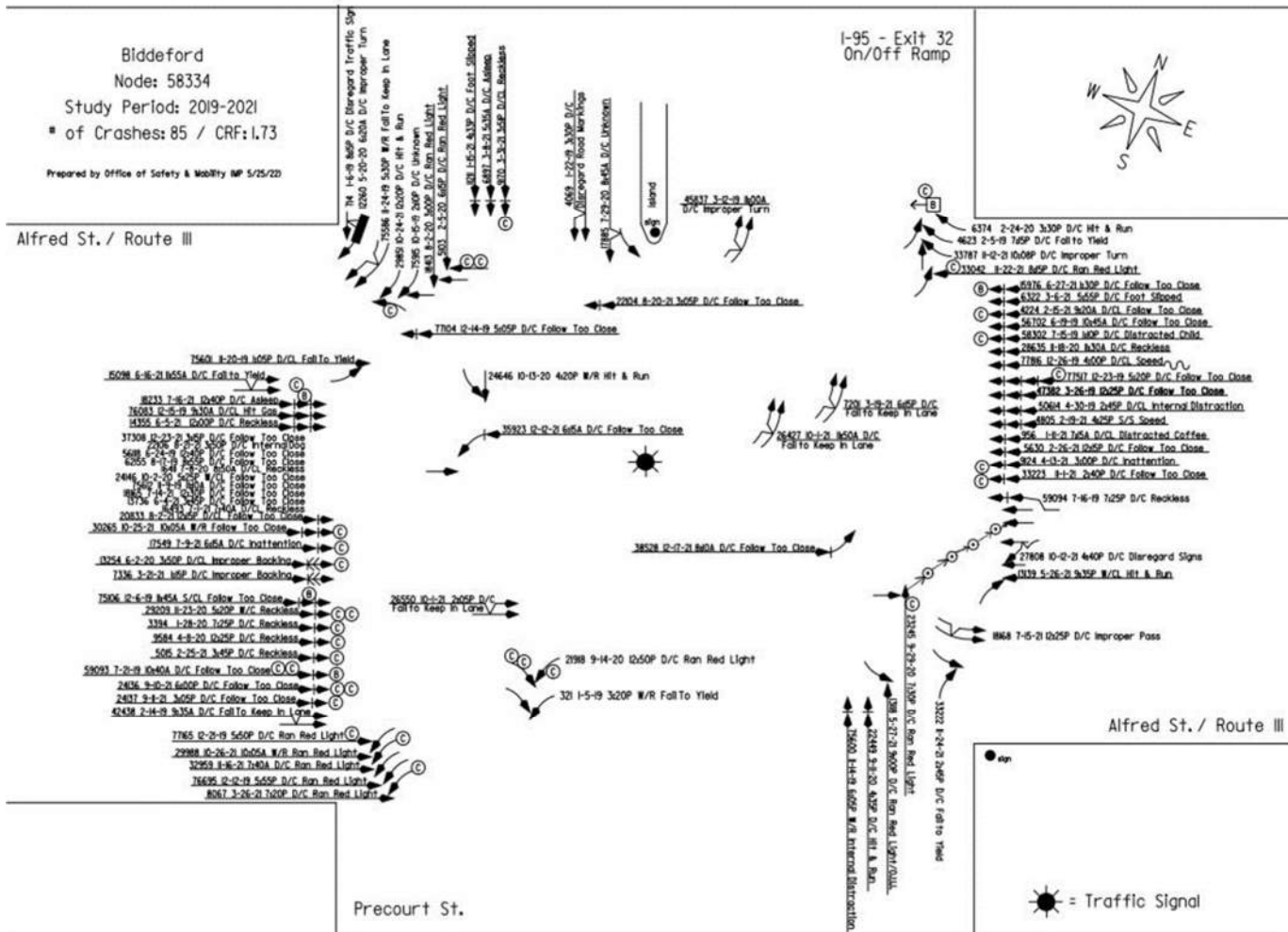
² MaineDOT Map Viewer

Crash analysis

Exit 32 Ramps Intersection with Alfred Street

Figure 2: 2019-2021 Exit 32 Intersection Crash Diagram depicts the HCL location at the node of the Exit 32 Ramps intersection with Alfred Street. This location was identified as an HCL during 8 other time periods over the past 10 years.

Figure 2: 2019-2021 Exit 32 Intersection Crash Diagram



As shown in **Figure 2**, there were 85 crashes resulting in a 32.9% injury rate during this analysis period.

- While there were many intersection movement crashes at this location, the majority occurred at the intersection approaches
 - Of the crashes that occurred at the intersection approaches, the vast majority were a result of vehicles following too close, followed by recklessness
- Many of the intersection movement crashes were a result of running red lights
- The vast majority of the crashes at this intersection occurred at or along the Alfred Street approaches
- June to August and December to February were the most common time spans for which crashes occurred
- One of these crashes involved a heavy vehicle

Photo 1: Exit 32 Intersection captured by Google Maps³ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL. The photo represents the intersection from the view of the Exit 32 Ramps approach.

Photo 1: Exit 32 Intersection

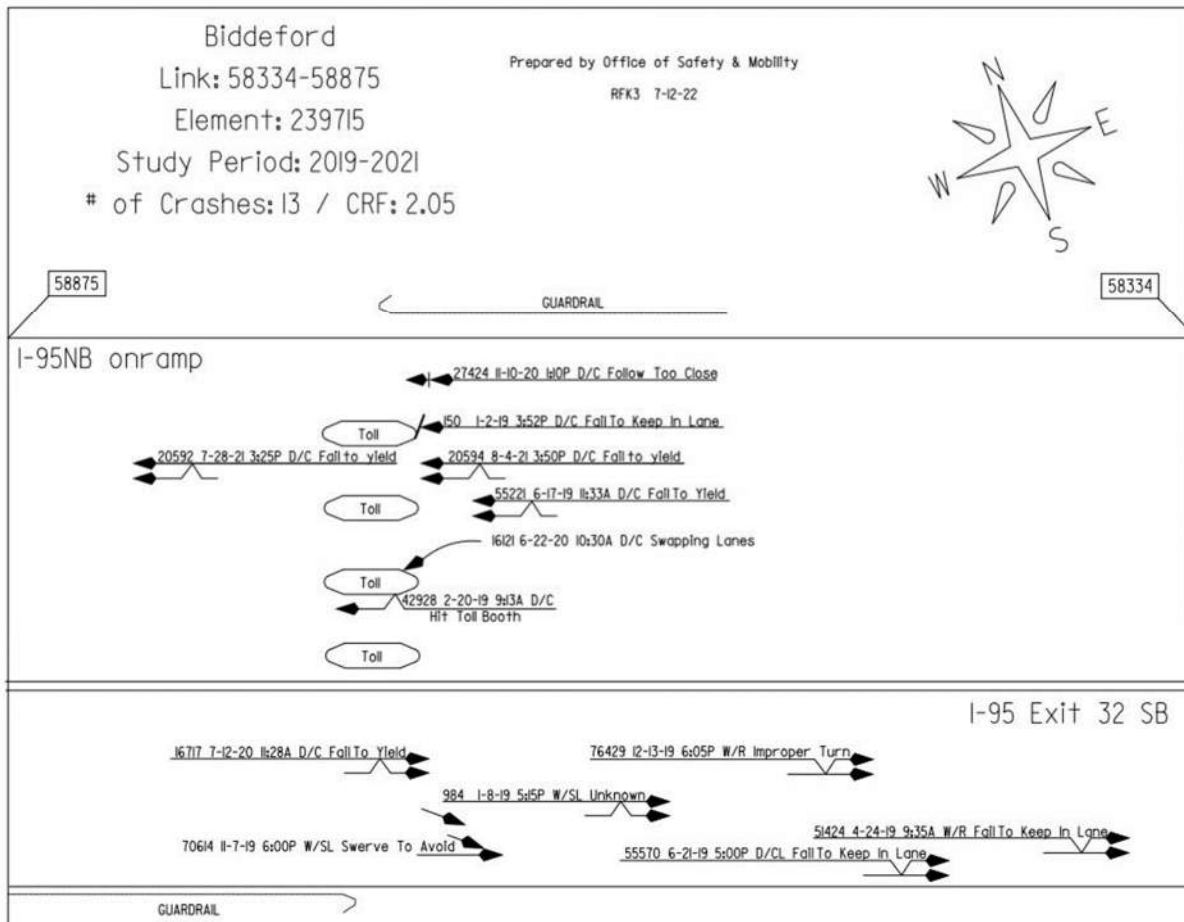


³ Google Maps accessed on March 15, 2023

Toll Plaza on Exit 32 Ramps

Figure 3: 2019-2021 Exit 32 Plaza Ramps Crash Diagram depicts the HCL at the Exit 32 Toll Plaza. This location was identified as an HCL during 9 other time periods over the past 10 years.

Figure 3: 2019-2021 Exit 32 Plaza Ramps Crash Diagram



As shown in **Figure 3**, there were 13 crashes resulting in a 0% injury rate during this analysis period.

- The most common cause of crash at this location was failure to yield, followed by failure to keep in lane
- 8 of these 13 crashes were sideswipe crashes
- While there is not a strong correlation between time of year and crash frequency, the majority of the crashes occurred during typical AM and PM Peak commuting hours

Photo 2: Exit 32 Plaza Ramps, captured by Google Maps⁴ in of June 2019, depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: Exit 32 Plaza Ramps



Alfred Street EB Approach to Exit 32 Ramps Intersection

While there is not a crash diagram currently available for the 2017-2019 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
3/16/2017	7:55 AM	Property Damage Only	Rear End/Sideswipe
3/17/2017	1:55 PM	Property Damage Only	Rear End/Sideswipe
12/9/2017	8:35 PM	Property Damage Only	Rear End/Sideswipe
3/21/2018	7:20 AM	Property Damage Only	Rear End/Sideswipe
11/26/2018	7:40 AM	Property Damage Only	Rear End/Sideswipe
12/30/2018	11:35 AM	Property Damage Only	Rear End/Sideswipe
5/25/2019	10:55 AM	Injury (non-fatal)	Rear End/Sideswipe
11/19/2019	12:10 PM	Property Damage Only	Rear End/Sideswipe

It can be observed from this table that there were 8 crashes at this location with a 12.5% injury rate during this time period.

- All recorded crashes at this location were rearend/sideswipe type crashes
- 3 of the 8 crashes occurred between 7:20am and 8:00am
- 3 of these crashes occurred in the month of march, while 4 others occurred between the months of November and December

⁴ Google Maps accessed March 15, 2023

Photo 3: Alfred St Approach EB captured by Google Streetview on June 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 3: Alfred St Approach EB



Alfred Street WB Approach to Exit 32 Ramps Intersection

While there is not a crash diagram currently available for the 2019-2021 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
2/21/2019	12:45 PM	Property Damage Only	Went Off Road
3/1/2019	5:45 PM	Property Damage Only	Rear End/Sideswipe
3/29/2021	8:50 AM	Property Damage Only	Thrown or Falling Object
6/8/2021	1:55 PM	Property Damage Only	Rear End/Sideswipe
7/13/2021	4:40 PM	Property Damage Only	Rear End/Sideswipe

It can be observed from this table that there were 5 crashes at this location with a 0% injury rate during this time period.

- Rear end/sideswipe crashes were the most common type of crash at this location, making up 3 of the 5 recorded crashes
- 3 of the 5 recorded crashes at this location occurred between the months of February and March
- There is not a strong correlation between time of day and crash frequency at this location

Photo 4: Alfred Street WB Approach captured by HNTB on November 8th, 2022, depicts the condition of this location at the time that it was most recently noted as an HCL.

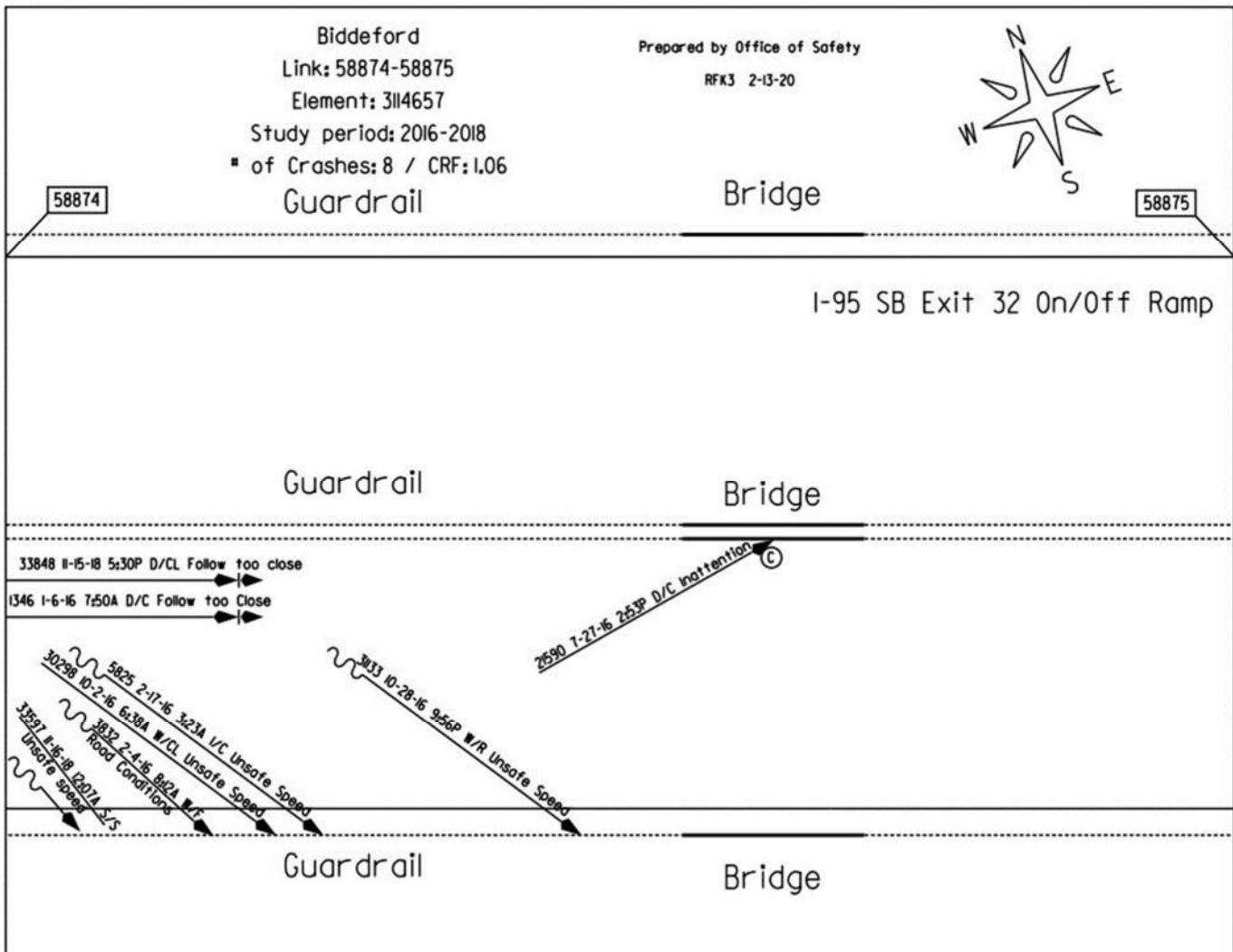
Photo 4: Alfred Street WB Approach⁵



⁵ Accessed Google Maps March 15th, 2022

Figure 4: 2016-2018 Exit 32 SB Off Ramp Crash Diagram depicts the HCL on the Exit 32 SB Off Ramp before the I-95 overpass. There was one other time period in which this location was recorded as an HCL over the past 10 years.

Figure 4: 2016-2018 Exit 32 SB Off Ramp Crash Diagram



As shown in **Figure 4**, there were 8 crashes resulting in a 12.5% injury rate during this analysis period.

- 6 of the 8 crashes in this location resulted in vehicles departing from the roadway and colliding with guardrail spans
 - 4 of these 6 crashes were a result of unsafe speeds
 - All but one of these crashes occurred when the road was not dry
 - While it is not depicted in the crash diagram, this location is along the curve of the ramp
- The two crashes that did not result in vehicles departing from the roadway were a result of following too close
- 7 of the 8 crashes occurred between the months of October and February, the months in which winter conditions are most common
- There is not a strong correlation between time of day and crash frequency

Photo 5: Exit 32 SB Off Ramp captured by Google Maps⁶ in September of 2017 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 5: Exit 32 SB Off Ramp



Findings and Observations

Existing Road Audit ⁷	
Road alignment and Cross Section	The Exit 32 southbound ramps consist of a curve with a radius of approximately 250 feet. Upon approaching the toll plaza and adjacent intersection, the roadway straightens out into a much longer and less significant curve. Both Alfred Road approaches as well as the Biddeford Connector intersection approach are straight and flat, posing no sight distance concerns.
Lighting	No lighting exists along the southbound off ramp until the approach of the toll plaza. Lighting is then present through the toll plaza and at the adjacent intersection.
General Sign Issues	The curve along the southbound off ramp does not contain any curve warning signs. The toll plaza includes signage including clearance, speed limit and lane use signs. Similarly, the intersection has signage which includes lane use signs, do not enter signs and no U-Turn signs.
Marking and Delineation	Adequate pavement markings exist along the entirety of the ramp, as well as at the toll plaza and intersection. These markings help to designate lane use and separate lanes. Dashes striping also exists within the intersection to aid drivers in maintaining their lane through their turning movements.
Barriers and Clear Zones	Guardrail is present along the ramp, through areas of the toll plaza and along legs of the intersection for purposes such as protecting against steep side slopes and separating travel directions.

⁶ Google Maps accessed on March 15, 2023

Bridges and Culverts	Components of bridge 1338 which carries the southbound ramps over I-95 were rated ⁸ as being in good condition.
Pavement	The roadways included within this ramp and adjacent intersection were given the following pavement condition ratings⁹: • Exit 32 SB Off Ramp: A • Exit 32 Ramps Intersection Approach: C • Alfred Street EB Approach: B • Alfred Street WB Approach: B • Biddeford Connector Approach: N/A (Received Condition Score of D)
Heavy Vehicles	The ramps at this interchange have percentages of heavy vehicles ranging from 1% to 8%.

Conclusions

While there were multiple locations around the Exit 32 interchange, toll plaza and adjacent intersections which have been both currently and historically identified as HCLs, the entirety of the area will soon be undergoing significant construction. Since this construction project will impact the interchange geometry, the adjacent intersection and travel volumes and patterns, the recommendations in this area will be centered around monitoring the location post-construction to identify any lingering safety concerns.

Recommendations

- Short-Term Solutions:
 - Separate bypass ramp connection to Route 111.
- Mid-Term Solutions:
 - Exit 32 ramp connection to South Street.
- Long-Term Solutions:
 - Reconfiguration of Exit 32 interchange.

⁸ According to MaineDOT Map Viewer – Bridge Layer

⁹ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location: Mile Marker 32-36

Nodes 58337 to 58338: NB Segment Over Saco River

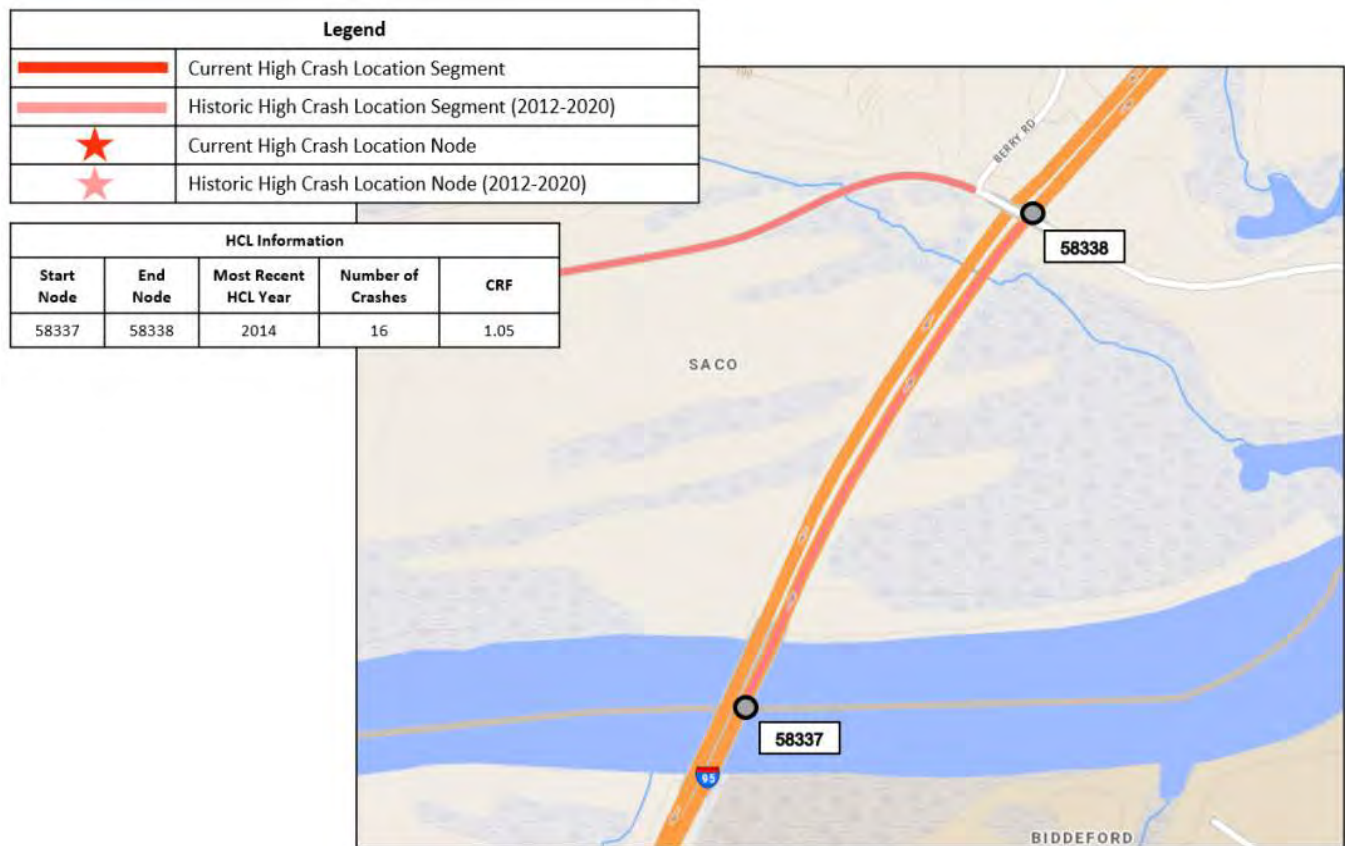
Introduction

There is 1 HCL for the mainline segment of mile marker 32 to 32 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- NB Segment over Saco River

This mainline segment is located in the City of Saco in York County. It is along I-95 northbound, spanning from the Saco River Bridge to the Maine Route 5 overpass. The Saco River Bridge is a major bridge, spanning over 500 feet and carrying both directions of the Maine Turnpike over the Saco River. This segment consists of three lanes with shoulders and is part of a larger, 4 mile mainline segment between the Exits 32 and 36 interchanges.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

While this segment of mainline has not undergone any recent construction, there are plans in place to conduct major construction on the interchanges surrounding it. Plans are currently in place to make major changes to the Exit 32 interchange which includes reconfiguration, toll plaza upgrades, intersection upgrades and a new connector road which is anticipated to alter travel patterns and traffic volumes throughout the area. At the Exit 36 interchange, plans include

major interchange reconfiguration including the implementation of a C-D segment, as well as the addition of a new Exit 35 interchange. These projects are anticipated to have significant impacts on travel patterns and traffic volumes throughout the area.

General Mobility Observations

This segment of the turnpike has one of the highest AADTs of the entire Turnpike. The location experiences significant seasonal variation in traffic volumes, experiencing increases during the summer months of June through September. This can be contributed to the increased tourist traffic during these months, which also adds a component of increased number of drivers who are less familiar with the area.

Demographics

The AADT along this mainline segment is 35,087¹. The mainline through the segment has a signed speed limit of 65 MPH.

Corridor Characteristics

This segment of mainline consists of three mainline lanes northbound with shoulders on both sides of the road. North of the Saco River Bridge, rumble strips can be found along both the inside and outside shoulders. Bridge rail exists along the bridge which transitions to guardrail north of the bridge and continues through the entirety of the HCL segment. Guardrail along the median separates the northbound and southbound travel directions.

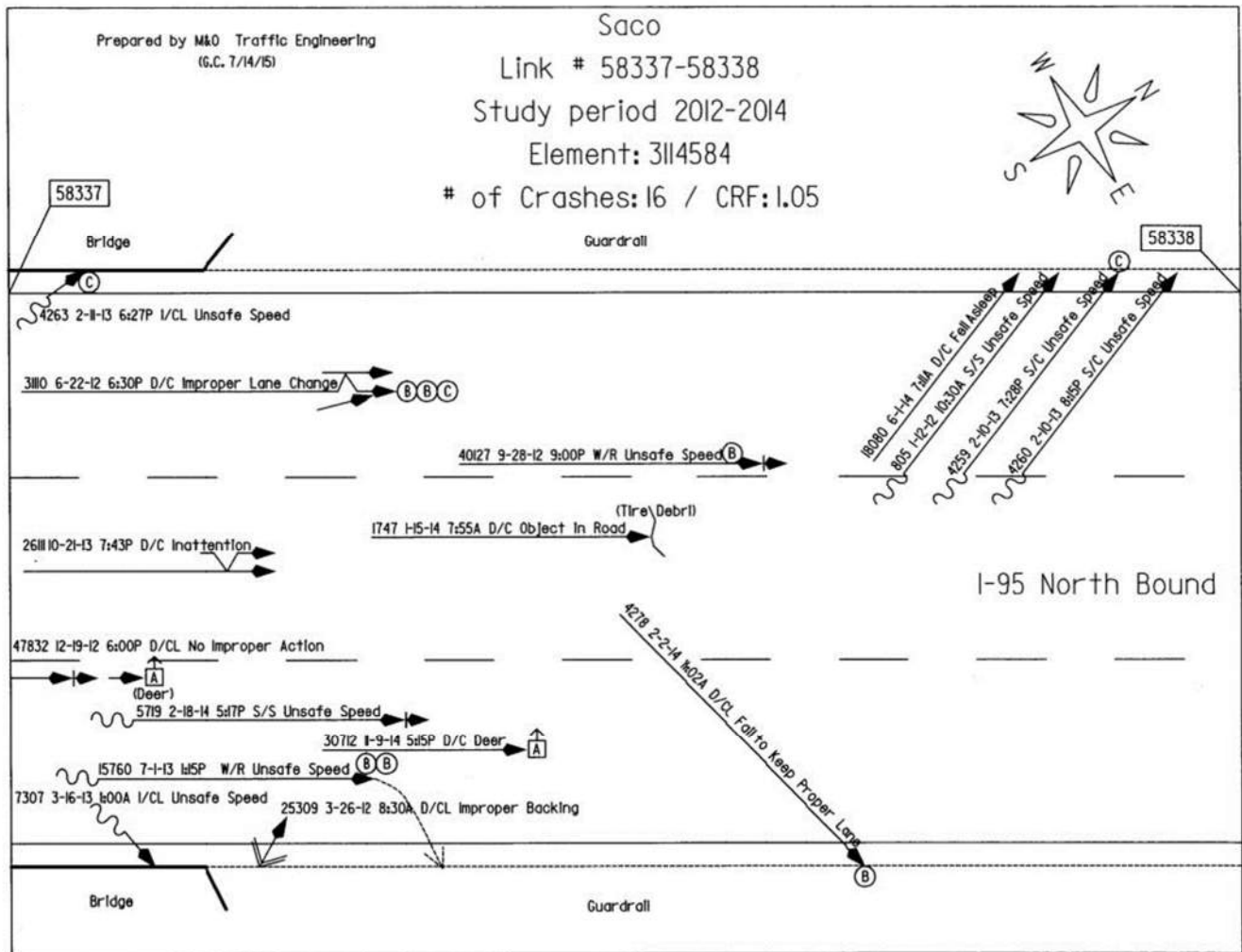
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Mainline over Saco River

Figure 2: 2012-2014 NB Segment Over Saco River Crash Diagram depicts the HCL north of the Exit 32 interchange over the Saco River for the time period in which it was most recently identified as an HCL. This segment was also identified as an HCL in 2013.

Figure 2: 2012-2014 NB Segment Over Saco River Crash Diagram



As shown in **Figure 2**, there were 16 crashes resulting in a 37.5% injury rate during this analysis period.

- 8 of the 16 crashes included in this crash diagram (50%) were a result of unsafe speed
 - None of these 8 crashes occurred on a dry roadway
 - 7 of these 8 crashes resulted in vehicles departing from the travel way and colliding with either bridge rail or guardrail
- 2 crashes at this location were due to collisions with large animals
- 3 of the 16 crashes included in this diagram occurred during the time period of increased summer traffic volumes
- 9 of the 16 crashes occurred during the evening hours between 5:00pm and 10:00pm

Photo 1: Mainline over Saco River captured from Google Maps² in October of 2015 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Mainline over Saco River



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This section of mainline is flat and has one curve with a large enough radius that it does not create any sight distance concerns.
Lighting	No lighting exists along this mainline segment.
General Sign Issues	Signage for upcoming recreational sites and Exit 36 can be found along this segment.
Marking and Delineation	The pavement markings along this segment are in good condition and are used to separate the three mainline lanes.
Barriers and Clear Zones	Barrier is present along both sides of the entire length of this segment.
Bridges and Culverts	Components of bridge 1341 which carries the Turnpike over the Saco River have been rated ³ as good, satisfactory and fair.
Pavement	The pavement along this segment has been given a pavement condition rating ⁴ of A.
Heavy Vehicles	The percentage of heavy vehicles along this section of the mainline tends to be 8% - 14%, dependent on the time of day.

Conclusions

Many of the crashes in this location were a result of unsafe speeds, especially in cases that the roadway was wet or icy. Additionally, large animal collisions were present in this area. While this can be used to identify safety concerns during the analysis period, the most recent time span in which this location was identified as an HCL was 2012-2014. For this

² Google Maps accessed March 15, 2023

³ According to MaineDOT Map Viewer – Bridge Layer

⁴ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

reason, the recommendations for this HCL will focus around monitoring the area for any current safety concerns, particularly the post-construction conditions after the surrounding interchange updates are implemented.

Recommendations

- Short-Term Solutions:
 - Monitor location for any updated and current safety concerns.
- Mid-Term Solutions:
 - Monitor the Exits 32 and 35/36 areas post-construction to identify any lingering or resultant safety concerns.

Interchange High Crash Location: Exit 36

Nodes 57541 to 58390: Exit 36 SB Off Ramp

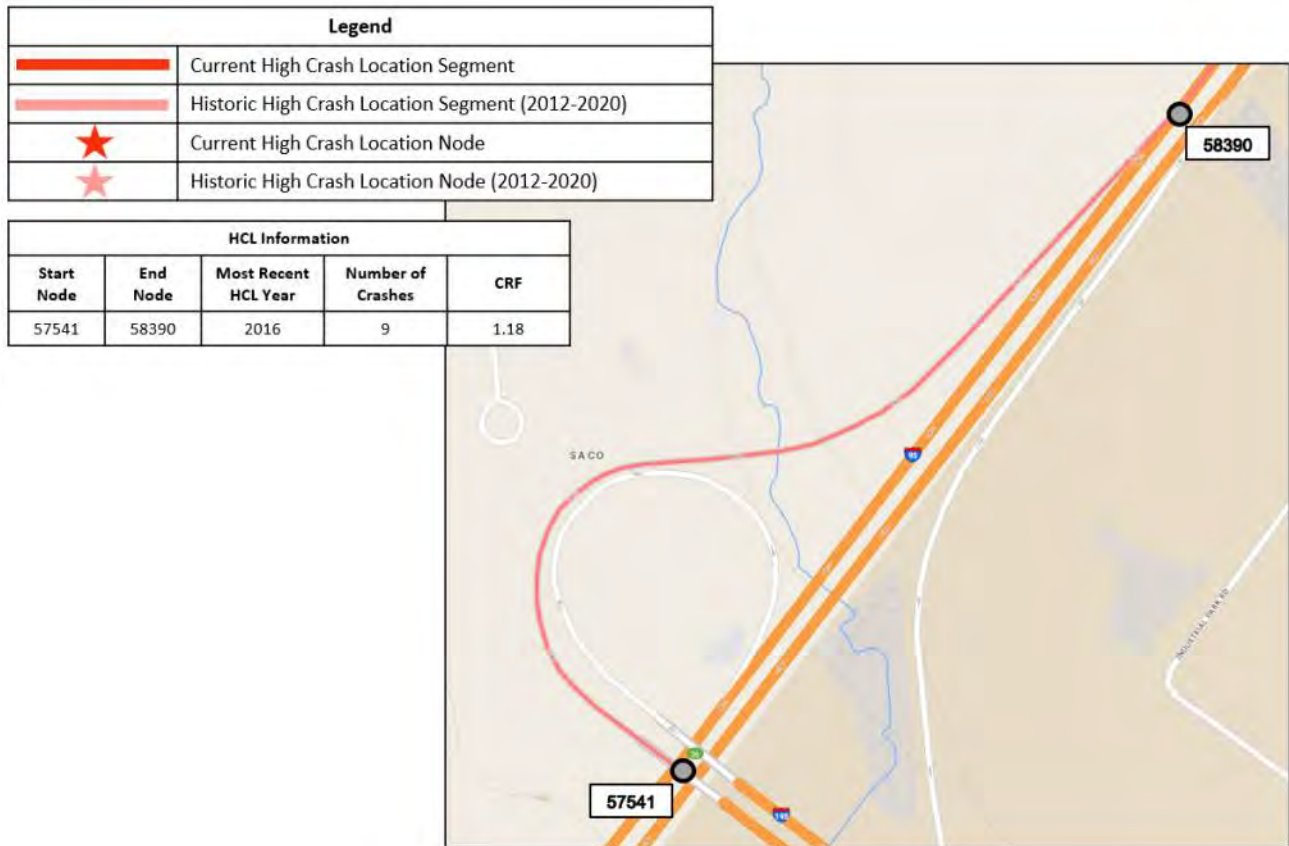
Introduction

There is 1 HCL along the Exit 36 interchange during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 36 SB Off Ramp

This interchange is located in the City of Saco in York County. It is a trumpet interchange with on and off ramps in both directions. Based on 2022 AADTs, this interchange experiences the highest volumes of all interchanges along the entirety of the Turnpike. This is to be expected, as it is a major access point to I-195. The Exit 36 intersection includes a toll plaza which collects from vehicles entering both the northbound and southbound directions of the Turnpike.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

A project has recently been contracted which will have major impacts to this interchange and surrounding areas. The project will implement changes including the addition of an Exit 35 interchange as well as major reconfiguring to the existing Exit 36 interchange, including the addition of a collector distributor in the southbound direction. This is anticipated

to have significant impacts on travel patterns and traffic volumes through this interchange, especially with the addition of a new interchange in such close proximity.

General Mobility Observations

As previously noted, this interchange experiences the highest volumes of all Turnpike interchanges due to its convenient access to I-195. The area experiences significant seasonal variation, with increased volumes during the summer months. This is compounded by the additional traffic volumes being due in part to tourism, especially with this interchange providing access to Old Orchard Beach, a popular summer destination. With this increased summer volume also comes an increase in users who are less familiar with the area.

Demographics

The Exit 36 SB Off Ramp has an AADT of 9,914¹ and is signed with an advisory speed of 30 MPH.

Corridor Characteristics

The Exit 36 interchange is a trumpet interchange. The southbound off ramp consists of a reverse curve, with the tighter of the two curves measuring approximately 300 feet in radius². Both curves are signed with chevron signs to aid drivers in maneuvering the geometry. The ramp is comprised of a single lane with shoulders on both sides. Guardrail on both sides of the ramp begins towards the end of the first curve. As the ramp conjoins with the southbound on ramp, the guardrail on the inside of the ramp transitions to concrete barrier to separate the travel directions. At the I-95 overpass bridge, the ramp splits into two lanes and the concrete barriers transitions back to guardrail which continues through the remainder of the ramp. The northbound off ramp merges into the southbound off ramp just before the toll plaza location.

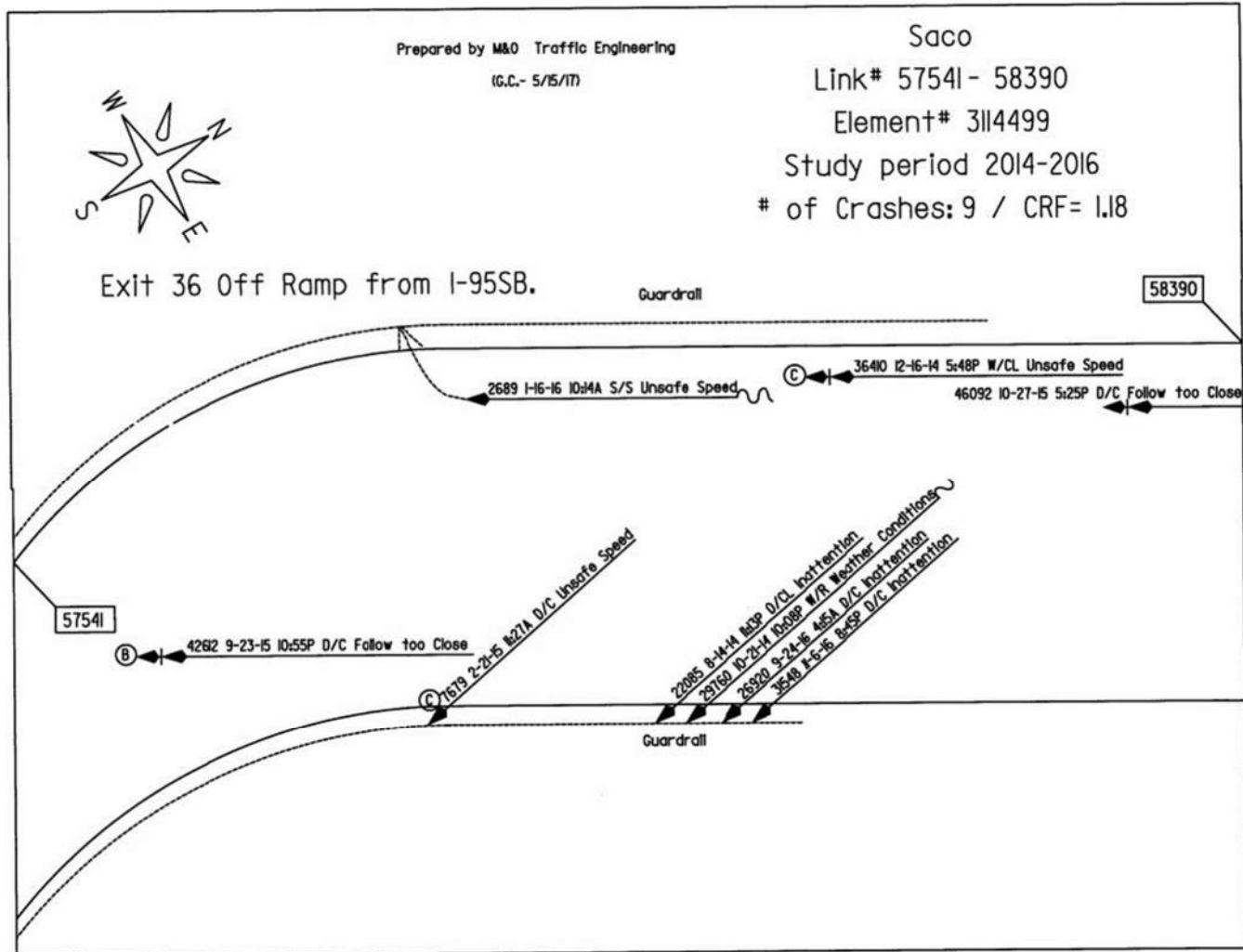
¹ 2022 AADT Summary Created by HNTB for MTA.

² Measured in Google Earth on March 17, 2023

Exit 36 SB Off Ramp

Figure 2: 2014-2016 Exit 36 SB Off Ramp Crash Diagram depicts the HCL on the Exit 36 SB Off ramp just before the bridge curve.

Figure 2: 2014-2016 Exit 36 SB Off Ramp Crash Diagram



As shown in **Figure 2**, there were 9 crashes resulting in a 33.3% injury rate during this analysis period.

- The two most common causes of crashes at this location were unsafe speeds and inattention, each contributing to 3 crashes
- Following too closely contributed to 2 crashes at this location
- 6 of the crashes along the ramp resulted in vehicles departing from the travel way and colliding with guardrail
- 6 of the 9 crashes occurred between the months of October and February, the months in which winter conditions are most common in this area
- Crashes in this area are most common in the evening, with 6 of the 9 occurring between 5:30pm and midnight

Photo 1: Exit 36 SB Off Ramp captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Exit 36 SB Off Ramp



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This ramp consists of a reverse curve with the sharper of the two curves measuring at approximately 300' in radius. While the straight portion of the ramp does not appear to have sight distance obstructions, this is the location where the northbound off ramp merges.
Lighting	Lighting is present at the diverge, at the end of the reverse curve, at the merge of the northbound ramp and around the toll plaza. No lighting is currently present along the reverse curve of the ramp.
General Sign Issues	The ramp includes advisory speed signs as well as chevron signs along both segments of the reverse curve.
Marking and Delineation	Pavement markings along the ramp are in good condition and effective in designing lanes.
Barriers and Clear Zones	Both guardrail and concrete barrier are utilized throughout the length of the ramp. This helps to protect against steep side slopes as well as separate travel directions.
Bridges and Culverts	There are two bridges along this ramp: • Bridge 0807 – carries the ramp over I-95 • Bridge 0809 – carries the ramp over a railroad crossing

³ Google Maps accessed March 15, 2023

	Bridge 0807 serves at the endpoint of the HCL and has components which were given condition ratings ⁴ of fair, satisfactory and good.
Pavement	The pavement along this ramp segment has been given a pavement condition rating ⁵ of C.
Heavy Vehicles	The percentage of heavy vehicles along this ramp s typically 1% - 2%.

Conclusions

Since this location will soon be under construction to implement major reconfiguration and changes to both the ramp as well as surrounding areas, the recommendations for this HCL will center around monitoring post-construction conditions. This will be especially important as travel patterns change and vehicles distribute themselves between the Exit 35 and 36s interchanges, as well as begin to maneuver the collector distributor that will be present along the southbound corridor.

Recommendations

- Mid-Term Solutions:
 - Monitor the area post-construction to identify any lingering or resultant safety concerns.

⁴ According to MaideDOT Map Viewer – Bridge Layer

⁵ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location: Exit 36-42

Nodes 58390 to 70966: Exit 36 SB Off Ramp Approach

Nodes 70967 to 18585: Exit 42 NB Off Ramp Approach

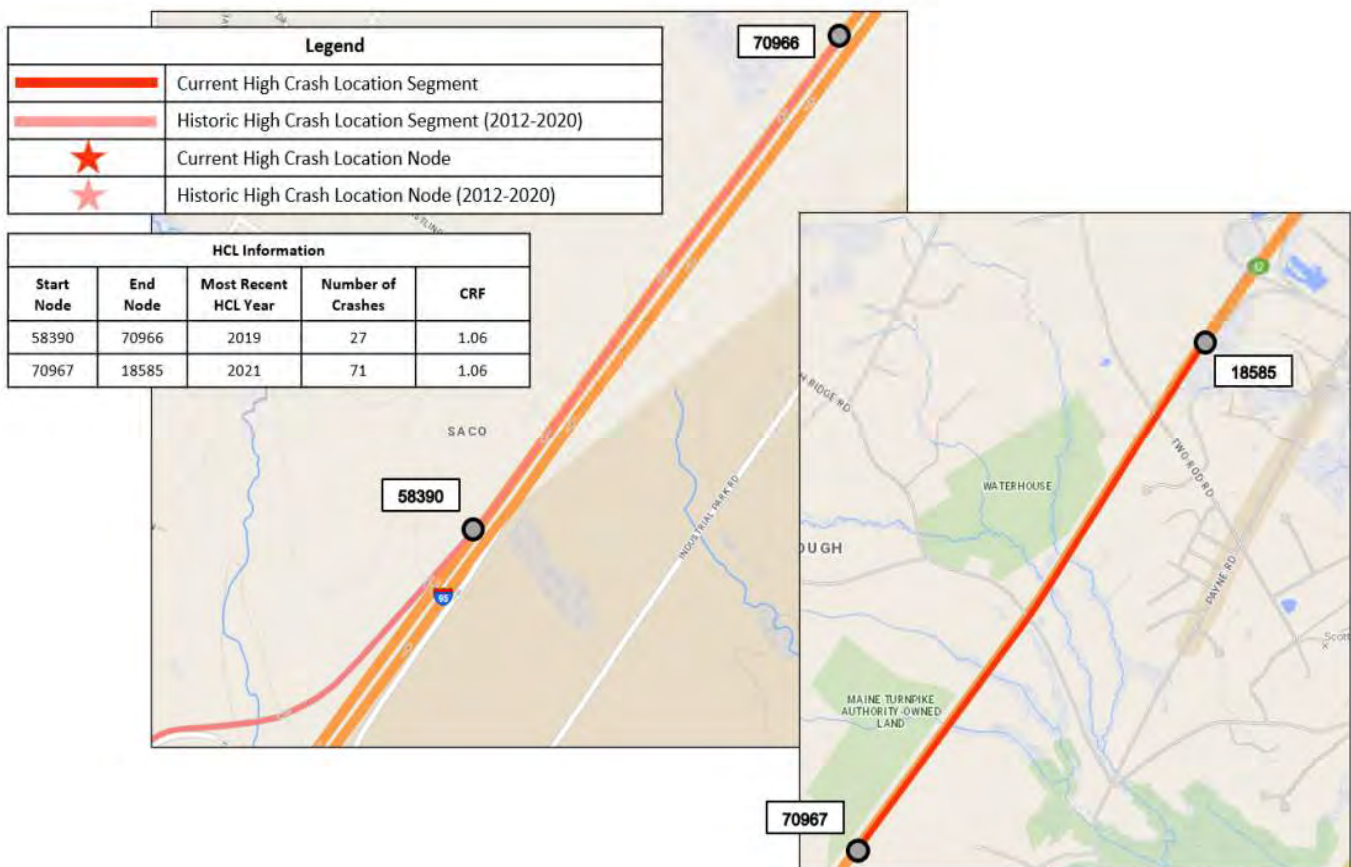
Introduction

There are 2 HCLs for the mainline segment between Exit 36 and Exit 42 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 36 SB Off Ramp Approach
- Exit 42 NB Off Ramp Approach

The southerly mainline section included in this audit is located in the City of Saco in York County. The northerly segment is located in Scarborough in Cumberland County. Directly adjacent to these segments are the interchanges for Exits 36 and 42, respectively. Based on 2022 AADTs, the Exit 36 interchange experiences the highest volumes of all interchanges along the entirety of the Turnpike. This is to be expected, as it is a major access point to I-195. The mainline segments themselves each carry three lanes of traffic in opposing directions along the Turnpike.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

A project has recently been contracted which will have major impacts to the Exit 36 interchange and surrounding areas. The project will implement changes including the addition of an Exit 35 interchange as well as major reconfiguring to the existing Exit 36 interchange, including the addition of a collector distributor in the southbound direction. This is anticipated to have significant impacts on travel patterns and traffic volumes through this interchange, especially with the addition of a new interchange in such close proximity.

The Exit 42 Interchange has undergone changes including safety improvements along the ramps.

General Mobility Observations

As previously noted, the Exit 36 interchange experiences the highest volumes of all Turnpike interchanges due to its convenient access to I-195. In addition to this, the mainline segment between Exit 36 and Exit 32 regularly tends to be the highest volume mainline segment along the Turnpike. The area experiences significant seasonal variation, with increased volumes during the summer months, focused between the months of May through October. With this increased summer volume also comes an increase in users who are less familiar with the area.

Demographics

Both directions of the mainline in this location are signed with a 65 MPH speed limit. The AADT¹ along the northbound segment at this location is 39,335, while the AADT along the southbound segment is 39,387.

Corridor Characteristics

The southbound HCL segment consists of three travel lanes with shoulders on both sides of the road. Rumble strips can be found on both sides of the travel way along the entirety of the segment. Guardrail exists along the inside of the mainline segment which separates the northbound and southbound travel directions for the entirety of the segment length. There is also guardrail on the outside of the roadway at certain spots along the segment.

The northbound HCL segment in this area has very similar features, including three lanes with shoulders which include rumble strips, guardrail separating the travel directions and some runs of guardrail on the outside of the roadway.

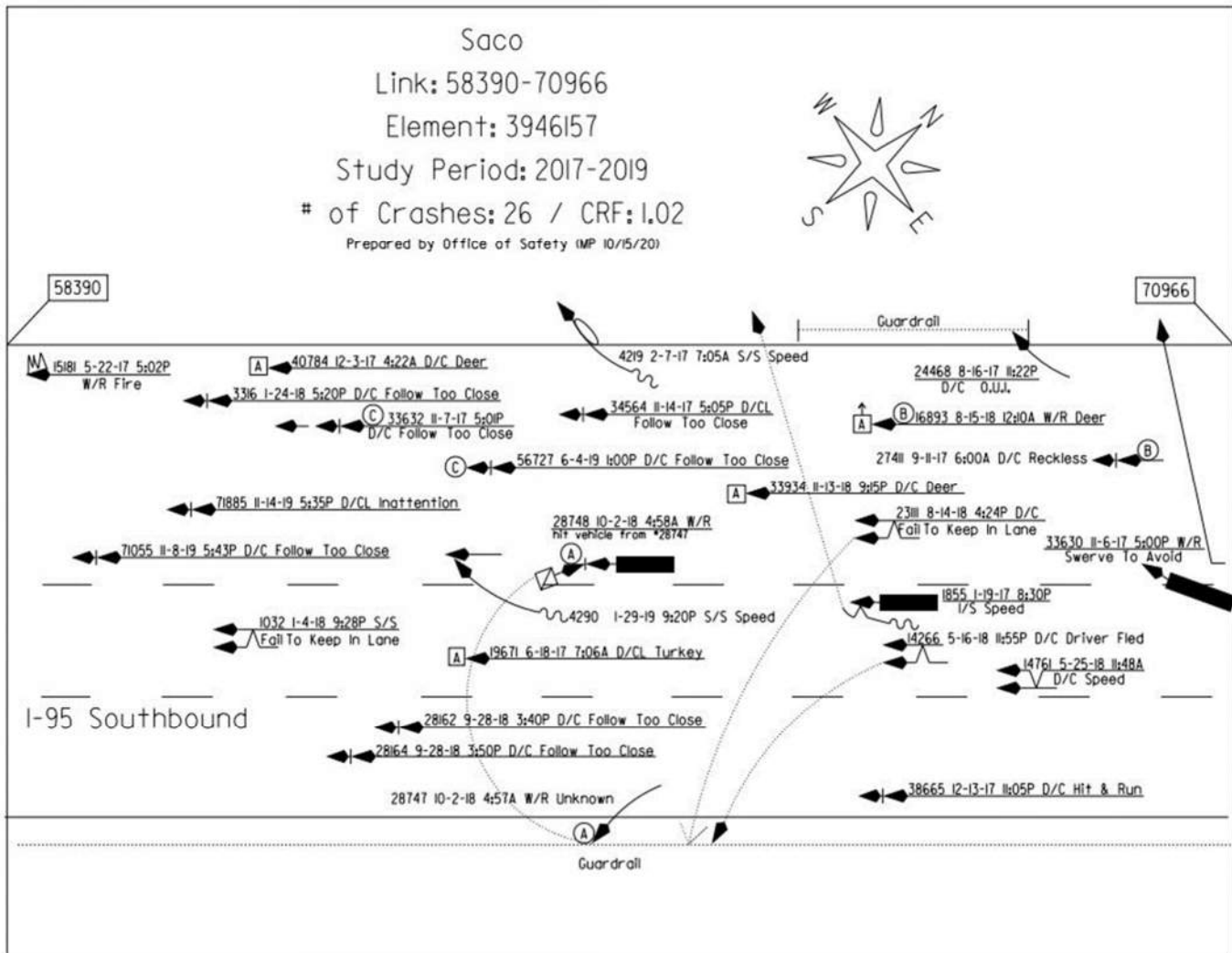
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Just Prior to Exit 36 SB Off Ramp

Figure 2: 2017-2019 SB Mainline Between Exit 36 and 42 Crash Diagram depicts the HCL just north of the Exit 36 SB Off Ramp diverge. This location was also identified as an HCL during the 2016-2018 time period.

Figure 2: 2017-2019 SB Mainline Between Exit 36 and 42 Crash Diagram



As shown in **Figure 2**, there were 26 crashes resulting in a 23.1% injury rate during this analysis period.

- The most common cause of crash in this location was following too close, which contribute to 7 crashes during this time period
 - This is a common crash type in locations of high volumes and congestion such as this mainline segment
- Collisions with animals was the next most frequent contributing factor in this location, contributing to 4 crashes, followed by speeding which was the cause of 3 crashes
- 7 of these crashes resulted in vehicles departing from the travel way, some of which resulted in collisions with guardrail
- 3 of these crashes involved heavy vehicles
- 12 of these 26 crashes occurred from May to October during the time of increased volumes through this area
- 11 of these crashes occurred during evening hours between 3:30pm and 9:00pm

Photo 1: Just Prior to Exit 36 SB Off Ramp captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

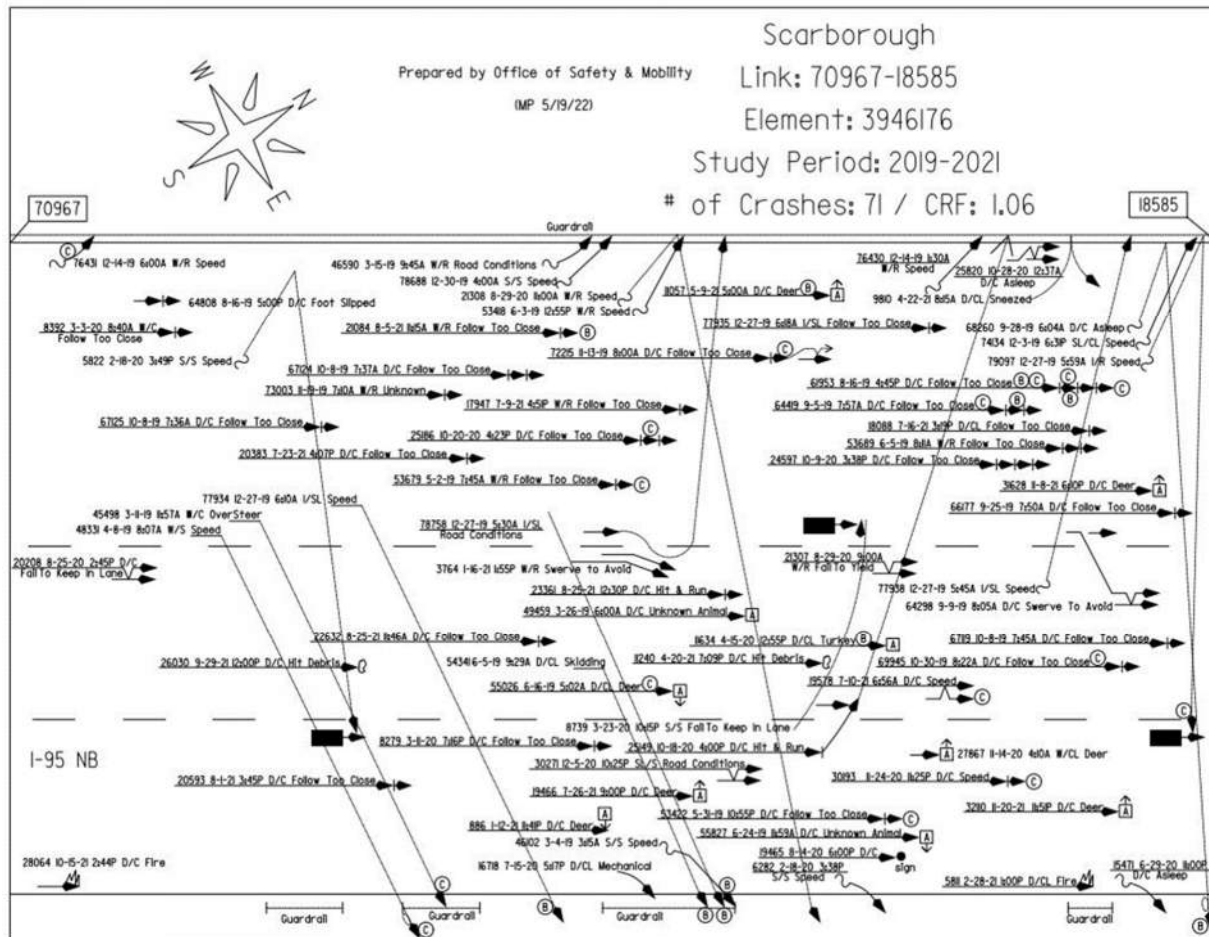
Photo 1: Just Prior to Exit 36 SB Off Ramp



² Google Maps accessed March 15, 2023

Figure 3: 2019-2021 NB Mainline Between Exit 36 and 42 Crash Diagram depicts the HCL south of the Exit 42 NB Off Ramp during the time period in which it was most recently identified as an HCL. This location was also identified as an HCL during the 2018-2020 time period.

Figure 3: 2019-2021 NB Mainline Between Exit 36 and 42 Crash Diagram



As shown in **Figure 3**, there were 71 crashes resulting in a 31% injury rate during this analysis period.

- The most common crash cause at this location during the analysis period was following too close, which contributed to 22 crashes
 - This is a common crash cause at locations such as these that have high traffic volumes, causing congestion
- Speed was the next most common contributing factor, causing 15 crashes at this location
 - Many of these occurred during times in which the pavement was not dry
- There were 10 crashes involving collisions with animals at this location
- 20 of these crashes resulted in vehicles departing from the roadway, some of which resulted in these vehicles colliding with guardrail
- 3 of these crashes involved heavy vehicles
- 38 of these 71 crashes (approximately 54%) occurred between the months of May and October when traffic volumes in this location are increased

Photo 2: Just Prior to Exit 42 NB Off Ramp captured by Google Maps³ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: Just Prior to Exit 42 NB Off Ramp



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	Both HCL locations included in this road safety audit are straight, flat and do not contain any sight distance obstructions.
Lighting	Lighting is present at the interchange end of both segments.
General Sign Issues	Signing for adjacent intersections can be found along both segments.
Marking and Delineation	Both segments are adequately marked in order to designate lane separation.
Barriers and Clear Zones	Guardrail is present between the northbound and southbound corridors to separate the travel directions. Guardrail is also utilized along certain parts of each segment along the outside of the roadway.
Bridges and Culverts	While there are no bridges or culverts along the southbound segment included in this location, three bridges are located at I-95 overpasses along the northbound segment. The bridge locations, numbers and condition ratings ⁴ for each can be found below: • Broadturn Road Overpass: #0268, Satisfactory and Good Condition • Beech Ridge Road Overpass: #0269, Good Condition • Two Rod Road: #0270, Good Condition
Pavement	The pavement along both HCL segments were given condition ratings ⁵ of A.

³ Google Maps accessed March 15, 2023

⁴ According to MaineDOT Map Viewer – Bridge Layer

⁵ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Heavy Vehicles	Percentage of heavy vehicles through this mainline segment range from 4% - 9%, depending on direction and time of day.
----------------	--

Conclusions

Vehicles following too close was the main crash cause at both of the HCLs examined as a part of this audit. This is a common crash type on congested roadways with high volumes such as this mainline segment. For this reason, future widening at this location should be evaluated, especially as volumes continue to grow in the future.

The southbound segment should continue to be monitored as construction around the Exit 36 interchange is implemented to examine any lingering or resultant safety concerns in the post-construction condition.

Speed was a significant contributing factor at the northbound location, especially in circumstances in which the roadway was wet, icy or slippery. As such, speed mitigation elements should be considered for implementation within this location, especially during weather events.

Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Monitor the Exit 36 area post-construction to identify any lingering or resultant safety concerns. Include this location in MTA's large animal study.
- Mid-Term Solutions:
 - Develop plans for corridor widening. For more information on capacity needs, please see Section 4 of the Safety and Capacity Study.

Intersection High Crash Location: Exit 42

Node 12550: Exit 42 Intersection

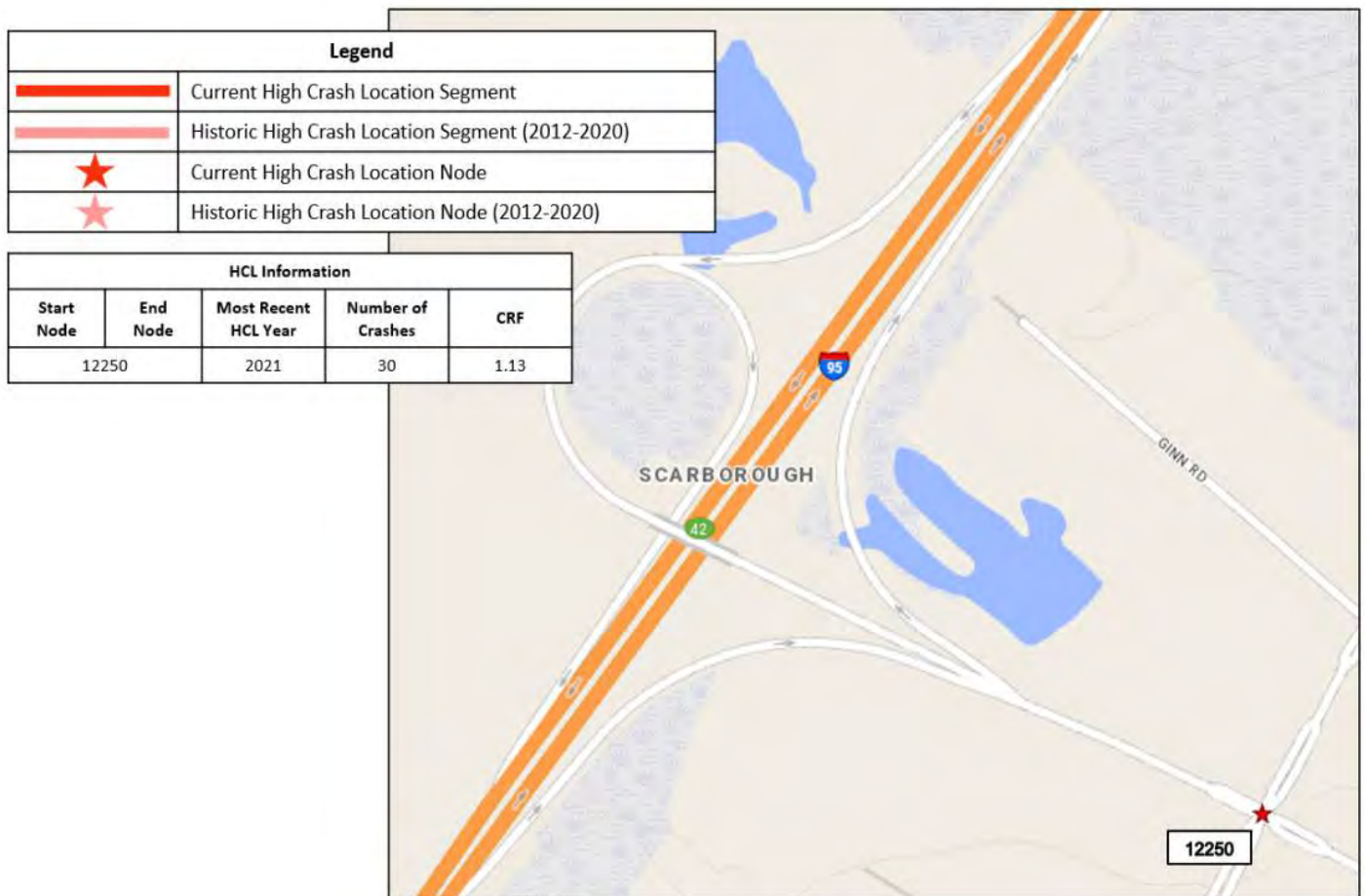
Introduction

There is 1 HCL at the Exit 42 ramps intersection during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 42 Ramps Intersection with Payne Road

This intersection is located in the Town of Scarborough in Cumberland County. It is a 4-legged signalized intersection which connects the Exit 42 ramps to Payne Road and Haigis Parkway. There is a toll plaza which collects from Exit 42 ramp users directly adjacent to the intersection. Haigis Parkway continues southeast of this intersection to act as a major connection from I-95 to Route 1 in Maine.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

In 2013 the Exit 42 ramps that act as a leg of this intersection were restriped near the toll plaza as a safety measure. Additionally, the Exit 42 interchange has more recently undergone additional construction in order to improve safety at the location.

The nearby intersection of Payne Road with Gorham Road has recently undergone intersection improvements.

General Mobility Observations

The Turnpike mainline segment of mile marker 36-42, directly adjacent to this intersection, consistently exhibits the highest AADT of the entirety of the Turnpike. This location also experiences season variations in volumes with increased numbers of vehicles during the summer months, particularly from May to October. This volume increase brings with it an increased number of drivers who are less familiar with the area.

Demographics

The AADT and posted speed limits for each leg of this intersection can be found in the table below:

Intersection Approach	AADT	Speed Limit
Exit 42 Ramps	14,946 ¹	30 MPH (Ramp Advisory Speed)
Haigis Parkway	8,168	45 MPH
Payne Road NB	9,541	35 MPH
Payne Road SB	14,910	35 MPH

Corridor Characteristics

This signalized intersection consists of four two-directional legs. Concrete medians exist at each approach to separate travel directions. The Exit 42 ramps intersection leg contains a toll plaza in very close proximity to the intersection. Additionally, a stop-controlled intersection to access Ginn Road from Payne Road is located just to the north of this intersection. To the south, there is a signalized intersection that can be used to access a large park and ride. All intersection legs consist of striped lanes with shoulders. The number of approach and receiving lanes that each intersection is comprised of can be found in the table below:

Intersection Approach	Number of Approach Lanes	Number of Receiving Lanes
Exit 42 Ramps	4 (L, T, R, R)	2*
Haigis Parkway	3 (L, T, TR)	1
Payne Road NB	3 (L, LT, TR)	2
Payne Road SB	4 (L, T, T, R)	2

*These two lanes immediately open up to three lanes for toll plaza access

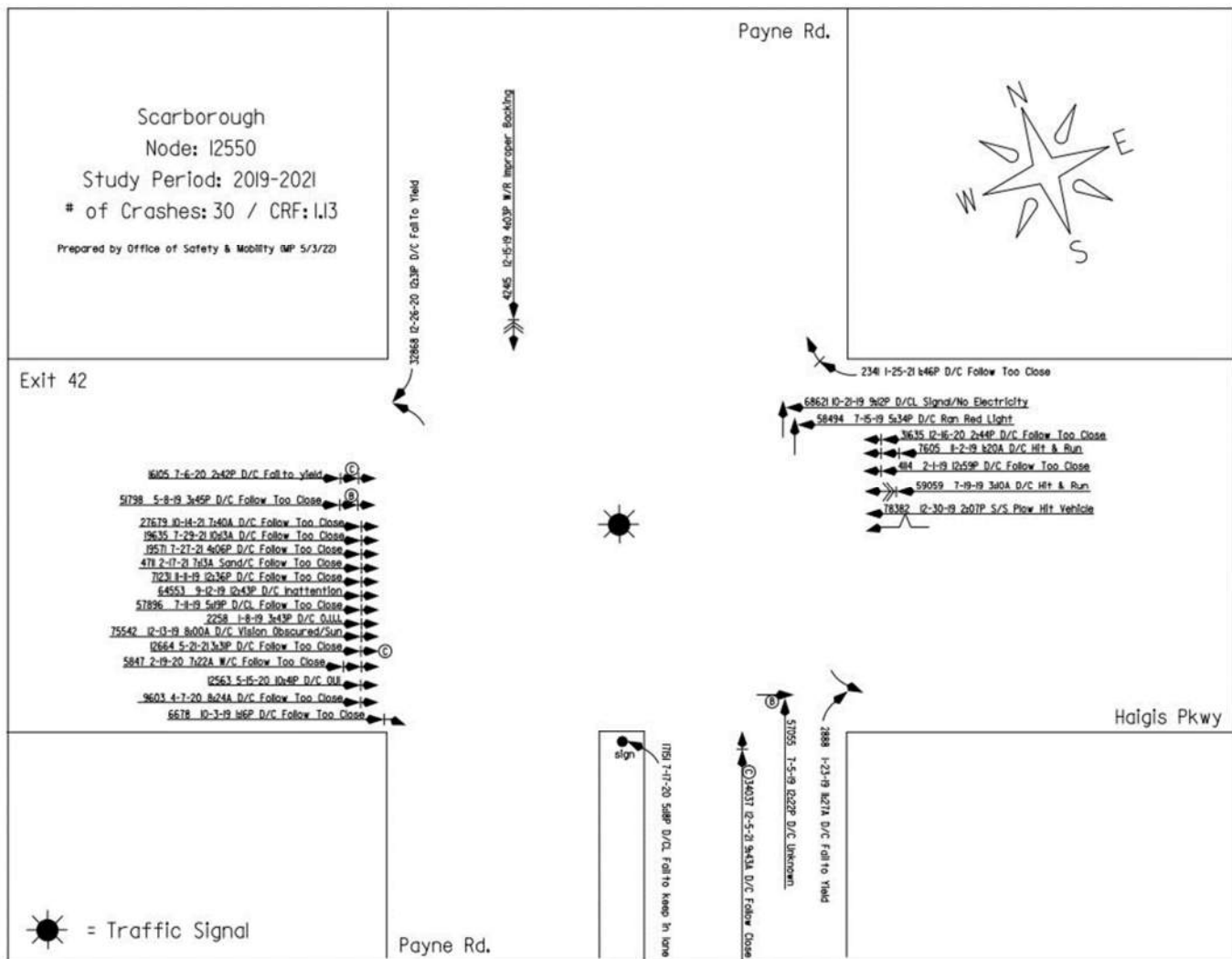
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Exit 42 Ramps Intersection with Payne Road

Figure 2: (2019-2021) Exit 42 Intersection Crash Diagram depicts the HCL at the intersection with Payne Road.

Figure 2: (2019-2021) Exit 42 Intersection Crash Diagram



As shown in **Figure 2**, there were 30 crashes resulting in a 16.7% injury rate during this analysis period.

- 16 of these 30 crashes occurred at the Exit 42 ramps intersection.
 - 11 of these 16 were a result of vehicles following too closely
- 6 of the crashes at this location were intersection movement crashes
 - The most common cause for the intersection movement crashes was failure to yield, which was a contributing factor for 2 crashes
- 15 of these 30 crashes occurred from May to October, the time period in which there are increased traffic volumes in this area
- The majority of these crashes occurred during peak traffic times (AM Peak, PM Peak and Noontime Peak)

Photo 1: Exit 42 Intersection captured by Google Maps² in June of 2019 depicts the condition of this intersection at the time that it was most recently noted as an HCL.

Photo 1: Exit 42 Intersection



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	The alignments for all four legs of this intersection are straight and flat, not contributing to any sight distance concerns. However, sunlight obstructing views was noted as a contributing factor for one of the crashes that occurred during the most recent HCL period.
Lighting	Lighting can be found at all 4 corners of this intersection, as well as at the adjacent intersection and the park and ride (very close proximity to the intersection)
General Sign Issues	Signage at the intersection includes lane use signs, signs at the medians and street name signs for navigation.
Marking and Delineation	Striping exists throughout the intersection which is used to separate lanes, mark the locations of stop bars and designate lane usage.
Barriers and Clear Zones	There is no guardrail or median barrier at this intersection. Concrete medians separate the travel directions along each intersection leg and chain link fence can be found along the Exit 42 Ramps leg to separate between the travel way and the park and ride.
Bridges and Culverts	Cross Culvert XC-1074136, which received a condition rating ³ of Good, can be found at the Payne Road SB approach.
Pavement	The condition ratings⁴ that the pavement along each intersection approach received can be found below: • Exit 42 Ramps: C • Haigis Parkway: A • Payne Road NB: A • Payne Road SB: A

² Google Maps accessed on March 15, 2023

³ According to MaineDOT Map Viewer – Cross Culverts Layer

⁴ MaineDOT Map Viewer – CSL Condition Data Simplified

Heavy Vehicles	The percentage of heavy vehicles at the Exit 42 ramps approach of this intersection tend to average around 0% to 2%.
----------------	--

Conclusions

The majority of crashes at this location were resulting from vehicles following too closely, particularly at the Exit 42 ramps approach. This is likely due to congestion in the area, especially with the intersection being adjacent to a mainline segment with such significant volumes.

Recommendations

- Short-Term Solutions:
 - Coordinate with local stakeholders and MaineDOT to ensure the intersection is operating safely.

Mainline High Crash Location: Mile Marker 42 - 44

Nodes 19240 to 16847: Exit 42 SB Off Ramp Approach

Nodes 70842 to 19239: Exit 44 NB Off Ramp Approach

Node 19239: Exit 44 NB Diverge

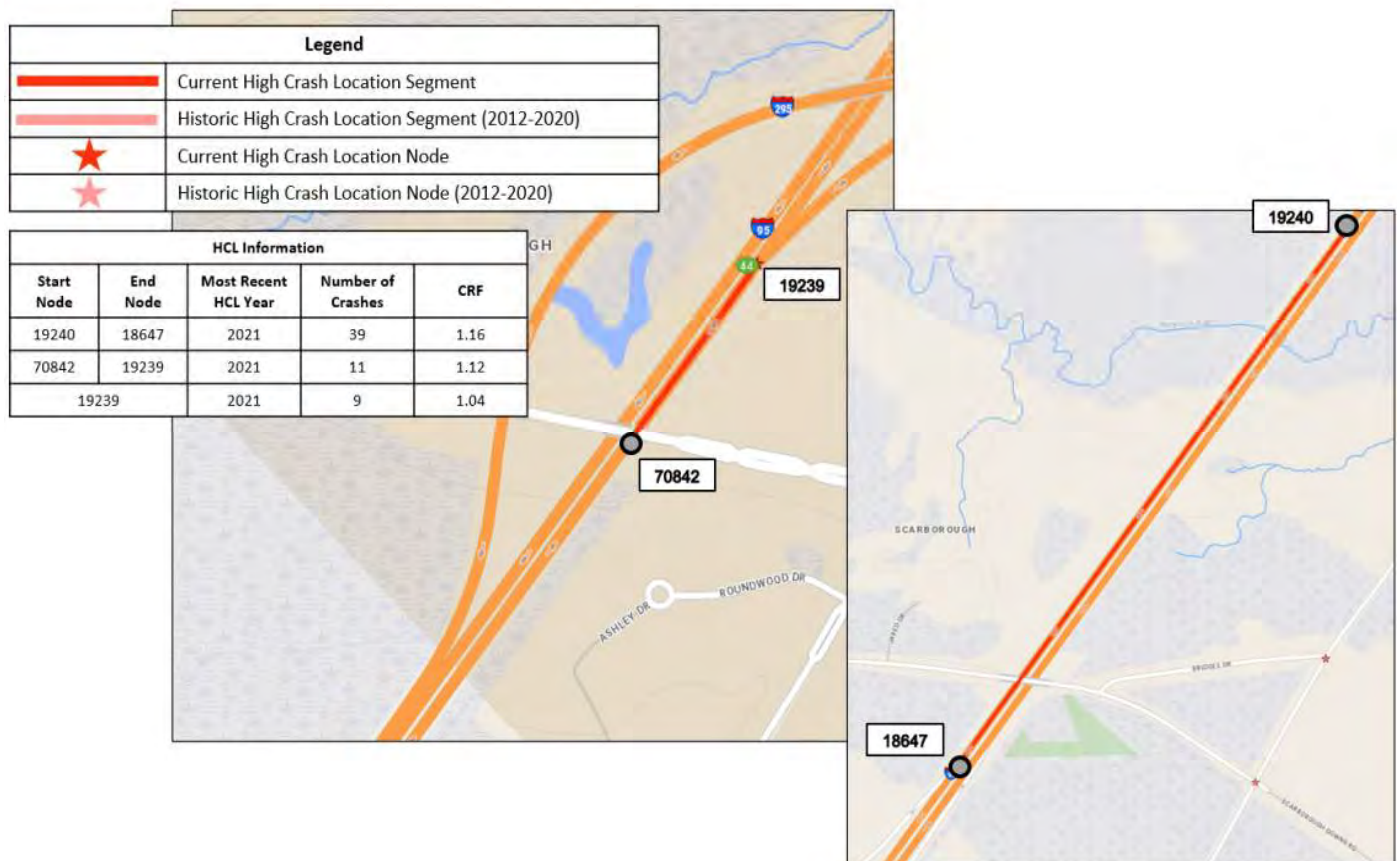
Introduction

There are 3 HCLs for the segment of mainline between Exit 42 and Exit 44 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Just North of Exit 42 SB Off Ramp
- Just South of the Exit 44 NB Off Ramp
- Exit 44 NB Off Ramp Diverge Point

This mainline segment, which carries traffic both northbound and southbound along the Turnpike, spans from mile marker 42 to 44 in the Town of Scarborough in Cumberland County. Directly adjacent to these segments are the interchanges for Exit 42 and Exit 44 which provide access to Route 1 and I-295, respectively. According to a performed AADT analysis, this mainline segment is one of the most heavily travelled along the entirety of the Turnpike. Additionally, the Exit 44 interchange is the second most used of all interchanges along the turnpike.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Both ends of this mainline segment have recently undergone construction projects for improvements. The Exit 42 Interchange has undergone changes including safety improvements along the ramps. Additionally, ongoing construction began in 2020 to implement an additional travel lane in both directions along the Turnpike from mile marker 43 to 46.4. This project also included the addition of a lane to the Exit 44 NB Off Ramp, resulting in a two-lane ramp.

General Mobility Observations

As previously noted, this mainline segment and the Exit 44 interchange are some of the most utilized sections of the entire Turnpike. This can likely be attributed to the I-295 access that the Exit 44 provides. The mainline segment between Exits 42 and 44 experiences seasonal fluctuations in volumes, with the months of June to October exhibiting higher volumes. This is due to an increase in tourism traffic in the area during this time of year, which also results in a higher percentage of drivers who are unfamiliar with the area during this time period.

Demographics

Both directions of this mainline segment are posted with 65 MPH speed limits. A table noting the AADT's for the locations included in this RSA can be found below:

Location	AADT¹
NB Mainline	38,815
Exit 44 NB Off	14,152
SB Mainline	39,061

Corridor Characteristics

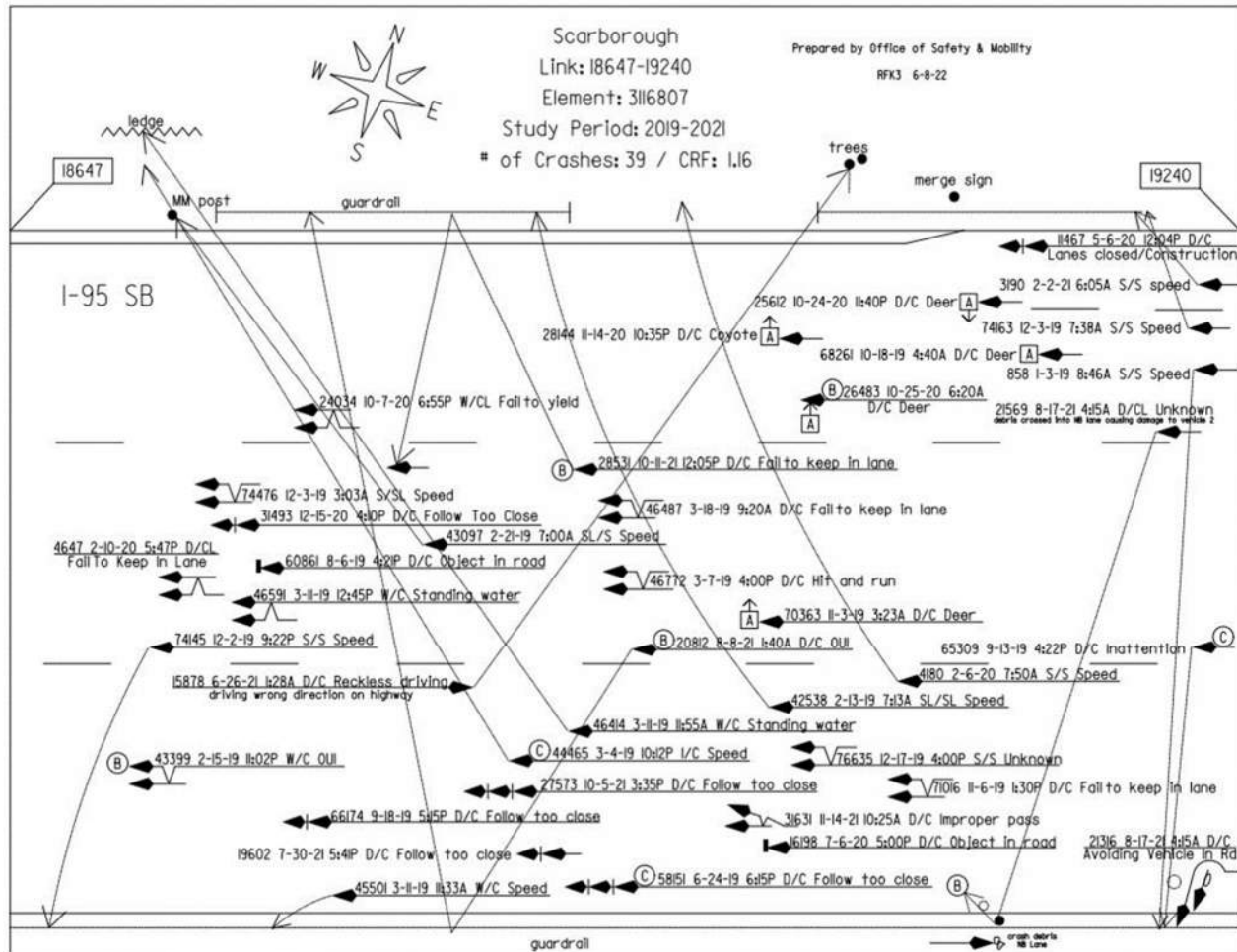
The mainline in this location currently consists of three lanes in both directions with shoulders on both sides of the travel way. While rumble strips do not currently exist along the roadway, it can be assumed that this is due to the area being under construction conditions, as 2019 Google Imagery² shows rumble strips present along both shoulders. The Exit 42 SB Off Ramp is a single lane, while the Exit 44 NB Off Ramp has recently had a second lane added. This is achieved with the use of an exit-only and a choice lane, such that two lanes currently continue northbound beyond the ramp. Guardrail is present along the inside of the corridor to separate travel directions. At the Bridges Drive Overpass within the southbound segment, this guardrail transitions to concrete barrier which is present through Exit 44. Guardrail can also be found along portions of the outside of both segments as a safety measure.

¹ 2022 AADT Summary Created by HNTB for MTA.

² Google Maps accessed March 17, 2023

Just North of Exit 42 SB Off Ramp

Figure 2: 2019-2021 Exit 42 SB Off Ramp Approach Crash Diagram



- The leading cause of crash in this location was speed, which was a contributing factor in 9 of these 39 crashes
- Following too close and collisions with large animals were the next most common cause with each acting as a contributing factor to 5 crashes
- 2 of the crashes at this location involved standing water
- 2 crashes at this location, each which resulted in a type B injury, were the result of an O.U.I.
- 16 of these 39 crashes (41%) resulted in vehicles departing the roadway and colliding with objects including guardrail, trees, ledge and signposts
- 16 of the recorded crashes at this location occurred between the months of June and October when this area experiences increased traffic volumes
- There is not a strong correlation between time of day and crash frequency at this location

Photo 1: Exit 42 SB Off Ramp Approach, captured by Google Maps³ in June of 2019, depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Exit 42 SB Off Ramp Approach

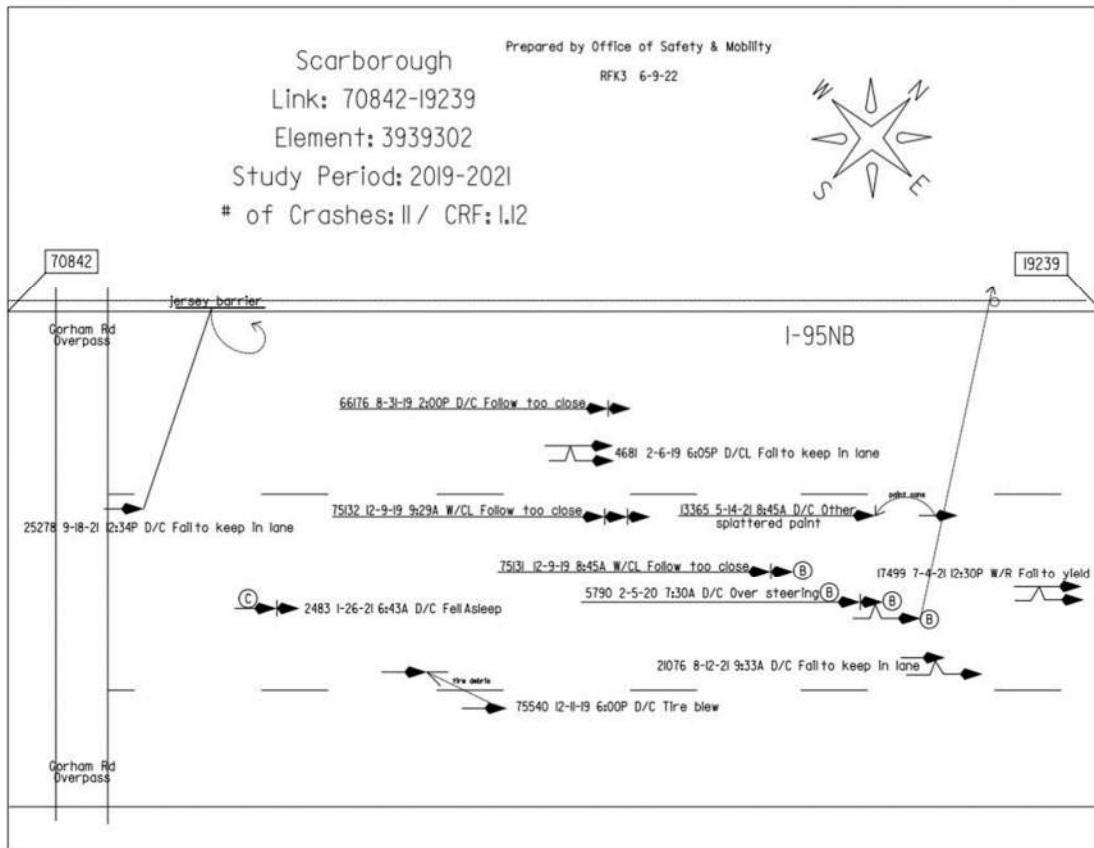


³ Google Maps Accessed March 15, 2023

Just South of the Exit 44 NB Off Ramp

Figure 3: 2019-2021 Exit 44 NB Off Ramp Approach Crash Diagram depicts the HCL just south of the Exit 44 NB off ramp during the most recent period that it was identified as an HCL. This location was also classified as an HCL during the 2018-2020 and 2017-2019 time periods.

Figure 3: 2019-2021 Exit 44 NB Off Ramp Approach Crash Diagram



As shown in **Figure 3**, there were 11 crashes resulting in a 27.3% injury rate during this analysis period.

- Following too close and failure to keep in lane are the two most common contributing factors in this location, each causing 3 crashes
- 2 of the crashes in this location resulted in vehicles departing from the travel way, one of which result in a collision with jersey barrier
- 5 of the 11 crashes occurred during the winter months of December to February
- 5 of the 11 occurred during the typical AM Peak Hour period

Photo 2: Just South of the Exit 44 NB Off Ramp captured by Google Maps⁴ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: Just South of the Exit 44 NB Off Ramp

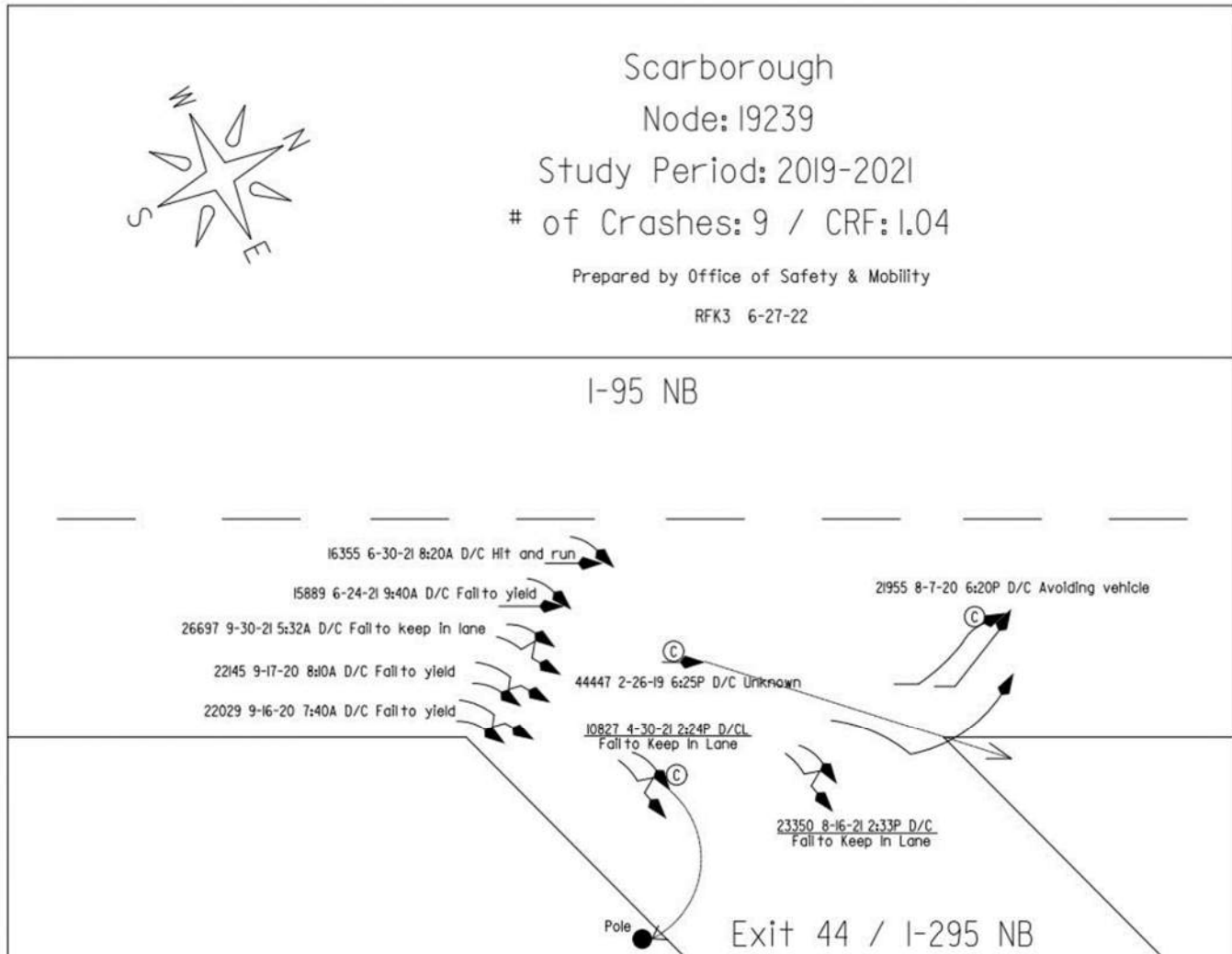


⁴ Google Maps accessed on March 15, 2023

Exit 44 NB Off Ramp Diverge Point

Figure 4: 2019-2021 Exit 44 NB Diverge Crash Diagram depicts the HCL at the Exit 44 NB diverge point for the time period in which it was most recently classified as an HCL. This is the only time period over the past 10 years during which this diverge was identified as an HCL.

Figure 4: 2019-2021 Exit 44 NB Diverge Crash Diagram



As shown in **Figure 4**, there were 9 crashes resulting in a 33.3% injury rate during this analysis period.

- The two most common contributing factors at this location were failure to yield and failure to keep in lane, which each contributed to 3 crashed during the most recent HCL period
- 2 of the crashes at this location resulted in vehicles departing from the roadway, one causing collision with a pole
- 5 of these 9 crashes were sideswipe-type crashes
- 5 of the 9 crashes occurred during the summer months of August to September
- 4 of these 9 crashes occurred during typical AM Peak hours

Photo 3: Exit 44 NB Diverge, captured by Google Maps⁵ in June of 2019, depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 3: Exit 44 NB Diverge



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	Both segments included in this RSA are straight and flat, which do not pose any sight distance concerns. The diverge point at Exit 44 NB at the time that it was classified as an HCL was a choice lane.
Lighting	Lighting is present at both the northbound and southbound diverges.
General Sign Issues	Signage is present ahead of both diverges for information including exit information, lane use and advisory speed signs. These signs were updated as a part of the recent construction.
Marking and Delineation	Pavement markings delineating lanes were in good condition at the time that these locations were noted as HCLs. Striping has been updated as a part of the recent construction.
Barriers and Clear Zones	Guardrail and concrete barrier span the median along both segments in this location to separate the northbound and southbound travel directions. Guardrail also exists along portions of the outside of both segments as a safety measure.
Bridges and Culverts	Bridge 0271 carries Holmes Road over I-95 at the southern segment at this location. This bridge has components which have been given condition ratings⁶ of good. Culvert 0272 which carrier I-95 over the Nonesuch River is located along the northern segment and does not present any condition ratings of concern.
Pavement	The pavement along both mainline segments in this area have been given pavement condition ratings ⁷ of B.

⁵ Google Maps accessed March 15, 2023

⁶ According to MaineDOT Map Viewer – Bridge Layer

⁷ MaineDOT Map Viewer – CSL Condition Data Simplified

Heavy Vehicles	The percentage of heavy vehicles along this mainline segment tends to average around 4% to 9% depending on direction and time of day.
----------------	---

Conclusions

Many of the recorded crashes at this location were congestion-related in this high volume area. Since the location has recently been under construction to widen the mainline and Exit 44 ramps to address congestion concerns through the area, the mitigation recommendations will focus around monitoring the area to ensure that the recent improvements are effective in clearing up congestion. Additionally, there were some crashes that involved standing water through the area, so this will also be recommended for monitoring to ensure that the new pavement is effective in draining water from the travel way.

Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.
- Mid-Term Solutions:
 - Monitor the area post-construction to identify any lingering or resultant safety concerns with special attention to concerns relating to congestion and drainage.

Toll Plaza High Crash Location: Exit 44 Toll Plaza

Nodes 17916 to 71277: I-295 WB at Exit 44 Toll Plaza

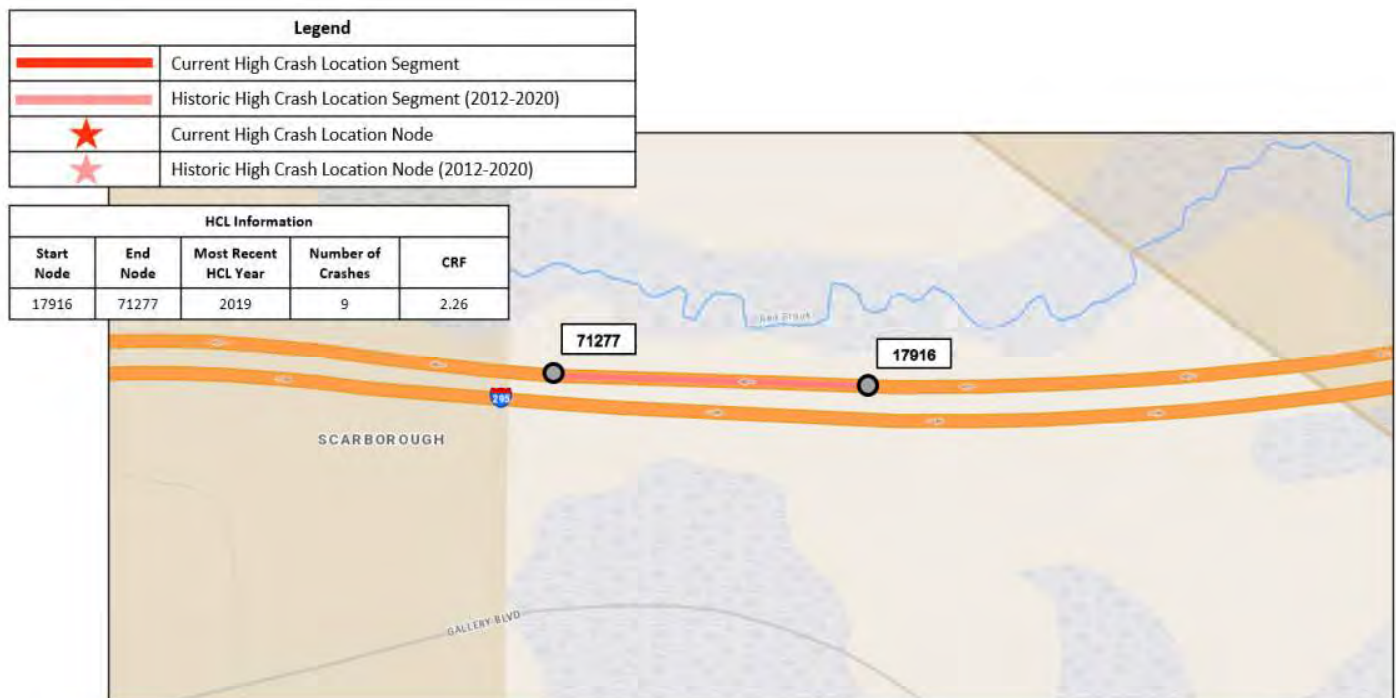
Introduction

There is 1 HCL at the Exit 44 Toll Plaza during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- I-295 WB at Exit 44 Toll Plaza

This segment is located in the Town of Scarborough in Cumberland County. It consists of a toll plaza along I-295 WB, just before the Exit 44 SB On Ramp. According to an AADT analysis performed by HNTB, the Exit 44 interchange is one of the most utilized interchanges along the entirety of the Turnpike. This is to be expected, as both I-95 and I-295 are both corridors with significant volumes, and this interchange is the intersection of the two which works as an access point to/from both. Additionally, the adjacent mainline segment between Exit 42 and Exit 44 is one of the most heavily traveled along the entirety of the turnpike.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Ongoing construction began in 2020 to implement an additional travel lane in both directions along the Turnpike from mile marker 43 to 46.4. This project also included the addition of a lane to the Exit 44 NB Off Ramp, resulting in a two-lane ramp which impacts the ramp and mainline segment along and directly adjacent to this HCL. Additionally, the toll plaza at this location underwent construction between 2017 and 2019 which converted some of the toll lanes to open road tolling collection.

General Mobility Observations

As previously noted, this mainline segment and the Exit 44 interchange are some of the most utilized sections of the entire Turnpike. This can likely be attributed to the I-295 access that the Exit 44 provides. The mainline segment between Exits 42 and 44 experiences seasonal fluctuations in volumes, with the months of June to October exhibiting higher volumes. This is due to an increase in tourism traffic in the area during this time of year, which also results in a higher percentage of drivers who are unfamiliar with the area during this time period.

Demographics

This segment begins within an area signed at 55 MPH which transitions to 50 MPH just after the toll plaza. Under the current configuration which includes open road tolling lanes, the cash collection plaza is signed at 10 MPH while the ORT lanes are signed at 55 MPH. The AADT¹ along this ramp and through the toll plaza is 14,607.

Corridor Characteristics

This segment begins as a 2 lane mainline segment traveling westbound with shoulders on both sides. Guardrail spans the inside of roadway to separate the eastbound and westbound travel directions. At the split for the toll, the lanes split with concrete barrier separating the two, with the left lane heading toward the ORT lanes and the right allowing access to the toll plaza lanes. Each of these individual lanes form to two lanes prior to reaching the collection area. Following the toll, the plaza lanes merge into one which ultimately merges into the two ORT lanes to create two lanes upon reaching I-95 SB.

¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

I-295 WB at Exit 44 Toll Plaza

While there is not a crash diagram currently available for the 2017-2019 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
5/25/2017	2:20 PM	Property Damage Only	Rear End/Sideswipe
5/8/2018	8:05 AM	Property Damage Only	Deer
2/2/2019	12:36 PM	Property Damage Only	Rear End/Sideswipe
6/11/2019	3:42 PM	Property Damage Only	Rear End/Sideswipe
6/13/2019	3:45 PM	Property Damage Only	Rear End/Sideswipe
7/17/2019	4:40 PM	Property Damage Only	Rear End/Sideswipe
8/17/2019	11:45 AM	Injury (Non-Fatal)	Other
10/14/2019	5:48 PM	Property Damage Only	Rear End/Sideswipe
10/30/2019	6:15 AM	Property Damage Only	Deer

It can be observed from this table that there were 9 crashes at this location with a 11.1% injury rate during this time period.

- Rear End/Sideswipe type crashes were the most common type during this time period
- 6 of these 9 crashes occurred between the months of May and August
- The most common time of crash during this period is early afternoon, with 5 crashes occurring between the hours of noon and 5:00pm
- The only crash that resulted in an injury has an unknown cause
- There were 2 collisions with large animals during this time period

Photo 1: I-295 WB Toll Plaza captured by Google Maps² in September of 2017 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-295 WB Toll Plaza



² Google Maps accessed on April 21, 2023

Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	The toll plaza portion of this roadway segment is straight and flat, with curved sections of roadway on either side of the toll plaza.
Lighting	Lighting exists around the toll plaza.
General Sign Issues	Signing exists near the toll plaza to note items including speed limits and collection type by lane.
Marking and Delineation	Adequate pavement markings exist along this section of roadway to separate travel lanes as well as shoulders. Additional markings exist at the toll plaza to aid in guiding vehicles through the lanes.
Barriers and Clear Zones	At the toll plaza concrete barrier separates the travel directions as well as the ORT and toll plaza collection lanes. Guardrail spans the outside of the roadway at the toll plaza.
Bridges and Culverts	There are no bridges or culverts along this roadway segment.
Pavement	The pavement along this segment has most recently been given a pavement condition rating ³ of A.
Heavy Vehicles	This segment tends to experience a percentage of heavy vehicles that averages from 2% to 5%.

Conclusions

As can be seen from **Photo 1**, this area was under construction during the time in which it was most recently noted as an HCL. For this reason, the safety recommendations will center around monitoring the toll plaza location now that construction has concluded.

There were two large animal collisions along this roadway segment. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term:
 - Monitor the toll plaza area post-construction to identify any lingering or resultant safety concerns. Include this location in MTA's large animal study.

³ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Interchange High Crash Location: Exit 45 Interchange

Nodes 19399 to 18653: Exit 45 On Ramps Approach

Nodes 14585: Route 703 Merge to Exit 45 NB SB On

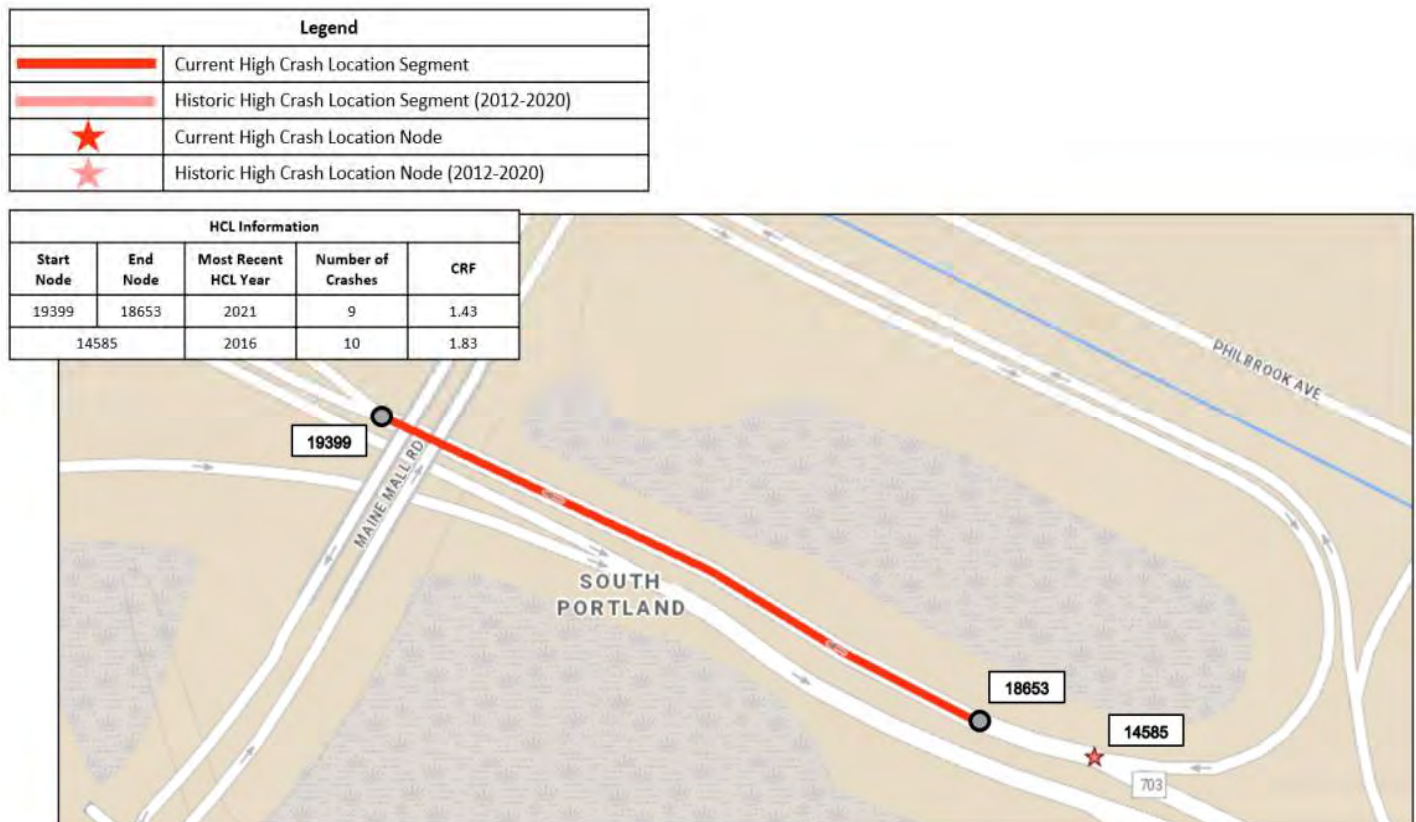
Introduction

There are 2 HCLs for the Exit 45 interchange area during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 45 On Ramps Approach
- Route 703 Merge to Exit 45 NB SB On

These locations are located in South Portland in Cumberland County. The first location is at the merge point between the Maine Turnpike Approach and the loop connecting Maine Mall Road to the Exit 45 on ramps. The other location is just north of this, a segment along the Maine Turnpike Approach which contains a toll plaza. According to an AADT analysis performed by HNTB, this interchange is one of the most utilized along the entirety of the Turnpike, providing access to/from locations including Maine Mall Road and I-295 which are each high volume corridors.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchange directly adjacent to this segment has recently been under construction to reconfigure it entirely. This includes aspects such as new Exit 45 interchange geometry, ramp access points and acceleration and deceleration lanes.

General Mobility Observations

As previously noted, the interchange directly adjacent to this location is one of the most utilized of all of the interchanges along the Turnpike. This is due to its access to high volume corridors including I-295 and Maine Mall Road. The mainline segments adjacent to this intersection experiences seasonal traffic variation, with increased volumes experienced during the months of May through October. This trend is due to increased tourism in this location during those months, which also comes with increased volumes of drivers who are less familiar with the area.

Demographics

The loop from Maine Mall Road is signed with a 25 MPH advisory speed. The Maine Turnpike approach is signed with a 55 MPH speed limit which drops to 10 MPH at the toll plaza. The AADT¹ along the Maine Turnpike Approach along the HCL segment is 12,587, while the AADT along the loop from Maine Mall Road is 4,261.

Corridor Characteristics

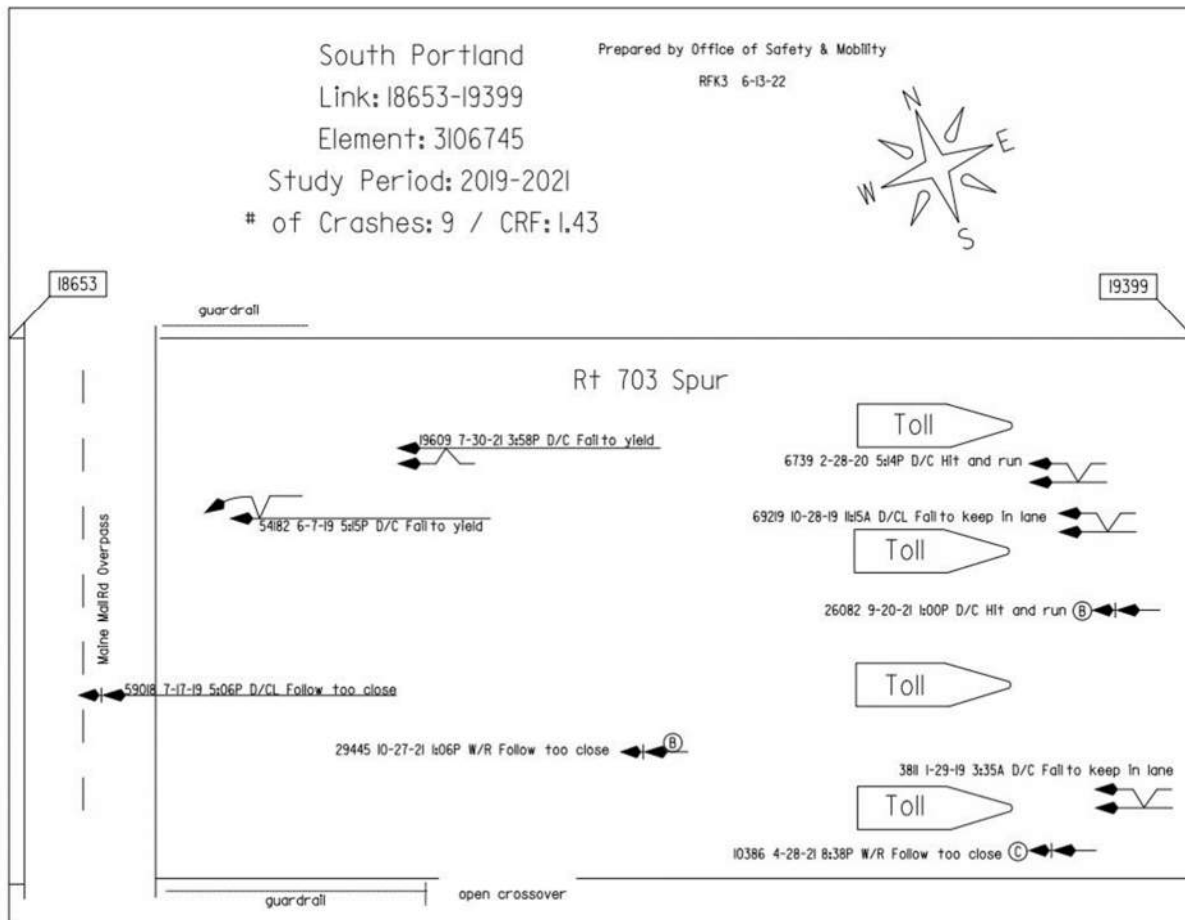
The loop from Maine Mall Road is a single lane ramp which is yield-controlled at the merge with the two-laned Maine Turnpike Approach. Immediately following the merge point, the lanes open up to 4 lanes through the toll plaza. Following the toll plaza, the roadway forms two lanes; one used to access I-95 NB and another to access I-95 SB. Upon approaching the merge, the ramp from Maine Mall Road has guardrail along the right side of the road and the Maine Turnpike Approach has guardrail along the left side to separate the on ramp and off ramp travel directions.

¹ MaineDOT Map Viewer

Exit 45 On Ramps Approach

Figure 1: 2019-2021 Exit 45 On Ramp Toll Plaza Crash Diagram depicts the toll plaza segment for the most recent time period in which it was identified as an HCL. This location has been classified as an HCL for 4 other time periods over the last 10 years.

Figure 1: 2019-2021 Exit 45 On Ramp Toll Plaza Crash Diagram



As shown in **Figure 1**, there were 9 crashes resulting in a 33.3% injury rate during this analysis period.

- The most common cause of crash at this location is following too close which was a contributing factor for 3 of these 9 crashes
- Failure to yield, failure to keep in lane and hit and runs were the other types of crashes at this location, each contributing to 2 crashes
- 6 of the 9 crashes at this location happened from May to October, the time period in which there is an increased volume at this interchange
- 4 of these recorded crashes happened during the typical PM Peak hours of around 4:00pm to 6:00pm
- 7 of these crashes occurred when the pavement was dry and the weather was either clear or cloudy, while the other 2 happened during rain when the pavement was wet

Photo 1: Exit 45 On Ramp Toll Plaza (2019) captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

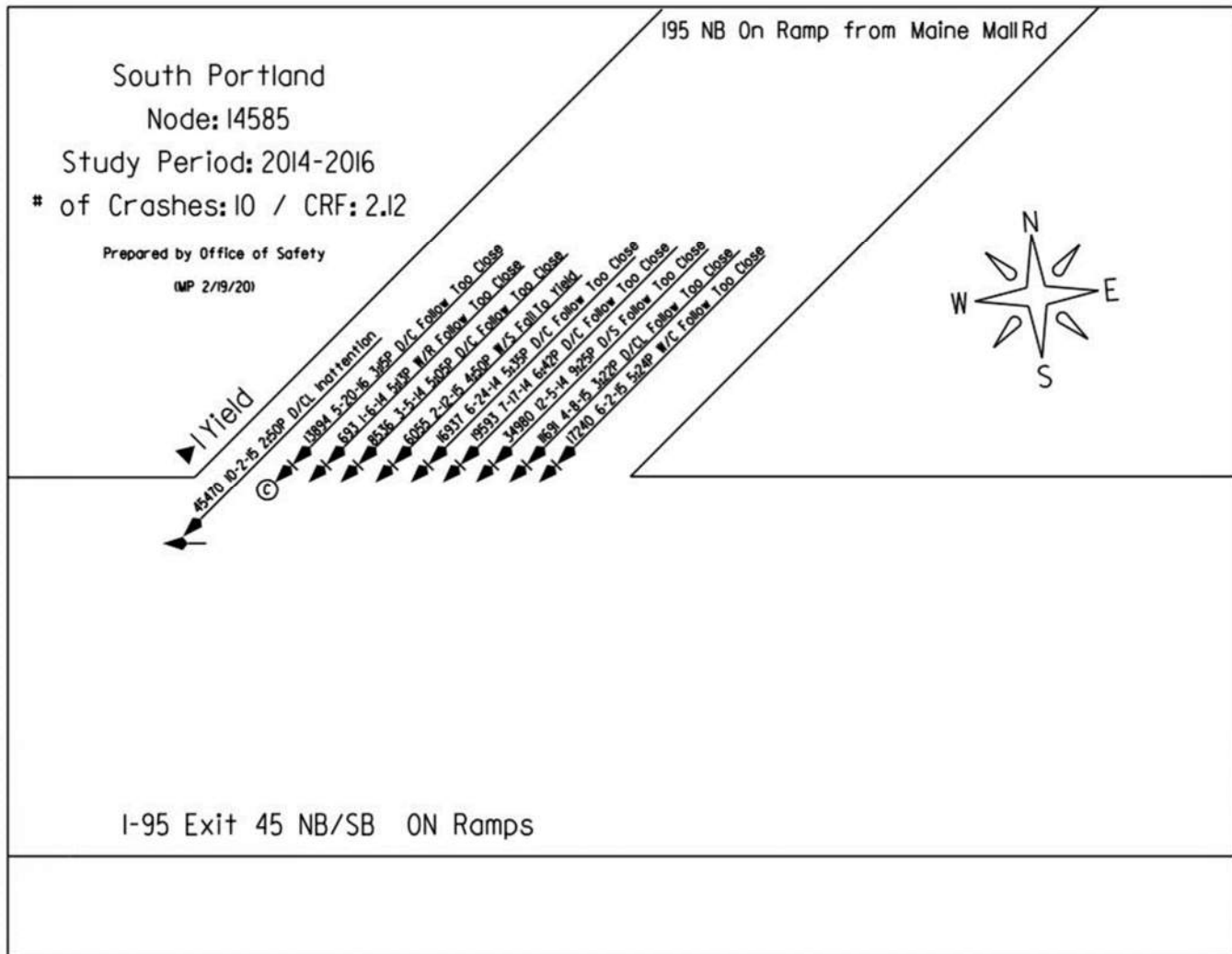
Photo 1: Exit 45 On Ramp Toll Plaza (2021)



² Google Maps accessed March 15, 2023

Figure 2: 2014-2016 Route 703 Merge to Exit 45 On Ramps Crash Diagram depicts the crash diagram for the merge point of the Maine Turnpike Approach and ramp from Maine Mall Road during the most recent period in which it was identified as an HCL. This location was identified as an HCL for 3 other time periods over the past 10 years.

Figure 2: 2014-2016 Route 703 Merge to Exit 45 On Ramps Crash Diagram



As shown in **Figure 2**, there were 10 crashes resulting in a 10% injury rate during this analysis period.

- 1 of these crashes was a turning movement crash while the other 9 happened at the ramp from Maine Mall Road approach
- 8 of the 9 crashes at the approach were a result of vehicles following too close
- 5 of these crashes occurred between the months of May and October when there are increased volumes in this area

Photo 2: Route 703 Merge with Exit 45 On Ramps (2016) captured by Google Maps³ in August of 2016 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: Route 703 Merge with Exit 45 On Ramps (2016)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	The Maine Turnpike Approach at this location is straight and flat, with the toll plaza being the only obstruction that would be anticipated to cause some potential sight distance concerns. The ramp from Maine Mall Road has a curve with a radius measuring around 200 feet.
Lighting	The merge and toll plaza areas have lighting.
General Sign Issues	There is signage at the merge indicating the yield movements, as well as at the toll plaza which indicate things such as speed limits and lane usage.
Marking and Delineation	These areas are well marked to indicate lane separation.
Barriers and Clear Zones	Guardrail is present along the outside of the Maine Mall Road ramp. There is also guardrail along the Maine Turnpike Approach to separate the on ramp and off ramp travel directions.
Bridges and Culverts	Culvert 974423 is along the ramp from Maine Mall Road, just before the merge. This culvert was most recently given a condition rating ⁴ of Good. Bridge 6450 carries Maine Mall Road over the interchange segment HCL and has components which were most recently given condition ratings ⁵ of good and very good.
Pavement	The pavement along the Maine Mall Road ramp was most recently given a pavement condition rating ⁶ of F, while the Maine Turnpike Approach pavement along the HCL segment was rated as C and D.

³ Google Maps accessed March 15, 2023

⁴ According to MaineDOT Map Viewer – Cross Culvert Layer

⁵ According to MaineDOT Map Viewer – Bridges Layer

⁶ MaineDOT Map Viewer – CSL Condition Data Simplified

Heavy Vehicles	The percentage of heavy vehicles at this location varies from 2% to 5% on average.
----------------	--

Conclusions

Since the interchange adjacent to this location has recently undergone major construction for reconfiguration, the mitigation strategies for these HCLs will focus around monitoring the location(s) post-construction to identify whether any safety concerns remain.

Recommendations

- Short-Term Solutions:
 - Monitor the area post-construction to identify any lingering or resultant safety concerns.

Intersection High Crash Location: Exit 45 Intersection

Node 15530: Exit 45 Off Ramp and Payne Rd Intersection

Node 15531: Exit 45 On and Payne Rd Intersection

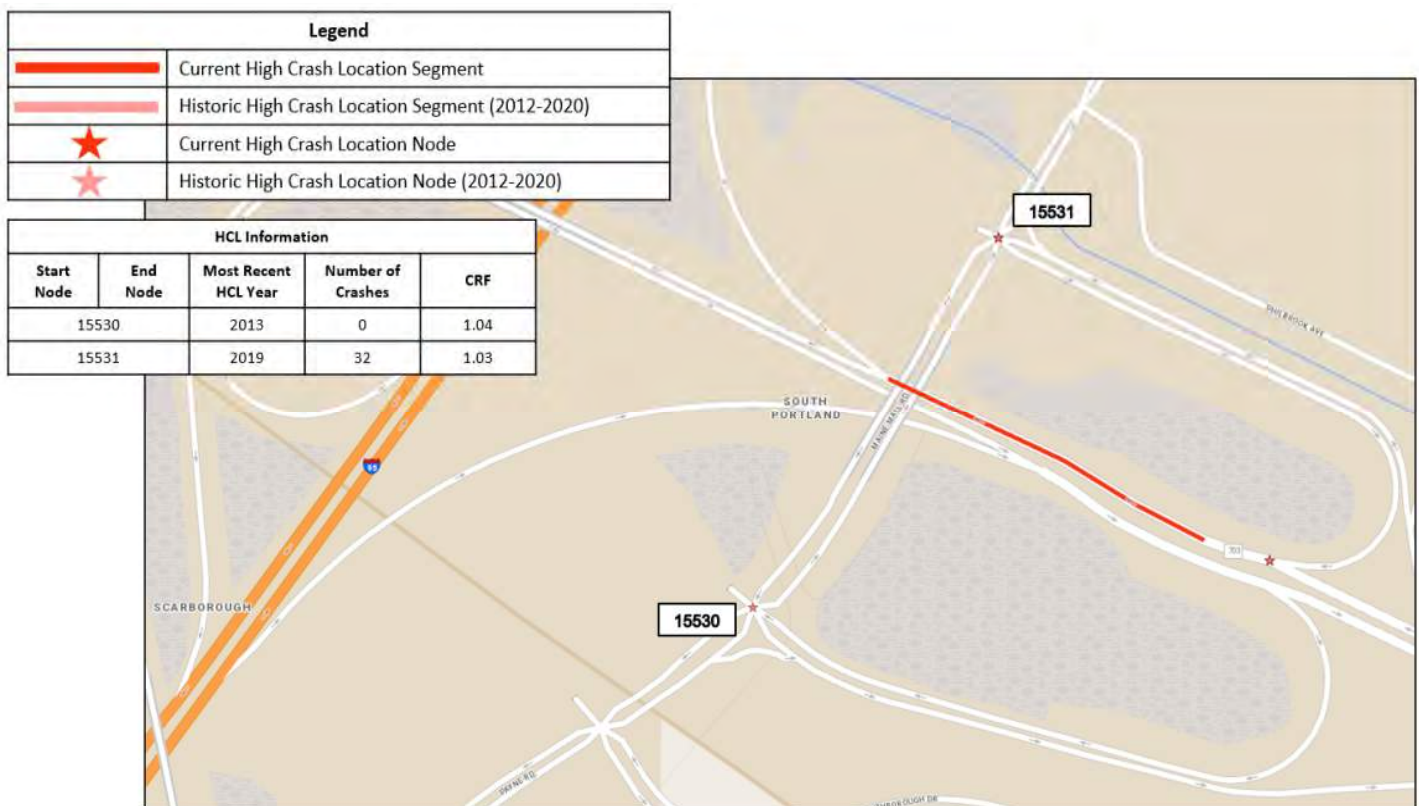
Introduction

There are 2 HCLs at the Exit 45 intersections during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 45 Off Ramp and Payne Road Intersection
- Exit 45 On and Pay Road Intersection

These locations are located in South Portland in Cumberland County. The two locations are the intersections between the ramps to/from the Exit 45 interchange and Maine Mall Road. According to an AADT analysis performed by HNTB, this interchange is the sixth most utilized along the entirety of the Turnpike, providing access to/from locations including Maine Mall Road and I-295 which are each high volume corridors.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchange directly adjacent to this segment has recently been under construction to reconfigure it entirely. This includes aspects such as new Exit 45 interchange geometry, ramp access points and acceleration and deceleration lanes.

General Mobility Observations

As previously noted, the interchange adjacent to these intersections is one of the six most utilized of all of the interchanges along the Turnpike. This is due to its access to high volume corridors including I-295 and Maine Mall Road. The mainline segments adjacent to this intersection experiences seasonal traffic variation, with increased volumes experienced during the months of May through October. This trend is due to increased tourism in this location during those months, which also comes with increased volumes of drivers who are less familiar with the area.

Demographics

The AADTs and posted speed limits for the major legs of each intersection can be found in the table below:

Location	AADT ¹	Speed Limit
On Ramp Intersection: Ramps Approach	6,786	25 MPH (Advisory Speed)
On Ramp Intersection: Payne Road NB Approach	8,330	35 MPH
On Ramp Intersection: Maine Mall Road SB Approach	11,908	35 MPH
Off Ramp Intersection: Ramps Approach	3,766	25 MPH (Advisory Speed)
Off Ramp Intersection: Payne Road NB Approach	7,734	35 MPH
Off Ramp Intersection: Payne Road NB Approach	13,707	35 MPH

Corridor Characteristics

Both intersections are four-legged signalized intersections which consist of Payne Road NB, Exit 45 ramps WB and a commercial drive EB. The on ramps approach has pedestrian accommodations at the ramps leg of the intersection, while the other has accommodations at all legs other than the commercial drive. All legs of both intersections consist of concrete medians to separate travel directions. Some corners of each intersection consist of guardrail, and a combination of bridge rail and guardrail spans the majority of Payne Road between the two intersections. A summary of the lane configurations, including number of approach and receiving lanes at each leg, can be found in the table below:

Intersection	Approach	Number of Approach Lanes	Number of Receiving Lanes
On Ramp Intersection	Ramps Approach	3 (L, LT, R)	2
	Payne Road NB Approach	4 (L, T, T, TR)	2
	Maine Mall Road SB Approach	4 (L, L, T, TR)	3
	Commercial Drive	1 (LTR)	1
Off Ramp Intersection	Ramps Approach	2 (LT,R)	3 (1 from NB slip ramp)
	Payne Road NB Approach	5 (L, T, T, T, R)	2
	Payne Road SB Approach	4 (L, L, T, TR)	3
	Commercial Drive	2 (LT,R)	1

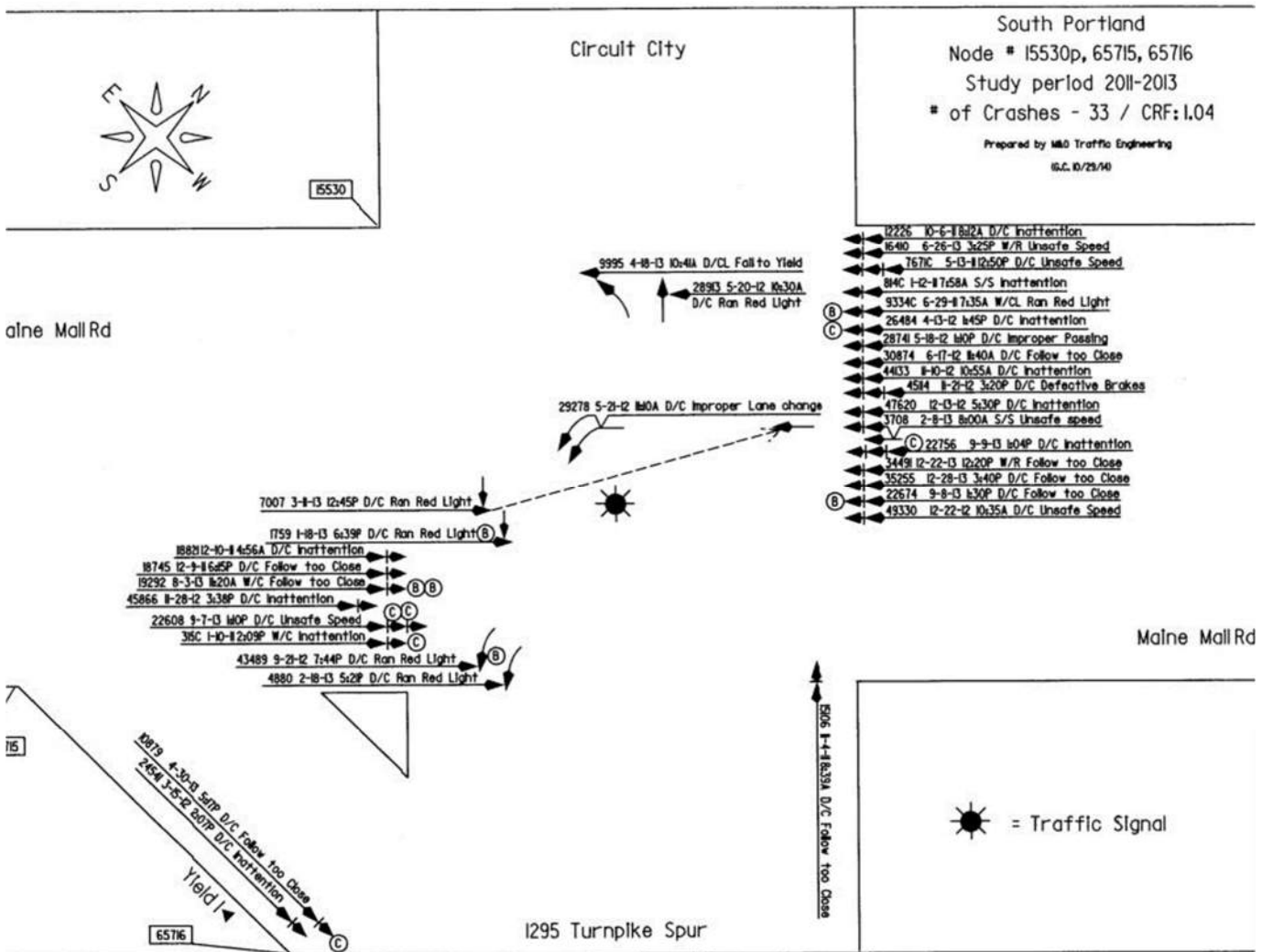
¹ MaineDOT Map Viewer

Crash analysis

Exit 45 Off Ramp and Payne Road Intersection

Figure 2: 2011-2013 Exit 45 Off Ramp Intersection Crash Diagram depicts the crash diagram for the most recent time period in which this intersection was identified as an HCL. 2011-2013 was the only time period over the past 10 years in which this intersection was identified as an HCL.

Figure 2: 2011-2013 Exit 45 Off Ramp Intersection Crash Diagram



As shown in **Figure 2**, there were 33 crashes resulting in a 30.3% injury rate during this analysis period.

- While there were some intersection movement crashes at this location, the majority of the crashes at the intersection occurred at its approaches
 - The Maine Mall Road approach consisted of the most crashes with 17 of the 33 crashes happening at this location
- Inattention was the leading contributing factor at this location, causing 10 crashes at this location
- This is closely followed by following too close, running red lights, and unsafe speeds which account for 8, 6 and 5 crashes, respectively
- 13 of the 33 reported crashes at this location occurred between May and October when the adjacent mainline segments experience seasonal volume increases

- There does not appear to be a strong correlation between time of day and crash frequency at this location, as crashes seem to be distributed throughout the day

Photo 1: Exit 45 Off Ramp Intersection (2011) captured by Google Maps² in August of 2011 depicts the condition of this location at the time that it was most recently noted as an HCL.

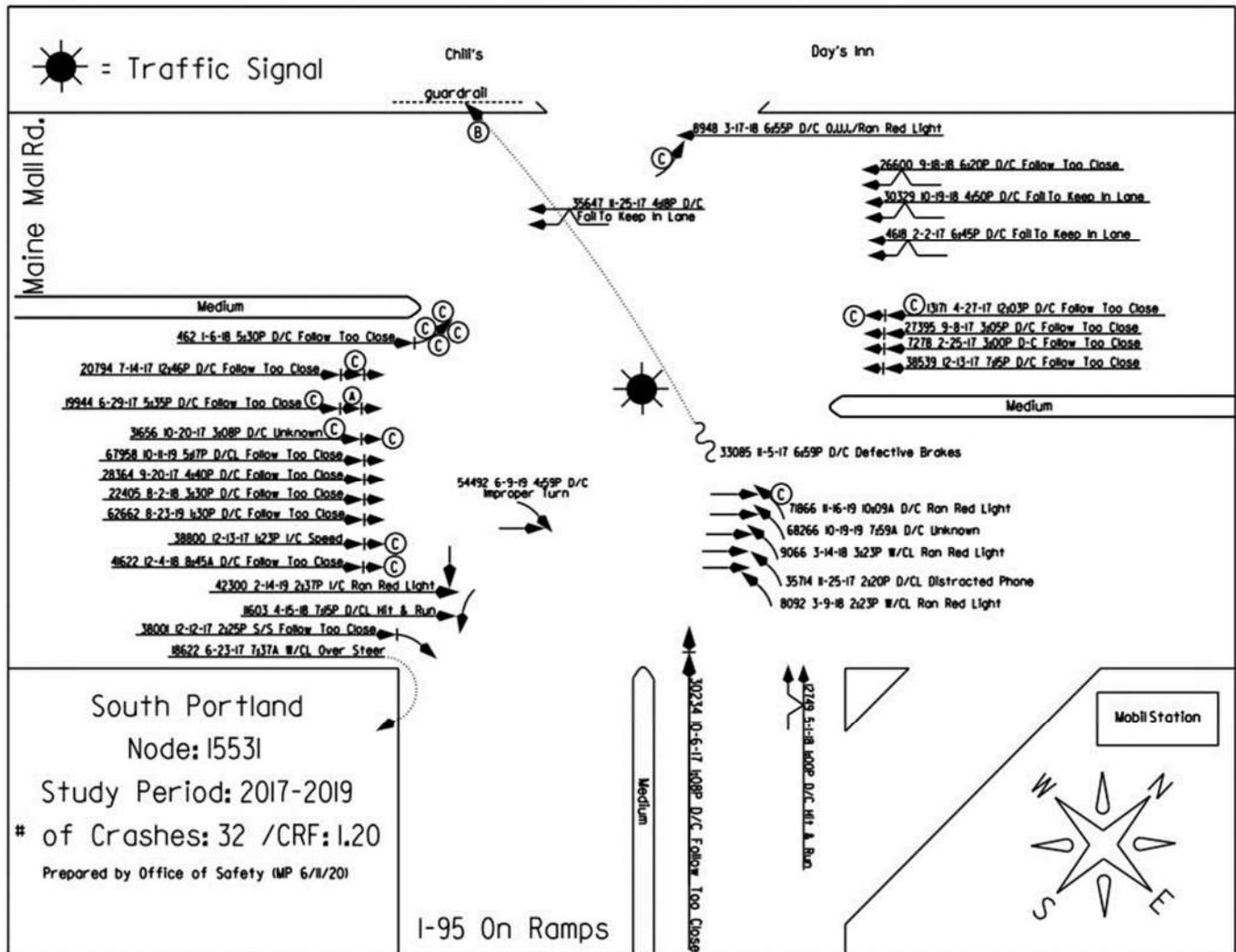
Photo 1: Exit 45 Off Ramp Intersection (2011)



² Google Maps accessed March 16, 2023

Figure 3: 2017-2019 Exit 45 On Ramps Intersection Crash Diagram depicts the crash diagram for this intersection during the most recent time period in which it was identified as an HCL. This location was also classified as an HCL during 5 other time periods over the past 10 years.

Figure 3: 2017-2019 Exit 45 On Ramps Intersection Crash Diagram



As shown in **Figure 3**, there were 32 crashes resulting in a 31.3% injury rate during this analysis period.

- 13 of these 32 crashes were a result of vehicles following too closely
- The next most common crash causes were running red lights and failure to keep in lane which contributed to 5 and 3 crashes, respectively
- 20 of these crashes (63%) involved vehicles originating from the Payne Road NB Approach
- 9 of the crashes at this location were intersection movement crashes
- 15 of these crashes occurred between May and October when the adjacent mainline segments experience seasonal volume increases
- 17 of these crashes occurred during the evening hours of approximately 3:00pm to 7:00pm
- 26 of these 32 crashes occurred when the pavement was dry and the weather was either clear or cloudy

Photo 3: Exit 45 On Ramps Intersection (2019) captured by Google Maps³ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 3: Exit 45 On Ramps Intersection (2019)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	The approaches of the On Ramps intersection are straight and flat with the exception of the Payne Road NB approach, which is straight with a downward slope resulting from the adjacent overpass bridge. At the Off Ramps intersection, Payne road has a slight curve and approaches with a downward slope from the overpass bridge.
Lighting	Lighting is present at both intersections.
General Sign Issues	Both intersections consist of signage including lane use signs, do not enter signs, no U-turn signs and wrong way signs.
Marking and Delineation	Both intersections have adequate markings which accomplish designating lane use and separating lanes.
Barriers and Clear Zones	Guardrail is present along some intersection legs to protect against hazards including the overpass bridge. Concrete medians exist at each intersection approach to separate travel directions.
Bridges and Culverts	Bridge 6450 carries Payne Road over the Exit 45 ramps between the two intersections and has components that have most recently been given condition ratings⁴ of good and very good. Cross culvert number 1075102 is along the ramps approach of the On Ramps Intersection and has most recently been given a condition rating⁵ of good.
Pavement	The pavement along the main approaches of each intersection have been given the following condition ratings ⁶ :

³ Google Maps accessed March 16, 2023

⁴ According to MaineDOT Map Viewer – Bridge Layer

⁵ According to MaineDOT Map Viewer – Cross Culverts Layer

⁶ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

	On Ramps Intersection: • Ramps Approach: A • Payne Road NB Approach: B • Maine Mall Road SB Approach: C Off Ramps Intersection: • Ramps Approach: D • Payne Road NB Approach: B • Payne Road SB Approach: C
Heavy Vehicles	The percentage of heavy vehicles at the Exit 45 interchange averages from 0% to 9%, depending on direction and time of day.

Conclusions

Following too closely was the most common cause of crash at the On Ramp intersection, which is a common crash type at areas that are nearing or at capacity. If this location continues to be an HCL post-construction, its signal timing, phasing and geometry (especially in regards to lane use) should be evaluated for traffic flow improvement.

Recommendations

- Short-Term Solutions:
 - Coordinate with MaineDOT and the local municipality regarding potential improvements to Exit 45.

Mainline High Crash Location: Prior to Exit 47 NB

Nodes 19737 to 18602: Exit 47 NB Off Ramp Approach

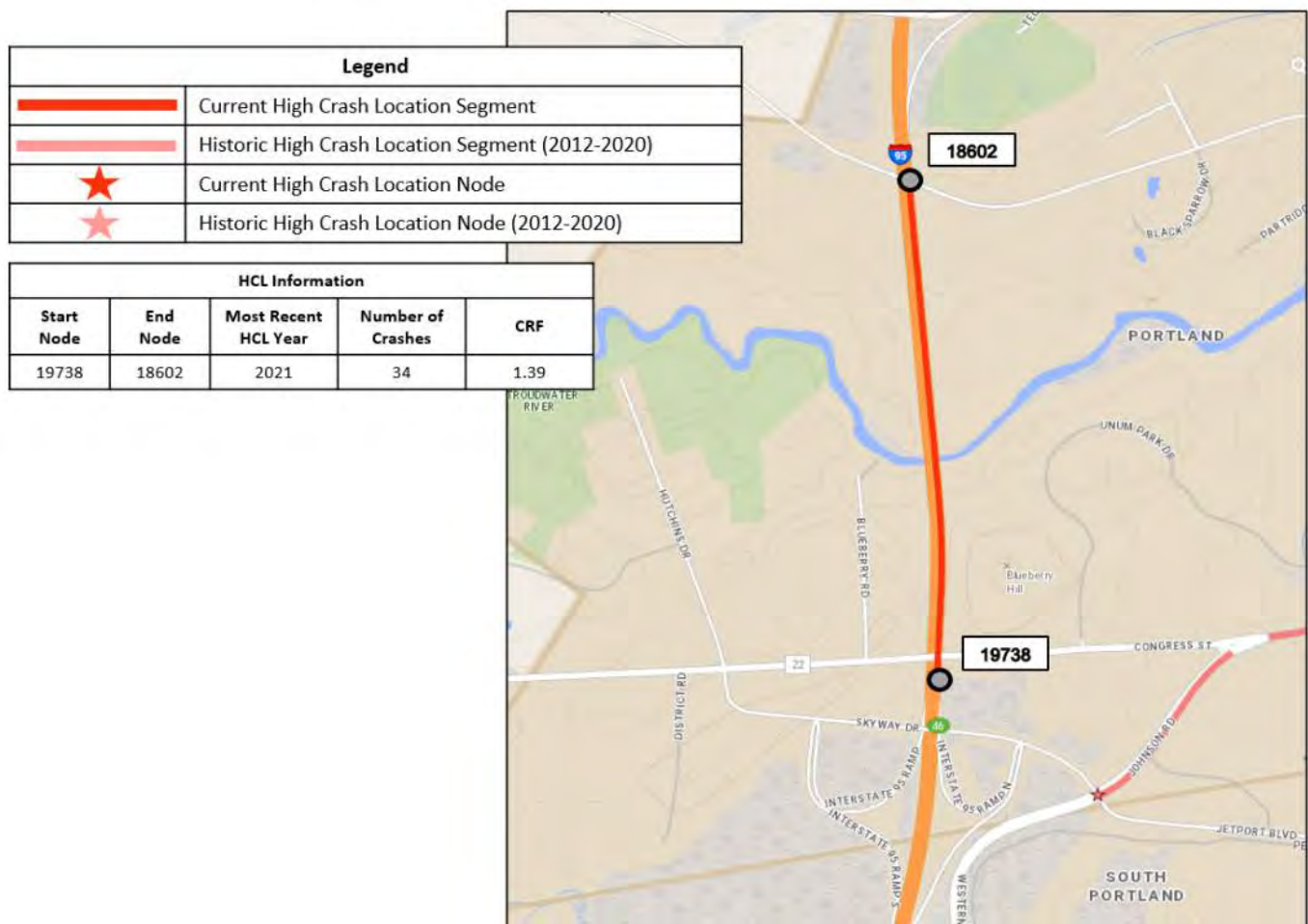
Introduction

There is 1 HCL for the mainline segment of mile marker 46-47 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 47 NB Off Ramp Approach

This mainline segment is located along the I-95 NB Mainline in the City of Portland in Cumberland County. It begins just south of the Congress Street overpass and ends just south of the diverge for the Exit 47 NB Off Ramp. Exit 47 provides access to Rand Road and surrounding areas in Portland. Due to the close proximity of the Exits 46 and 47 interchanges, this segment spans almost the entire length of mainline that separates the exits.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Both interchanges adjacent to this mainline segment have recently undergone construction activities. The exit 46 intersection has had an additional toll plaza added and has undergone NB ramp widening. The Exit 47 interchange has undergone intersection changes including signalization and intersection improvements. In addition, this mainline segment is currently under construction to widen the area to three lanes (this widening is through the Exit 48 interchange).

General Mobility Observations

While the Portland area is a location that tends to experience some of the highest volumes along the Turnpike, this particular section has a drop in volumes as compared to some of the mainline segments south of this location. In addition, this location experiences seasonal variation that is less emphasized than some of the more southerly segments. The variation between these interchanges is most focused between the months of June and August.

Demographics

This mainline has a posted speed limit of 55 MPH and an AADT¹ of 26,598.

Corridor Characteristics

This segment currently consists of two lanes which carry vehicles along I-95 NB. The area is currently under construction to widen this area to be three lanes. Due to this, the area is under construction conditions, with shifted mainline lanes, a narrow inside shoulder and construction barrels designating the outside shoulder. There are not currently rumble strips along the shoulders, but this is likely due to the current construction conditions, as there were rumble strips along both the inside and outside shoulders pre-construction. Similarly, guardrail was present along both sides of the road pre-construction, while currently barrels are along the outside of the roadway and guardrail is present along the inside of the road to separate the northbound and southbound travel directions.

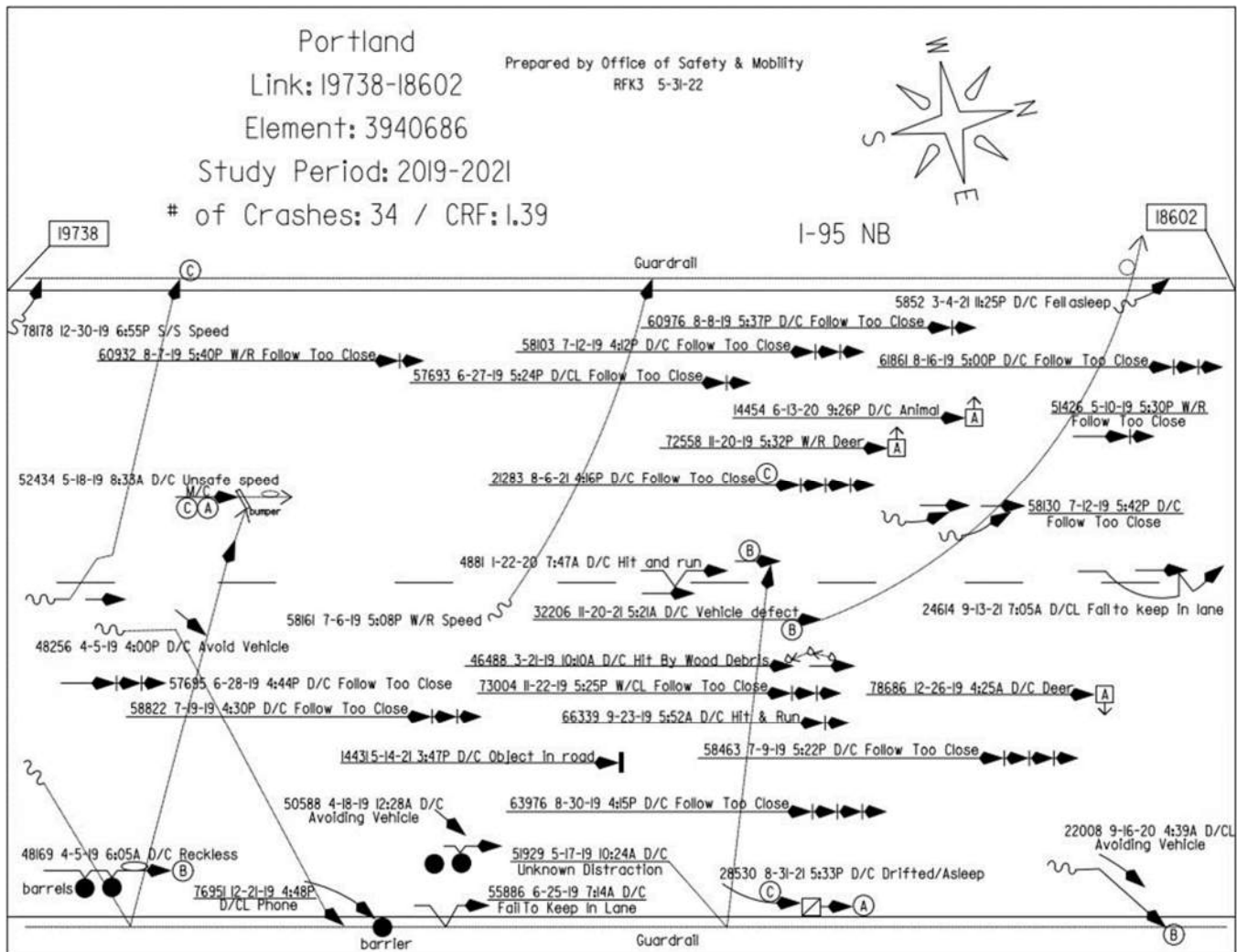
¹ 2022 AADY Summary Created by HNTB for MTA

Crash analysis

Exit 47 NB Off Ramp Approach

Figure 2: 2019-2021 NB Mile Marker 46-47 Crash Diagram depicts the crash diagram for the time period in which this mainline segment was most recently identified as an HCL. This location was also classified as an HCL during the two prior analysis time periods (2018-2020 and 2017-2019).

Figure 2: 2019-2021 NB Mile Marker 46-47 Crash Diagram



As shown in **Figure 2**, there were 34 crashes resulting in a 20.6% injury rate during this analysis period.

- 13 of these 34 crashes were caused by vehicles following too close
- 3 of these crashes were collisions with animals
- 11 of these crashes resulted in vehicles departing the travel way and colliding with guardrail or barrier
- 3 of the crashes at this location resulted in vehicles colliding with construction barrels
- 14 of these 34 crashes occurred between the months of June and August when this segment tends to experience increased volumes
- 19 of these 34 crashes occurred during the typical PM Peak hours of approximately 3:00pm to 6:00pm
- 28 of these crashes occurred when the pavement was dry and the weather was either clear or cloudy

Photo 1: I-95 NB South of Exit 47 Off Ramp (2019) captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 NB South of Exit 47 Off Ramp (2019)



Findings and Observations

Existing Road Audit ³	
Road alignment and Cross Section	This segment is along slight horizontal and vertical curvature. However, the curves are not so abrupt as to create sight distance concerns.
Lighting	Lighting spans the beginning portion of this mainline segment and can also be found around the Exit 47 interchange.
General Sign Issues	Typical signage through this area is to notify drivers of the upcoming Exit 47 interchange. Under current conditions, this segment has temporary construction signage throughout.
Marking and Delineation	Temporary pavement markings are currently along the entirety of this segment to designate the temporary lane configuration.
Barriers and Clear Zones	While guardrail could be found spanning both sides of the roadway pre-construction, it is currently along the inside of the roadway to separate the northbound and southbound travel directions while construction barrels can be found along the outside of the travel way.
Bridges and Culverts	Bridge 0343 is near the southerly end of this segment and carries Congress Street over I-95. This bridge has components which have been given condition ratings⁴ of satisfactory, good and very good. Bridge 0344 is along the segment and carries I-95 NB over the Stroudwater River. This bridge has components which have been given condition ratings of satisfactory and good. Bridge 0345 which carries Westbrook Street over I-95 is near the northerly end of this segment and has components which have been given condition ratings of good and very good.
Pavement	The pavement through this segment has been given a pavement condition rating ⁵ of B.
Heavy Vehicles	The percentage of heavy vehicles along this mainline segment tends to average between 3% and 8%, depending on the time of day.

² Google Maps accessed March 16, 2023

⁴ According to MaineDOT Map Viewer – Bridge Layer

⁵ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Conclusion

Over the past 10 years, this location has recently began being classified as an HCL. Many of the crashes at this location were consistent with locations that experience high volumes and congestion. Since this location is currently undergoing widening construction to address this congestion, the mitigation recommendations will focus around monitoring the location post-construction for any remaining and/or resultant safety concerns.

Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.
- Mid-Term Solutions:
 - Monitor the area post-construction to identify any lingering or resultant safety concerns.

Mainline High Crash Location: Prior to Exit 47 SB

Nodes 18667 to 59837: Exit 47 SB Off Ramp Approach

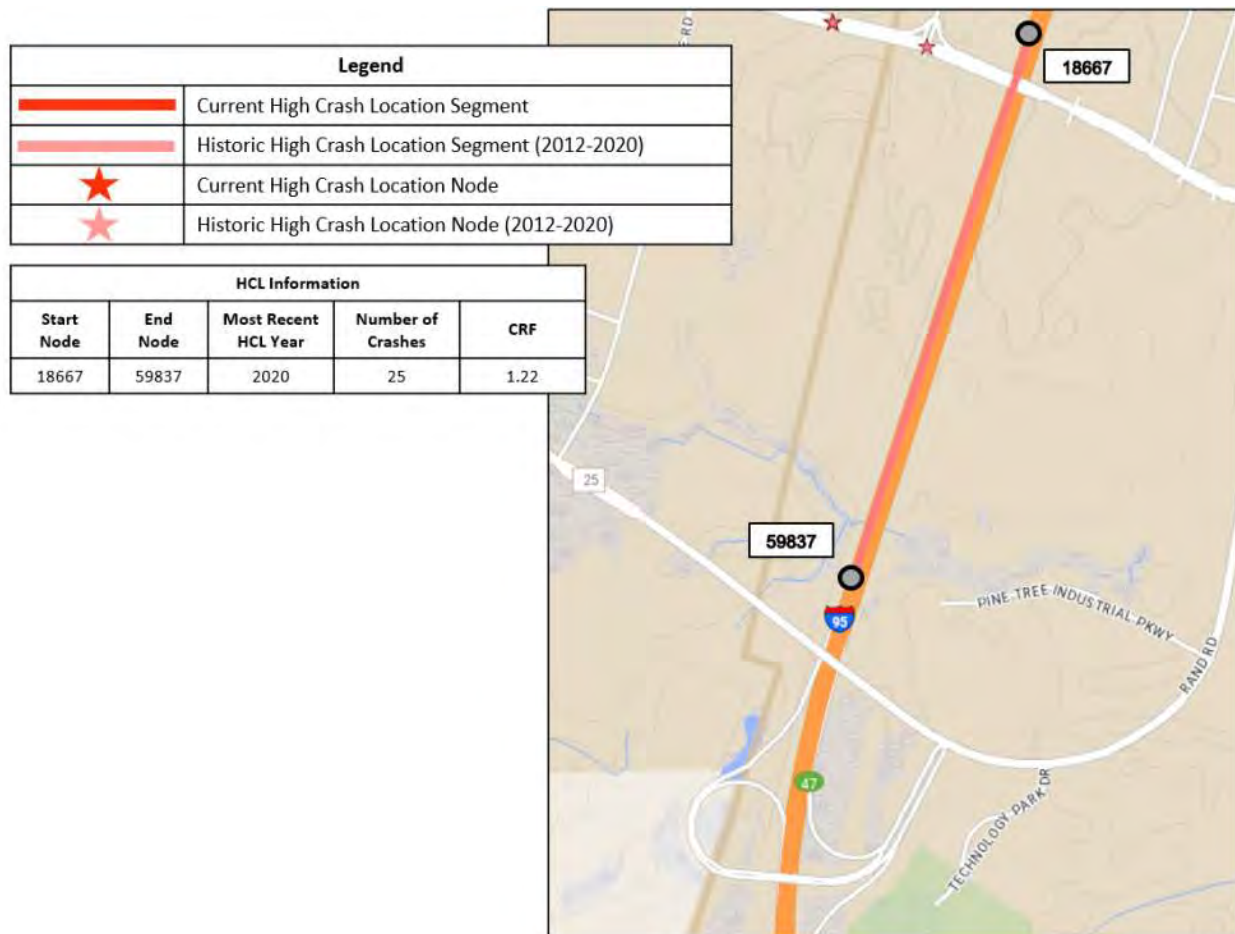
Introduction

There is 1 HCL for the mainline segment of mile marker 47-48 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 47 SB Off Ramp Approach

This mainline segment is located along the I-95 SB Mainline in the City of Portland in Cumberland County. The segment spans from just north of the Brighton Ave overpass (just south of the Exit 48 SB On Ramp merge point) at the northern end to just north of the Exit 47 SB Off Ramp diverge at the southern end. Exit 47 provides access to Rand Road and surrounding areas in Portland while Exit 48 provides access to Route 25/25B.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The intersection adjacent to the Exit 47 interchanges, which connects the Turnpike to Rand Road, underwent construction in 2018 which included intersection reconfiguration and improvements.

General Mobility Observations

This portion of mainline tends to be more commuter-driven than the interchanges and mainline segments to its south. While there is still a seasonal peak in traffic volumes that occurs from May to September, the variation from the volumes during the rest of the year is less than what can be observed along the mainline to the south.

Demographics

This segment of mainline has a posted speed limit of 65 MPH and an AADT¹ of 26,060.

Corridor Characteristics

This mainline segment currently consists of two mainline lanes with shoulders on each side. While rumble strips are currently not present along the segment, it can be assumed that this is due to the ongoing construction activities through the area, as rumble strips previously lines the outside shoulder. A combination of guardrail, concrete barrier and bridge rail span the inside of the roadway to separate the northbound and southbound travel directions. As of July 2022, the northerly end of this segment had concrete barrier along the outside of the travel way as a art of the construction conditions.

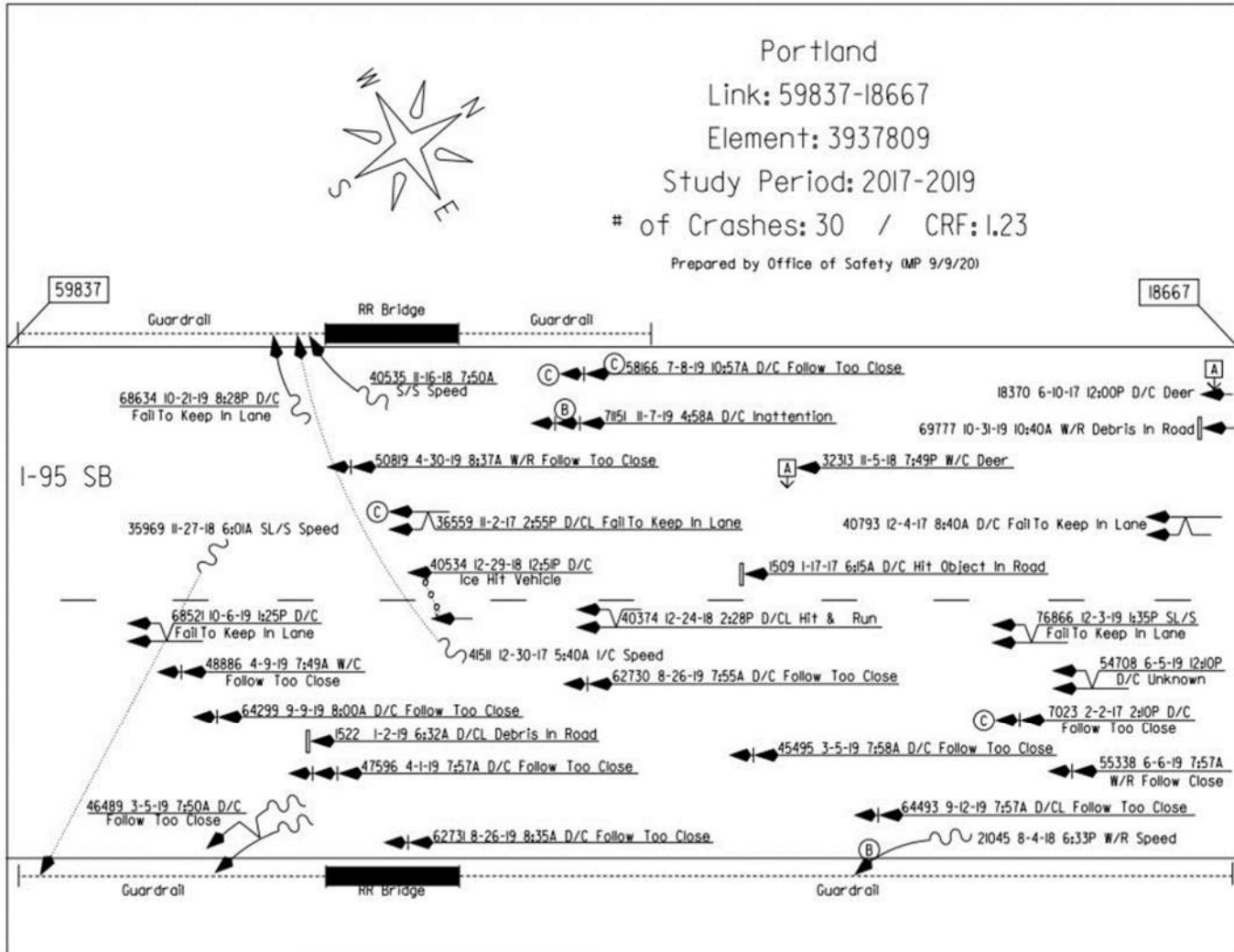
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Exit 47 SB Off Ramp Approach

Figure 2: 2017-2019 I-95 SB Mile Marker 47-48 Crash Diagram depicts the mainline segment at the time that it was most recently identified as an HCL. This location was also classified as an HCL during the 2016-2018 time period.

Figure 2: 2017-2019 I-95 SB Mile Marker 47-48 Crash Diagram



As shown in **Figure 2**, there were 30 crashes resulting in a 16.7% injury rate during this analysis period.

- The leading cause of crash at this location was following too close, which contributed to 12 of the 30 recorded crashes at this location
- Failure to keep in lane was the next most common factor, causing 5 crashes
- 2 of the crashes at this location involved collisions with animals
- 6 of the crashes at this location resulted in vehicles departing from the travel way and colliding with guardrail
- 20 of these 30 crashes occurred when the pavement was dry and the weather was either clear or cloudy
- 15 of these crashes occurred during the months of October through February when this area typically experiences winter weather
- 15 of the recorded crashes at this location occurred during the hours of approximately 6:00am to 9:00am

Photo 1: I-95 SB Just North of Exit 47 Off Ramp (2019) captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 SB Just North of Exit 47 Off Ramp (2019)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This roadway segment is straight with some vertical curvature at the bridge over the railroad crossing. This is not steep enough of a curve to create sight distance concerns.
Lighting	Some temporary lighting currently spans this area as a part of the construction setup. Permanent lighting exists around the Exit 47 interchange.
General Sign Issues	Signage for the Exit 47 interchange can be found along this mainline segment.
Marking and Delineation	As can be seen in Photo 1 , this location has recently been under temporary configuration and is adequately striped as such. Markings designate lane separation throughout the segment.
Barriers and Clear Zones	Guardrail, concrete barrier and bridge rail can be found along the median through the entirety of this segment to separate the northbound and southbound travel directions. Under the temporary construction conditions, concrete barrier is currently along the outside of the roadway.
Bridges and Culverts	There are two bridges along this segment: Bridge 0347 carries Brighton Ave over I-95 NB and SB and has components which have most recently received condition ratings ³ of good.

² Google Maps accessed March 16, 2023

³ According to MaineDOT Map Viewer – Bridge Layer

	Bridge 1485 carries this segment of I-95 SB over a railroad crossing and has components which have most recently been given condition ratings of satisfactory and good.
Pavement	The pavement along this segment has been given a pavement condition rating ⁴ of B.
Heavy Vehicles	This mainline segment has a percentage of heavy vehicles of approximately 6%.

Conclusion

Over the past 10 years, this location has recently began being classified as an HCL. Many of the crashes at this location were consistent with locations that experience high volumes and congestion. Since this location is currently undergoing widening construction to address this congestion, the mitigation recommendations will focus around monitoring the location post-construction for any remaining and/or resultant safety concerns.

Recommendations

- Mid-Term Solutions:
 - Monitor the area post-construction to identify any lingering or resultant safety concerns.

⁴ MaineDOT Map Viewer – CSL Condition Data Simplified Layer

Intersection & Interchange High Crash Location: Exit 48

Node 18670: Exit 48 Intersection

Nodes 15890 to 65548: Riverside St SB Approach

Nodes 18673 to 65549: Exit 48 Plaza Segment

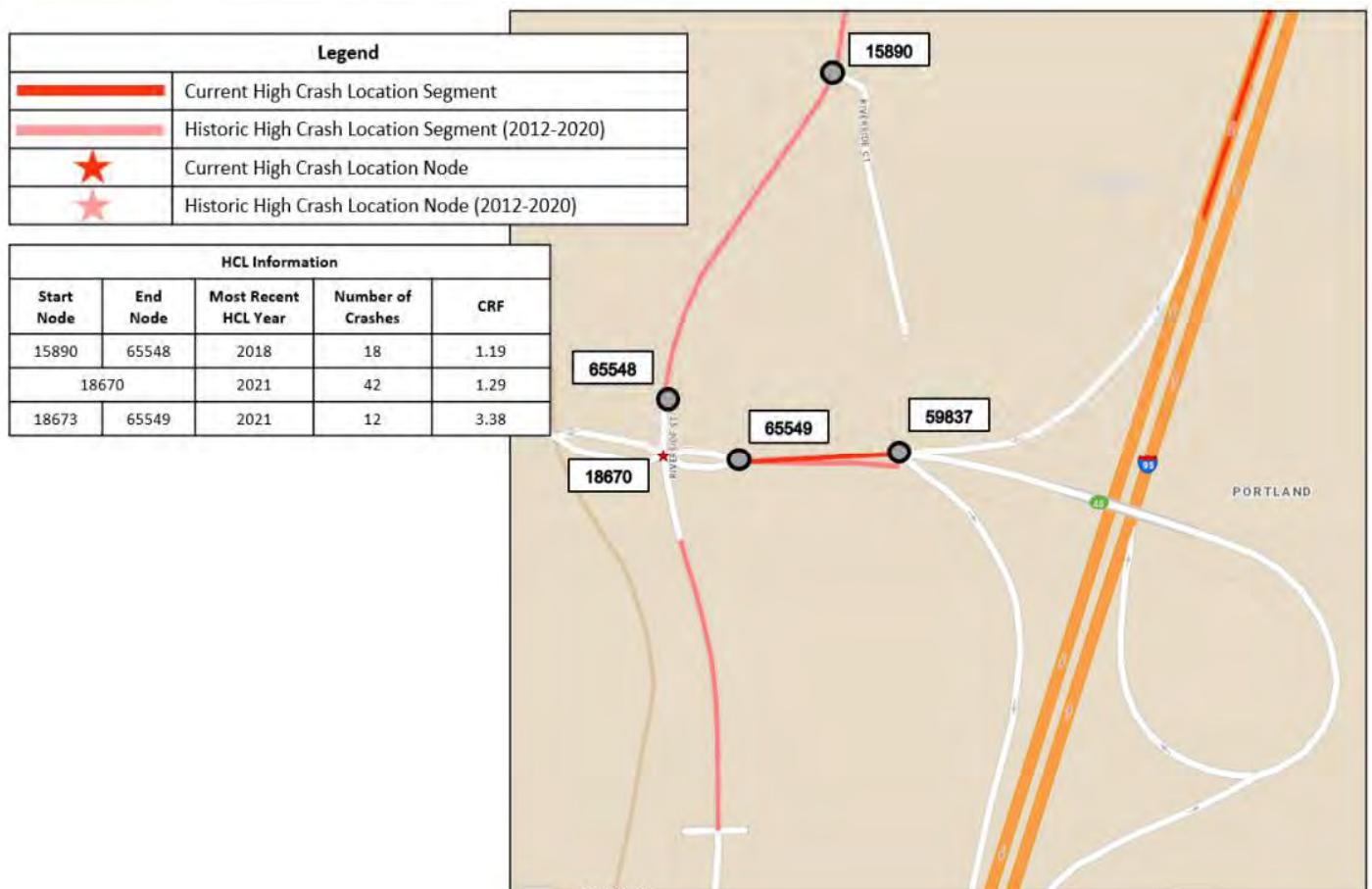
Introduction

There are 3 HCLs for the interchange and intersection of Exit 48 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**

- Exit 48 Intersection
- Riverside St SB Approach
- Exit 48 Plaza Segment

This interchange and adjacent intersection are in the City of Portland in Cumberland County. There are three HCLs within this analysis area which includes the Exit 48 ramps and adjacent intersection. The included interchange provides access between the Maine Turnpike and Route 25/25B.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Between 2017 and 2018, the Exit 48 interchange and the adjacent intersection underwent construction to improve the area. Some of the changes included in this project were toll plaza upgrades, widening of exit lanes and reconfiguration of the Riverside Street intersection (the intersection of interest of this RSA).

General Mobility Observations

This interchange is a part of the Turnpike section where there begins to be a shift from heavy tourism traffic to more commuter-heavy traffic. While there is still some variation in volumes during the summer months, this section experiences less seasonal fluctuation than the interchanges and mainline segments to its south. This results in the weekday AM and PM Peaks acting as the highest-volume times.

Demographics

The AADTs and speed limits for all legs of the Exit 48 intersection as well as the on ramps toll plaza can be found in the table below:

Location	AADT ¹	Speed Limit
Exit 48 On Ramps	10,133 ²	10 MPH (Through Toll)
Riverside St SB Approach	26,969	35 MPH
Ramps WB Approach	9,978 ²	30 MPH (Advisory Speed)
Riverside St NB Approach	10,044	35 MPH
Larrabee Rd EB Approach	5,171	35 MPH

Corridor Characteristics

The on ramp toll consists of four collections lanes which then condenses down to two lanes: a NB on ramp and a SB on ramp. Guardrail can be found along the inside of the ramp to separate travel directions from the ramps. The intersection adjacent to Exit 48 is a four-legged signalized intersection with pedestrian accommodations along all legs except the I-95 ramps approach. Concrete medians can be found at each approach to separate the travel directions. In addition to the striping at the intersection for crosswalks and lanes at each approach, the SB left movement has dashed lines through the intersection to aid in maintaining lanes. A summary of lane configuration at this intersection can be found in the table below:

Intersection Approach	Number of Approach Lanes	Number of Receiving Lanes
Riverside St SB Approach	4 (L, L, T, TR)	2
Ramps WB Approach	4 (L, T, T, R)	2*
Riverside St NB Approach	4 (L, T, T, R)	2
Larrabee Rd EB Approach	4 (L, L, T, TR)	2

*These two lanes immediately open up to four lanes for toll plaza access

¹ From MaineDOT Map Viewer unless Otherwise Specified

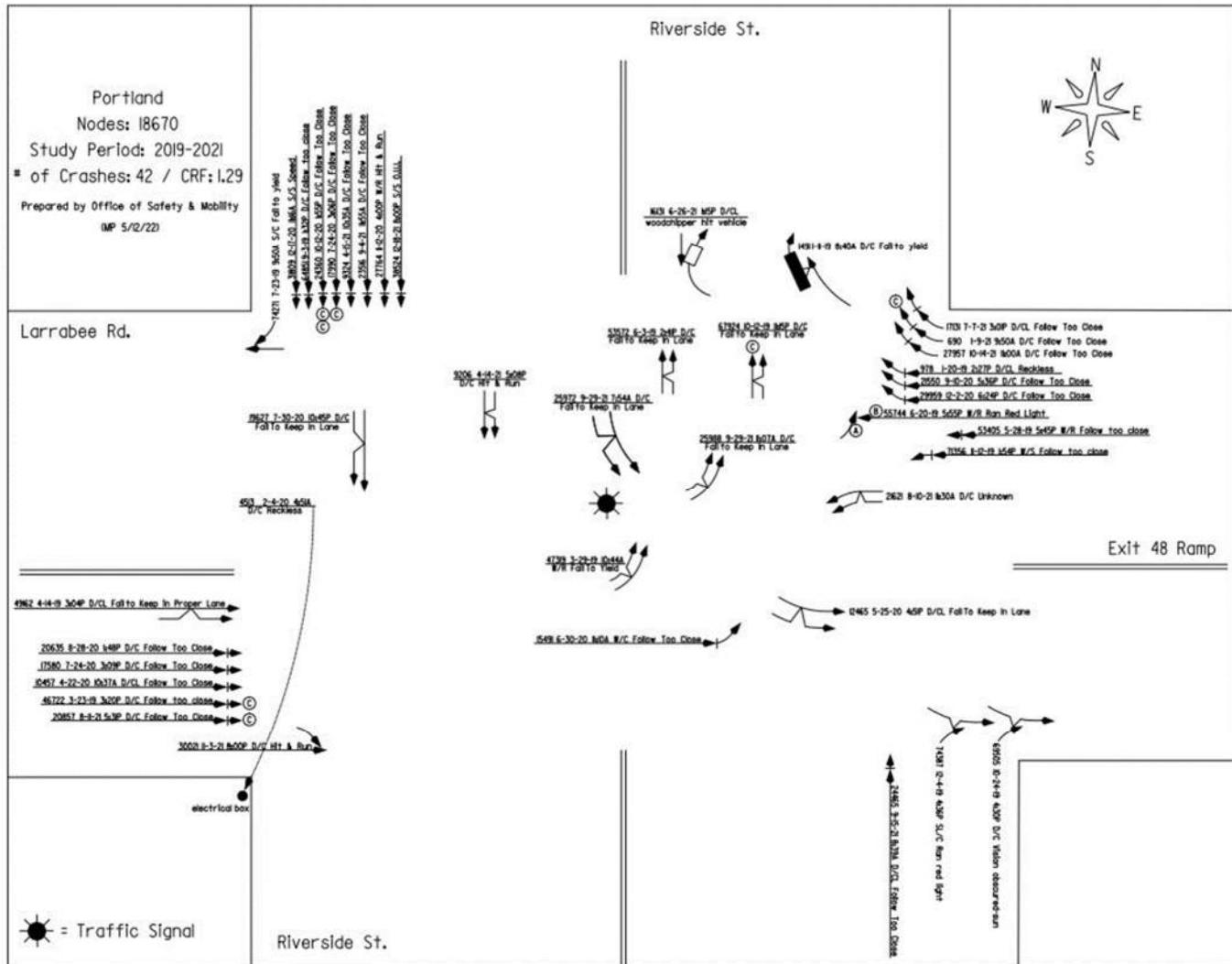
² 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Exit 48 Intersection

Figure 2: 2019-2021 Exit 48 Intersection Crash Diagram depicts the Exit 48 intersection during the time period for which it was most recently identified as an HCL. This intersection was classified as an HCL during 8 other time periods over the past 10 years.

Figure 2: 2019-2021 Exit 48 Intersection Crash Diagram



As shown in **Figure 2**, there were 42 crashes resulting in a 16.7% injury rate during this analysis period.

- 17 of these crashes occurred within the intersection
 - 6 of these 17 crashes were a result of drivers failing to keep within their lane
- The most common cause of crash at this intersection was following too close which contributed to 19 of the 42 crashes
- 2 of these crashes involved heavy vehicles
- 19 of these crashes occurred between the summer months of May and September
- There is not a strong correlation between time of day and crash frequency
- 31 of these 42 crashes occurred when the roadway was dry and the weather was either clear or cloudy

Photo 1: Exit 48 Intersection (2022) captured by HNTB in November of 2022 depicts the condition of this location at the time that it was most recently noted as an HCL.

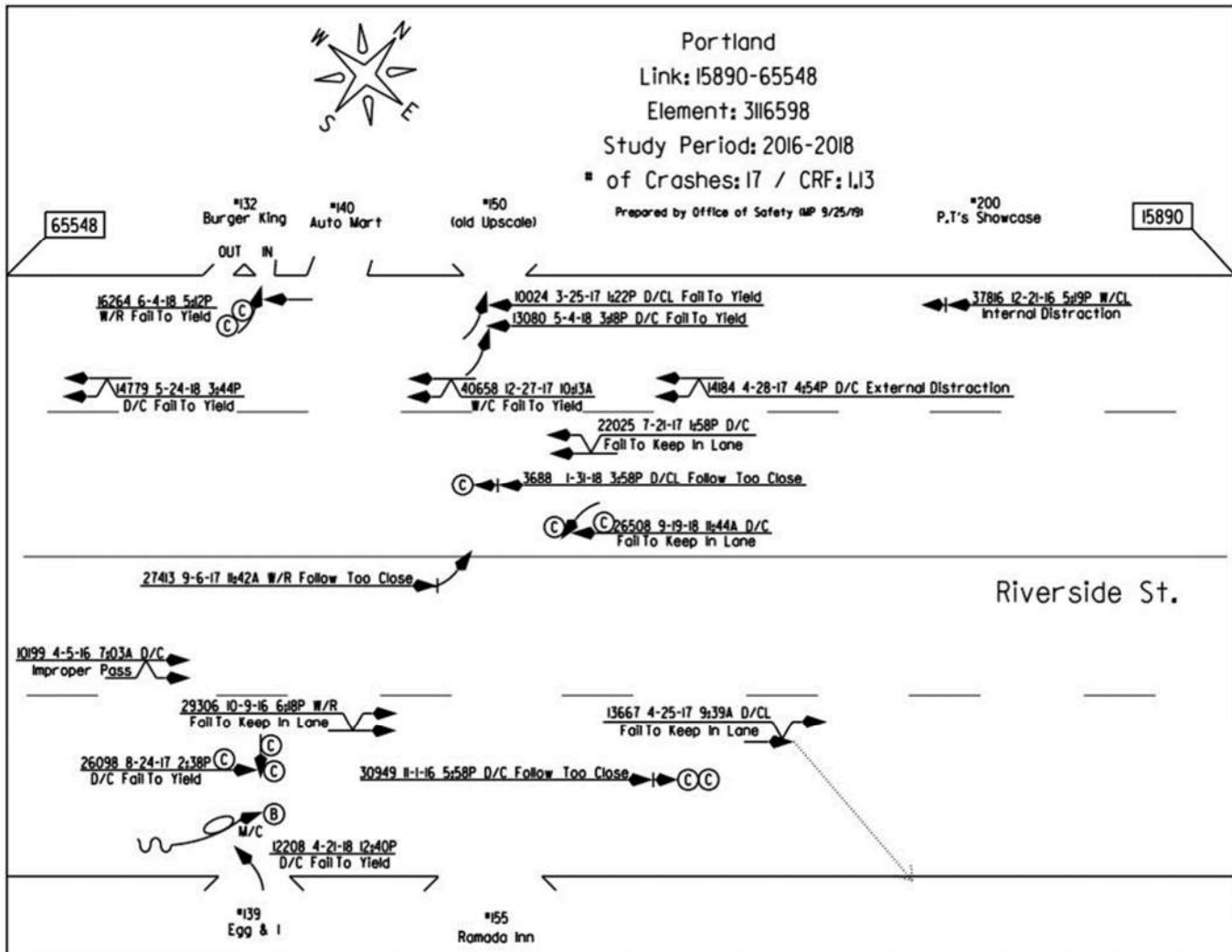
Photo 1: Exit 48 Intersection (2022)



Riverside Street Southbound Approach

Figure 3: 2016-2018 Riverside Street SB Approach Crash Diagram depicts the crash diagram for this intersection leg at the time for which it was most recently classified as an HCL. This segment was also identified as an HCL during 5 other time periods over the past 10 years.

Figure 3: 2016-2018 Riverside Street SB Approach Crash Diagram



As shown in **Figure 3**, there were 17 crashes resulting in a 35.3% injury rate during this analysis period.

- 7 of the 17 recorded crashes at this location were turning movement crashes, many involving vehicles attempting to enter or exit businesses along the roadway
- The most common cause of crash at this location was failure to yield, which contributed to 7 of the 17 crashes at this location
- Failure to keep in lane and following too close were the next two most common contributing factors, causing 4 and 3 crashes each, respectively
- 8 of the crashes recorded at this location occurred between the months of March and June
- 8 of the 17 crashes occurred during the PM Peak hours of approximately 3:00pm to 6:00pm
- All but 3 of the crashes at this location occurred when the pavement was dry and the weather was either clear or cloudy

Photo 2: Riverside Street Southbound Approach (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: Riverside Street Southbound Approach (2018)

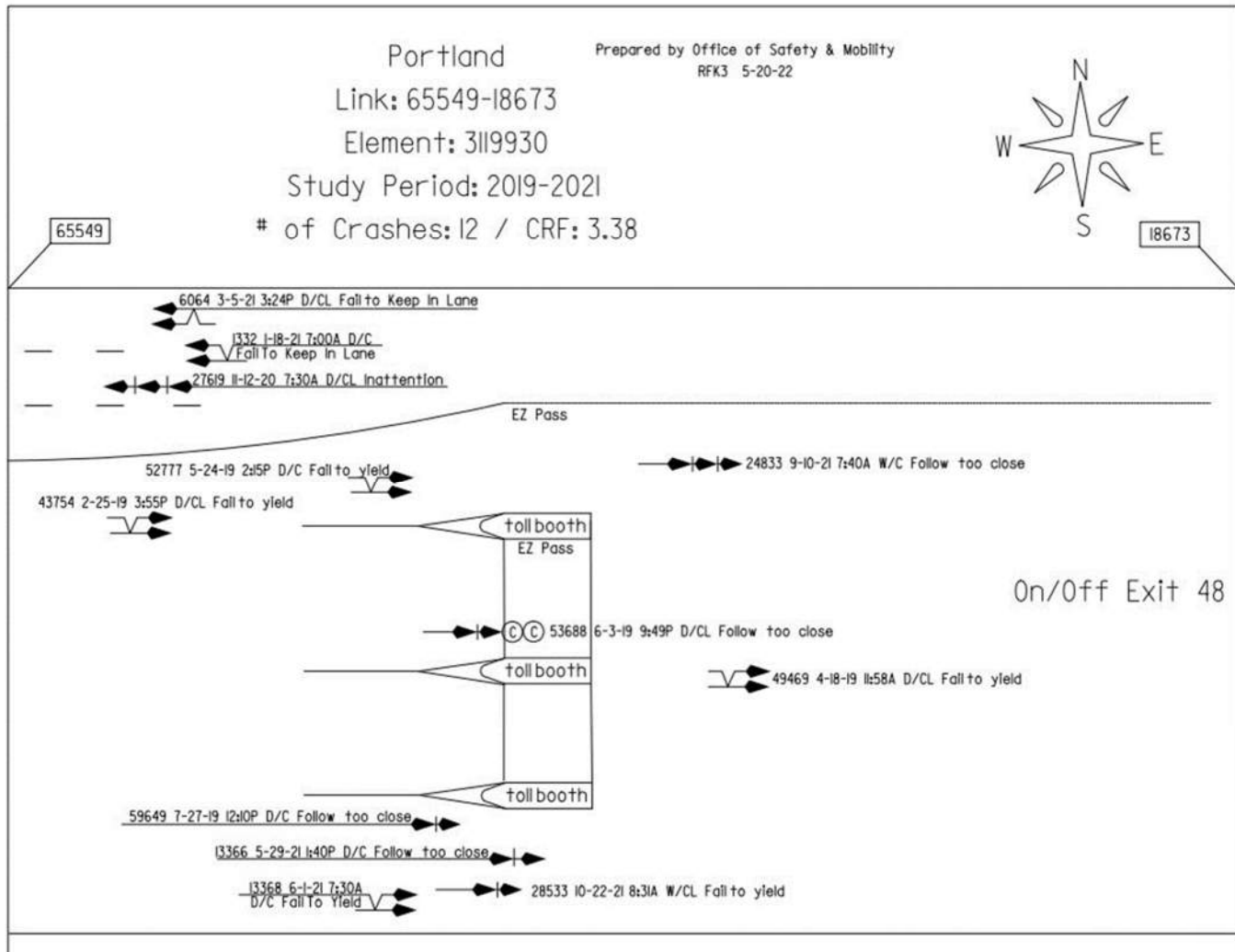


³ Google Maps accessed March 16, 2023

Exit 48 Plaza Segment

Figure 4: 2019-2021 Exit 48 Toll Plaza Crash Diagram depicts the Exit 48 ramps intersection approach and toll plaza for the time period in which this location was identified as an HCL. This location was also classified as an HCL during 3 other time periods over the past 10 years.

Figure 4: 2019-2021 Exit 48 Toll Plaza Crash Diagram

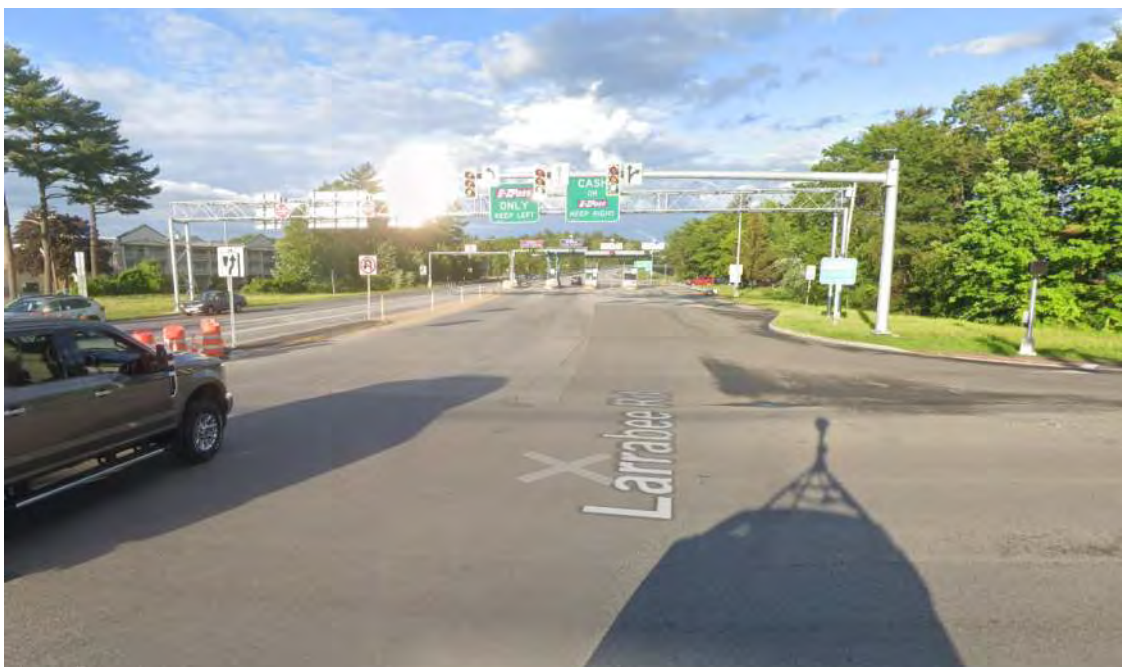


As shown in **Figure 4**, there were 12 crashes resulting in a 8.3% injury rate during this analysis period.

- 5 of these 12 crashes were due to a failure to yield, while 4 were due to following too close
- 2 of the 3 crashes that occurred along the off ramp direction of this segment were due to failure to keep in lane
- There does not appear to be a strong correlation between time of year and crash frequency along this segment
- 5 of the 12 recorded crashes at this location occurred between 7:00am and 8:30am
- The majority of crashes at this location occurred when the pavement was dry and the weather was either clear or cloudy

Photo 3: Exit 48 Toll Plaza Approach (2019) captured by Google Maps⁴ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 3: Exit 48 Toll Plaza Approach (2019)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This intersection is flat and within a curve. Even with this curve, there is good sight distance at the intersection. There is a sharp curve along Larrabee Road approximately 450 feet prior to the intersection approach. The ramps leg of the intersection is straight and the toll plaza works as the only obstruction.
Lighting	There is lighting at all corners of the intersection as well as surrounding the toll plaza.
General Sign Issues	Signing can be found throughout the intersection to designate lane use, identify restrictions on U-turns and for pedestrians at the push buttons. Signage at the toll plaza designates type of collection by lane, pricing information and speed limits through the plaza.
Marking and Delineation	Each intersection approach is adequately marked to designate lane use and separate travel lanes. There are also dashed lines through the intersection to aid the SB left movement with maintaining their lane through the turn. Markings at the toll plaza aid in guiding vehicles safely through the plaza.
Barriers and Clear Zones	Concrete medians can be found at each intersection leg to separate travel directions. There is a run of guardrail along the outside of the roadway at the toll plaza.
Bridges and Culverts	There are no bridges or culverts at this location.

⁴ Google Maps accessed March 16, 2023

Pavement	The pavement condition ratings⁵ of each intersection leg can be found below: • Ramps WB Approach: B • Riverside Street SB Approach: B • Larrabee Road EB Approach: C • Riverside Street NB Approach: A
Heavy Vehicles	The percentage of heavy vehicles at the Exit 48 ramps tends to range from 0% to 5%, depending on time of day and direction.

Conclusion

There are four HCLs related to this intersection, consisting of the intersection and three of its approach legs. Congestion, toll plaza movements, and interchange movements dominate crash patterns.

Recommendations

- Short-Term Solutions:
 - Based on the long history of HCL status, minor improvements alone are not enough to provide improvements at this location. Coordination with MaineDOT and local stakeholders is recommended to determine improvements to be implemented.

⁵ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location: Prior to Exit 48 SB

Nodes 18674 to 19273: Exit 48 SB Off Ramp Approach

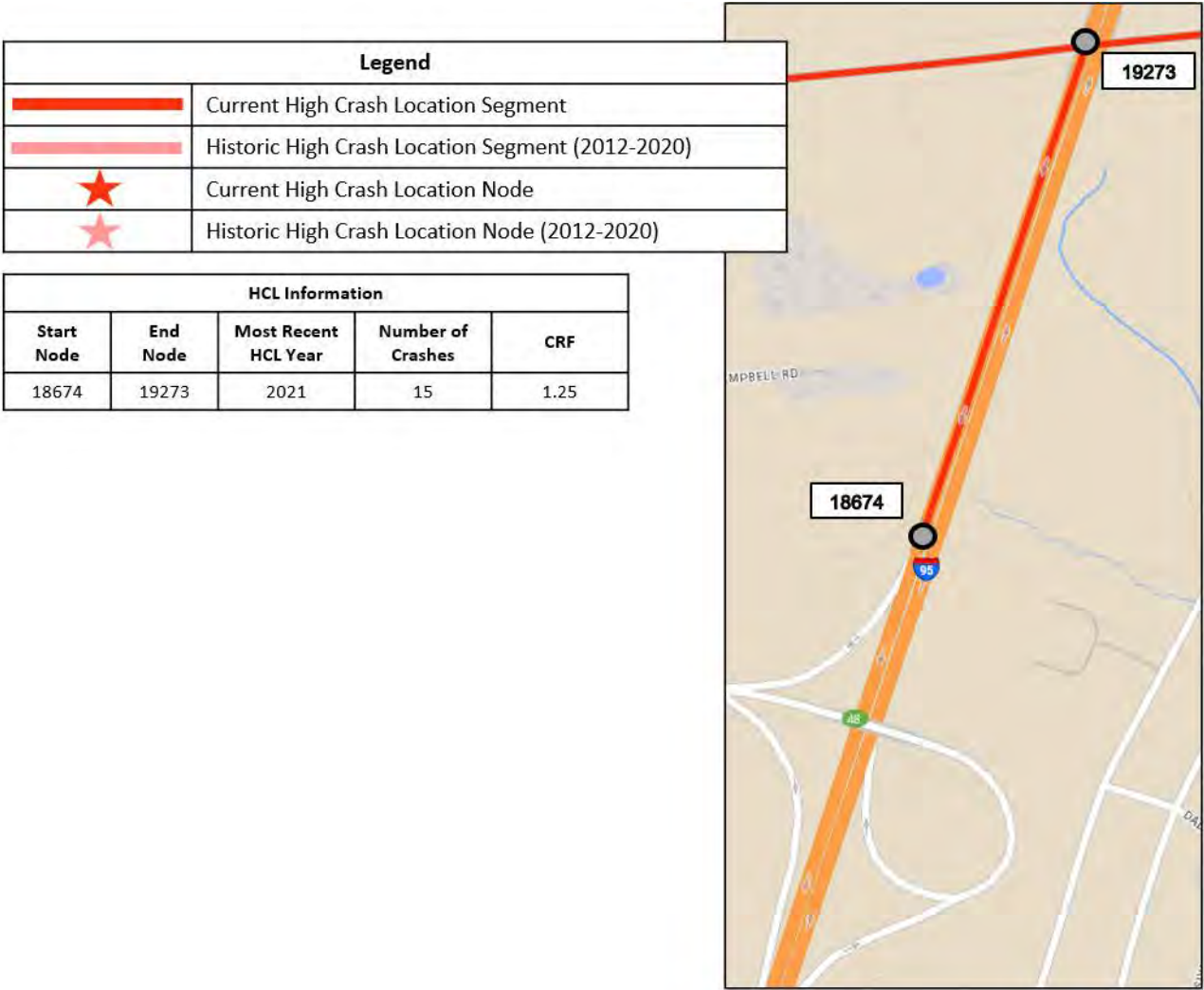
Introduction

There is 1 HCL for the mainline segment of mile marker 48-52 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 48 SB Off Ramp Approach

This mainline segment is located along the I-95 SB Mainline in the City of Portland in Cumberland County. The segment spans from the Warren Road underpass at the northern end to just north of the Exit 48 SB Off Ramp diverge point at the southern end. The exit 48 interchange provides access to Route25/25B.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Between 2017 and 2018, the Exit 48 interchange and the adjacent intersection underwent construction to improve the area. Some of the changes included in this project were toll plaza upgrades, widening of exit lanes and reconfiguration of the Riverside Street intersection.

General Mobility Observations

This interchange is a part of the Turnpike section where there begins to be a shift from heavy tourism traffic to more commuter-heavy traffic. While there is still some variation in volumes during the summer months, this section experiences less seasonal fluctuation than the interchanges and mainline segments to its south. This results in the weekday AM and PM Peaks acting as the highest-volume times.

Demographics

This segment of I-95 SB is signed with a 65 MPH speed limit and has an AADT¹ of 22,485.

Corridor Characteristics

This mainline segment consists of two lanes which carry vehicles along I-95 SB. There are shoulders along both sides of the travel way. While there are not currently rumble strips along the segment, this may be due to ongoing construction in the area, as a June 2019 Google Street View image shows rumble strips along the outside shoulder. Guardrail separates the NB and SB travel directions of I-95 at the northerly part of this segment, which transitions to concrete barrier midway. Runs of guardrail can be found along the outside shoulder at various locations throughout this segment to protect against hazards including steep side slopes.

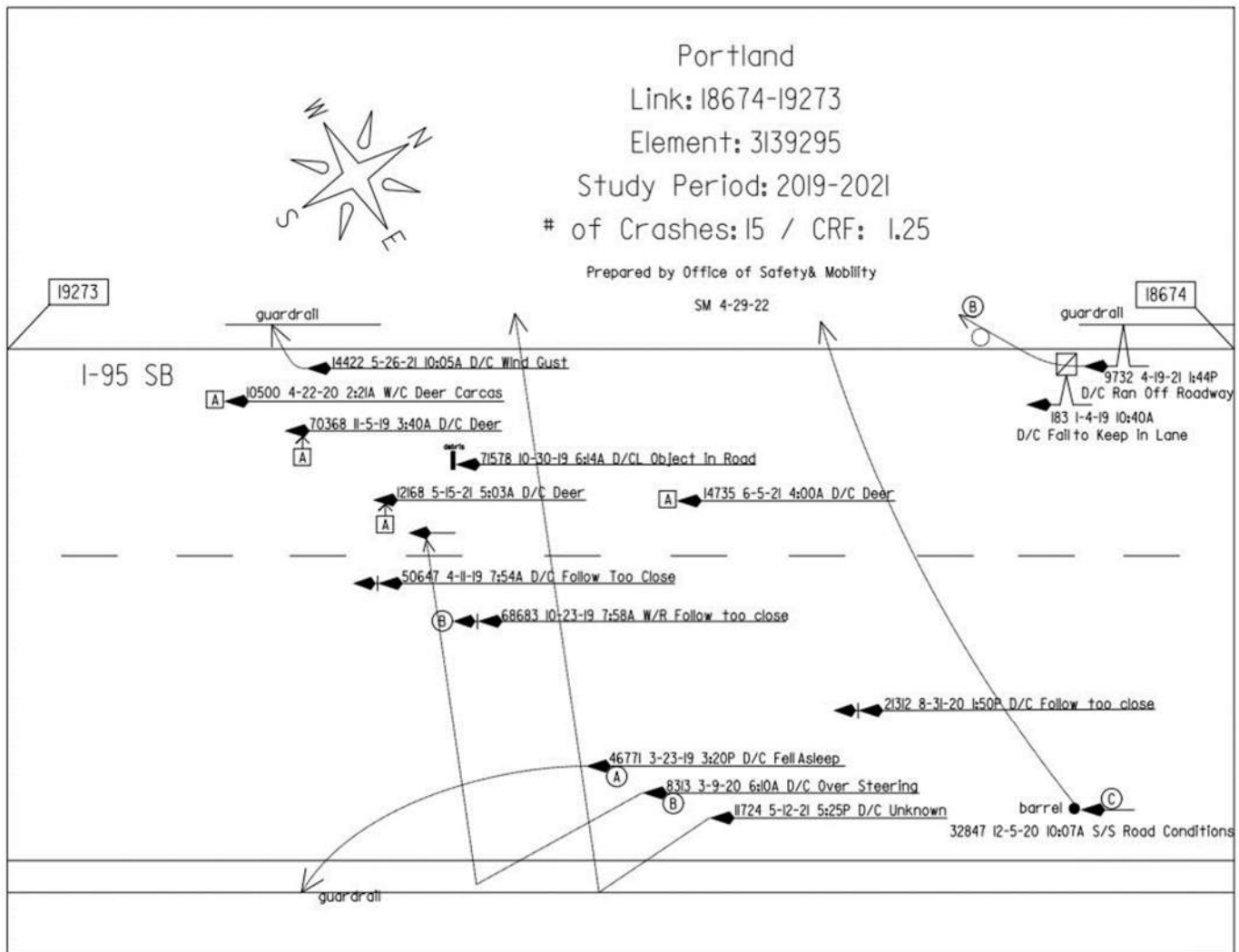
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Exit 48 SB Off Ramp Approach

Figure 2: 2019-2021 Exit 48 SB Ramp Approach Crash Diagram depicts the crash diagram for this mainline segment between 2019-2021, when it was most recently identified as an HCL. This segment was also classified as an HCL during the 2018-2020 time period.

Figure 2: 2019-2021 Exit 48 SB Ramp Approach Crash Diagram



As shown in **Figure 2**, there were 15 crashes resulting in a 33.3% injury rate during this analysis period.

- The most common cause of crash at this location was collisions with live or deceased animals, which contributed to 4 crashes
- Following too close was the next most common crash cause, contributing to 3 crashes
- There was 1 crash during this time period that was due to roadway conditions
- 6 of the 15 crashes at this location resulted in vehicles departing from the travel way
 - 5 of these 6 departure crashes resulted in collision with guardrail
- 9 of the 15 crashes along this segment occurred between the months of March and June
- Many of these crashes occurred during early morning hours, with 6 crashes occurring between 2:00am and 6:30am

Photo 1: Exit 48 Southbound Approach (2019) captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Exit 48 Southbound Approach (2019)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This segment of roadway is straight and flat, allowing for good sight distance.
Lighting	Lighting can be found along this segment near the Exit 48 interchange.
General Sign Issues	This segment includes signage for the Exit 48 interchange.
Marking and Delineation	Adequate markings exist along this mainline segment to separate travel lanes and shoulders.
Barriers and Clear Zones	Guardrail and concrete barrier separate the northbound and southbound travel directions of I-95 along this segment. Guardrail is also present at some locations along the outside of the travel way through the segment.
Bridges and Culverts	Bridge 1486 carries Warren Ave over this mainline segment and has components which have been given condition ratings ³ of good and very good.
Pavement	The pavement along this segment has been given a pavement condition rating ⁴ of A.
Heavy Vehicles	This mainline segment tends to average from around 0% to 6% fo heavy vehicles.

Conclusion

Over the past 10 years, this location has recently began being classified as an HCL. Many of the crashes at this location were consistent with locations that experience high volumes and congestion. Since this location is currently undergoing widening construction to address this congestion, the mitigation recommendations will focus around monitoring the location post-construction for any remaining and/or resultant safety concerns.

Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

² Google Maps accessed March 16, 2023

³ According to MaineDOT Public Map Viewer – Bridges Layer

⁴ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.
- Mid-Term Solutions:
 - Monitor the area post-construction to identify any lingering or resultant safety concerns.

Mainline High Crash Location: South of Exit 53 Interchange

Nodes 19314 to 19312: Segment after Exit 53 SB On Ramp

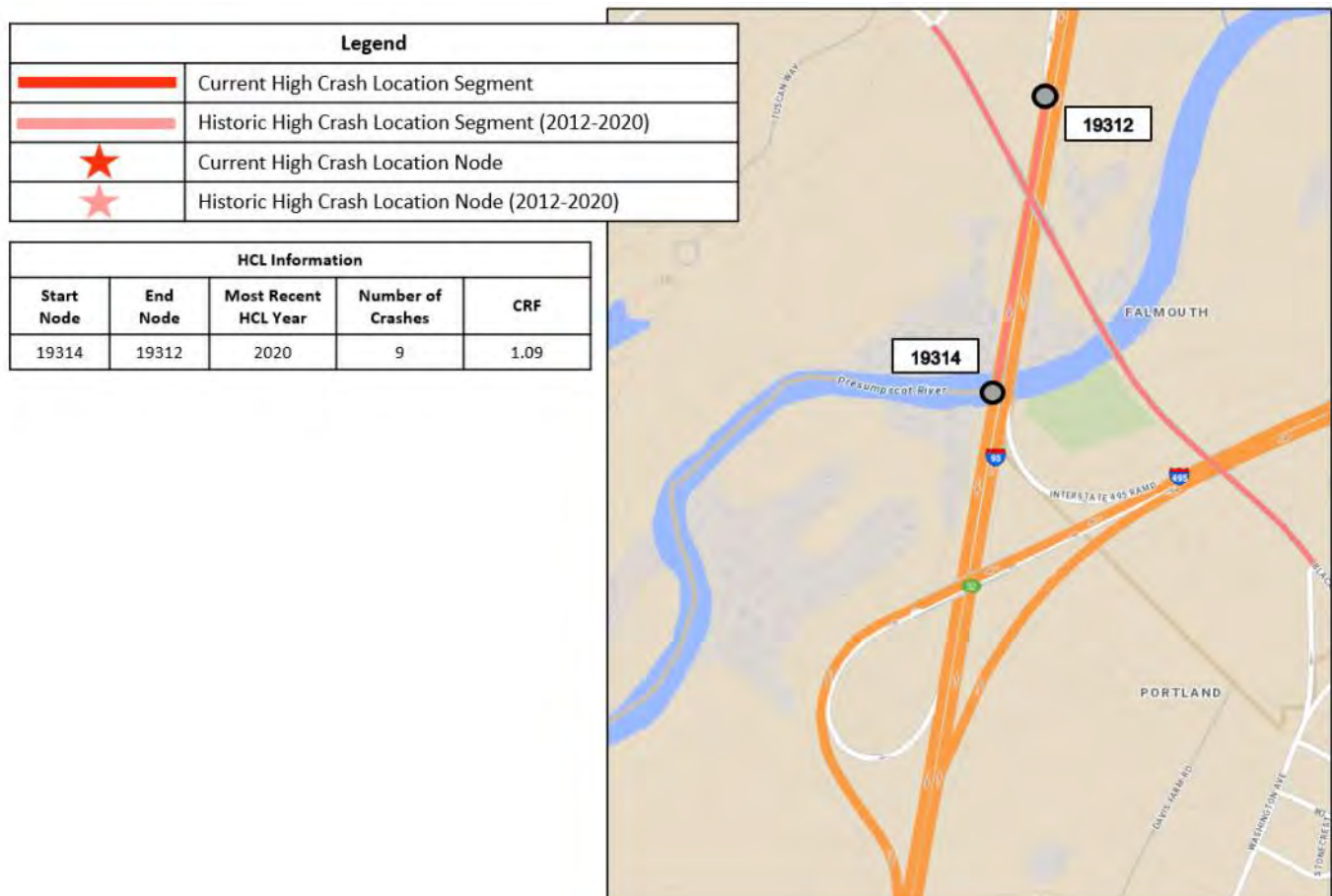
Introduction

There is 1 HCL for the mainline segment of mile marker 52-53 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Segment after Exit 53 SB On Ramp

This mainline segment is located along the I-95 SB Mainline in the Town of Falmouth in Cumberland County. The segment spans from just south of the Exit 53 SB On Ramp merge point at the northerly end to the bridge over the Presumpscot River at the southerly end. The southern limit of this HCL segment is very close to the Exit 52 SB off ramp. Exit 52 is a significant interchange along the Turnpike, providing access to the Falmouth Spur. The Exit 53 interchange provides access to Route 100/26.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment have both undergone construction relatively recently. Around 2015, the Exit 52 interchange toll plaza underwent changes to implement an ORT lane. Additionally, around 2016 the Exit 53 toll plaza was reconstructed to add an additional collection lane, and thus a ramp lane.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This segment has a posted speed limit of 65 MPH and an AADT¹ of 18,031.

Corridor Characteristics

This segment consists of two lanes that carry vehicles along I-95 SB. There are shoulders along both sides of the travel way, with rumble strips spanning the length of the inside shoulder. Guardrail through this location separates the northbound and southbound travel directions. Guardrail can also be found along the outside of the travel way at certain locations of this segment, protecting against hazards such as steep side slopes and bridge abutments.

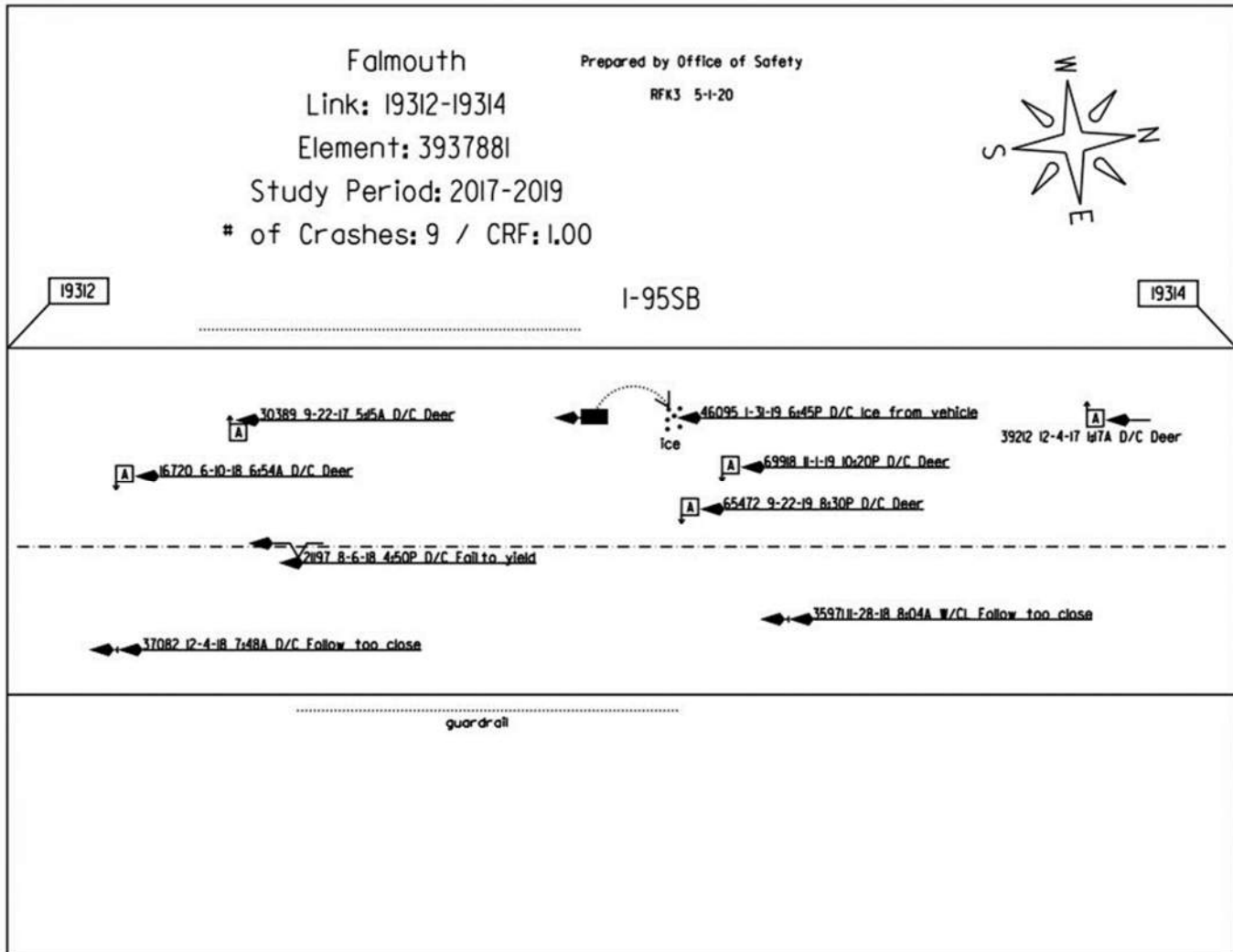
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Segment after Exit 53 Southbound On Ramp

Figure 2: 2017-2019 Mile Marker 52-53 Southbound Crash Diagram depicts the most recent available crash diagram for this mainline segment. This location was also classified as an HCL during the 2018-2020 time period over the past 10 years.

Figure 2: 2017-2019 Mile Marker 52-53 Southbound Crash Diagram



As shown in **Figure 2**, there were 9 crashes resulting in a 0% injury rate during this analysis period.

- Collisions with deer was the most common type of crash at this location with 5 crashes
- 2 of the crashes at this location were a result of vehicles following too close
- 5 of the 9 crashes at this location occurred between the winter months of November to January
- All but 1 of these crashes occurred when the roadway was dry and the weather was either clear or cloudy
- There is not a strong correlation between time of day and crash frequency at this location

Photo 1: Just South of Exit 53 Southbound On Ramp captured by Google Maps² in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Just South of Exit 53 Southbound On Ramp



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This roadway segment is straight and flat, creating good sight distance conditions.
Lighting	Lighting can be found at the northerly end of this segment near the Exit 53 interchange and the Blackstrap Road overpass.
General Sign Issues	There is signing along this segment for the Exit 52 interchange.
Marking and Delineation	This segment has adequate pavement markings to separate travel lanes as well as shoulders.
Barriers and Clear Zones	Guardrail spans the entirety of the inside of the roadway along this segment to separate the northbound and southbound travel directions. Lengths of guardrail can also be found along the outside of the roadway to protect against hazards including bridge abutments and steep side slopes.
Bridges and Culverts	Bridge 0283 carries Blackstrap Road over this mainline segment and has components which have been given condition ratings ³ of satisfactory and good. Bridge 1489 is the southerly endpoint of this segment and carries I-95 SB over the Presumpscot River. This bridge has been given condition ratings of satisfactory and good.
Pavement	The pavement along this segment has been given a pavement condition rating ⁴ of B.
Heavy Vehicles	This segment tends to average around 5% to 8% heavy vehicles.

² Google Maps accessed March 16, 2023

³ According to MaineDOT Public Map Viewer – Bridge Layer

⁴ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

Interchange High Crash Location: Exit 53 Interchange

Nodes 70699 to 19286: Exit 53 Plaza Segment

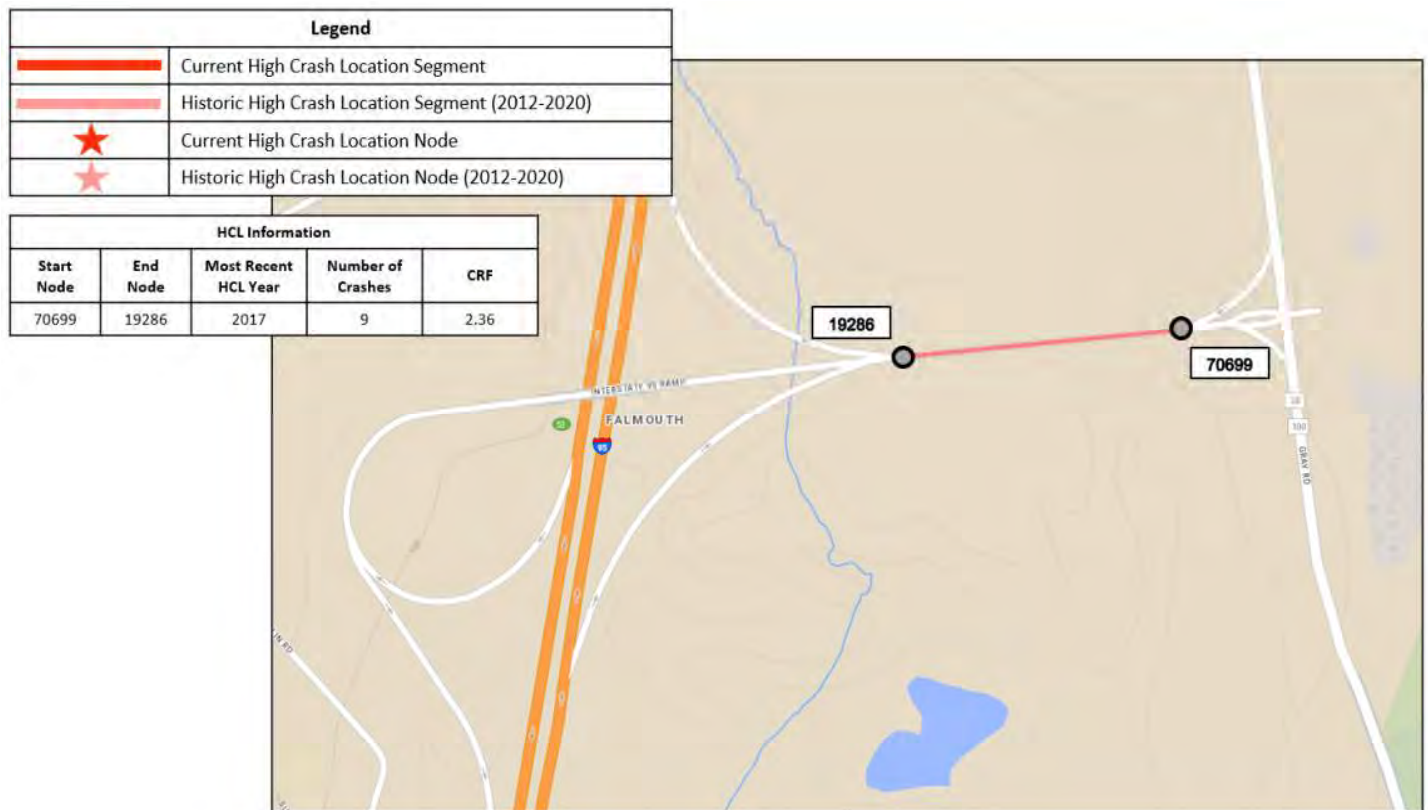
Introduction

There is 1 HCL for the Exit 53 interchange during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 53 Plaza Segment

This interchange is located in the Town of Falmouth in Cumberland County. The segment spans between the merge/diverge of the Exit 53 On and Off ramps and the adjacent intersection. Exit 53 provides access to Route 26/1022.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

This interchange underwent construction around 2016 which involved the addition of a toll collection lane as well as the construction of an additional ramp lane.

General Mobility Observations

This location is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

The Exit 53 off ramps have posted advisory speeds of 30 MPH and a combined (NB and SB) AADT¹ of 6,206. The on ramps have a posted speed limit of 10 MPH through the toll plaza and have a combined AADT of 5,806.

Corridor Characteristics

This segment consists of two lanes that carry the off ramp lanes WB. These two lanes are created by the individual ramp lanes joining together which works similar to a weave upon approaching the adjacent intersection. The on ramps side consists of a toll plaza with 3 collection lanes which then merge to create the NB and SB ramp lanes which split from each other soon after the plaza. Both directions consist of lanes and shoulders, with guardrail present to the north of the on ramp lanes to protect against steep side slopes. To the west of the toll plaza there is guardrail which separates the travel directions, while this is achieved by the use of a curbed median to the east of the plaza.

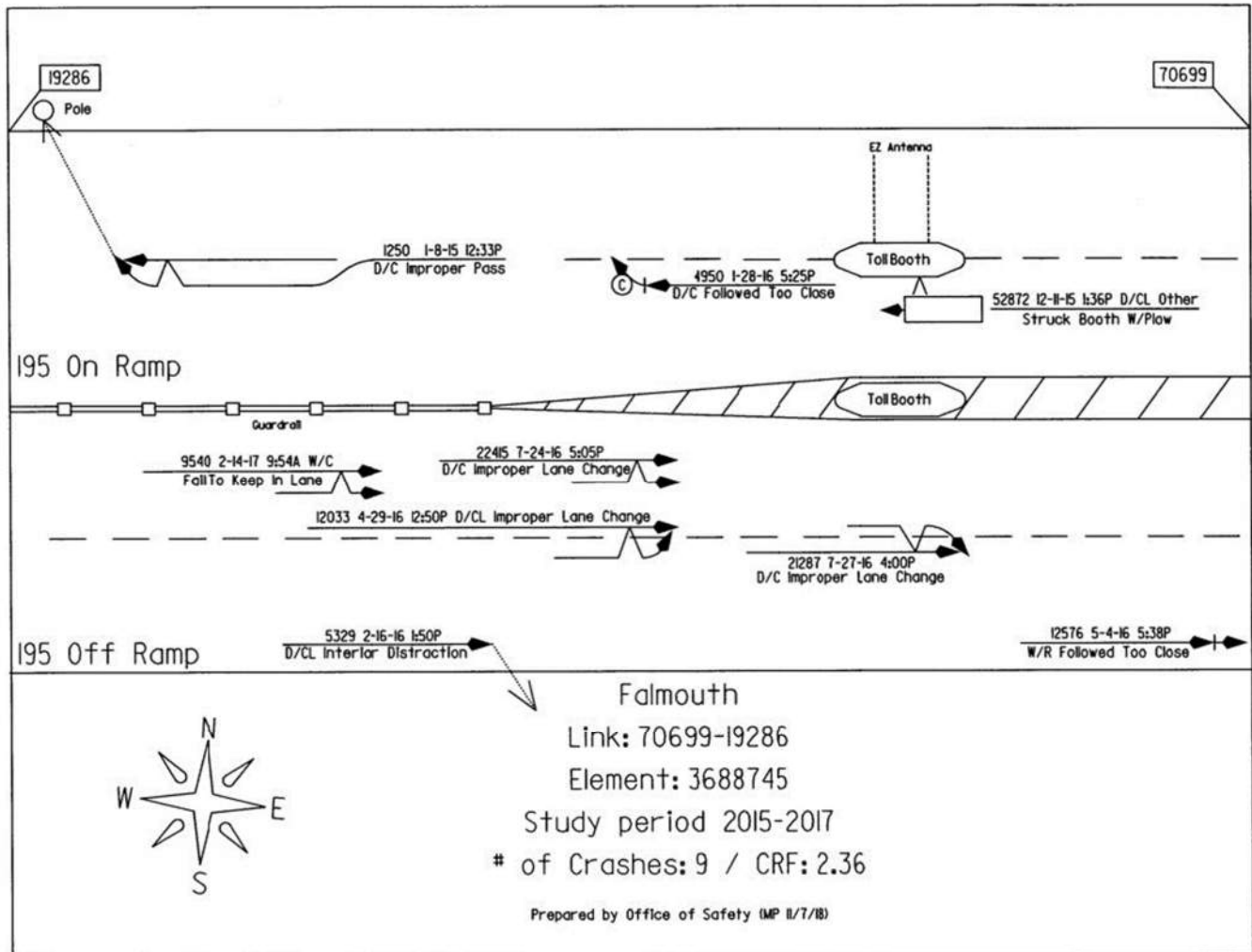
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Exit 53 Plaza Segment

Figure 2: 2015-2017 Exit 53 Toll Plaza Crash Diagram depicts this interchange segment for the most recent period in which it was identified as an HCL. It is important to note that this HCL diagram represents the location around the time that it was under construction. This location was classified as an HCL during one other time period over the past 10 years.

Figure 2: 2015-2017 Exit 53 Toll Plaza Crash Diagram



As shown in **Figure 2**, there were 9 crashes resulting in a 11.1% injury rate during this analysis period.

- 3 of these crashes occurred on the on ramp side of the segment while the other 3 were on the off ramp side
- The most common cause of crash at this location was improper lane change, which contributed to 3 crashes
 - All 3 of these crashes occurred within the weave segment of the off ramp
- The next most common cause is following too close which contributed to 2 crashes
- 1 of these crashes involved a heavy vehicle
- 5 of these 9 crashes occurred between the months of December to February
- The two most common times of crash at this location were the noontime and PM peak hours, with 4 crashes occurring between 12:30am and 2:00pm, and 4 crashes occurring from approximately 4:00pm – 5:30pm

Photo 1: Exit 53 Toll Plaza (2016) captured by Google Maps in October of 2016 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: Exit 53 Toll Plaza (2016)



Photo 2: Exit 53 Toll Plaza (2022)



Findings and Observations

Existing Road Audit ²	
Road alignment and Cross Section	This roadway segment is straight and flat, with the toll plaza being the only obstruction to sight distance.
Lighting	Lighting is present throughout this segment.
General Sign Issues	Signage is present through this segment to designate things such as toll plaza collection types by lane and lane designation upon approach the adjacent intersection.

Marking and Delineation	There are adequate pavement markings through this location which help to separate lanes and guide vehicles through the toll plaza.
Barriers and Clear Zones	Guardrail and asphalt medians separate the travel directions through this segment. Some guardrail spans can be found on the outside of the roadway through the segment.
Bridges and Culverts	No bridges or culverts exist along this segment.
Pavement	The pavement along this segment has been given a pavement condition rating ³ of C.
Heavy Vehicles	The percentage of heavy vehicles at this location tends to 0% - 3%

Conclusions

This area has not been an HCL since the implementation of ramp improvements. Crashes tend to be evenly divided between the on and off ramp.

Recommendations

- Short-Term Solutions:
 - Continue to monitor the ramp in future studies.

³ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location: Mountain Road to Leighton Road

Nodes 19316 to 19381: SB Segment (Mountain Rd – Leighton Rd)

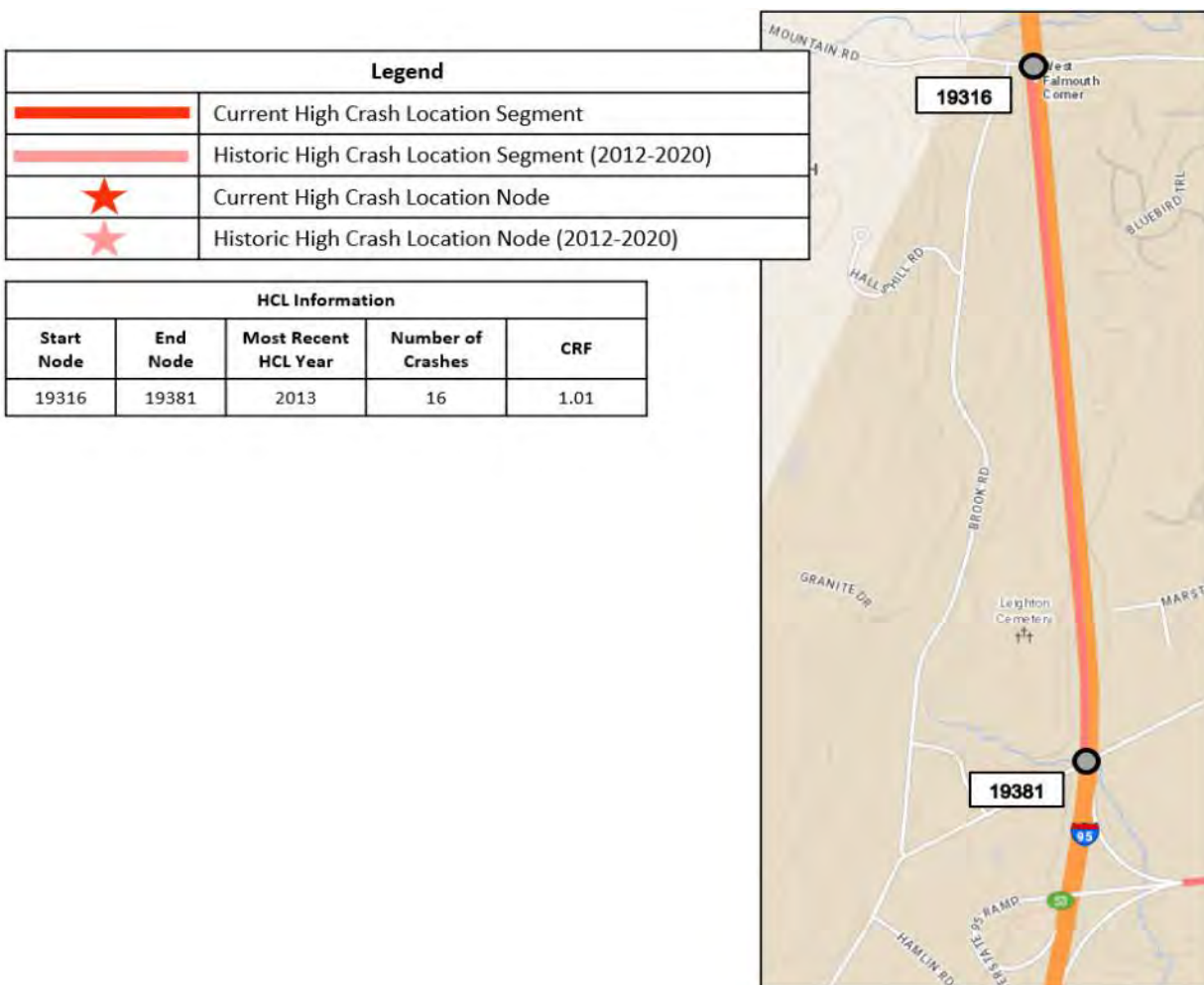
Introduction

There is 1 HCL for the mainline segment between Mountain Road and Leighton Road during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- SB Segment (Mountain Rd – Leighton Rd)

This mainline segment is located along the I-95 SB Mainline in the Town of Falmouth in Cumberland County. The segment spans from the Mountain Road overpass at the northern end to the Leighton Road overpass, which is north of the Exit 53 SB Off Ramp diverge point at the southerly end. Exit 53 provides access to Route 100/26. The segment is far enough from Exit 63 that it is not anticipated to be impacted by the interchange.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment both underwent construction around 2016. The Exit 53 interchange underwent changes which included the addition of a toll plaza lane and a ramp lane. Improvements were made to the Exit 63 interchange which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This segment has a posted speed limit of 65 MPH and an AADT¹ of 15,793.

Corridor Characteristics

This mainline segment consists of two lanes that carry vehicles along I-95 SB with shoulders on both sides of the travel way. Rumble strips span both shoulders along the entirety of the segment. Guardrail spans the inside of the roadway to separate the northbound and southbound travel directions. There are guardrail spans along the outside of the travel way at certain points through this segment.

¹ 2022 AADT Summary Created by
HCL 25: Mile Marker 53-63: Mountain Road to Leighton Road

Crash analysis

SB Segment (Mountain Rd – Leighton Rd)

While there is not a crash diagram currently available for the 2011-2013 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
3/21/2011	10:09 PM	Property Damage Only	Went Off Road
6/2/2011	9:45 AM	Property Damage Only	Rear End/Sideswipe
11/2/2011	7:41 PM	Property Damage Only	Deer
12/24/2011	5:06 PM	Injury (Non-fatal)	Rear End/Sideswipe
1/7/2012	1:10 PM	Injury (Non-fatal)	Went Off Road
1/12/2012	8:26 AM	Injury (Non-fatal)	Went Off Road
2/6/2012	7:54 AM	Property Damage Only	Other
9/2/2012	4:45 AM	Property Damage Only	Deer
9/9/2012	12:38 PM	Injury (Non-fatal)	Went Off Road
10/18/2012	3:10 PM	Property Damage Only	Rear End/Sideswipe
12/17/2012	3:50 PM	Property Damage Only	Went Off Road
1/5/2013	8:25 PM	Property Damage Only	Deer
1/16/2013	7:30 AM	Property Damage Only	Went Off Road
6/11/2013	12:00 PM	Property Damage Only	Other
8/10/2013	3:19 PM	Property Damage Only	Went Off Road
11/1/2013	6:12 PM	Property Damage Only	Deer

It can be observed from this table that there were 10 crashes at this location with a 25% injury rate during this time period.

- 7 of these 10 crashes resulted in vehicles going off the road
- There were 4 large animal collisions within the segment during the analysis period
- 7 of these crashes occurred between the hours of 3:00pm to 9:00pm
- There is not a strong correlation between time of year and crash frequency at this location

Photo 1: I-95 SB Between Mountain and Leighton Road (2011) captured by Google Maps² in August of 2011 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 SB Between Mountain and Leighton Road (2011)



² Google Maps accessed March 22, 2023

Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This mainline segment is almost entirely flat and straight, with the exception of the southern end of the segment which is along a curve. This curve is not abrupt enough to create sight distance concerned.
Lighting	There is lighting near the southern end of this segment at the Exit 53 interchange.
General Sign Issues	There is signing at the southern end of this segment for the Exit 53 interchange.
Marking and Delineation	There are adequate pavement markings along this segment which separate the travel lanes and shoulders.
Barriers and Clear Zones	Guardrail is along the inside of this segment to separate the northbound and southbound travel directions.
Bridges and Culverts	At the northern end of this segment, bridge 0362 carries Mountain Road over I-95. This bridge has components which have been given condition ratings of satisfactory and good. At the southern end of this segment, bridge 0361 carries Leighton Road over I-95. This bridge has components that have been given condition ratings of satisfactory and good.
Pavement	The pavement along this segment has been given a pavement condition rating of C.
Heavy Vehicles	This mainline segment has percentages of heavy vehicles that tend to average around 5% to 8%.

Conclusions

The majority of crashes in this location were the result of going off the road, however, this area has not been identified as an HCL since 2013. For this reason, recommendations will focus around continuing to monitor the location for any future safety concerns.

Recommendations

- No recommendations at this time – continue monitoring as part of future studies.

Mainline High Crash Location: Between Hurricane Road and Blackstrap Road

Nodes 19299 to 70979: NB Segment North of Hurricane Road

Nodes 19321 to 70899: SB Segment South of Upper Blackstrap Road

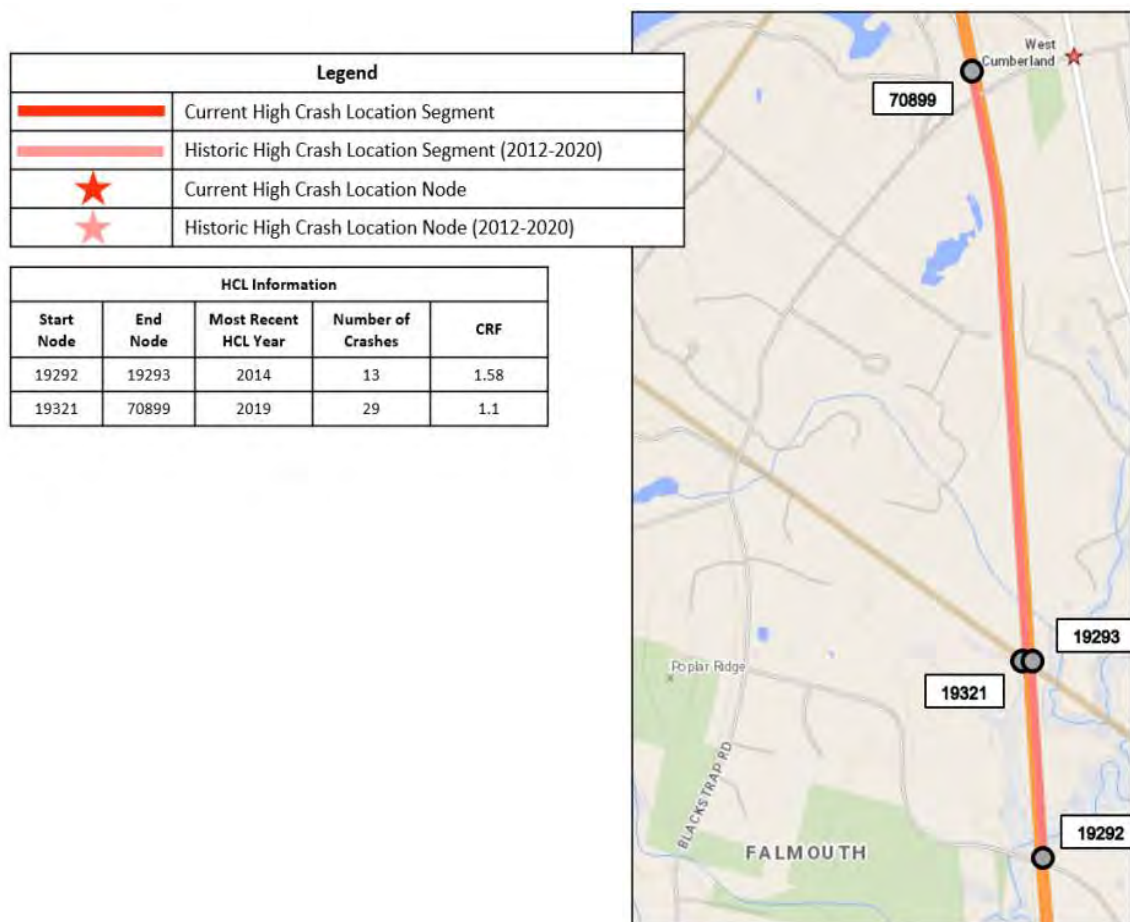
Introduction

There are 2 HCLs for the mainline segment of between Hurricane Road and Blackstrap Road during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- NB Segment North of Hurricane Road
- SB Segment South of Upper Blackstrap Road

The southern segment carries I-95 NB and is located in the Town of Falmouth in Cumberland County. This segment spans between the Hurricane Road overpass at the southern end to the Falmouth/Cumberland Town Line at the northern end. The northern segment, which carries vehicles along I-95 SB in the Town of Cumberland in Cumberland County, spans from the town line at the southern end to just south of the Cumberland Service Plaza SB on ramp merge point at the northern end. The Cumberland Service Plaza provides amenities to users of the Turnpike which include dining and fueling.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment both underwent construction around 2016. The Exit 53 interchange underwent changes which included the addition of a toll plaza lane and a ramp lane. Improvements were made to the Exit 63 interchange which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

Both directions of this mainline segment have a posted speed limit of 65 MPH. The northbound segment has an AADT¹ of 15,641 while the southbound has an AADT of 15,739.

Corridor Characteristics

These segments are located between the Exit 53 and Exit 63 interchanges. Both the northbound and southbound directions consist of two travel lanes with shoulders on both sides. Rumble strips span both the inside and outside shoulders for the entire length of the segments. Guardrail spans the entire length between the two interchanges to separate the northbound and southbound travel directions. Guardrail also spans the majority of the length along the outside of both segments.

¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

NB Segment North of Hurricane Road

While there is not a crash diagram currently available for the 2014-2014 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
2/24/2012	9:46 PM	Property Damage Only	Went Off Road
8/29/2012	8:38 PM	Property Damage Only	Object in Road
12/25/2012	10:20 AM	Property Damage Only	Went Off Road
12/25/2012	10:10 AM	Property Damage Only	Rear End/Sideswipe
4/20/2013	9:50 PM	Property Damage Only	Moose
5/26/2013	9:11 PM	Property Damage Only	Deer
8/24/2013	3:28 PM	Property Damage Only	Thrown or Falling Object
11/9/2013	12:02 AM	Property Damage Only	Deer
1/16/2014	5:21 PM	Property Damage Only	Rear End/Sideswipe
1/17/2014	3:50 PM	Injury (Non-Fatal)	Went Off Road
11/8/2014	9:20 PM	Injury	Deer
11/26/2014	11:52 PM	Property Damage Only	Deer
12/18/2014	1:18 AM	Property Damage Only	Went Off Road

It can be observed from this table that there were 13 crashes at this location with a 10.4% injury rate during this time period.

- The most common crash type at this location was large animal collisions with 5 crashes
- 4 of these crashes involved vehicles going off the road
- 9 of these 13 crashes occurred between the months of November and February
- While the correlation between time of day and crash frequency is not very strong at this location, many of the crashes occurred during the late evening or very early morning hours

Photo 1: NB Just North of Hurricane Road captured by Google Maps² in October of 2015 depicts the condition of this location most nearly to the time that it was most recently noted as an HCL.

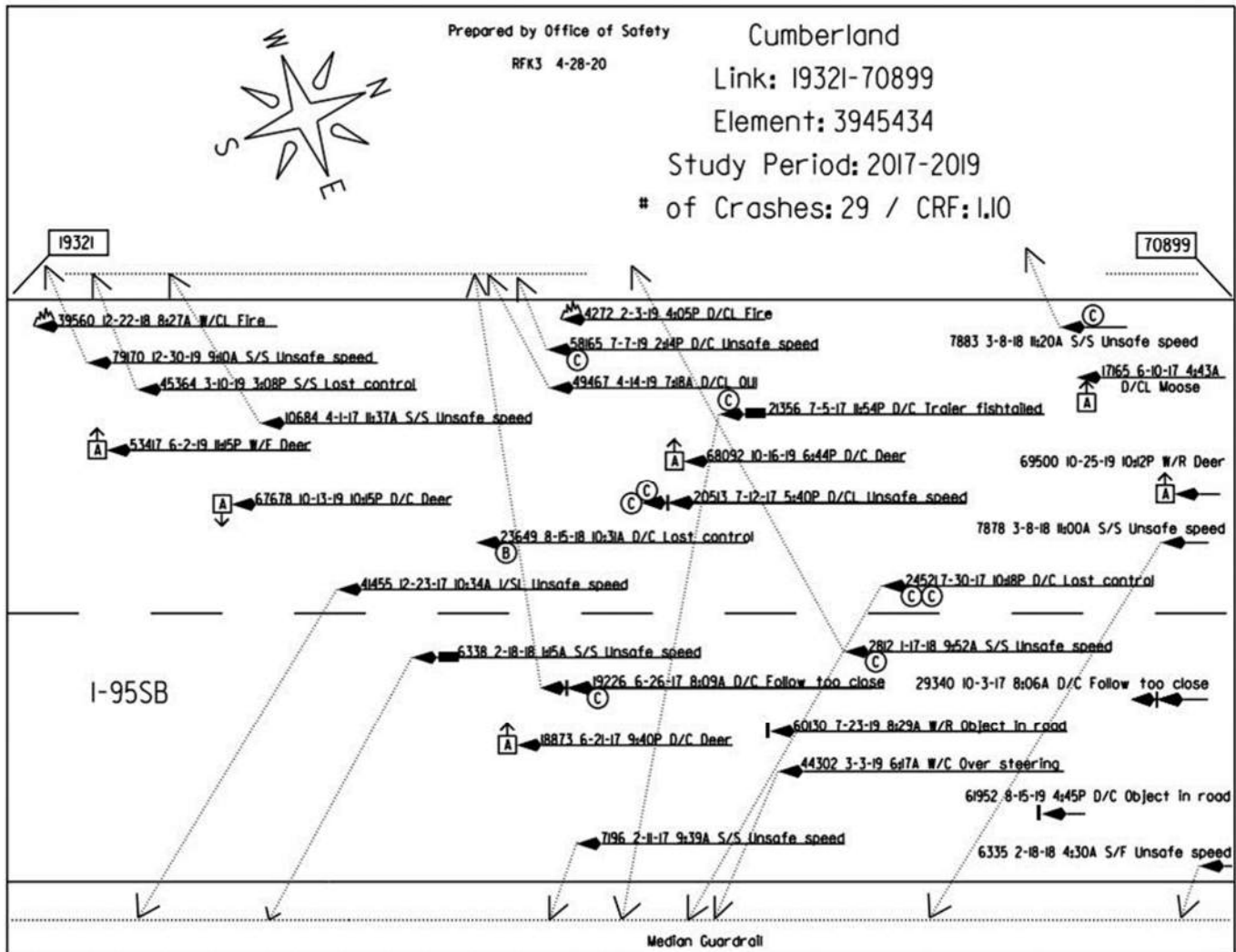
Photo 1: NB Just North of Hurricane Road (2015)



² Google Maps Accessed

Figure 2: 2017-2019 SB South of Upper Blackstrap Road Crash Diagram depicts the southbound segment crash diagram for the time period in which it was most recently identified as an HCL. This is the only time period in which this location qualified as an HCL in the prior 10 years.

Figure 2: 2017-2019 SB South of Upper Blackstrap Road Crash Diagram



As shown in **Figure 2**, there were 29 crashes resulting in a 27.6% injury rate during this analysis period.

- The leading cause of crash in this location is speed, which contributed to 11 crashes
- Collisions with animals was the next most common type of crash, with 6 total crashes
- 2 Of the crashes at this location involved heavy vehicles
- 16 of the crashes at this location resulted in vehicles departing from the travel way
 - o 13 of these 16 roadway departures resulted in vehicles colliding with guardrail
- 11 of the crashes at this location occurred between the summer months of June to August
- There is not a strong correlation between time of day and crash frequency at this location

Photo 2: SB South of Upper Blackstrap Road (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: SB South of Upper Blackstrap Road (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	The northbound segment of this location is straight and flat. The southbound segment has some horizontal curvature, but does not create sight distance concerns.
Lighting	The southbound segment has lighting along the northern portion of it.
General Sign Issues	Signage exists along the segments to denote mile marker locations.
Marking and Delineation	Adequate markings exist along the entirety of the segments to separate travel lanes as well as shoulders.
Barriers and Clear Zones	Guardrail is along the median of the roadway for the entire length of both segments to separate the northbound and southbound travel directions. Guardrail is along the majority of the outside of both segments.
Bridges and Culverts	Along the northbound segment, bridge 0280 carries Hurricane Road over I-95 and bridge 0284 carries I-95 NB over the Piscataqua River. At the northern segment, bridge 0285 carries Blackstrap Road over I-95. The condition ratings⁴ that components of each of these bridges has been given can be found below: 0280: Good and Satisfactory

³ Google Maps accessed

⁴ According to MaineDOT Public Map Viewer – Bridges Layer

	• 0284: Very Good and Satisfactory • 0285: Good and Satisfactory
Pavement	Both segments have pavement which was given pavement condition ratings ⁵ of B.
Heavy Vehicles	The percentages of heavy vehicles through this area ranges from 4% to 13%, depending on direction and time of day.

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

⁵ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location: Near Service Plaza

Nodes 70898 to 19323: Cumberland Service Plaza SB Off Ramp Approach

Nodes 70887 to 70975: NB Segment after Gray Service Plaza on Ramp

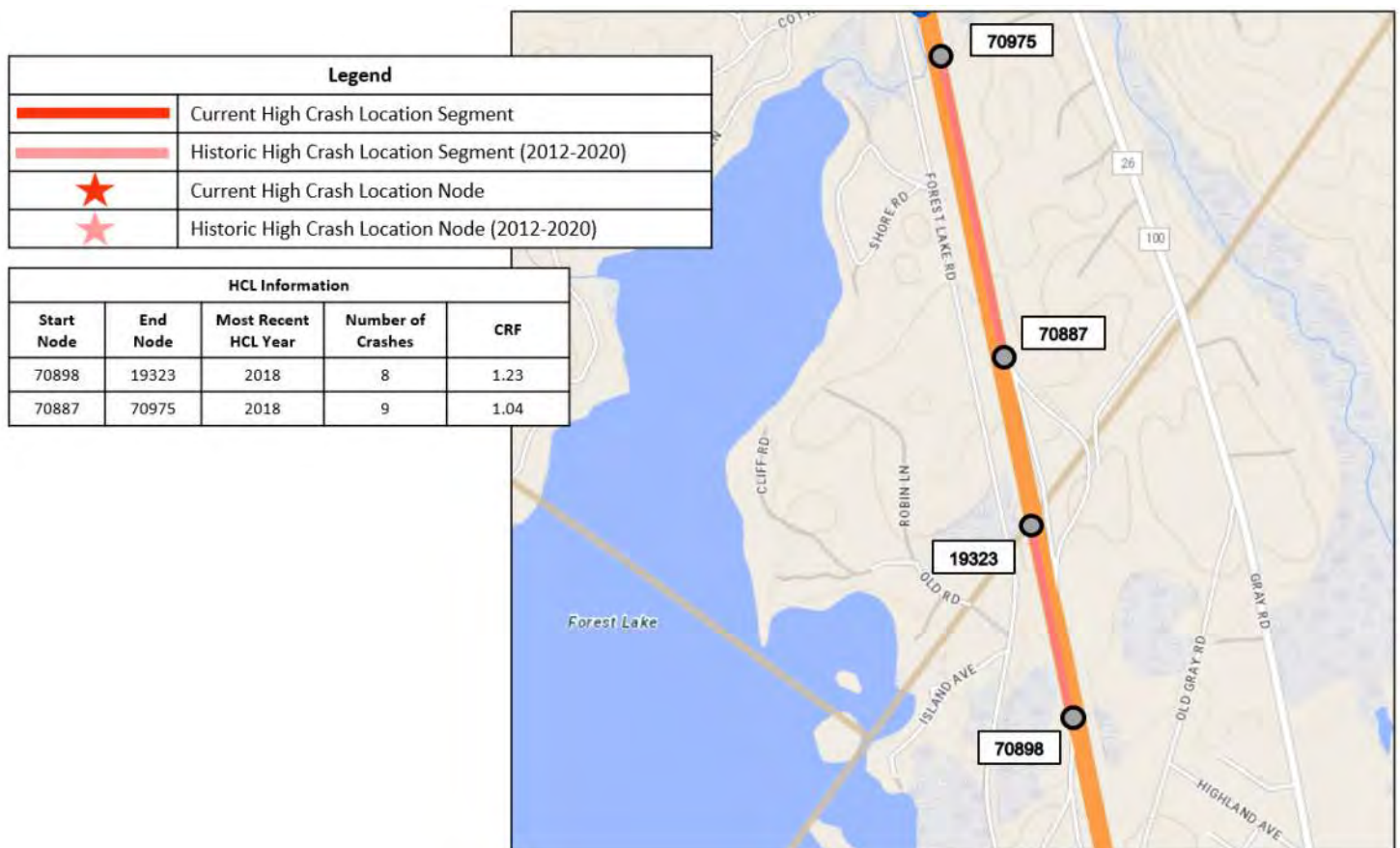
Introduction

There are 2 HCLs for the mainline segment surrounding the Gray service plaza during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Cumberland Service Plaza SB Off Ramp Approach
- NB Segment after Gray Service Plaza on Ramp

These segments are located along I-95 NB and SB in the Town of Cumberland in Cumberland County. Both segments are located near the Cumberland Service Plaza; the SB segment just north of the southbound Service Plaza diverge while the NB segment is located just north of the NB Service Plaza merge. Both service plazas provides amenities to users of the Turnpike including dining and fueling.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment both underwent construction around 2016. The Exit 53 interchange underwent changes which included the addition of a toll plaza lane and a ramp lane. Improvements were made to the Exit 63 interchange which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

Both directions of this mainline segment have a posted speed limit of 65 MPH. The northbound segment has an AADT¹ of 15,641 while the southbound has an AADT of 15,739.

Corridor Characteristics

These segments are located between the Exit 53 and Exit 63 interchanges. Both the northbound and southbound directions consist of two travel lanes with shoulders on both sides. The southern end of the SB segment contains a third lane for deceleration for the service plaza while the southern end of the NB segment contains a third lane for acceleration. Rumble strips span both the inside and outside shoulders for the entire length of the segments (with the exception of the locations where the plaza acceleration/deceleration lanes extend). Guardrail spans the entire length between the two interchanges to separate the northbound and southbound travel directions. Guardrail also spans portions of the outside of the roadway along both segments.

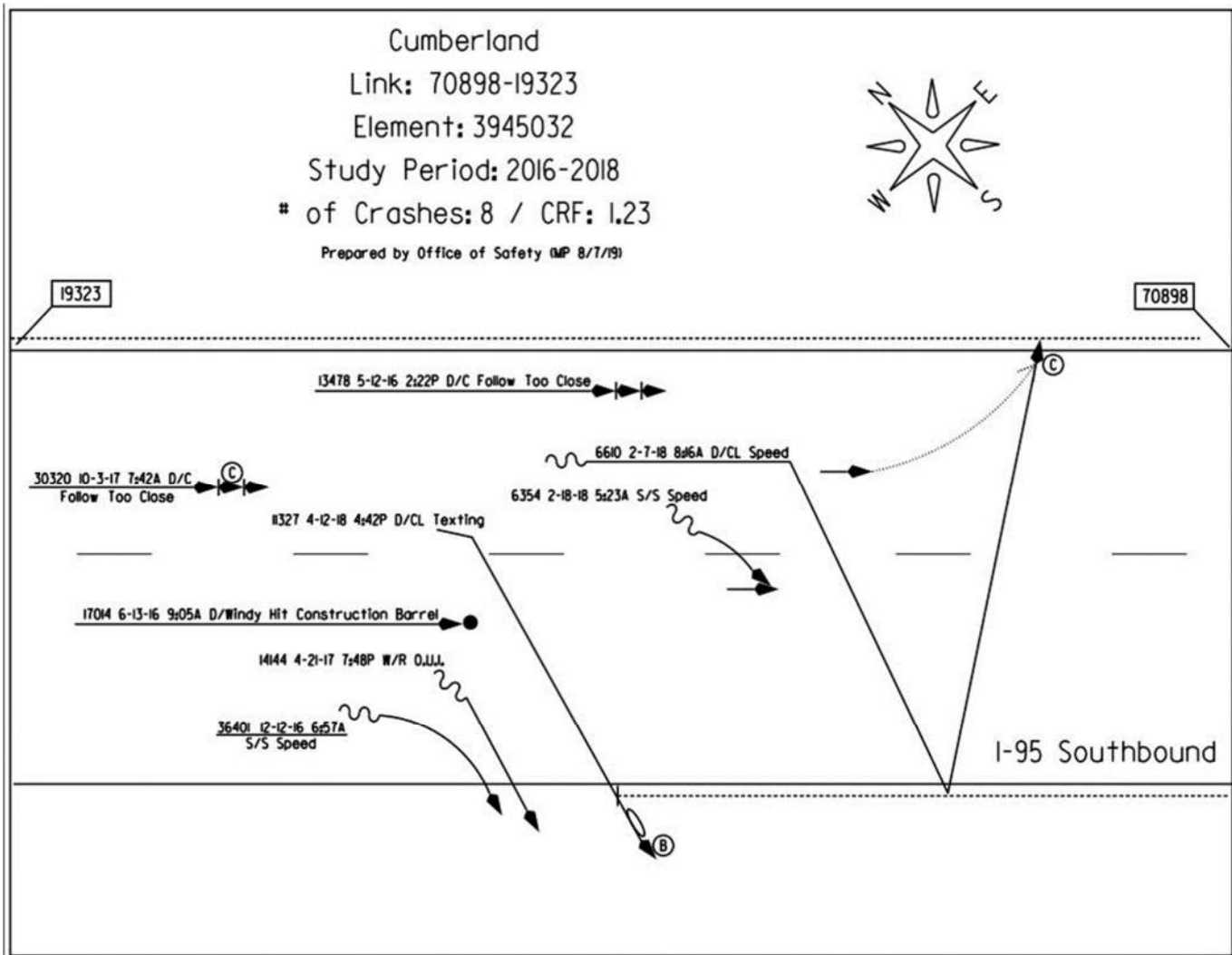
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Cumberland Service Plaza SB Off Ramp Approach

Figure 2: 2016-2018 SB Plaza Approach Crash Diagram depicts the crash diagram for this location during the time period in which it was most recently identified as an HCL. This is the only time period over the past 10 years in which this location was identified as an HCL.

Figure 2: 2016-2018 SB Plaza Approach Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 37.5% injury rate during this analysis period.

- The most common cause of crash at this location was speed, which contributed to 3 crashes
- The next most common cause was following too close which contributed to 2 crashes
- 4 of the crashes at this location resulted in vehicles departing from the roadway
 - 1 of these 4 resulted in collision with guardrail
- 4 of the 9 crashes at this location occurred between February and April
- The majority of crashes at this location occurred in the morning, with 5 crashes happening between approximately 5:30am and 9:00am

Photo 1: North of SB Service Plaza captured by Google Maps² in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

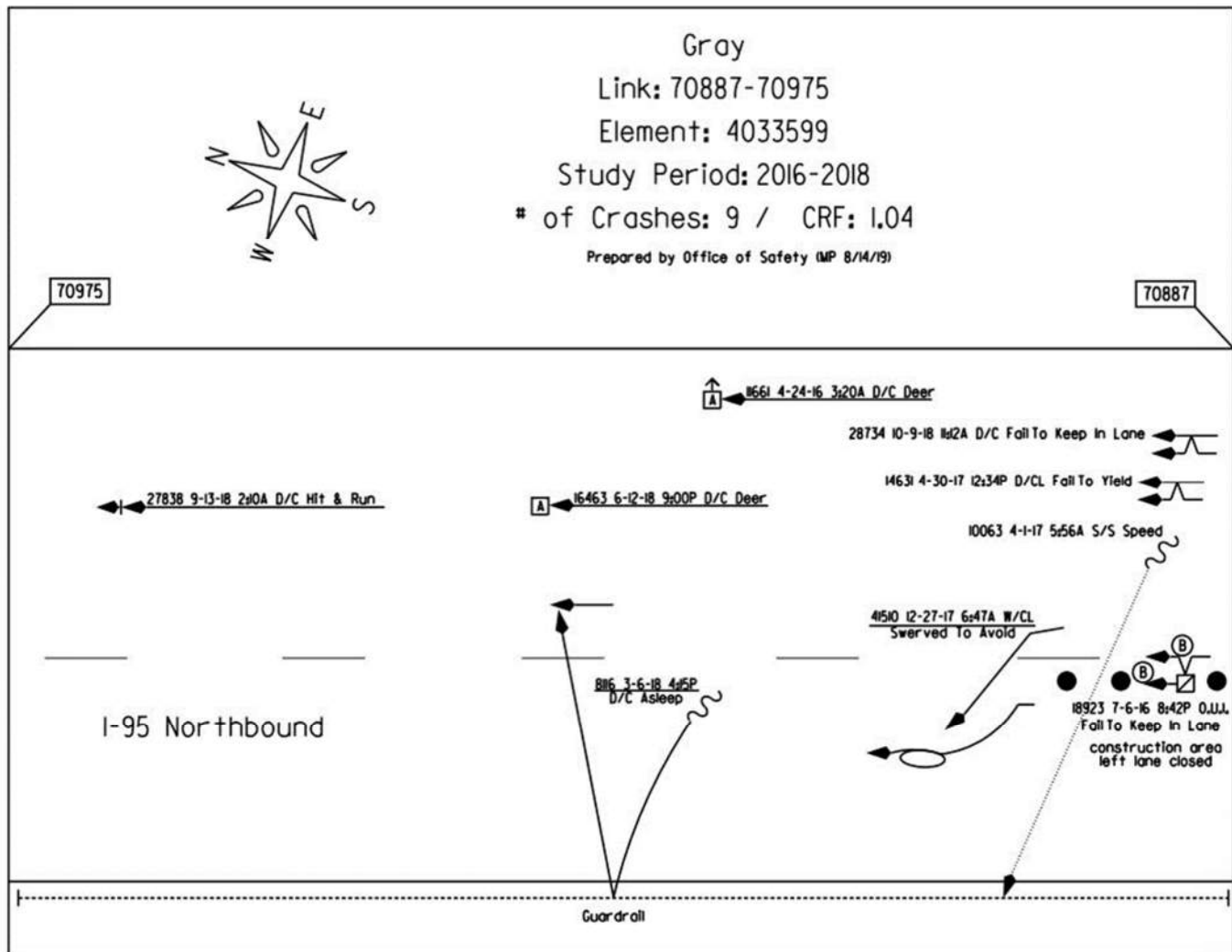
Photo 1: North of SB Service Plaza



² Google Maps accessed March 22, 2023

Figure 3: 2016-2018 NB North of Gray Service Plaza Crash Diagram depicts the crash diagram during the time period in which the location was most recently identified as an HCL. This is the only time period in the past 10 years in which it was identified as an HCL.

Figure 3: 2016-2018 NB North of Gray Service Plaza Crash Diagram



As shown in **Figure 3**, there were 9 crashes resulting in a 11.1% injury rate during this analysis period.

- The two most common causes of crash at this location are collisions with animals and failure to keep in lane, each while contributed to 2 crashes
 - One of the failure to keep in lane crashes occurred in construction conditions when the left lane was closed
- 2 of the crashes at this location resulted in vehicles departing from the travel way and colliding with guardrail
- There does not appear to be a strong correlation between time of year and crash frequency
- Many of the crashes at this location occurred during the early morning, with 4 crashes being recorded between 2:00am and 7:00am

Photo 2: NB North of Gray Service Plaza (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: NB North of Gray Service Plaza (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	Both segments at this location are straight and flat which does not create sight distance concerns.
Lighting	Lighting can be found along the northbound segment at this location.
General Sign Issues	Signage along the SB segment with information for the Cumberland Service Plaza.
Marking and Delineation	Adequate markings exist along the entirety of the segments to separate travel lanes as well as shoulders.
Barriers and Clear Zones	Guardrail is along the median of the roadway for the entire length of both segments to separate the northbound and southbound travel directions. Guardrail is along portions of the outside of both segments.
Bridges and Culverts	No bridges or culverts exist along the segments included in this RSA.
Pavement	Both HCL segments at this location have pavement that have been given pavement condition ratings ⁴ of B.
Heavy Vehicles	The percentages of heavy vehicles through this area ranges from 4% to 13%, depending on direction and time of day.

Conclusions

Generally, neither location has strong correlations or trends relating to crash patterns.

There are large animal crashes at this location. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

³ Google Maps Accessed March 22, 2023

⁴ According to

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

Mainline High Crash Location: Just South of Exit 63 Interchange

Nodes 19299 to 70979: Exit 63 NB Off Ramp Approach

Nodes 17678 to 90780: Segment after Exit 63 SB On Ramp

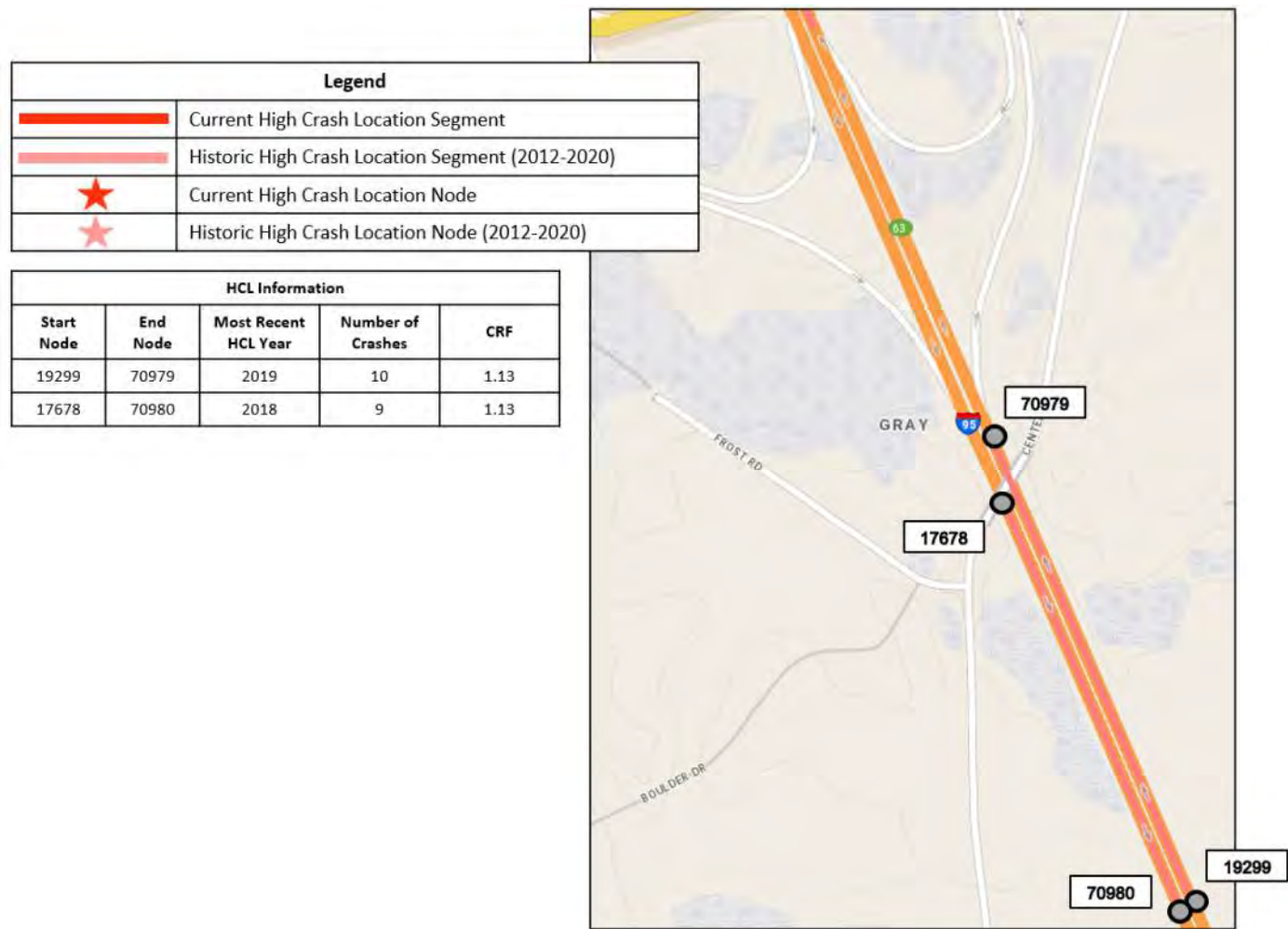
Introduction

There are 2 HCLs for the mainline segment just south of the Exit 63 interchange during the most recent 10-year period as shown in **Figure 1: HCL Location Map**

- Exit 63 NB Off Ramp Approach
- Segment after Exit 63 SB On Ramp

These segments carry I-95 NB and SB in the Town of Gray in Cumberland County. Both segments have a southerly limit of the Pleasant River. The NB segment has a northerly limit of just south of the Exit 63 NB Off Ramp diverge point while the SB segment has a northerly limit of the Center Road overpass. The Exit 63 interchange provides access to a number of significant roadways, including US Route 202, Route 26, Route 26A and Route 115.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment both underwent construction around 2016. The Exit 53 interchange underwent changes which included the addition of a toll plaza lane and a ramp lane. Improvements were made to the Exit 63 interchange which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

Both directions of this mainline segment have a posted speed limit of 65 MPH. The northbound segment has an AADT¹ of 15,641 while the southbound has an AADT of 15,739.

Corridor Characteristics

These segments are located between the Exit 53 and Exit 63 interchanges. Both the northbound and southbound directions consist of two travel lanes with shoulders on both sides. Rumble strips span both the inside and outside shoulders for the entire length of the segments. Guardrail spans the entire length between the two interchanges to separate the northbound and southbound travel directions.

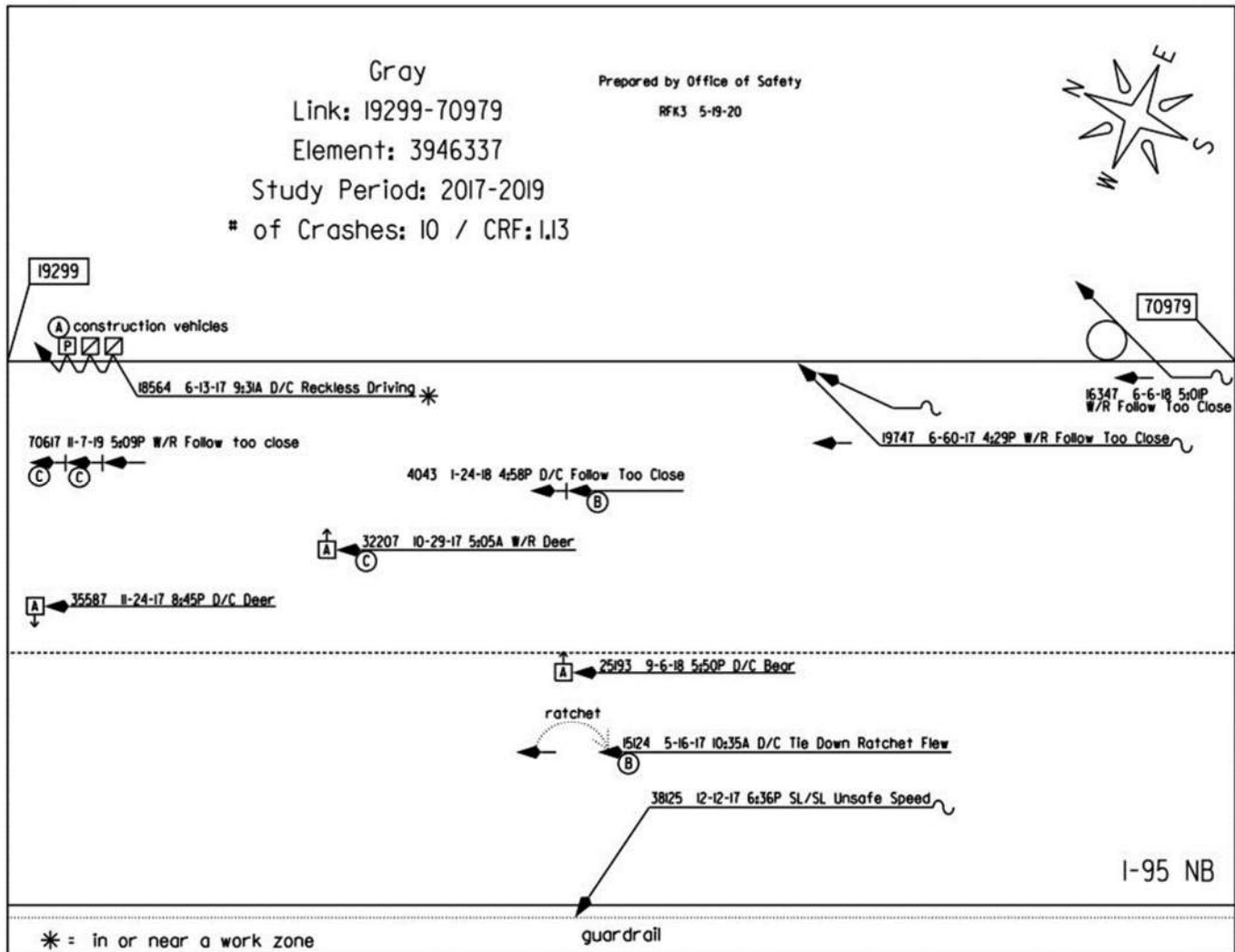
¹ 2022 AADT Summary Created by HNTB for MTA.

Crash analysis

Exit 63 NB Off Ramp Approach

Figure 2: 2017-2019 NB Exit 63 Off Ramp Approach Crash Diagram depicts the location's crash diagram during the time period in which it was most recently identified as an HCL. This location was classified as an HCL during two other time periods over the prior 10 years.

Figure 2: 2017-2019 NB Exit 63 Off Ramp Approach Crash Diagram



As shown in **Figure 2**, there were 10 crashes resulting in a 50% injury rate during this analysis period.

- The most common crash type at this location was following too close, which cause 4 crashes
- 3 crashes at this location were caused by collisions with animals
- 4 of these 10 crashes resulted in vehicles departing from the roadway
- 1 of these crashes was a work zone crashes
- 3 of these crashes occurred during the month of June, while 4 occurred between the months of October and December
- 6 of these crashes occurred during typical PM peak hours of approximately 4:30pm to 6:30pm

Photo 1: South of Exit 63 Off Ramp (2019) captured by Google Maps² in June of 2019 shows the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: South of Exit 63 Off Ramp (2019)

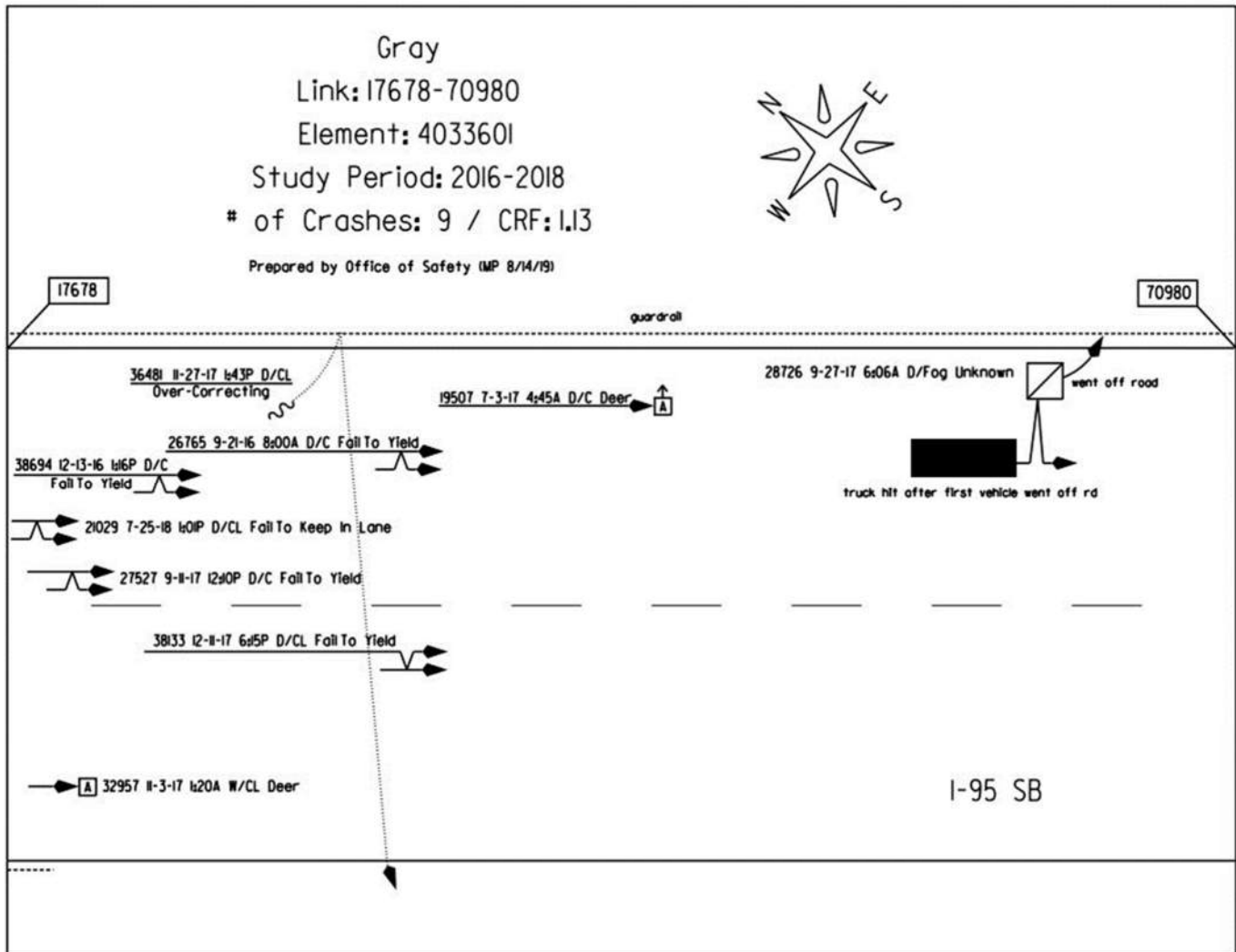


² Google Maps accessed March 22, 2023

Segment after Exit 63 SB On Ramp

Figure 3: 2016-2019 SB South of Exit 63 On Ramp Crash Diagram depicts the crash diagram for the most recent time period in which this location was identified as an HCL. This location was also classified as an HCL during one other time period in the past 10 years.

Figure 3: 2016-2019 SB South of Exit 63 On Ramp Crash Diagram



As shown in **Figure 3**, there were 9 crashes resulting in a 0% injury rate during this analysis period.

- The most common cause of crash at this location was failure to yield, which contributed to 4 crashes
- 2 of these crashes were collisions with large animals
- 6 of these 9 vehicles were sideswipe-type crashes
- 1 of these crashes involved a heavy vehicle
- 1 of these crashes resulted in a vehicle departing from the travel way
- 4 of these crashes occurred in the months of November and December
- 4 of the crashes occurred between 12:00pm and 2:00pm

Photo 2: SB South of Exit 63 On Ramp (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: SB South of Exit 63 On Ramp (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	Both segments at this location are straight and flat which does not create sight distance concerns.
Lighting	Lighting can be found along both segments near the Exit 63 interchange.
General Sign Issues	Signing exists along both segments. Signing along the NB segment is to notify drivers of the Exit 63 interchange.
Marking and Delineation	Adequate markings exist along the entirety of the segments to separate travel lanes as well as shoulders.
Barriers and Clear Zones	Guardrail is along the median of the roadway for the entire length of both segments to separate the northbound and southbound travel directions.
Bridges and Culverts	Bridge 0288 carries Center Road over both segments at this location and has components which have been given condition ratings ⁴ of fair and good.
Pavement	The pavement along the NB segment has been given a pavement condition rating ⁵ of B, while the SB segment has been given a pavement condition rating of C.
Heavy Vehicles	The percentages of heavy vehicles through this area ranges from 4% to 13%, depending on direction and time of day.

³ Google Maps Accessed March 22, 2023

⁴ According to MaineDOT Public Map Viewer – Bridge Layer

⁵ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Failure to stay in lane crashes are also common at this location. The area should be continued to be monitored for this concern.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.
 - Continue to monitor location.

Intersection High Crash Location: Exit 63 Intersections

Nodes 12522 to 66227: Exit 63 NB Off Ramp Intersection (WB Approach)

Node 61549: Exit 63 SB Ramps Intersection

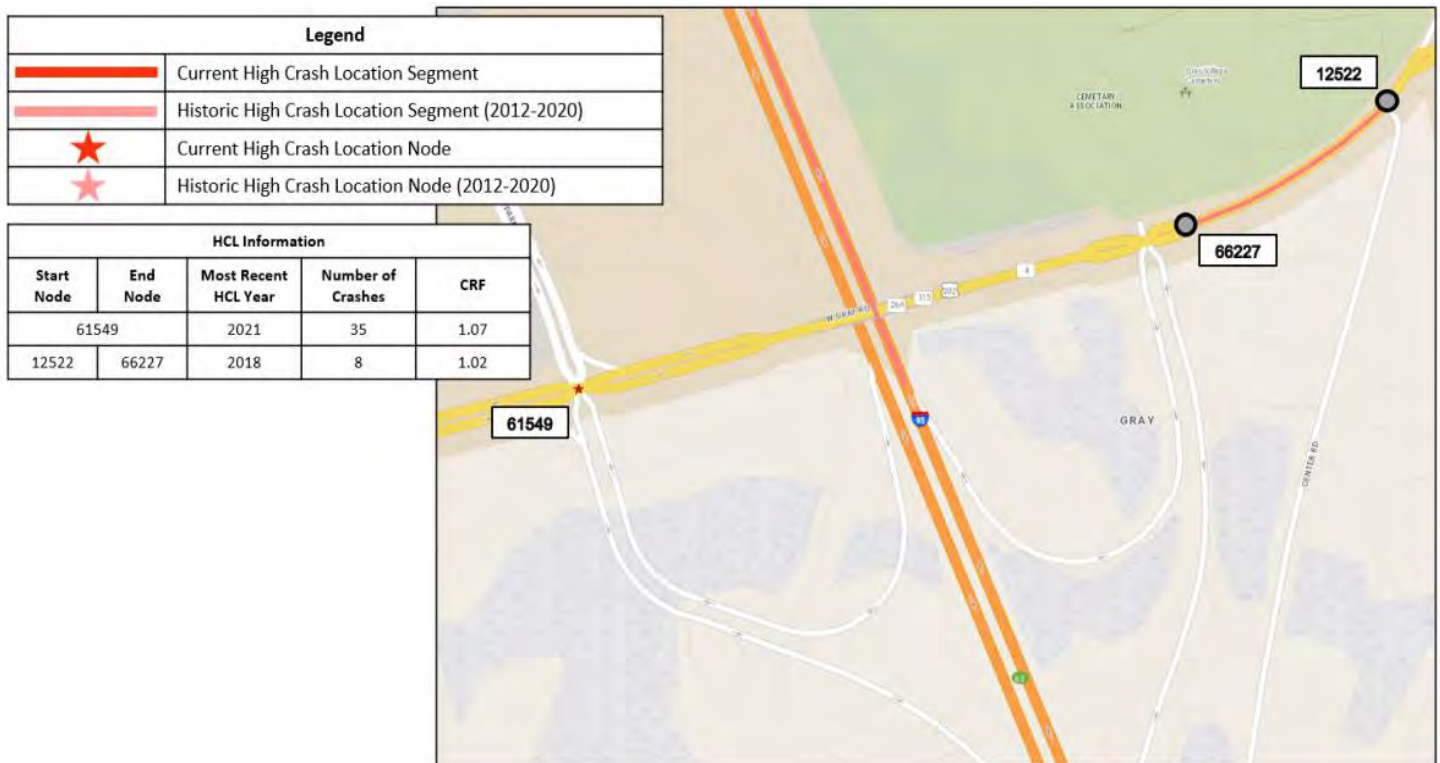
Introduction

There are 2 HCLs for the segment Exit 63 intersections during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 63 NB Off Ramp Intersection (WB Approach)
- Exit 63 SB Ramps Intersection

These HCLs are located in the Town of Gray in Cumberland County. The segment and node included in this analysis area are associated with the intersections adjacent to the Exit 63 NB and SB interchanges. Exit 63 provides access to a number of significant roadways which include US Route 202, Route 26, Route 26A and Route 115.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

This interchange underwent construction around 2016 to implement improvements which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps.

General Mobility Observations

This location is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

The speed limits and AADTs of each intersection approach at the SB ramps as well as the WB approach of the NB intersection can be found in the table below:

Intersection	Approach	AADT ¹	Speed Limit
SB Ramps Intersection	Ramps Approach (NB)	2,612 ²	30 MPH (Advisory Speed)
	Maine Wildlife Parkway (SB)	6,375	35 MPH
	W. Gray Road (EB)	7,393	30 MPH
	W. Gray Road (WB)	13,025	30 MPH
NB Ramps Intersection	W. Gray Road (WB)	6,605	30 MPH

Corridor Characteristics

The SB ramps intersection is a four-legged signalized intersection. The ramps approach receiving lanes have a toll plaza just south of the intersection. The southern corners of the intersection have guardrail. Each leg of the intersection is comprised of lanes with shoulders and has an asphalt median separating the travel directions. The number of approach and receiving lanes for each intersection leg can be found in the table below:

Intersection Leg	Number of Approach Lanes	Receiving Lanes
Ramps Approach (NB)	3 (L, T, R)	3 (One is Slip Ramp from EB Approach)
Maine Wildlife Parkway (SB)	4 (L, T, T, R)	1
W. Gray Road (EB)	3 (L, T, R)	2
W. Gray Road (WB)	4 (L, LT, T, R)	1

The W. Gray Road WB approach segment to the NB ramps intersection consists of 1 WB lane and 2 EB lanes. Each side of the travel way has a shoulder, and there is curbing to the north of the WB direction.

¹ From MaineDOT Public Map Viewer Unless Otherwise Specified

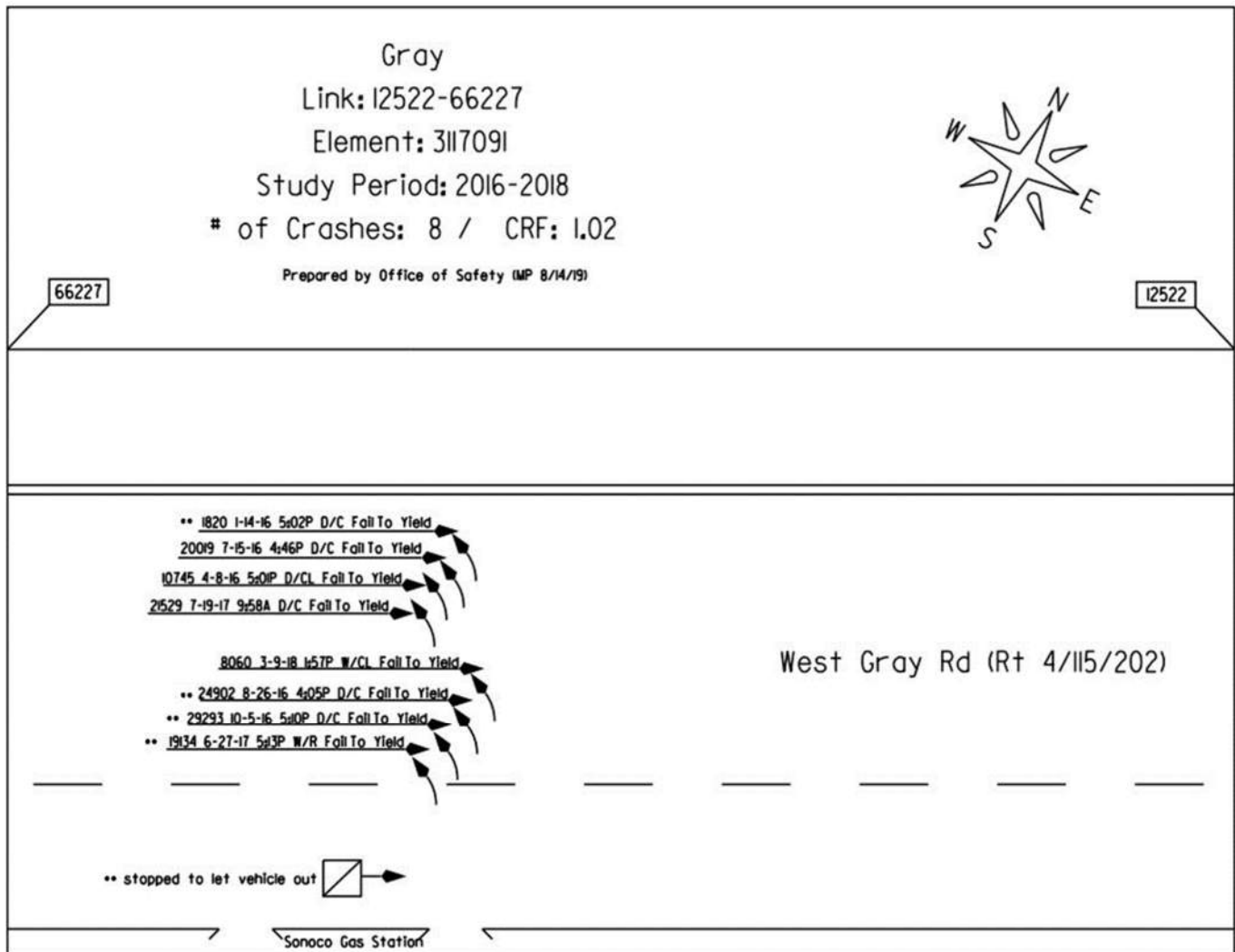
² 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Exit 63 NB Off Ramp Intersection (WB Approach)

Figure 2: 2016-2018 WB NB Ramps Intersection Approach Crash Diagram depicts the crash diagram for the most recent time period in which this location was classified as an HCL. This segment was also identified as an HCL during 5 other time periods over the prior 10 years.

Figure 2: 2016-2018 WB NB Ramps Intersection Approach Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 0% injury rate during this analysis period.

- All of the recorded crashes at this location were between vehicles traveling EB and vehicles attempting to take a left turning movement out of the Sonoco Gas Station
 - 4 of these occurred as vehicles were stopped to let the vehicles out
- 4 of the crashes at this location occurred during the months of June through August
- 6 of the crashes occurred during the PM Peak hours of 4:00pm to 5:30pm

Photo 1: NB Ramps Intersection WB Approach (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

³ Google Maps accessed March 22, 2023

Photo 1: NB Ramps Intersection WB Approach (2018)



Figure 3: 2019-2021 SB Ramps Intersection Crash Diagram depicts the intersection during the most recent time period in which it was identified as an HCL. This location qualified as an HCL during one other time period over the prior 10 years.

Gray
Node: 61549(P)
Assoc Nodes: 66241, 66242,
71705, 71706
Study Period: 2019-2021
of Crashes: 35 / CRF: 1.07
Prepared by Office of Safety & Mobility
RFK3 4-13-22

West Gray Rd

Wildlife Parkway
Rt 26A

66242

66241

West Gray Rd

61549

71705

71706

Park & Ride
I-95 S/B On/Off Exit 63

☀ = Traffic Signal

Crash Data:

- 5993 5-5-19 7:00A D/C/L Follow Too Close
- 9000 4-2-21 3:44P D/C Fall To Yield
- 29648 10-26-21 10:30A W/R Rn Red Light
- 396 1-6-19 1:44P D/C Rn Red Light
- 54563 6-9-19 3:33P D/C Rn Red Light
- 69555 0-23-19 6:06A W/R Follow Too Close
- 63460 8-21-19 12:48P D/C Follow Too Close
- 6958 8-1-19 9:55A D/C Follow Too Close
- 35743 0-16-21 9:37A W/R Follow Too Close
- 4257 2-4-19 2:05P D/C Improper Backing
- 968 1-10-20 8:43A D/C Driver Inattention
- 2420 8-15-21 11:08A D/C Follow Too Close
- 68740 10-23-19 7:00A W/R Follow Too Close
- 10342 4-27-21 9:42A D/C Fall to keep in lane
- 14574 6-21-20 4:08P D/C Fall to keep in lane
- 44276 2-27-19 10:30A D/C/L Fall To Keep In Lane
- 5781 1-2-19 1:45A D/C Follow Too Close
- 62136 7-25-19 10:05A D/C Follow Too Close
- 10849 5-2-20 2:04P D/C Follow Too Close
- 62043 8-13-19 2:00P D/C Tire Fall Off
- 4234 2-18-21 8:46A D/C Fall to yield
- 2009 1-19-21 10:56A D/C Fall to keep in lane

- The leading cause of crash at this location is following too close, which contributed to 16 of the 35 crashes at this location
- The next most common crash cause was failure to yield, which contributed to 8 crashes
- 10 of these 35 crashes were turning movement crashes
 - The most common crash causes at turning movement crashes were running red lights and failure to keep in lane
- The Wildlife Parkway SB Approach and the W. Gray Road WB Approach were the most common locations of crash at this intersection
- There is not a strong correlation between time of year and crash frequency at this location
- Many of the crashes at this location occurred during typical AM Peak hours of travel

Photo 2: SB Ramps Intersection (2018) captured by Google Maps⁴ in August of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL. The view in this photo is from the perspective of vehicles approaching from W. Gray Street westbound.

Photo 2: SB Ramps Intersection (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	The W. Gray Road approach to the NB Ramps intersection is a flat segment of roadway with some curvature to it. The SB Ramps intersection location is flat, and all approaches are straight at the intersection and do not approach the intersection at any skew.
Lighting	There is lighting at both intersections.
General Sign Issues	There is signage at the SB ramps intersection which includes information including lane usage, route guidance and movement restrictions.
Marking and Delineation	Markings at the NB Ramp approach segment designate lane use and separate travel lanes and directions. At the intersections, markings separate lanes at each approach and designate turning lane use.
Barriers and Clear Zones	Guardrail exists along the NB approach of the SB ramps intersection which then wraps to the southern corners of the intersection. Asphalt medians can also be found at each approach to separate travel directions.
Bridges and Culverts	No bridges or culverts exist at either HCL included in this RSA.
Pavement	The pavement condition ratings⁵ that the pavement at each approach can be found below: • WB Approach to NB Ramps Intersection: B • NB Approach to SB Ramps Intersection: B • SB Approach to SB Ramps Intersection: A • EB Approach to SB Ramps Intersection: A • WB Approach to SB Ramps Intersection: B
Heavy Vehicles	The Exit 63 ramps have a heavy vehicle percentage ranging from 1% to 9%, depending on the direction and time of day.

⁴ Google Maps Accessed March 22, 2023

⁵ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Conclusions

Rear-end collisions at the Exit 63 SB intersection and movements at the Sunoco Gas Station are the most prominent crash patterns at these intersections. Recommendations will focus around evaluating the intersection signal timing and phasing to determine whether this could be a potential cause of the safety concerns.

Recommendations

- Short-Term Solutions:
 - Signal timing and phasing should be evaluated to understand if clearance intervals and operations are optimized.

Mainline High Crash Location: Just North of Exit 63 Interchange

Nodes 19301 to 70981: Segment After Exit 63 NB On Ramp

Nodes 70981 to 19303: NB Segment MM 63 to Shaker Rd Bridge

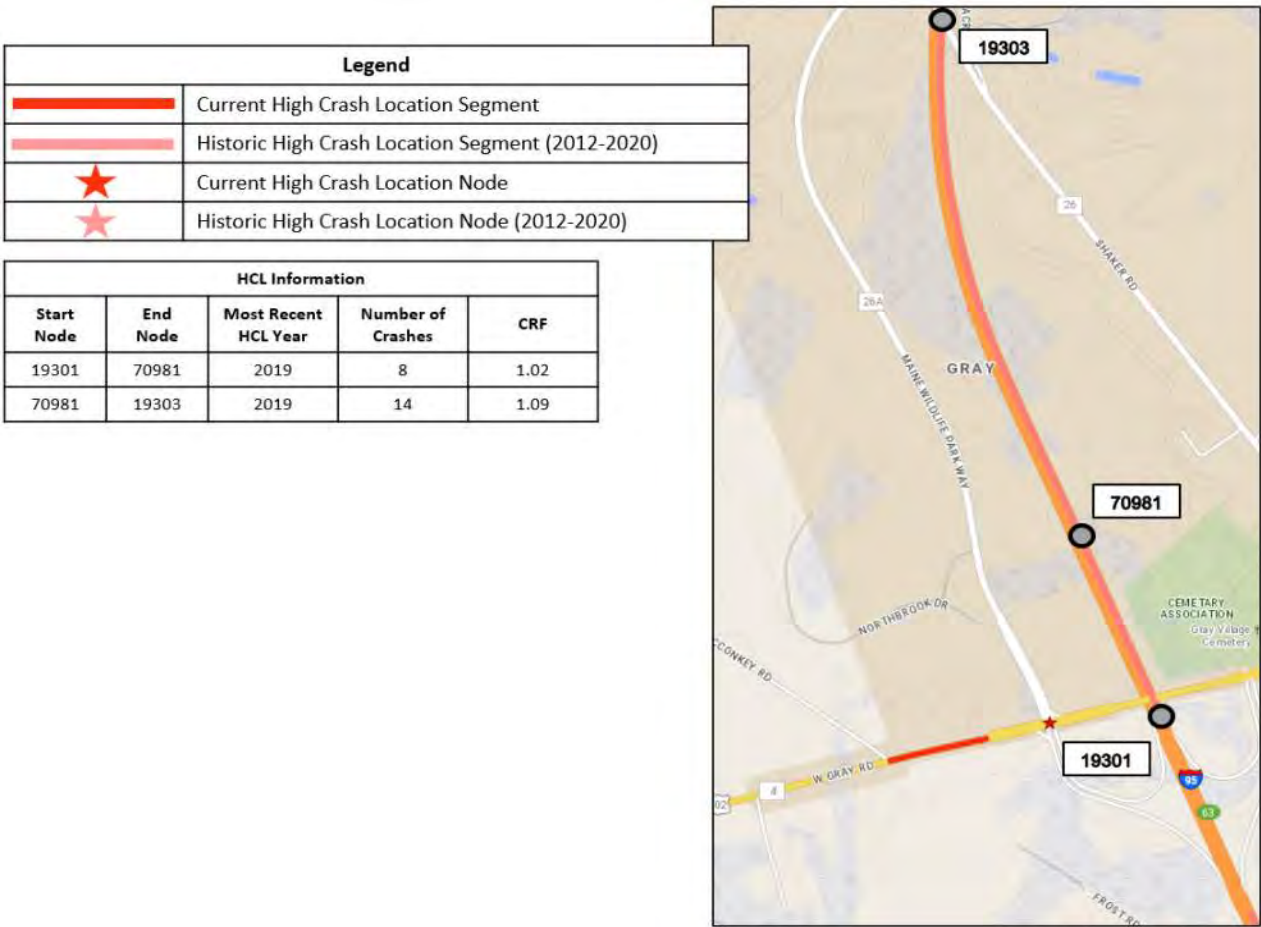
Introduction

There are 2 HCLs for the mainline segment just north of the Exit 63 interchange during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Segment After Exit 63 NB On Ramp
- NB Segment MM 63 to Shaker Road Bridge

These HCLs are both along I-95 NB in the Town of Gray in Cumberland County. The southern segment spans from just north of the Exit 63 NB on ramp merge point to the southern end of the northerly segment. The northern limit of the northerly segment is the Shaker Road overpass. These segments are both in very close proximity to the Exit 63 interchange which provides access to a number of significant roadways including US Route 202, Route 26, Route 26A and Route 115.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment both underwent construction within the past few years. In 2016 improvements were made to the Exit 63 interchange which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps. At the Exit 75 interchange, changes were made in 2018 including toll system improvements, lane widening and installation of delineators along the ramp to help improve safety and prevent head-on collisions.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This NB mainline segment has a posted speed limit of 65 MPH and an AADT¹ 11,192.

Corridor Characteristics

This mainline segment consists of two travel lanes which carry vehicles along I-95 NB. The roadway has shoulders on either side with rumble strips along both shoulders. Guardrail spans the inside of the roadway to separate the northbound and southbound travel directions. Some spans of guardrail can also be found on the outside of the corridor to protect against hazards.

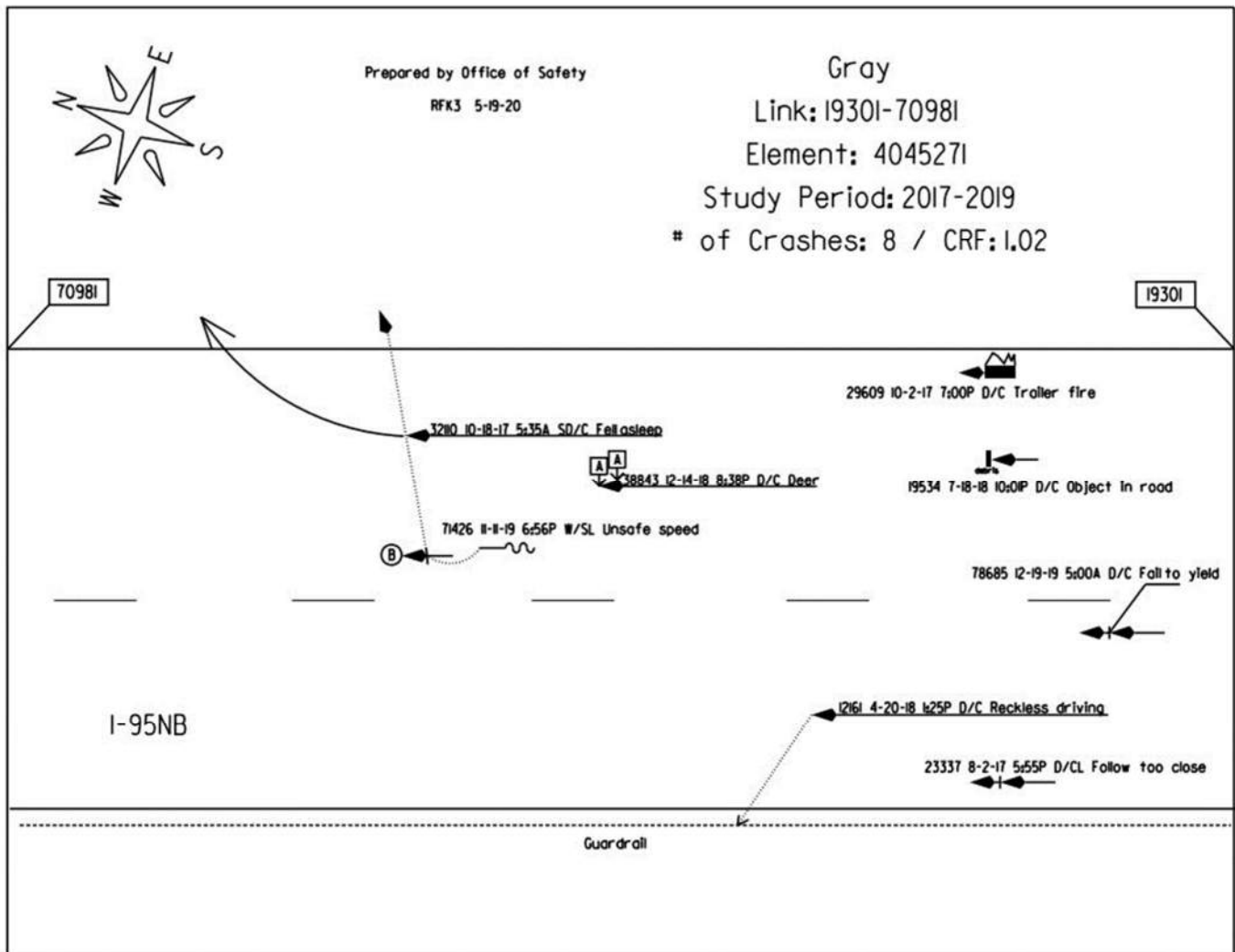
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Segment After Exit 63 NB On Ramp

Figure 2: 2017-2019 Immediately North of Exit 63 NB On Ramp Crash Diagram depicts this mainline segment during the most recent period in which it was identified as an HCL. This is the only time period over the past 10 years in which this location qualified as an HCL.

Figure 2: 2017-2019 Immediately North of Exit 63 NB On Ramp Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 12.5% injury rate during this analysis period.

- There are no crash types that repeated along this segment during this time period
- There was 1 crash which involved a heavy vehicle
- 3 of the crashes in this location resulted in vehicles departing from the travel way
 - o 1 of these 3 resulted in a vehicle colliding with guardrail
- 5 of these 8 crashes occurred during the months from October through December
- The majority of the crashes at this location occurred during evening hours

Photo 1: Just North of Exit 63 NB On Ramp (2019) captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

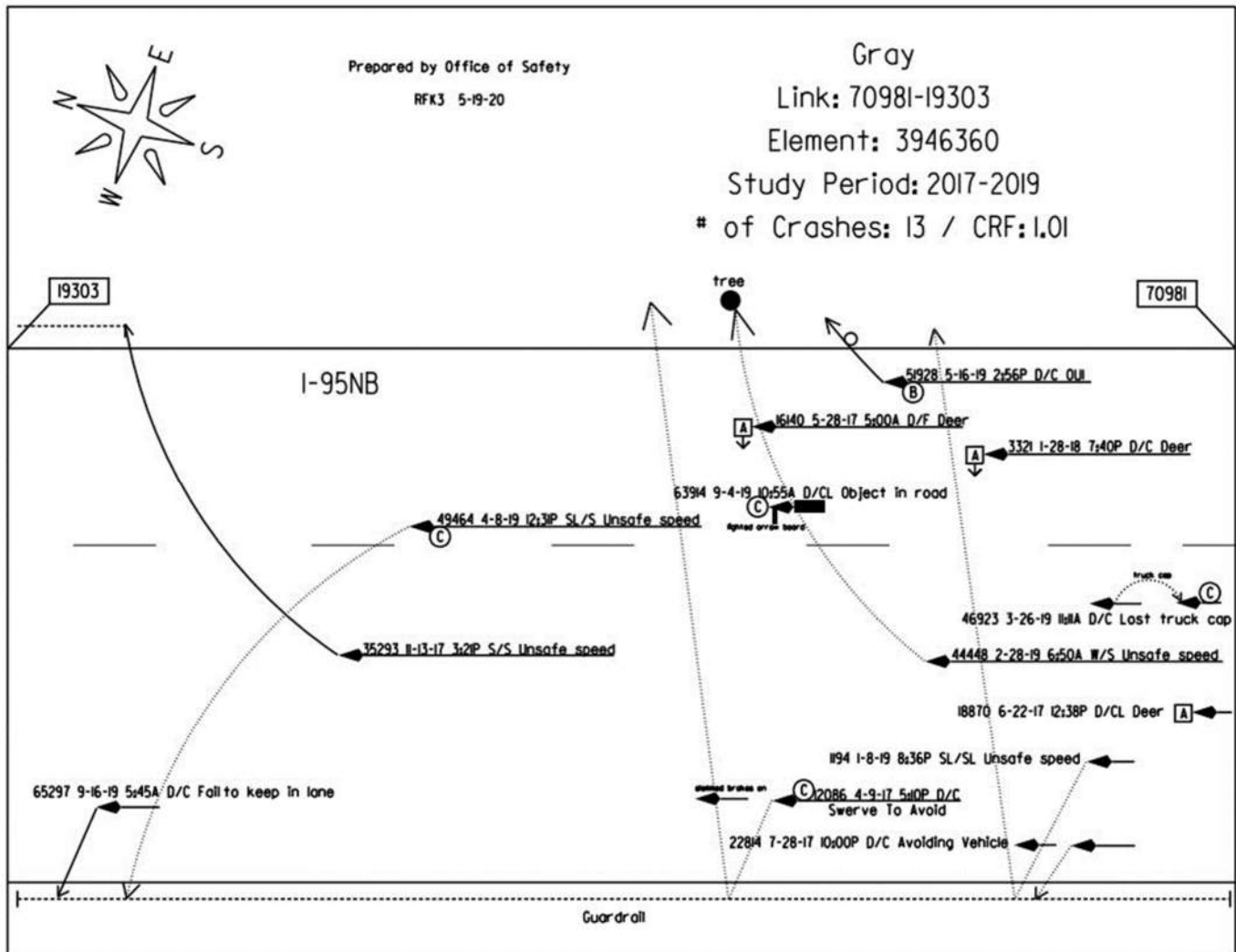
Photo 1: Just North of Exit 63 NB On Ramp (2019)



² Google Maps Accessed March 22, 2023

Figure 3: NB Segment MM 63 to Shaker Road Bridge depicts the HCL diagram for the location for the most recent time period in which it was classified as an HCL. This is the only time in the past 10 years in which this location was identified as an HCL.

Figure 3: 2017-2019 I-95 NB Near Shaker Road Crash Diagram



As shown in **Figure 3**, there were 13 crashes resulting in a 38.5% injury rate during this analysis period.

- The most common cause of crash at this location was unsafe speed, which contributed to 4 crashes
- The next most common crash type was collisions with large animals which contributed to 3 crashes
- 8 of these 13 crashes resulted in vehicles departing from the travel way
 - 6 of these 8 crashes resulted in vehicles colliding with guardrail
- There is not a strong correlation between time of year nor time of day and crash frequency at this location

Photo 2: I-95 NB (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: I-95 NB (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	Both segments at this location are straight and flat which does not create sight distance concerns.
Lighting	Lighting exists along the southern segment near the Exit 63 interchange.
General Sign Issues	Signing exists through this location which includes animal warning signs.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders.
Barriers and Clear Zones	Guardrail is along the inside of the roadway to separate the northbound and southbound travel directions. There is also a guardrail run along the outside of the northern segment.
Bridges and Culverts	Bridge 0289 carries W. Gray Road over I-95 at the southern end of these segments and has components which have been given condition ratings ⁴ of satisfactory and good.
Pavement	The pavement through this area has been given a pavement condition rating ⁵ of B.
Heavy Vehicles	This location ranges in percentage of heavy vehicles from approximately 4% to 13%.

Conclusions

Unsafe speeds, especially during inclement weather, is one of the leading causes of crash at this location. Because of this, the area should be included in a speed study evaluation to determine whether decreased posted speed limits during weather events should be implemented.

³ Google Maps accessed March 22, 2023

⁴ According to MaineDOT Map Viewer – Bridge Layer

⁵ According to MaineDOT Map Viewer – CSL Condition Data Simplified

Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.
 - Include area in future studies regarding 45 mph sign locations.

Mainline High Crash Location: New Gloucester Toll Plaza

Nodes 19305 to 19306: New Gloucester Toll Plaza NB

Nodes 70988 to 19333: New Gloucester Toll Plaza SB

Nodes 19334 to 19335: SB Segment (South of Bennett Road)

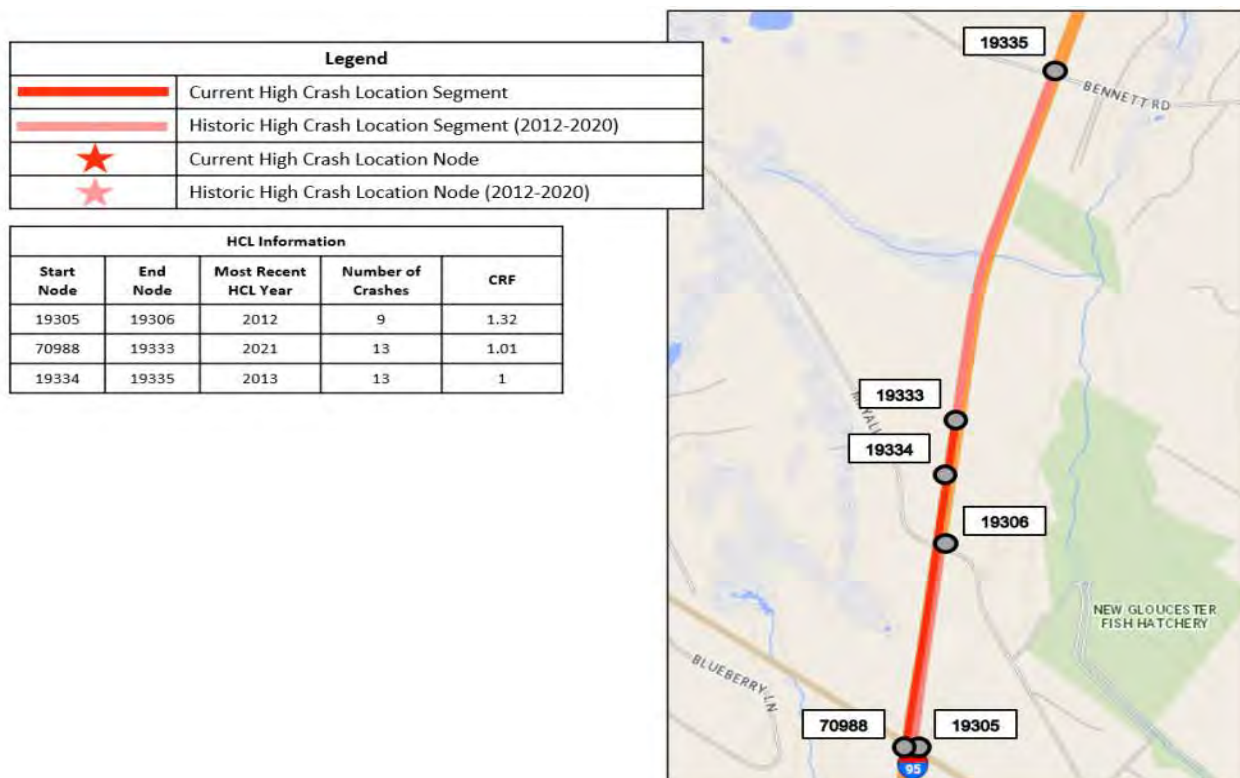
Introduction

There are 3 HCLs for the mainline segment around the New Gloucester Toll Plaza during the most recent 10-year period as shown in **Figure 1: HCL Location Map**

- New Gloucester Toll Plaza NB
- New Gloucester Toll Plaza SB
- SB Segment (South of Bennett Road)

These segments are located at and around the New Gloucester Toll Plaza in the Town of New Gloucester in Cumberland County. This analysis area consists of HCLs along both the NB and SB mainline segments, spanning from the Gray/New Gloucester Town Line north to the Bennett Road overpass. This area is north of the Exit 63 interchanges which provides access to a number of significant roadways including US Route 202, Route 26, Route 26A and Route 115.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment both underwent construction within the past few years. In 2016 improvements were made to the Exit 63 interchange which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps. At the Exit 75 interchange, changes were made in 2018 including toll system improvements, lane widening and installation of delineators along the ramp to help improve safety and prevent head-on collisions.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

The mainline through this segment has a posted speed limit of 65 MPH. The ORT lanes through the toll plaza are signed at the same speed limit of the mainline while the plazas have 35 MPH speed limits around them and 10 MPH posted speed limits through the plaza lanes. The NB mainline has an AADT¹ of 11,192 while the SB has an AADT of 11,627.

Corridor Characteristics

The mainline along these segments consists of two travel lanes in either direction. There are shoulders on both sides of the travel way along both segments which have rumble strips along them. At the toll plaza, the two lanes split such that the right lane splits into three to travel through the plaza while the left lane continues as an individual ORT lane. Guardrail separates the northbound and southbound travel directions, which transitions to concrete barrier around the toll plaza. At the toll plaza, concrete barrier also separates the ORT lanes from the plaza.

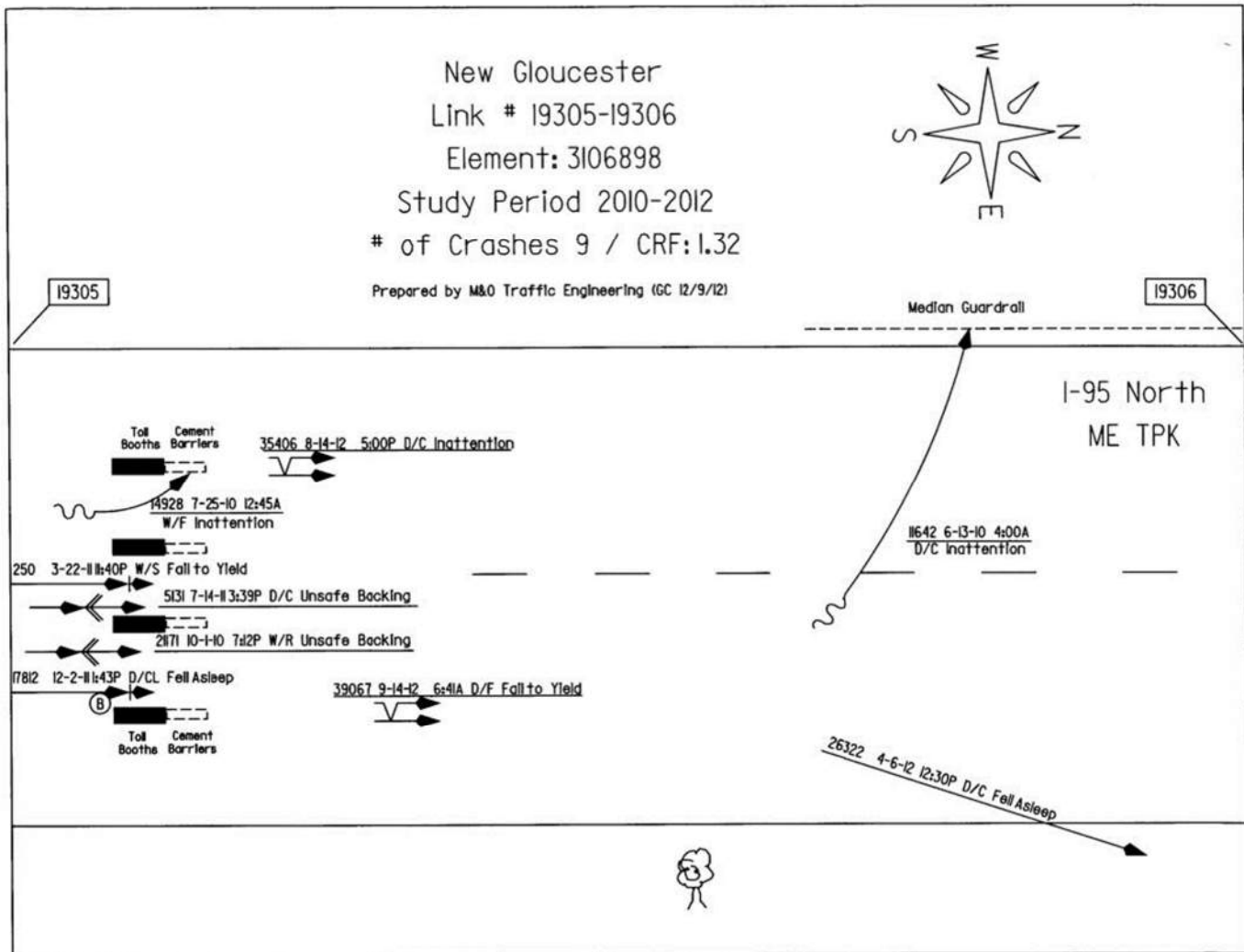
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

New Gloucester Toll Plaza NB

Figure 2: 2010-2012 NB Toll Plaza Crash Diagram depicts the northbound mainline segment at the New Gloucester toll plaza during the time period in which it was most recently identified as an HCL. This 2010-2012 time period was the only time during the past 10 years in which this location was identified as an HCL.

Figure 2: 2010-2012 NB Toll Plaza Crash Diagram



As shown in **Figure 2**, there were 9 crashes resulting in a 11.1% injury rate during this analysis period.

- The most common cause of crash at this location was inattention which contributed to 3 of the 9 crashes
- The next most common causes were falling asleep, unsafe backing and failure to yield, all which contributed to 2 crashes each
- 2 of these crashes resulted in vehicles departing from the travel way
 - 1 of these 2 resulted in vehicles colliding with guardrail
- There are not strong correlations between time of day nor time of year and crash frequency at this location

Photo 1: New Gloucester Toll Plaza NB (2008) captured by Google Maps² in October of 2008 depicts the condition of this location at the time most nearly to which it was most recently noted as an HCL.

Photo 2: New Gloucester Toll Plaza NB (2008)

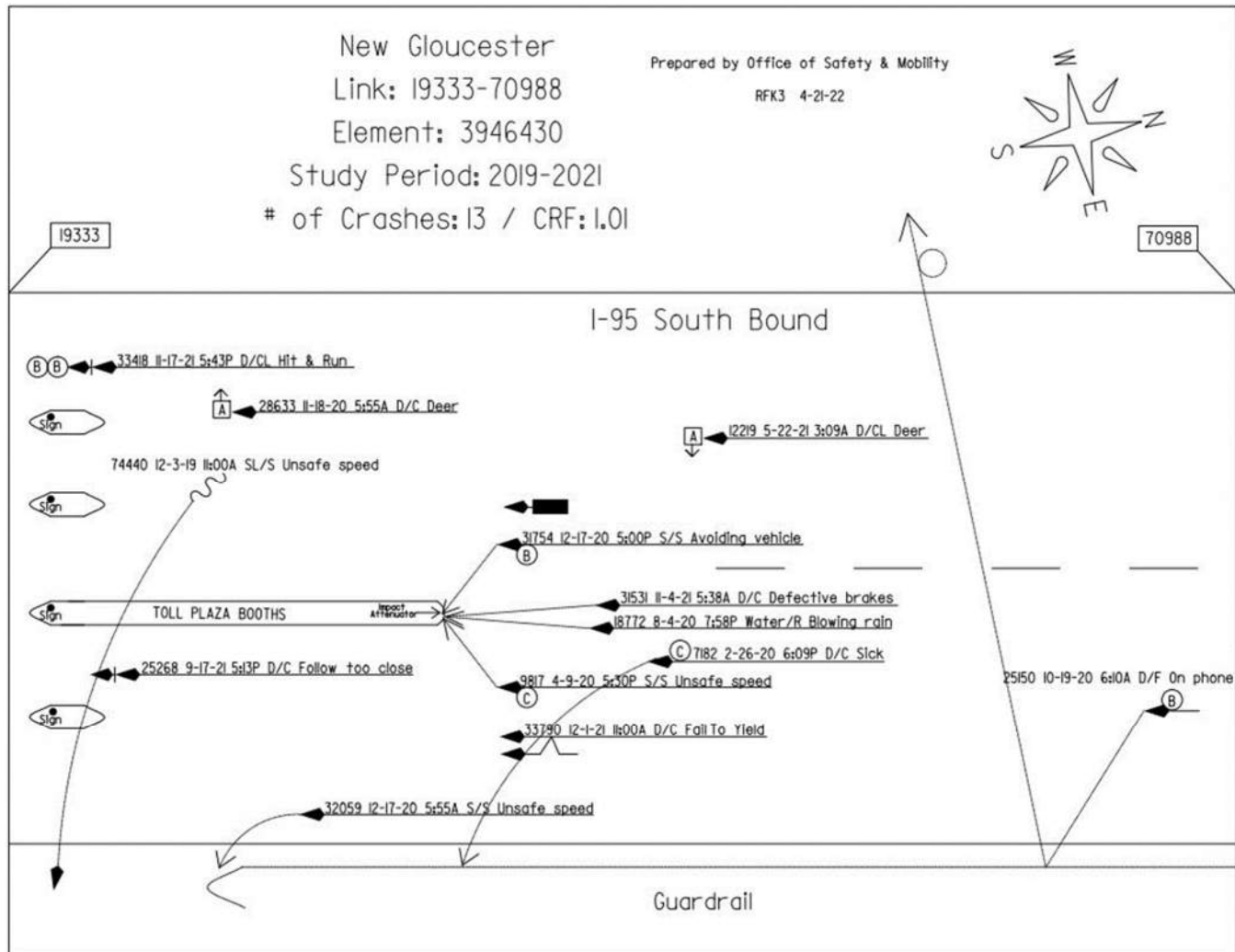


² Google Maps accessed March 22, 2023

New Gloucester Toll Plaza SB

Figure 3: 2019-2021 New Gloucester Toll Plaza SB Crash Diagram depicts the crash diagram for this location during the most recent time period in which it was identified as an HCL. This location has been classified as an HCL during every time period over the past 10 years.

Figure 3: 2019-2021 New Gloucester Toll Plaza SB Crash Diagram



As shown in **Figure 3**, there were 13 crashes resulting in a 38.5% injury rate during this analysis period.

- The leading crash cause at this location was unsafe speed which contributed to 3 crashes
- Animal collisions was the next most common type of crash with 2 crashes
- 1 of these crashes involved heavy vehicles
- 4 of these crashes resulted in vehicles departing from the travel way
- 7 of these 13 crashes occurred during the months of November and December
- 5 of these crashes occurred from approximately 5:00pm to 6:00pm

Photo 2: NB Toll Plaza (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

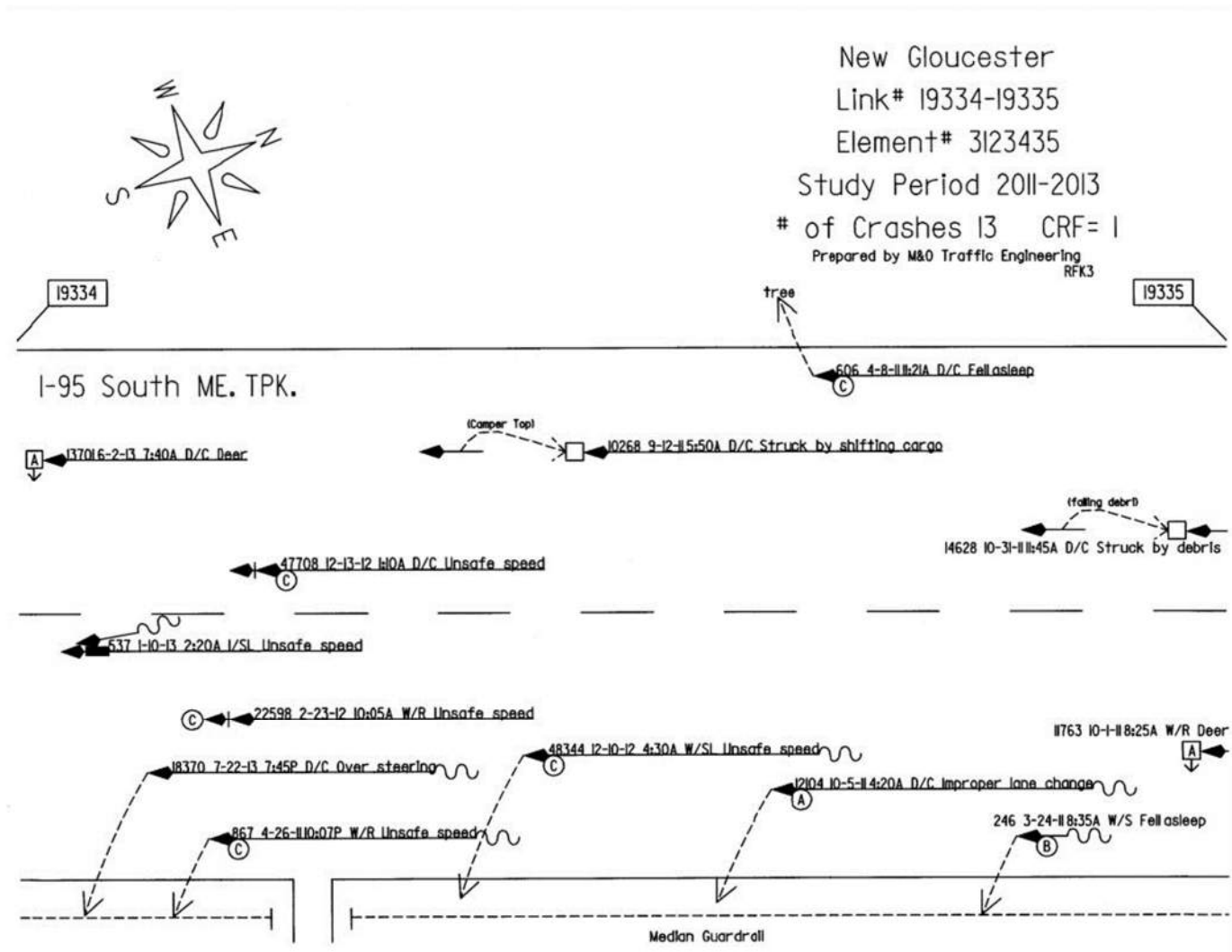
Photo 2: NB Toll Plaza (2018)



³ Google Maps accessed March 22, 2023

Figure 4: 2011-2013 SB North of Toll Plaza Crash Diagram depicts the crash diagram for this location during the most recent time period in which it was identified as an HCL. This location was identified as an HCL during one other time period over the prior 10 years.

Figure 4: 2011-2013 SB North of Toll Plaza Crash Diagram



As shown in **Figure 4**, there were 13 crashes resulting in a 53.8% injury rate during this analysis period.

- 5 of these crashes were caused by unsafe speed
- 2 of these crashes involved collisions with animals
- 6 of these crashes resulted in vehicles departing from the roadway and colliding with objects including median guardrail or trees
- 1 of these crashes involved a heavy vehicle
- There is not a strong correlation between time of year and crash frequency at this location
- Many crashes at this location occurred during early morning hours, with 5 crashes occurring between 1:00am and 6:00am

Photo 3: North of SB Toll Plaza (2008) captured by Google Maps in October of 2008 depicts the condition of this location at the time most nearly to which it was most recently noted as an HCL.

Photo 3: North of SB Toll Plaza (2008)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	All segments included in this RSA are straight and flat, with toll plazas being the factors that could create sight distance concerns.
Lighting	Lighting exists around the toll plazas.
General Sign Issues	Signage exists at the toll plaza to designate things including speed limits, lane use and collection type per lane.
Marking and Delineation	Adequate pavement markings exist along the entirety of the segments for lane designation and at the toll plazas to guard vehicles through their lanes.
Barriers and Clear Zones	Median barrier exists along the entirety of segments to separate the travel directions. At the toll plaza, concrete barrier separates the travel directions as well as the plaza from the ORT lanes.
Bridges and Culverts	Bridge 0294 carries Bennett Road over I-95 at the northerly point of these segments and has components which have been given condition ratings ⁴ of satisfactory and good. Bridge 0293 carries Mayall Road over I-95 along these segments and has components which have been given condition ratings of very good and good.
Pavement	Pavement along the NB segment has been given a pavement condition rating ⁵ of B, while the southbound segments have been given pavement condition ratings of B and C.
Heavy Vehicles	This location ranges in percentage of heavy vehicles from approximately 4% to 13%.

⁴ According to MaineDOT Public Map Viewer – Bridge Layer

⁵ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Conclusions

Unsafe speeds, especially during inclement weather, is one of the leading causes of crash at this location. Because of this, the area should be included in a speed study evaluation to determine whether decreased posted speed limits during weather events should be implemented.

Another leading crash cause at these locations are maneuvers at the toll booth. The surrounding area should be evaluated for implementation of safety measures to bring added attention to the toll booth, such as rumble strips.

Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.
 - Evaluate toll plaza location for potential implementation of added safety measures including rumble strips.
 - Include area in future studies regarding 45 mph sign locations.

Mainline High Crash Location: Northerly End of 63-75

Nodes 19311 to 5037: NB Segment (Over Poland Springs Bridge)

Nodes 5037 to 5038: Exit 75 NB off Ramp Approach

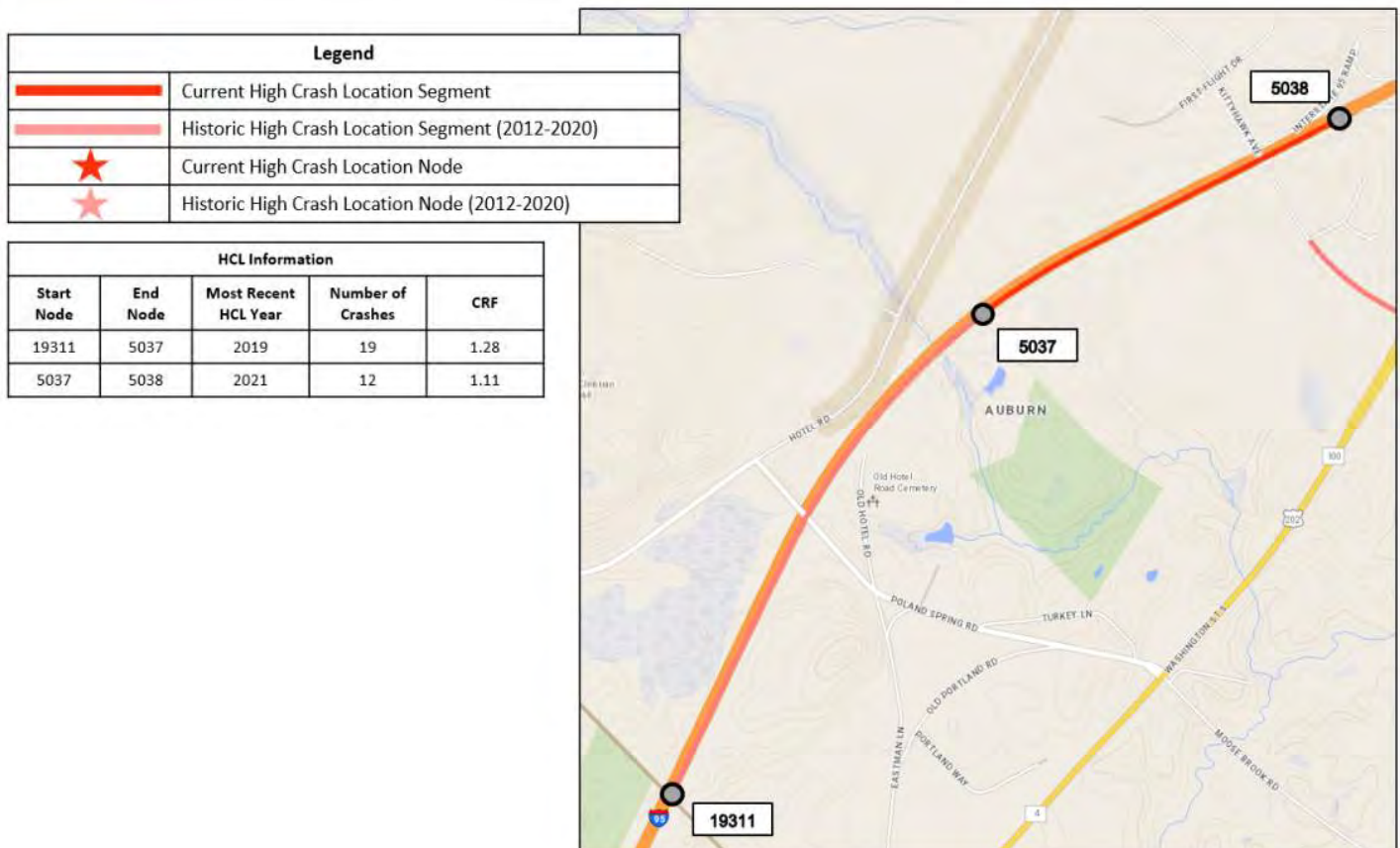
Introduction

There are 2 HCLs for the mainline segment at the northerly end of mile marker 63 to mile marker 75 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- NB Segment (Over Poland Springs Bridge)
- Exit 75 NB Off Ramp Approach

These segments carry I-95 NB in the City of Auburn in Androscoggin County. The southern segment spans between the New Gloucester/Auburn Town Line (which also acts as the Cumberland and Androscoggin County Line) and the southern limit of the northerly segment. The northern segment has a northern limit of just south of the Exit 75 NB Off Ramp diverge point. Exit 75 is a significant interchange, providing direct access to US Route 202, as well as a bus terminal and Park and Ride.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

The interchanges surrounding this mainline segment both underwent construction within the past few years. In 2016 improvements were made to the Exit 63 interchange which included new overhead signage and changes to the configuration of the intersections adjacent to the northbound and southbound ramps. At the Exit 75 interchange, changes were made in 2018 including toll system improvements, lane widening and installation of delineators along the ramp to help improve safety and prevent head-on collisions.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This location has a posted speed limit of 65 MPH and an AADT¹ of 11,192.

Corridor Characteristics

These segments consist of two lanes which carry vehicles along I-95 NB. There are shoulders along both sides of the travel way which have rumble strips along them. Median guardrail is along the entirety of the segments to separate the NB and SB travel directions. There are also guardrail runs along the outside of some portions of the segments.

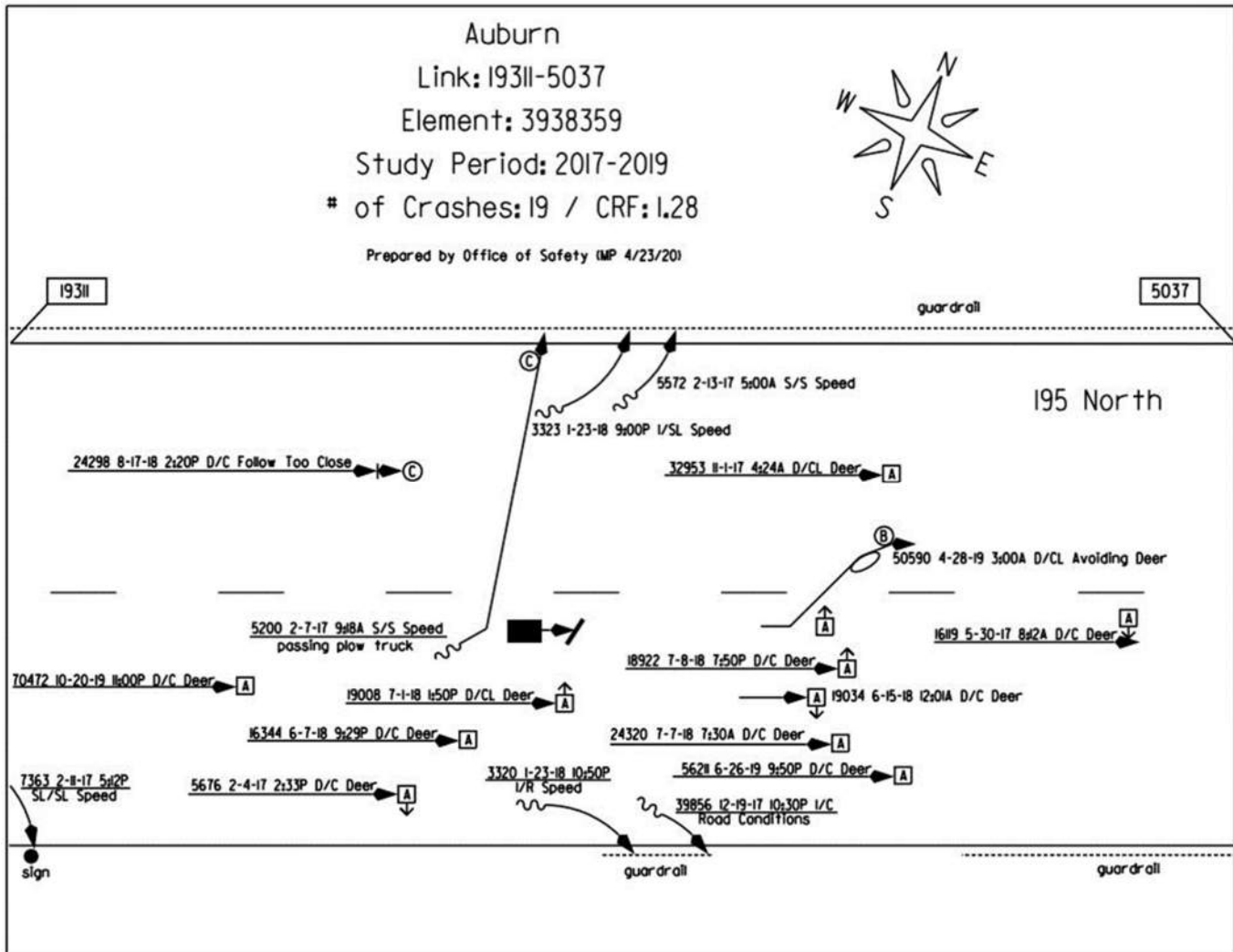
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

NB Segment (Over Poland Springs Bridge)

Figure 2: 2017-2019 NB Segment over Poland Springs Bridge Crash Diagram depicts the HCL diagram for the time period in which it was most recently identified as an HCL. This location was identified as an HCL during one other time period over the past 10 years.

Figure 2: 2017-2019 NB Segment over Poland Springs Bridge Crash Diagram



As shown in **Figure 2**, there were 19 crashes resulting in a 15.8% injury rate during this analysis period.

- There were 10 animal collisions at this location, as well as 1 additional crash which was due to avoiding a deer
- The next most common cause of crash at this location was speed, which contributed to 4 crashes
- There was 1 crash at this location that involved a heavy vehicle
- 6 of these crashes caused vehicles to depart from the travel way and collide with objects such as signs or guardrail

Photo 1: I-95 NB Near Poland Springs Bridge (2019) captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 NB Near Poland Springs Bridge (2019)

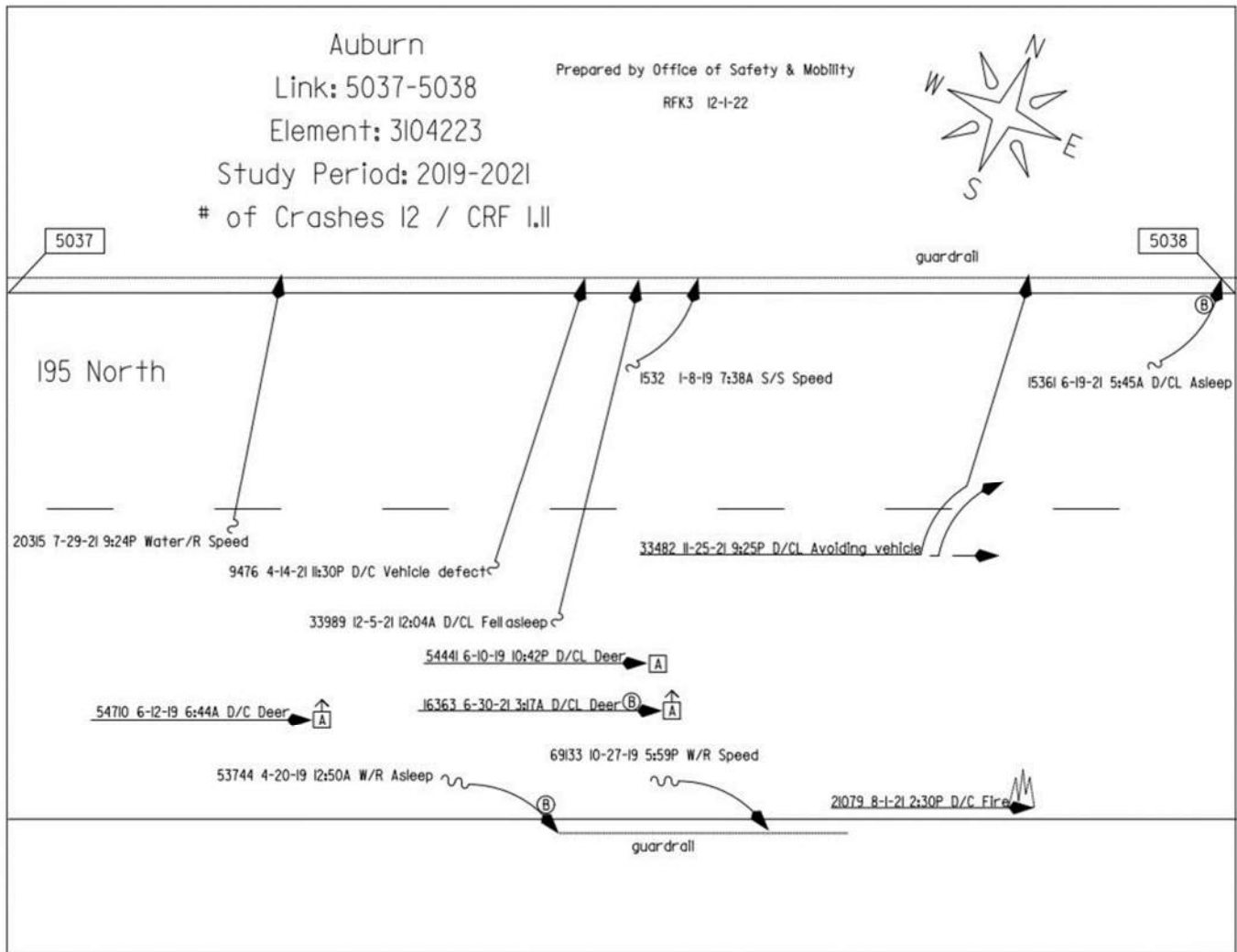


² Google Maps accessed March 22, 2023

Exit 75 NB Off Ramp Approach

Figure 3: 2019-2021 I-95 NB South of Exit 75 Crash Diagram depicts the crash diagram for the most recent time period in which the location was identified as an HCL. There were 3 other time periods over the past 10 years in which this location was identified as an HCL.

Figure 3: 2019-2021 I-95 NB South of Exit 75 Crash Diagram



As shown in **Figure 3**, there were 12 crashes resulting in a 25% injury rate during this analysis period.

- The leading crash causes at this location were speed, falling asleep and collisions with animals which each contributed to 3 crashes
- 8 of these 12 crashes resulted in vehicles departing the travel way and colliding with guardrail
- 6 of these crashes occurred between the months of June through August
- There is not a strong correlation between time of day and crash frequency at this location

Photo 2: I-95 NB Just South of Exit 75 (2019) captured by Google Maps³ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: I-95 NB Just South of Exit 75 (2019)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This roadway segment has a long curve along it. This curve is not abrupt enough to create sight distance concerns.
Lighting	There is lighting around the Exit 75 interchange.
General Sign Issues	Signage along this segment consists of mile marker information.
Marking and Delineation	There are adequate pavement markings through these segments to separate travel lanes as well as shoulders.
Barriers and Clear Zones	Median barriers exist along the entirety of these segments to separate the NB and SB travel directions. There are also spans of guardrail along the outside of some portions of these segments.
Bridges and Culverts	Bridge 0079 is along these segments and carries Poland Springs Road over I-95. This bridge has components which have been given condition ratings⁴ of fair and satisfactory. Bridge 0080 carries I-95 NB over a railroad crossing and has components which have been given condition ratings of satisfactory. Bridge 1275 carries Kittyhawk Ave over I-95 and has components which have been given condition ratings of satisfactory and good.
Pavement	The pavement along these segments have been given a pavement condition rating ⁵ of B.
Heavy Vehicles	This mainline segment has a heavy vehicle percentage that tends to range from 4% to 13%.

³ Google Maps accessed March 22, 2023

⁴ MaineDOT Public Map Viewer – Bridge Layer

⁵ MaineDOT Public Map Viewer – CSL Condition Data Simplified

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

Mainline High Crash Location: Mile Marker 75 - 80

Nodes 5067 to 70992: Just North of Exit 75 SB Off Ramp

Introduction

There is 1 HCL at the southern end of mile marker 75-80 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**

- Just North of Exit 75 SB Off Ramp

This segment carries I-95 SB in the City of Auburn in Androscoggin County. The southern limit of this segment is just north of the Exit 75 SB Off Ramp diverge point and the northern limit is the Hackett Road overpass. This segment is directly adjacent to the Exit 75 interchange, which provides direct access to US Route 202, as well as a bus terminal and Park and Ride.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

At the Exit 75 interchange, changes were made in 2018 including toll system improvements, lane widening and installation of delineators along the ramp to help improve safety and prevent head-on collisions.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This mainline segment has a posted speed limit of 65 MPH and an AADT¹ of 10,660.

Corridor Characteristics

This segment carries vehicles along I-95 SB. The segment consists of two travel lanes with shoulders on both sides of the travel way. Rumble strips are along both shoulders. Median guardrail spans the entire segment to separate the northbound and southbound travel directions and there are runs of guardrail along the outside of the roadway to protect against hazards including steep side slopes.

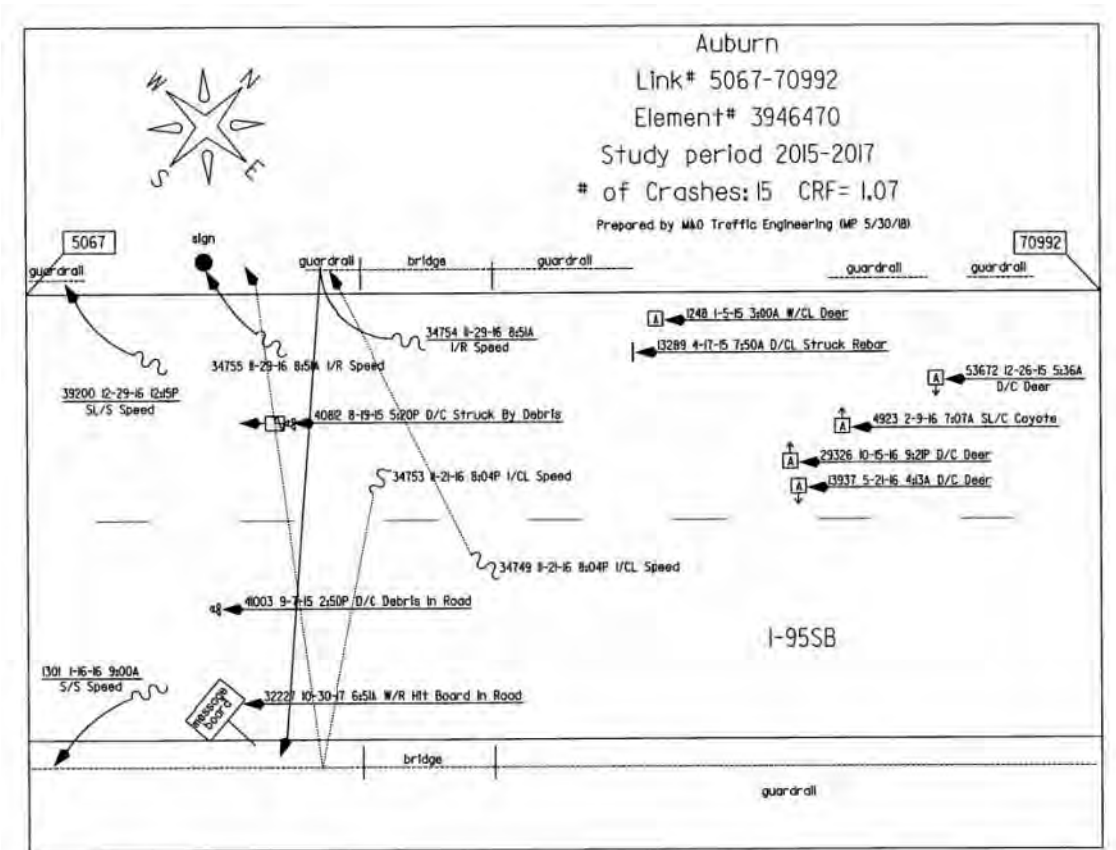
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Just North of Exit 75 SB Off Ramp

Figure 2: 2015-2017 Exit 75 SB Off Ramp Approach Crash Diagram depicts the crash diagram for the most recent time period in which this location was identified as an HCL. This location was classified as an HCL during one other time period over the past 10 years.

Figure 2: 2015-2017 Exit 75 SB Off Ramp Approach Crash Diagram



As shown in **Figure 2**, there were 15 crashes resulting in a 0% injury rate during this analysis period.

- There were 5 animal collision crashes at this location during the time period
- 5 of the crashes at this location were due to speeding
- 4 crashes occurred as a result of vehicles striking various inanimate objects in the roadway
- 6 of the 15 crashes resulted in vehicles departing from the travel way
 - 5 of these 6 resulted in collisions with objects including guardrail, bridge rail and signs
- There is not a strong correlation between time of year and crash frequency at this location

Photo 1: I-95 SB North of Exit 75 Interchange (2018) captured by Google Maps in July of 2018 depicts the condition of this location most nearly to the time that it was most recently noted as an HCL.

Photo 1: I-95 SB North of Exit 75 Interchange (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This roadway segment is straight and flat.
Lighting	There is lighting along this segment near the Exit 75 interchange.
General Sign Issues	Signing along this segment notified drivers of the upcoming Exit 75 interchange.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders.
Barriers and Clear Zones	Median guardrail separates the NB and SB travel directions along this segment and is also present along some sections of the outside of the roadway.
Bridges and Culverts	Bridge 1493 carries this segment over Washington Street and has components which have most recently been given condition ratings ² of satisfactory and good.
Pavement	The pavement along this segment has most recently been given a condition rating ³ of B.
Heavy Vehicles	The percentage of heavy vehicles through this area tends to average between 5% to 8%.

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA’s large animal study.

² According to MaineDOT Public Map Viewer – Bridge Layer
³ According to MaineDOT Public Map Viewer CSL Condition Data Simplified

Intersection High Crash Location: Exit 75

Node 60993: Exit 75 Ramps Weave

Node 65289: Exit 75 Washington Street Channelized Right

Nodes 65289 to 4708: Exit 75 Washington Street Segment After Channelized Right

Node 5040: Exit 75 Intersection

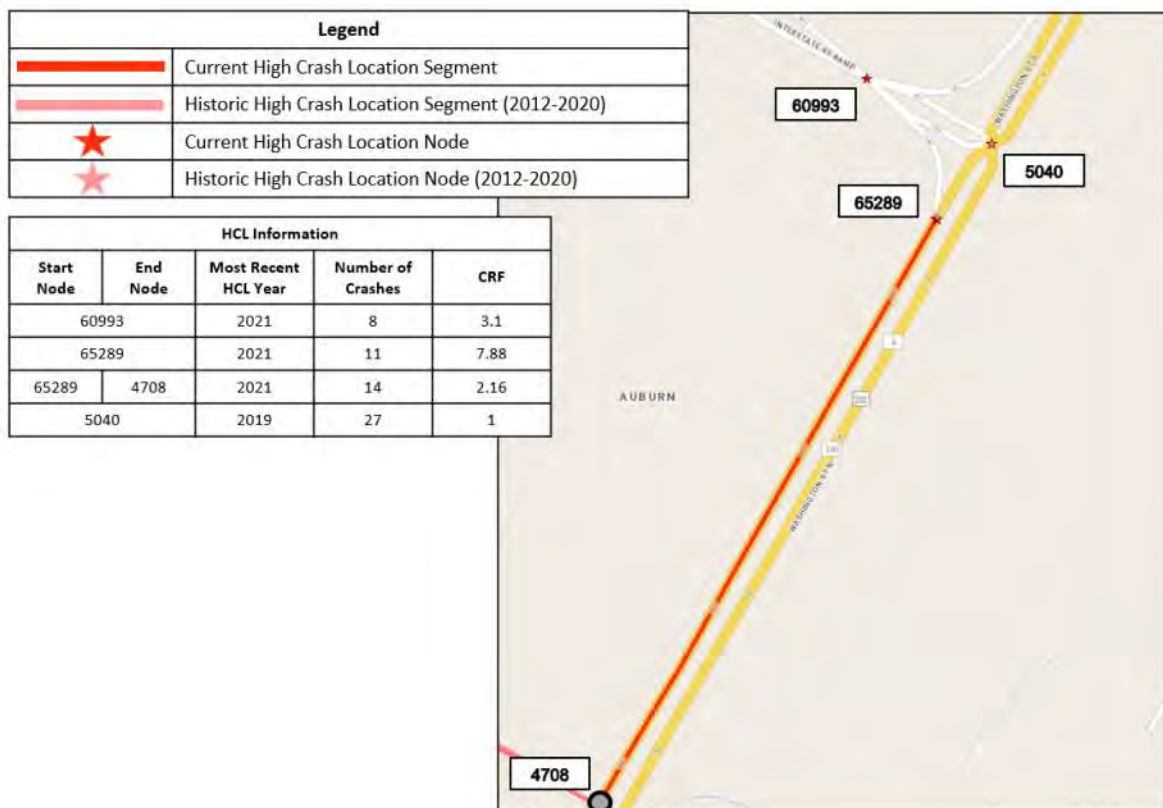
Introduction

There are 4 HCLs at the Exit 75 intersection during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 75 Ramps Weave
- Exit 75 Washington Street Channelized Right
- Exit 75 Washington Street Segment After Channelized Right
- Exit 75 Intersection

These HCLs are located at the Exit 75 interchange and adjacent intersection in the City of Auburn in Androscoggin County. This is a significant intersection which acts as the connecting point between the Maine Turnpike and US Route 202.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

At the Exit 75 interchange, changes were made in 2018 including toll system improvements, lane widening and installation of delineators along the ramp to help improve safety and prevent head-on collisions.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This intersection consists of three legs. The speed limits and AADTs of each can be found in the table below:

Approach	AADT	Speed Limit
Exit 75 Off Ramps	9,619 ¹	30 MPH (Advisory Speed)
Washington Street NB	10,091 ²	45 MPH
Washington Street SB	11,451 ²	45 MPH

Corridor Characteristics

This intersection is a three-legged intersection between Washington Street and the Exit 75 interchange. Both right movements at the intersection consist of slip ramps. The slip ramp from the southbound movement connects into a short weave before the segment splits into the NB and SB on ramps. The area just before the off ramps intersection approach also acts as a weave through this area. The number of approach and receiving lanes at each intersection leg can be found in the table below:

Intersection Leg	Number of Approach Lanes	Number of Receiving Lanes
Exit 75 Off Ramps	3 (L, L, Slip Ramp R)	2
Washington Street NB	4 (L, L, T, T)	2
Washington Street SB	3 (T, T, Slip Ramp R)	2

¹ 2022 AADT Summary Created by HNTB for MTA

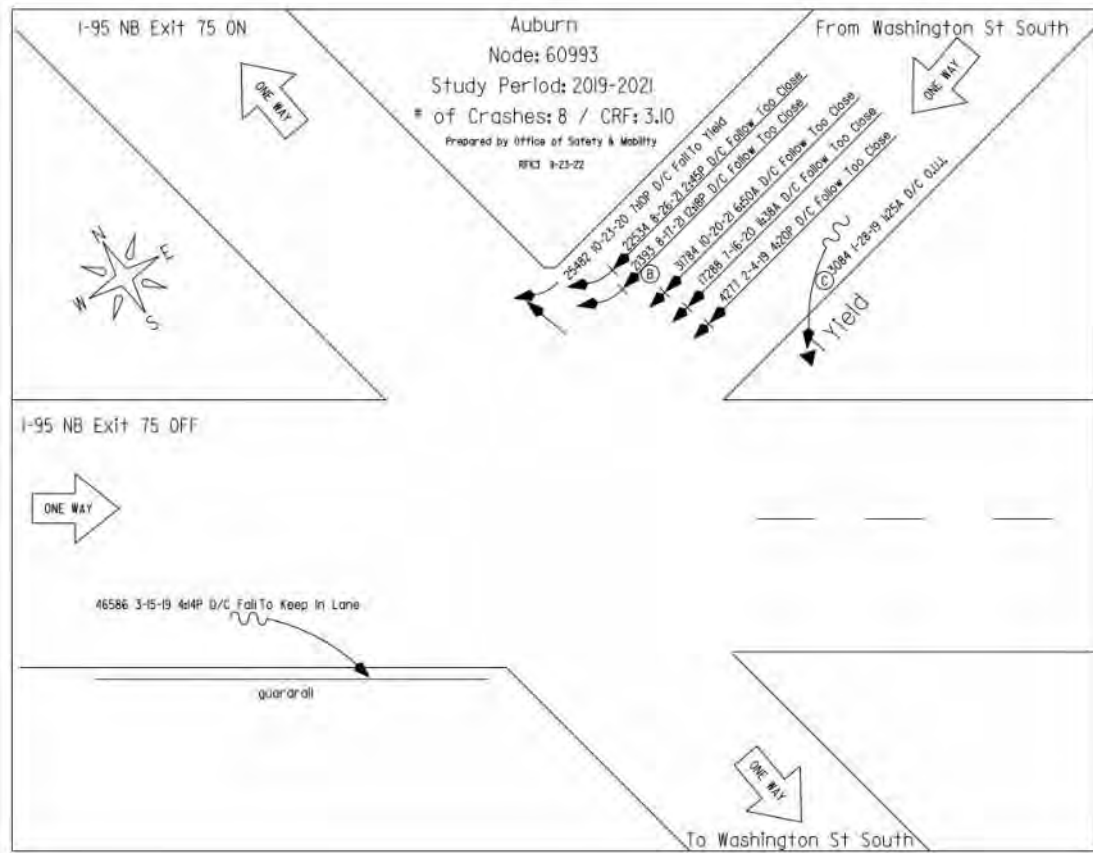
² MaineDOT Public Map Viewer

Crash analysis

Exit 75 Ramps Weave

Figure 2: 2019-2021 Exit 75 Intersection Weave Crash Diagram depicts the crash diagram at this location during the most recent time period in which it was identified as an HCL. This location was classified as an HCL during 1 other time period over the prior 10 years.

Figure 2: 2019-2021 Exit 75 Intersection Weave Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 25% injury rate during this analysis period.

- All but 1 of these crashes involved vehicles traveling along the Washington Street SB slip ramp
- 5 of these 8 crashes were a result of following too close
- 2 of these crashes were single vehicle crashes which resulted in the vehicles departing from the travel way and colliding with either guardrail or signage
- 5 of these crashes occurred between the months of July and October
- There is not a strong correlation between the time of day and crash frequency at this location

Photo 1: Exit 75 Ramps Weave (2018) captured by Google Maps³ in July of 2018 depicts the condition of this location at the time most nearly to when was most recently noted as an HCL. The view of the photo is from the perspective of vehicles approaching the weave from the Washington Street SB slip ramp.

Photo 1: Exit 75 Ramps Weave (2018)

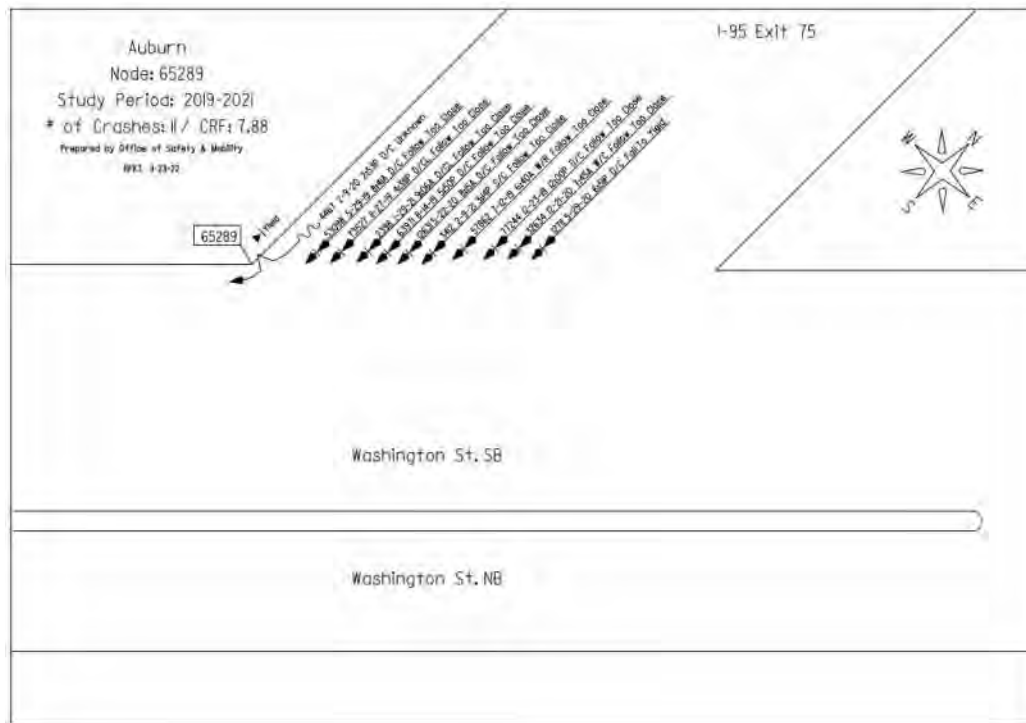


³ Google Maps accessed March 23, 2023

Exit 75 Washington Street Channelized Right

Figure 3: 2019-2021 SB Off Ramps Slip Ramp Crash Diagram depicts the diagram during which this location was most recently identified as an HCL. This location was also classified as an HCL during 7 other time periods over the prior 10 years.

Figure 3: 2019-2021 SB Off Ramps Slip Ramp Crash Diagram



As shown in **Figure 3**, there were 11 crashes resulting in a 0% injury rate during this analysis period.

- All of these crashes occurred along the slip ramp
- 9 of these 11 crashes were a result of following too close along the ramp
- 1 of these crashes was a single vehicle crash
 - This crash resulted in the vehicle departing the roadway
- There is not a strong correlation between time of day nor time of year and crash frequency at this location

Photo 2: Exit 75 Off Ramps Slip Ramp Merge (2018) captured by Google Maps⁴ in July of 2018 depicts the condition of this location most nearly to time that it was most recently noted as an HCL. This photo views the location from the view of the slip ramp.

Photo 2: Exit 75 Off Ramps Slip Ramp Merge (2018)

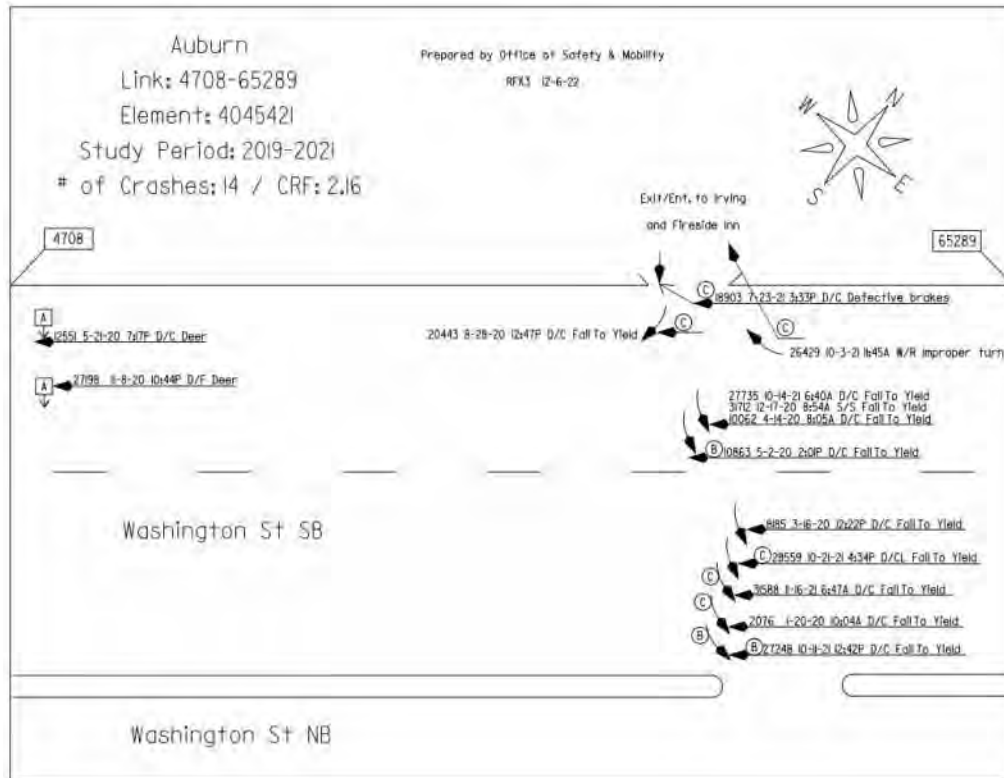


⁴ Google Maps accessed March 23, 2023

Exit 75 Washington Street Segment After Channelized Right

Figure 4: 2019-2021 Washington Street After Slip Ramp Crash Diagram depicts the crash diagram during the last time period in which the location was identified as an HCL. This segment was classified as an HCL during 5 other time periods over the past 10 years.

Figure 4: 2019-2021 Washington Street After Slip Ramp Crash Diagram



As shown in **Figure 4**, there were 14 crashes resulting in a 57.1% injury rate during this analysis period.

- 9 of these 14 crashes were turning movement crashes between vehicles traveling along Washington Street SB and vehicles attempting to turn left out of the Irving/Fireside Inn Entrance (these were all a result of failure to yield)
 - There was an additional similar type of crash with the only difference being the vehicle exiting the business drive was attempting to turn right
- There were 2 collisions with large animals at this location
- One of the crashes at this location resulted in a vehicle departing from the travel way
- 6 of these 14 crashes occurred in the months October and November
- There is not a strong correlation between time of day and crash frequency at this location

Photo 3: Washington Street at Irving Drive (2019) captured by Google Maps⁵ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 3: Washington Street at Irving Drive (2019)



⁵ Google Maps accessed March 23, 2023

Figure 5: 2017-2019 Exit 75 Intersection Crash Diagram depicts the crash diagram for the intersection during the most recent time period in which it was identified as an HCL. This intersection was also classified as an HCL during 3 other time periods over the past 10 years.

[illegible]

- The most common cause of crash at this location was running red lights which contributed to 8 crashes
- The next most frequent cause was following too close which caused 7 crashes
- 11 of these crashes involved turning movements
 - 5 of these 11 involved vehicles originating from the ramps approach to the intersection
- Heavy vehicles were involved in 2 of these crashes
- There was 1 fatality at this location which was caused by a crash resultant from running a red light between a vehicle from the ramp approach and a vehicle from the Washington Street SB approach
- There is not a strong correlation between time of year and crash frequency at this location
- 12 of these crashes occurred between the times of approximately 3:30pm and 8:00pm

Photo 4: Exit 75 Intersection (2018) captured by Google Maps⁶ in July of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 4: Exit 75 Intersection (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	The intersection approaches at this intersection are all straight and flat.
Lighting	There is lighting along the weave portion of the ramp approach of this intersection.
General Sign Issues	There are signs throughout the intersection, including lane use designation signs, speed limit signs and route information signs.
Marking and Delineation	Pavement markings exist throughout the intersection to separate travel lanes and shoulders as well as to designate lane designation along the ramp intersection approach.
Barriers and Clear Zones	Guardrail exists along weave portion of the ramp approach of this intersection. Asphalt medians are at each approach to separate travel directions.
Bridges and Culverts	No bridges or culverts exist within these HCL locations.
Pavement	The pavement throughout these HCLs have most recently been given the following pavement conditions: • Off Ramps Portion of Weave: C • On Ramps Portion of Weave: C • Off Ramps Slip Ramp: D • Washington Street SB Slip Ramp: C • Washington Street SB Approach: D • Washington Street NB Approach: B
Heavy Vehicles	The percentage of heavy vehicles at the ramps approach of this intersection tends to range from 2% to 9% depending on the time of day and direction.

⁶ Google Maps accessed March 24, 2023

Conclusions

The general interaction of the Exit 75 intersection, its approaches and the overall Turnpike ramps leads to crashes involving merging and weaving movements as well as a variety of intersection crashes including rear-end collisions and angle crashes. Many of the intersection crashes involved red-light running. Additional high crash patterns include traffic entering and exiting the Irving development.

Recommendations

- Short-Term Solutions:
 - Stakeholder coordination in this location is critical. Similar to the Riverside area, the interaction of the approaches, intersection and turnpike movements should be studied holistically.

Mainline High Crash Location:

Node 5041: Exit 75 NB On Ramp Merge

Nodes 5070 to 70992: SB Segment South of Hackett Road

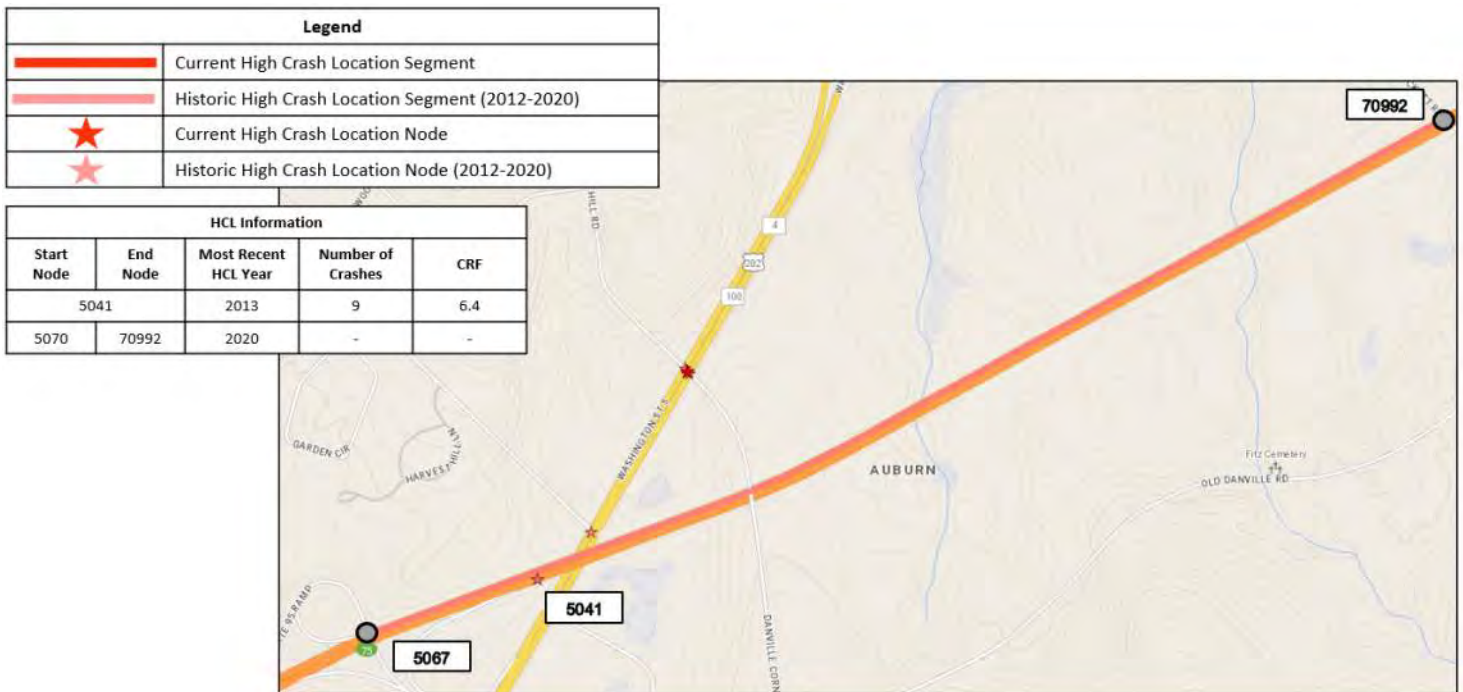
Introduction

There are 2 HCLs for the mainline segment of mile marker 75-80 near the Exit 75 interchange during the most recent 10-year period as shown in **Figure 1: HCL Location Map**

- Exit 75 NB On Ramp Merge
- SB Segment South of Hackett Road

These HCLs are located north of the Exit 75 interchange in the City of Auburn in Androscoggin County and include both northbound and southbound traffic on I-95. The southern HCL includes the Exit 75 NB On Ramp diverge point with I-95 northbound and the northern HCL includes an I-95 southbound segment with a northerly limit at the Hackett Road Bridge and a southerly limit just north of the SB Off Ramp diverge point.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

At the Exit 75 interchange, changes were made in 2018 including toll system improvements, lane widening and installation of delineators along the ramp to help improve safety and prevent head-on collisions.

During the time in which the merge point was classified as an HCL, the location was under construction.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This mainline segment has a posted speed limit of 65 MPH. The northbound segment has an AADT¹ of 10,165 while the southbound segment has an AADT of 10,660. The northbound on ramp has an AADT of 4,160.

Corridor Characteristics

The NB On Ramp merge point is comprised of two northbound travels that join one NB on ramp lane. There is an acceleration lane that measures approximately 650 feet in length.

Through this location, both the northbound and southbound directs consist of two mainline travel lanes with shoulders on both sides. Rumble strips span the inside shoulders of both directions from the Exit 75 interchange to the bridge. North of the bridge, rumble strips can be found along both shoulders. The median barrier is used to separate the northbound and southbound travel directions.

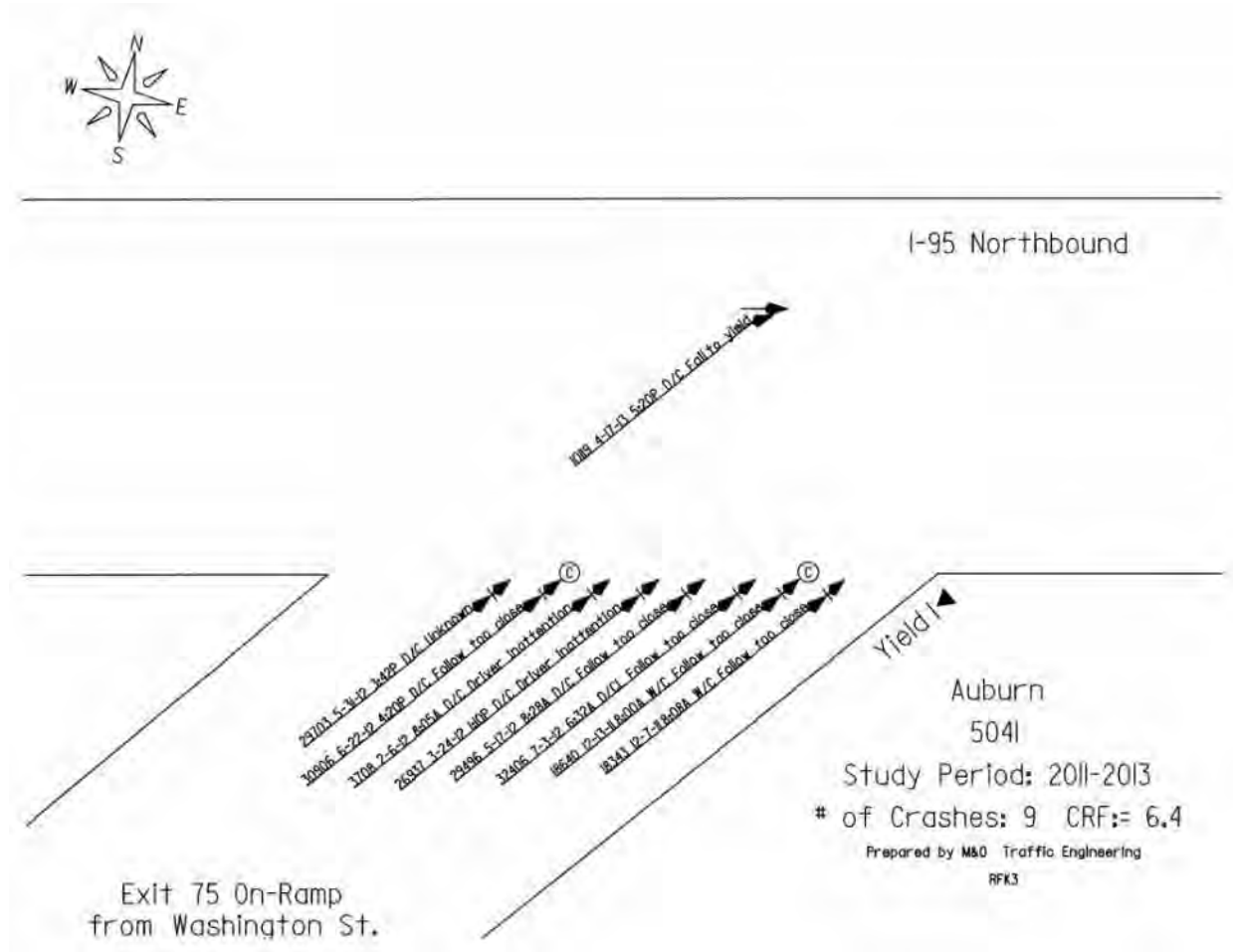
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Exit 75 NB On Ramp Merge

Figure 2: 2011-2013 Exit 75 NB On Ramp Merge Crash Diagram depicts the merge during the most recent time period in which this location was identified as an HCL. This location was also classified as an HCL for the time period of 2010-2012.

Figure 2: 2011-2013 Exit 75 NB On Ramp Merge Crash Diagram



As shown in **Figure 2**, there were 9 crashes resulting in a 22.2% injury rate during this analysis period.

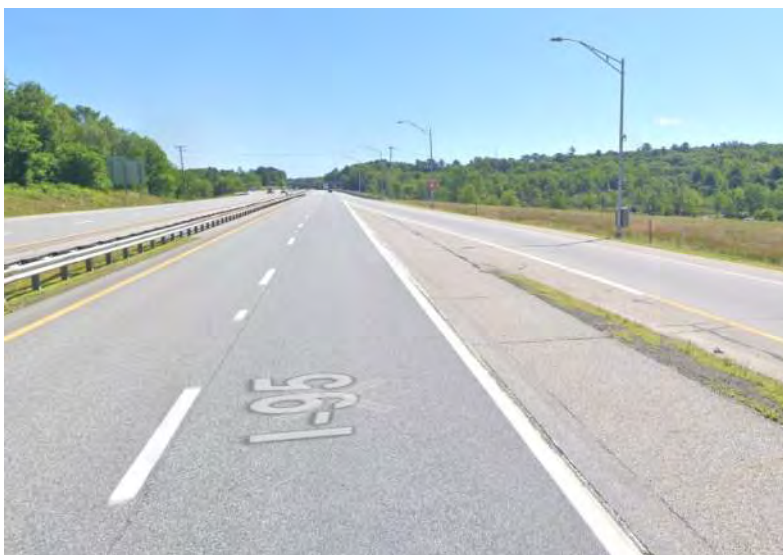
- All but 1 of these crashes occurred along the on ramp portion of the merge
 - The 1 other crash was due to failure to yield between a vehicle originating from the ramp and another from the mainline
- 5 of these crashes were a result of vehicles following too close
- 2 of the crashes were due to inattention
- 5 of these crashes occurred between the months of April and July
- 4 of these crashes occurred between 8:00am and 9:00am

Photo 1: Exit 75 on Ramp Merge (2012) captured by Google Maps² in May of 2012 depicts the condition of this location at the time that it was most recently noted as an HCL. **Photo 2: Exit 75 on Ramp Merge (2022)** depicts the current condition of the merge point.

Photo 1: Exit 75 on Ramp Merge (2012)



Photo 2: Exit 75 on Ramp Merge (2022)



² Google Maps accessed March 24, 2023

SB Segment South of Hackett Road

While there is not a crash diagram currently available for the 2018-2020 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

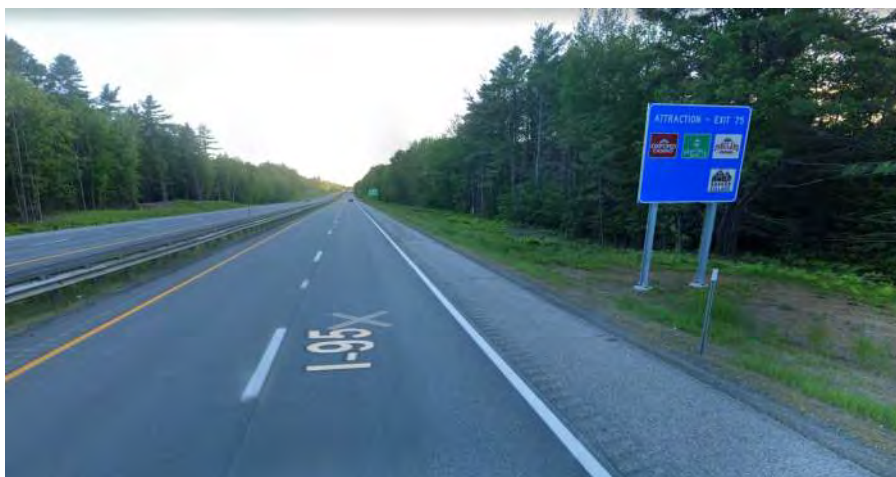
Date	Time	Injury Level	Type of Crash
6/4/2018	1:45 AM	Property Damage Only	Deer
7/29/2018	6:00 AM	Property Damage Only	Deer
11/9/2018	3:30 AM	Property Damage Only	Deer
11/16/2018	3:04 AM	Property Damage Only	Went Off Road
1/30/2019	6:25 PM	Property Damage Only	Object in Road
2/21/2019	6:10 PM	Property Damage Only	Object in Road
6/18/2019	8:20 PM	Property Damage Only	Deer
6/30/2019	10:35 PM	Property Damage Only	Deer
7/31/2019	7:40 AM	Property Damage Only	Object in Road
11/11/2019	4:25 PM	Property Damage Only	Went Off Road
11/11/2019	4:40 PM	Property Damage Only	Went Off Road
12/27/2019	6:03 AM	Property Damage Only	Went Off Road
2/7/2020	12:11 PM	Property Damage Only	Went Off Road
6/4/2020	12:27 AM	Property Damage Only	Deer
10/15/2020	12:11 PM	Property Damage Only	Deer
11/14/2020	7:50 AM	Property Damage Only	Other
11/27/2020	11:31 AM	Property Damage Only	Rear End/Sideswipe

It can be observed from this table that there were 17 crashes at this location with a 0% injury rate during this time period.

- 7 of these crashes were collisions with large animals
- 5 of the crashes resulted in vehicles departing from the roadway
- 8 of these 17 crashes occurred between the months of October and December
- 6 of the crashes occurred during the early morning hours of approximately 12:30am to 6:00am

Photo 2: I-95 SB (2019) captured by Google Maps³ in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: I-95 SB (2019)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This mainline segment is straight with some vertical curvature.
Lighting	There is lighting at this location near the Exit 75 interchange.
General Sign Issues	Signing exists along the southbound segment with information about the upcoming Exit 75 interchange. At the merge, there is a yield sign for the ramp leg.
Marking and Delineation	Adequate pavement markings exist throughout this location to separate the travel lanes as well as the shoulders.
Barriers and Clear Zones	Median barrier exists along the entirety of this segment to separate the northbound and southbound travel directions. There are also spans of guardrail along portions of the outside of the roadway along the southbound segment to protect against hazards including steep side slopes and bridge abutments.
Bridges and Culverts	The bridges that are along the southbound segment and the condition ratings⁴ that their components have most recently received can be found below: • Bridge 0084 – Carries Hackett Road Over I-95: Good • Bridge 0083 – Carries Danville Corner Road over I-95: Good • Bridge 1493 – Carries I-95 SB over Washington Street: Satisfactory and Good
Pavement	The pavement condition ratings that the pavement at these locations most recently received can be found below: • I-95 SB: B • I-95 NB: A

³ Google Maps accessed March 24, 2023

⁴ MaineDOT Public Map Viewer – Bridge Layer

	• Exit 75 NB On Ramp: C
Heavy Vehicles	The percentages of heavy vehicles throughout these locations tend to average from approximately 2% to 13% depending on location, direction and time of day.

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

Mainline High Crash Location: 75-80 Near Main Street

Nodes 5044 to 5045: NB Segment (Main St – Androscoggin River)

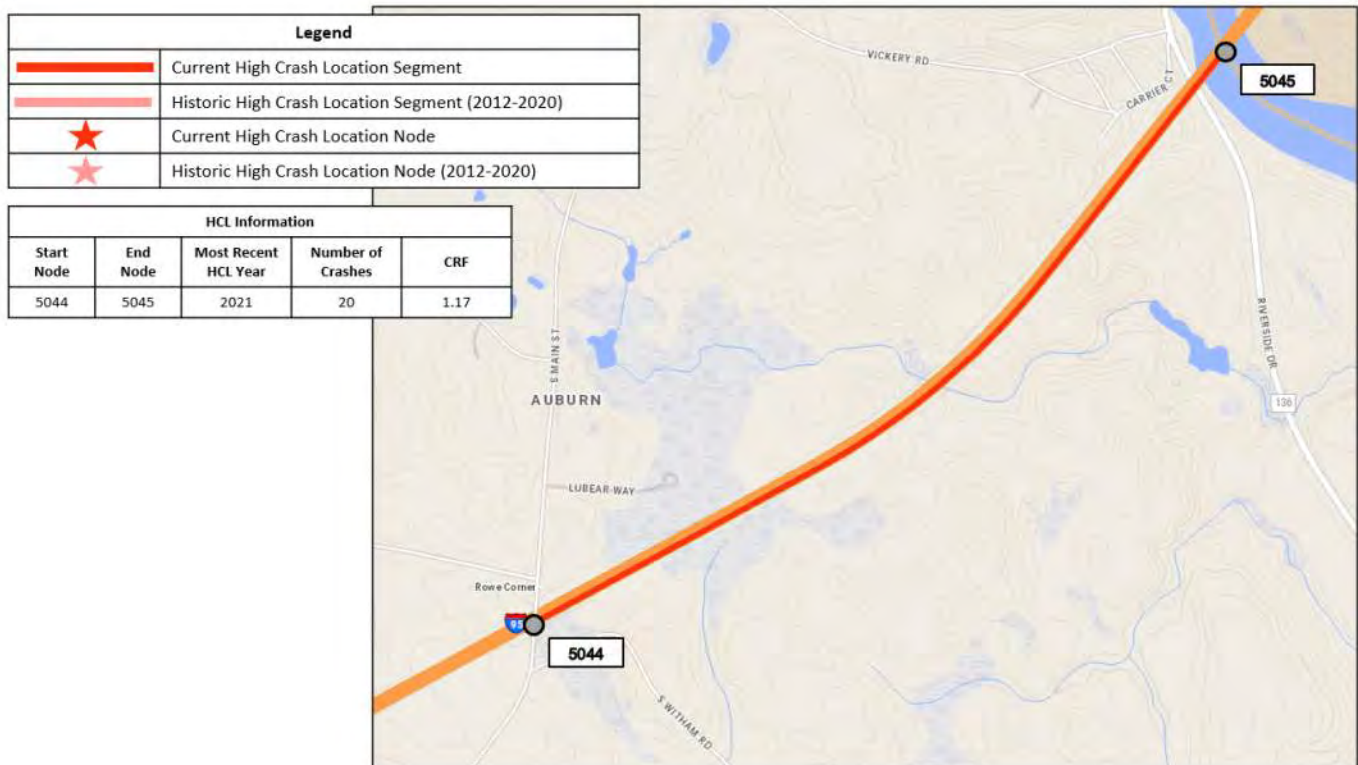
Introduction

There is 1 HCL for the segment of mile marker 75-80 near Main Street during the most recent 10-year period as shown in **Figure 1: HCL Location Map**

- NB Segment (Main St – Androscoggin River)

This mainline segment carries I-95 NB in the City of Auburn in Androscoggin County. The segment spans from the South Main Street bridge to the Androscoggin River Bridge, which also acts as the town line between the City of Auburn and the City of Lewiston.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

At the Exit 75 interchange, changes were made in 2018 including toll system improvements, lane widening and installation of delineators along the ramp to help improve safety and prevent head-on collisions.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This mainline segment has a posted speed limit of 65 MPH and an AADT¹ of 10,165.

Corridor Characteristics

This segment consists of two travel lanes which carry vehicles along I-95 NB. There are shoulders along both sides of the travel way with rumble strips along both. Median barrier spans the segment to separate the northbound and southbound travel directions. There are also some spans of guardrail along the outside of the roadway throughout the segment.

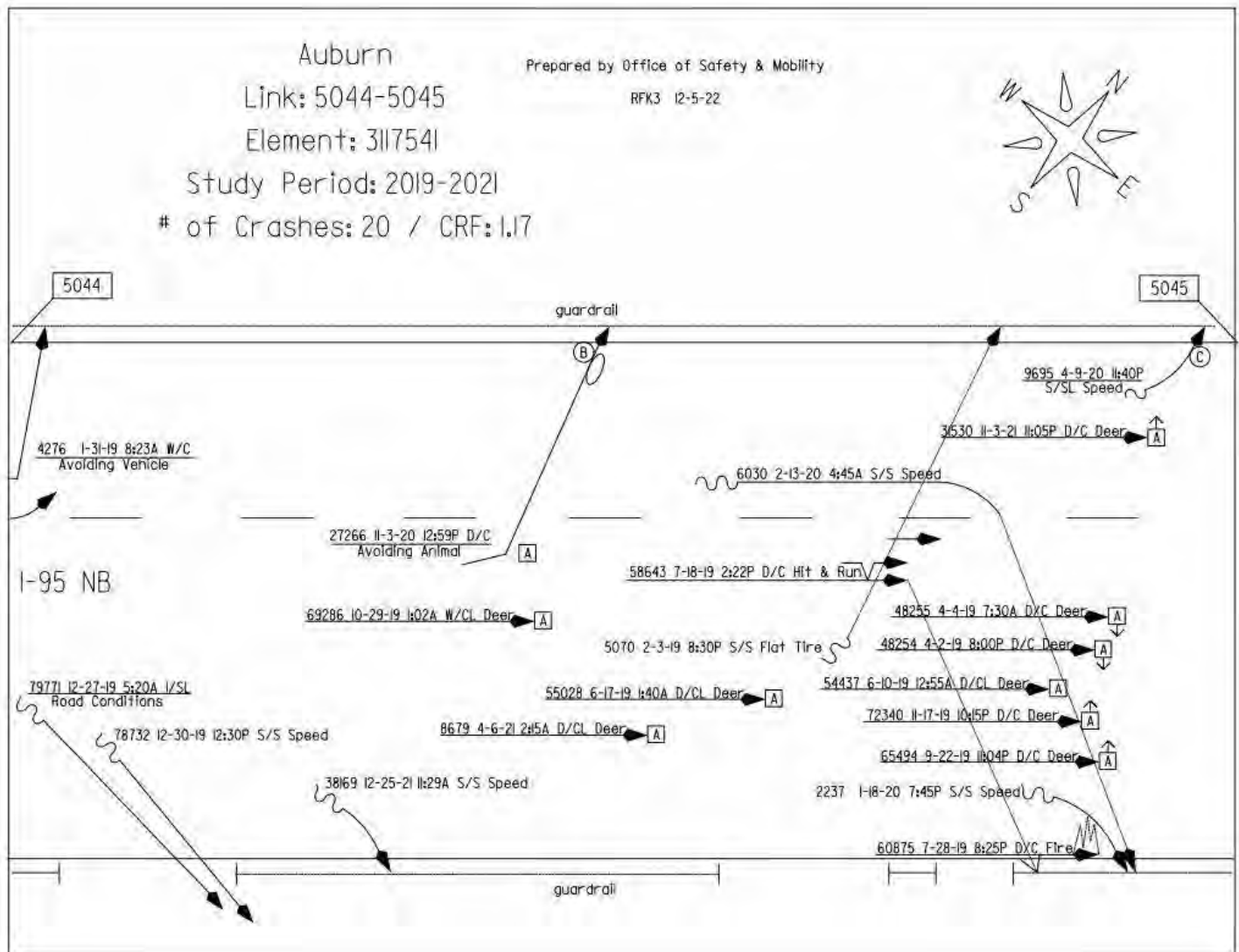
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

NB Segment (Main St – Androscoggin River)

Figure 2: 2019-2021 I-95 NB Crash Diagram depicts the crash diagram for this location during the most recent time span in which it was identified as an HCL. This location was also identified as an HCL during one other time period over the past 10 years.

Figure 2: 2019-2021 I-95 NB Crash Diagram



As shown in **Figure 2**, there were 20 crashes resulting in a 10% injury rate during this analysis period.

- 9 of these crashes were collisions with animals
 - There was 1 additional crash due to avoiding an animal
- The next most common cause of crash at this location was speeding which contributed to 5 crashes
- 10 of these crashes resulted in vehicles departing from the travel way
 - 8 of these 10 resulted in the vehicles colliding with guardrail
- 10 of these crashes occurred from the months of October through February
- 5 of these crashes occurred between the hours of 12:00am through 6:00am

Photo 1: I-95 NB (2019) captured by Google Maps² in June of 2019 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 NB (2019)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This mainline segment is flat and has a curve that is not abrupt enough to create sight distance concerns.
Lighting	There is no lighting along this segment.
General Sign Issues	Signage along this segment notifies drivers of the upcoming Exit 80 interchange.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders.
Barriers and Clear Zones	Guardrail is along the inside of the roadway to separate the northbound and southbound travel directions. There are also lengths of guardrail along the outside of the roadway along portions of the segment.
Bridges and Culverts	Bridge 0086 carries I-95 over the Androscoggin River at the northerly end of this segment and has components which have been given condition ratings ³ of good.

² Google Maps accessed March 22, 2023

³ According to MaineDOT Public Map Viewer – Bridge Layer

	Bridge 0085 at the southerly end of the segment carries South Main Street over I-95 and has been given condition ratings of satisfactory, good and very good.
Pavement	The pavement through this section has been given a pavement condition rating ⁴ of A.
Heavy Vehicles	The percentage of heavy vehicles through this area tends to average between 4% to 13%.

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

⁴ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location: Mile Marker 80-86

Nodes 70996 to 5053: NB Segment (North of Grove Street)

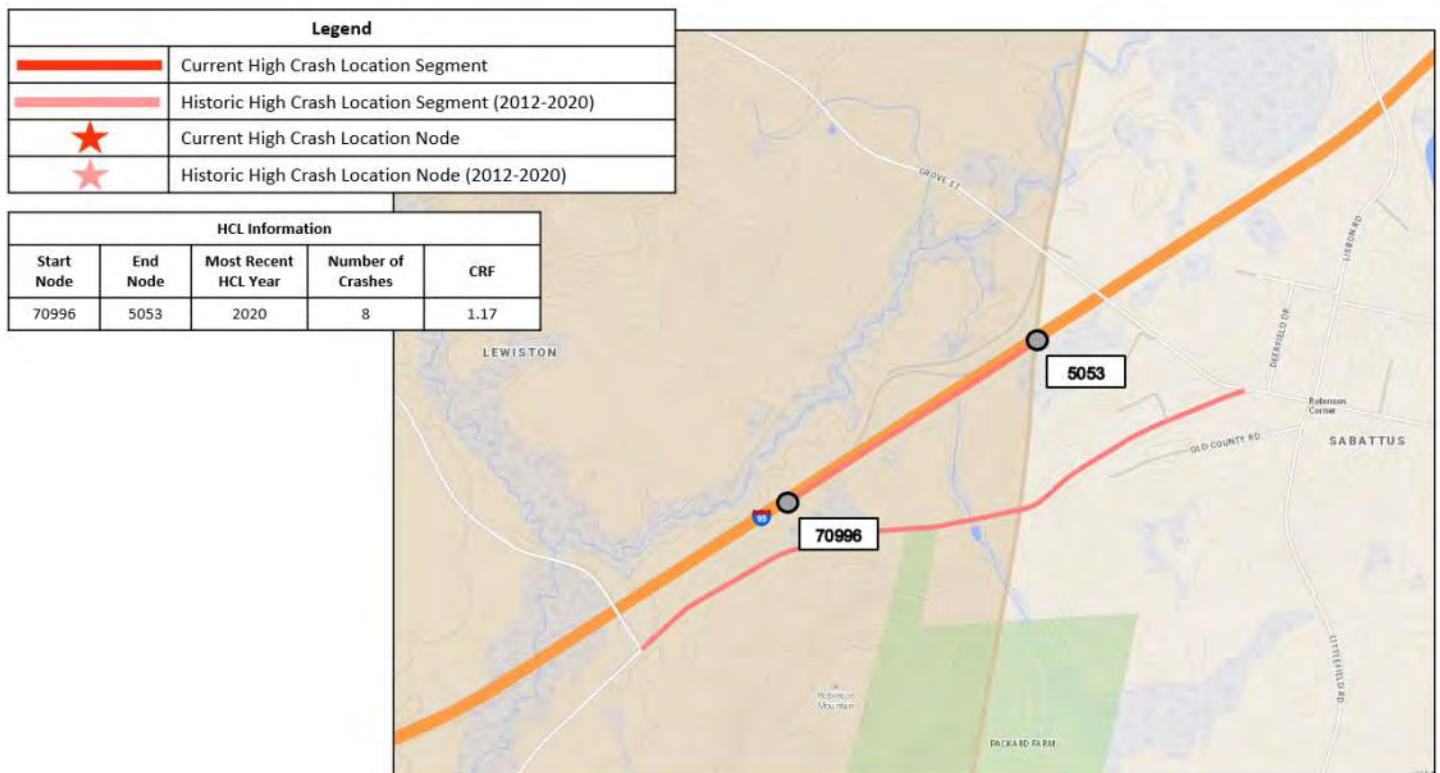
Introduction

There is 1 HCL along the mainline segment of mile marker 80 to 86 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- NB Segment (North of Grove Street)

This mainline segment carries I-95 NB in the City of Lewiston in Androscoggin County. The segment is located north of the Exit 80 interchange between the Old Webster Road bridge and the Grove Street Bridge, which also acts as the town line between the City of Lewiston and the Town of Sabattus.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

No recent construction activities have occurred in this location.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This segment has a posted speed limit of 65 MPH and an AADT¹ of 7,013.

Corridor Characteristics

This segment consists of two travel lanes which carry vehicles along I-95 NB. There are shoulders along both sides of the travel way with rumble strips along both. Median barrier spans the segment to separate the northbound and southbound travel directions. There is also some a span of guardrail along the outside of the roadway along the segment.

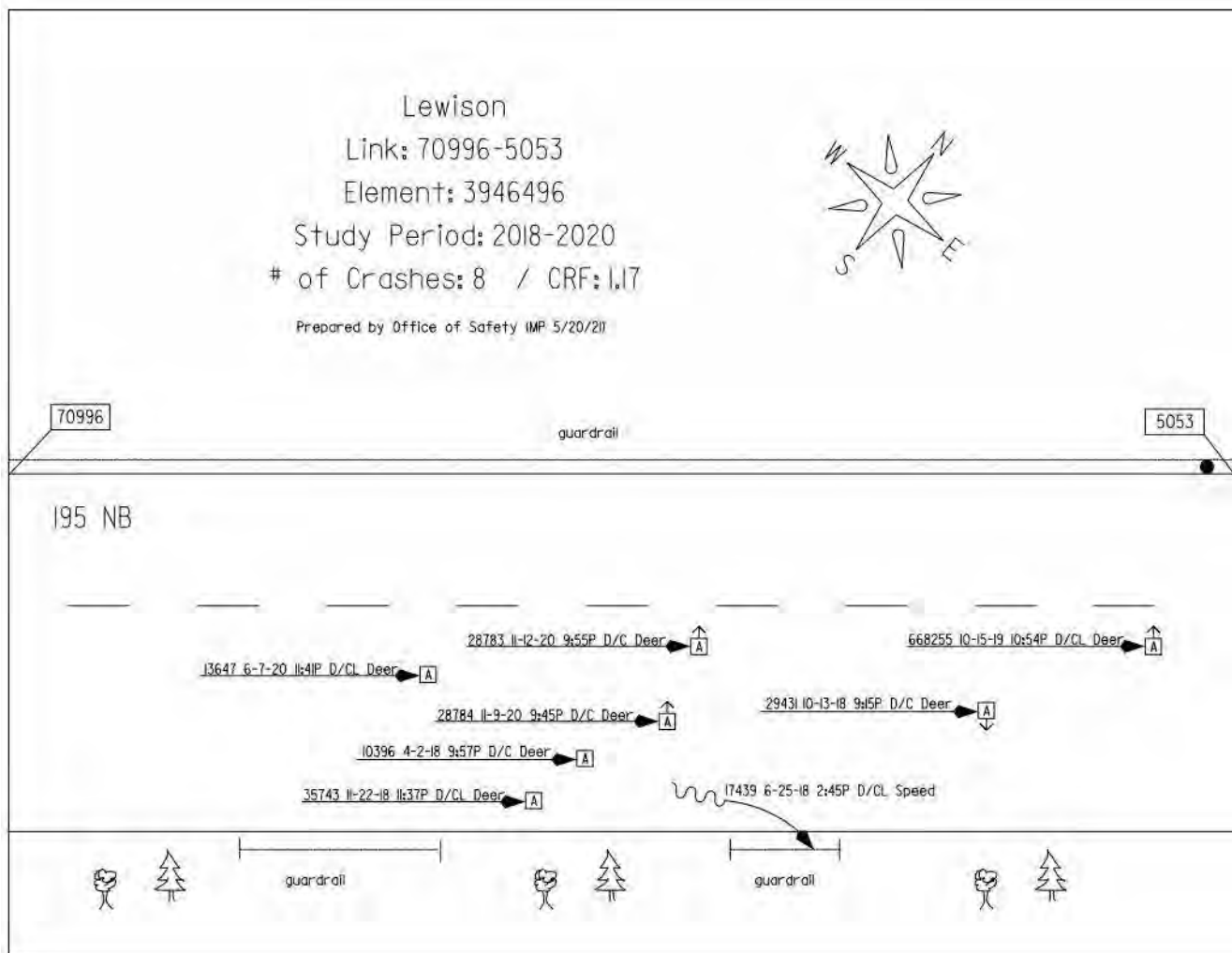
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

NB Segment (North of Grove Street)

Figure 2: 2018-2020 I-95 NB Crash Diagram depicts the HCL for this location during the most recent time span in which it was identified as an HCL. This location was identified as an HCL during 3 other time periods over the past 10 years.

Figure 2: 2018-2020 I-95 NB Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 0% injury rate during this analysis period.

- All but one of the crashes at this location were collisions with deer
- The only other crash at this location was due to speed and resulted in the vehicle departing the roadway and colliding with guardrail
- 5 of these 8 crashes occurred during the months of October and November
- All of the crashes at this location occurred in the afternoon or evening, with 6 crashes occurring between 9:30pm and midnight

Photo 1: I-95 NB Near Grove Street (2018) captured by Google Maps² in August of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 NB Near Grove Street (2018)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This mainline segment is flat and straight which does not create sight distance concerns.
Lighting	There is no lighting along this segment.
General Sign Issues	Signage along this segment notifies drivers of the upcoming Exit 86 interchange.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders.
Barriers and Clear Zones	Median barrier exists along the entirety of the segment to separate the northbound and southbound travel directions.
Bridges and Culverts	Bridge 0102 carries Old Webster Road over I-95 and has components which have been given condition ratings ³ of satisfactory and good. Bridge 0034 carries Grove Street over I-95 and has components which have been given condition ratings of good.
Pavement	The pavement along this segment has been given a pavement condition rating ⁴ of B.
Heavy Vehicles	This location tends to average between 5% to 11% heavy vehicles.

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

² Google Maps accessed March 23, 2023

³ According to MaineDOT Public Map Viewer – Bridge Layer

⁴ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified

Mainline High Crash Location: Mile Marker 86 – 102

Nodes 71005 to 28917: NB Segment Near Academy Road
Nodes 71005 to 71007: NB Segment Near Small Road
Nodes 71007 to 71009: NB Segment Near Stevenstown Road
Nodes 71009 to 28942: NB Segment Over Lunts Hill Road
Nodes 28931 to 71010: SB Segment Near Stevenstown Road

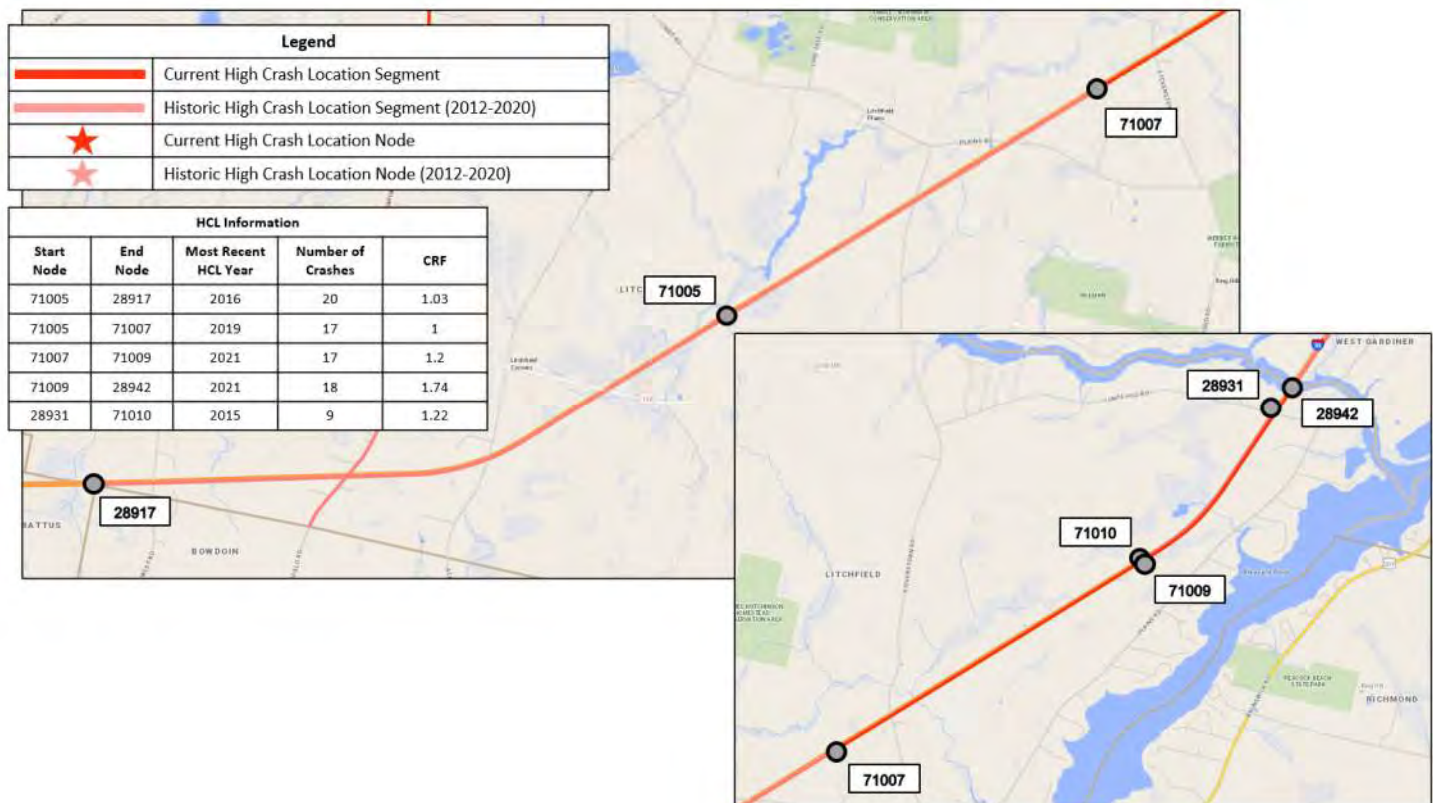
Introduction

There are 5 HCLs for the mainline segment near the southerly end of mile marker 86-102 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- NB Segment Near Academy Road
- NB Segment Near Small Road
- NB Segment Near Stevenstown Road
- NB Segment over Lunts Hill Road
- SB Segment Near Stevenstown Road

These HCL's are located along I-95 NB and SB from the West Road bridge to the Cobbosseecontee Stream in Litchfield in Kennebec County. The southernmost section along I-95 NB begins at the border with the Town of Sabattus and terminates just north of the Richmond Road bridge with the next segment continuing north and terminating between the Plains Road bridge and the Stevenson Road bridge. From there, the next two segments continue along I-95 NB and terminate at the Cobbosseecontee River bridge, with the first section terminating 1.5 miles north of the Stevenson Road bridge and the second section carrying the rest of the way. Finally, the I-95 SB segment carries from 1.5 miles north of the Stevenson Road bridge to the Lunt's Hill Road bridge.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Around 2016, the West Gardiner Toll Plaza underwent changes to implement ORT lanes.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

These mainline segments are all signed with a 70 MPH speed limit. The AADT¹ along the NB segments is 5,730 while the AADT along the SB segment is 5,782.

Corridor Characteristics

These segments carry vehicles along I-95 NB and SB. Each segment consists of two travel lanes with shoulders on both sides and ruble strips along both shoulders. Median guardrail exists along the entirety of this location to separate the NB and SB travel directions. Multiple spans of guardrail can also be found along the outside of the roadway at various locations along the segments.

¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

NB Segment Near Academy Road

While there is not a crash diagram currently available for the 2014-2016 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
2/21/2014	7:00 AM	Property Damage Only	Rollover
3/31/2014	5:00 AM	Property Damage Only	Went Off Road
4/11/2014	4:39 AM	Property Damage Only	Went Off Road
6/1/2014	5:47 AM	Property Damage Only	Deer
11/8/2014	12:10 AM	Property Damage Only	Deer
11/10/2014	3:30 AM	Property Damage Only	Deer
11/24/2014	7:20 PM	Property Damage Only	Deer
11/8/2015	12:34 AM	Property Damage Only	Deer
11/21/2015	1:00 AM	Property Damage Only	Deer
2/5/2016	11:35 AM	Property Damage Only	Went Off Road
2/5/2016	10:04 AM	Injury (Non-Fatal)	Rollover
6/11/2016	1:13 AM	Property Damage Only	Deer
8/12/2016	1:20 PM	Property Damage Only	Jackknife
8/16/2016	8:34 AM	Property Damage Only	Went Off Road
10/8/2016	2:18 AM	Injury (Non-Fatal)	Went Off Road
11/17/2016	9:05 PM	Property Damage Only	Went Off Road
11/19/2016	6:16 PM	Property Damage Only	Deer
7/15/214	1:51 PM	Property Damage Only	Went Off Road

It can be observed from this table that there were 18 crashes at this location with a 11.1% injury rate during this time period.

- 8 of these crashes were collisions with large animals
- 7 of these 18 crashes resulted in vehicles departing from the roadway
- 10 of these 18 crashes occurred during early morning hours between midnight and 7:00am
- 7 of these crashes occurred during the month of November

Photo 1: NB Segment Near Academy Road (2022) captured by Google Maps in July of 2022 depicts this location under current conditions.

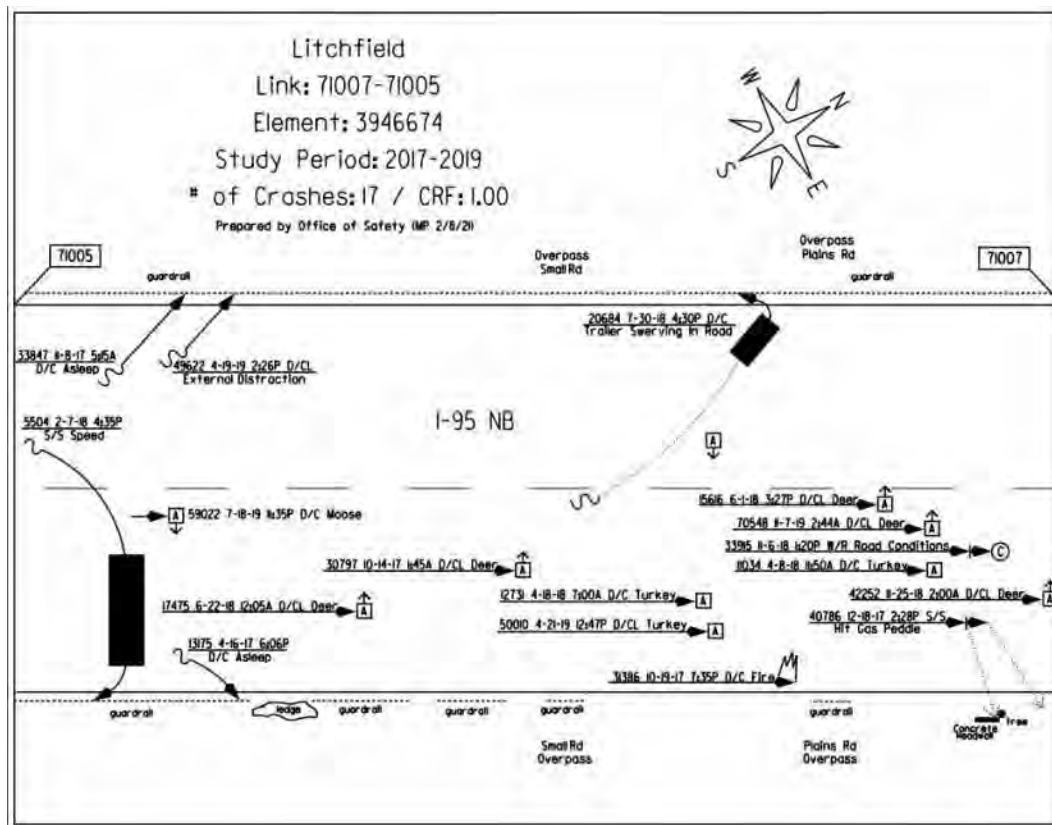
Photo 1: NB Segment Near Academy Road (2022)



NB Segment Near Small Road

Figure 2: 2017-2019 NB Segment Near Small Road Crash Diagram depicts the crash diagram at this location during the time period in which it was most recently classified as an HCL. This location was identified as an HCL during 1 other time period over the past 10 years.

Figure 2: 2017-2019 NB Segment Near Small Road Crash Diagram



As shown in **Figure 2**, there were 17 crashes resulting in a 5.9% injury rate during this analysis period.

- The most common type of crash at this location was collisions with animals which attributed to 9 crashes at this location
- The next most common cause of crash was vehicle operators falling asleep which caused 2 crashes
- One of the crashes at this location was due to road conditions
- 2 of these crashes involved heavy vehicles
- 6 of these crashes resulted in vehicles departing from the travel way and colliding with objects such as guardrail, concrete headwalls or trees
- April and November were the most common months of crash at this location with 4 crashes occurring within each
- There is not a strong correlation between time of day and crash frequency at this location

Photo 2: I-95 NB Near Small Road (2018) captured by Google Maps² in August of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 2: I-95 NB Near Small Road (2018)

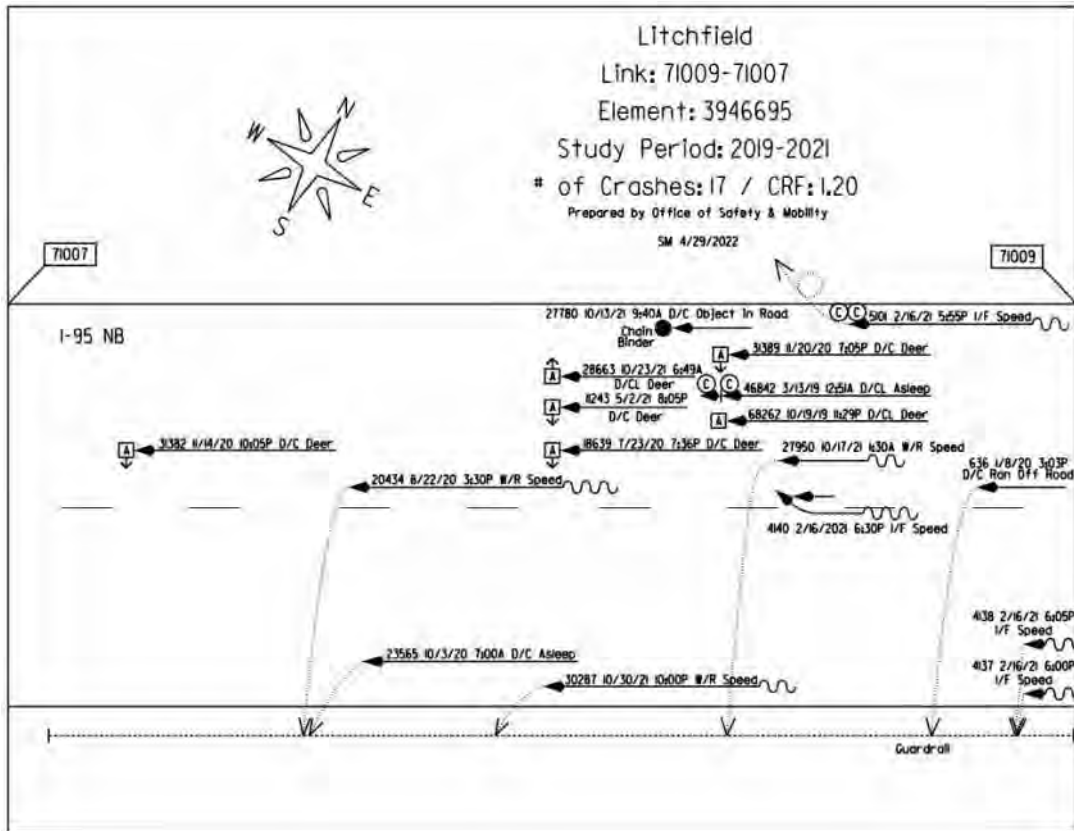


² Google Maps accessed March 23, 2023

NB Segment Near Stevenstown Road

Figure 3: 2019-2021 I-95 NB Near Stevenstown Road Crash Diagram depicts the crash diagram for the most recent time period in which this location was identified as an HCL. This is the only time in the past 10 years that this segment was classified as an HCL.

Figure 3: 2019-2021 I-95 NB Near Stevenstown Road Crash Diagram



As shown in **Figure 3**, there were 17 crashes resulting in a 11.8% injury rate during this analysis period.

- The most common cause of crash at this location was speeding which contributed to 7 crashes
- There were 6 collisions with animals at this location
- 8 of these crashes resulted in vehicles departing from the travel way
 - 7 of these 8 resulted in a collision with guardrail
- 13 of these 17 crashes occurred between the months of October and February
- 10 of these crashes occurred in the late evening, from approximately 6:00pm through midnight

Photo 3: NB Segment Near Stevenstown Road captured by Google Maps³ in August of 2018 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 3: NB Segment Near Stevenstown Road

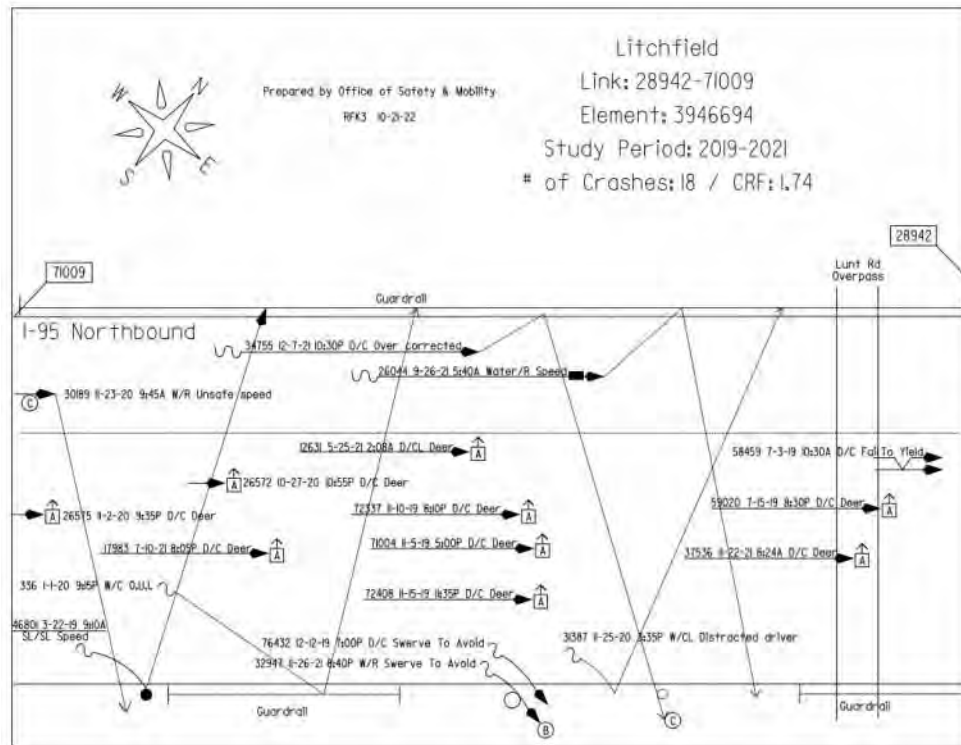


³ Google Maps accessed March 23, 2023

NB Segment over Lunts Hill Road

Figure 4: 2019-2021 I-95 NB Over Lunts Hill Road Crash Diagram depicts this mainline segment during the most recent time period in which it was identified as an HCL. This segment was identified as an HCL during two other time periods in the past 10 years.

Figure 4: 2019-2021 I-95 NB Over Lunts Hill Road Crash Diagram



As shown in **Figure 4**, there were 18 crashes resulting in a 16.7% injury rate during this analysis period.

- Of these 18 crashes were collisions with large animals
- The next most common cause of crash at this location was speeding which contributed to 3 crashes
 - One of these speed related crashes also involved water in the travel way
 - 1 of these crashes involved a heavy vehicle
- 8 of these crashes resulted in vehicles departing from the roadway
 - 5 of these 8 crashes resulted in collision with guardrail
- 12 of these crashes occurred between the months of October and January
- The majority of these crashes occurred during the evening hours, with 11 happening between 5:00pm and midnight

Photo 4: Near Lunts Hill Road captured by Google Maps in July of 2022 depicts the condition of this location most nearly to the time that it was most recently noted as an HCL.

Photo 4: I-95 NB Near Lunts Hill Road



SB Segment Near Stevenstown Road

While there is not a crash diagram currently available for the 2013-2015 time period in which this location was identified as an HCL, the following crash data was gathered from the Maine Public Crash Query Tool:

Date	Time	Injury Level	Type of Crash
7/22/2013	11:34 AM	Injury (Non-Fatal)	Went Off Road
2/26/2014	9:15 PM	Injury (Non-Fatal)	Went Off Road
5/13/2014	1:56 PM	Property Damage Only	Went Off Road
10/28/2014	9:25 PM	Injury (Non-Fatal)	Deer
5/17/2015	8:45 PM	Property Damage Only	Deer
6/18/2015	8:45 PM	Property Damage Only	Deer
12/17/2015	12:15 PM	Property Damage Only	Rear End/Sideswipe

It can be observed from this table that there were 7 crashes at this location with a 42.9% injury rate during this time period.

- The leading types of crash at this location were large animal collisions and departing from the roadway, each pertaining to 3 crashes
- 4 of these 7 crashes occurred between the hours of 8:45pm and 9:30pm
- 4 of these crashes occurred between the months of May and July

Photo 5: SB Segment Near Stevenstown Road captured by Google MAPS in August of 2018 depicts the condition of this location most nearly to the time that it was most recently noted as an HCL.

Photo 5: SB Segment Near Stevenstown Road



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This section of mainline has two curves along it as well as some vertical curvature.
Lighting	No permanent lighting exists along these mainline segments.
General Sign Issues	The NB segment contains chevron signs along the southerly curve in this area. Other signage through the area includes road names for overpasses and mile marker information.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders.
Barriers and Clear Zones	Median barrier exists along the entirety of the segment to separate the northbound and southbound travel directions. There are also some lengths of guardrail along the outside of the roadway at some locations within these segments.
Bridges and Culverts	The bridges and culverts along these segments and the condition ratings⁴ that their components most recently received are below: 0540 – West Road Over I-95: Good and Very Good 0541 – Center Road over I-95: Satisfactory and Good 0542 – Academy Road over I-95: Satisfactory, Good and Very Good 0543 – Richmond Road over I-95: Fair and Good 0544 – Small Road over I-95: Good and Very Good 1392 – Plains Road over I-95: Satisfactory and Good 0545 – Stevenstown Road over I-95: Fair and Good Culvert 0537 – I-95 over Potters Brook: 6: Deterioration or initial disintegration 0546 – Lunts Hill Road over I-95: Satisfactory, Good and Very Good 0547 – I-95 NB over Cobbosseecontee Stream: Satisfactory and Good 1500 – I-95 SB over Cobbosseecontee Stream: Good and Very Good
Pavement	The pavement along the both the NB and SB segments of this location have been given pavement condition ratings ⁵ of C and B.
Heavy Vehicles	The percentage of heavy vehicles in this area tends to average around 5% to 12%, depending on direction and time of day.

Conclusion

The majority of crashes at this location involve large animals. Large animal crash hotspots are examined separately as a part of a full corridor evaluation.

Recommendations

- Short-Term Solutions:
 - Include this location in MTA's large animal study.

⁴ According to MaineDOT Public Map Viewer – Bridge and Culvert Layers

⁵ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Mainline High Crash Location:

Nodes 28940 to 28942: NB Segment Near Lunts Hill Road to Barrier Toll

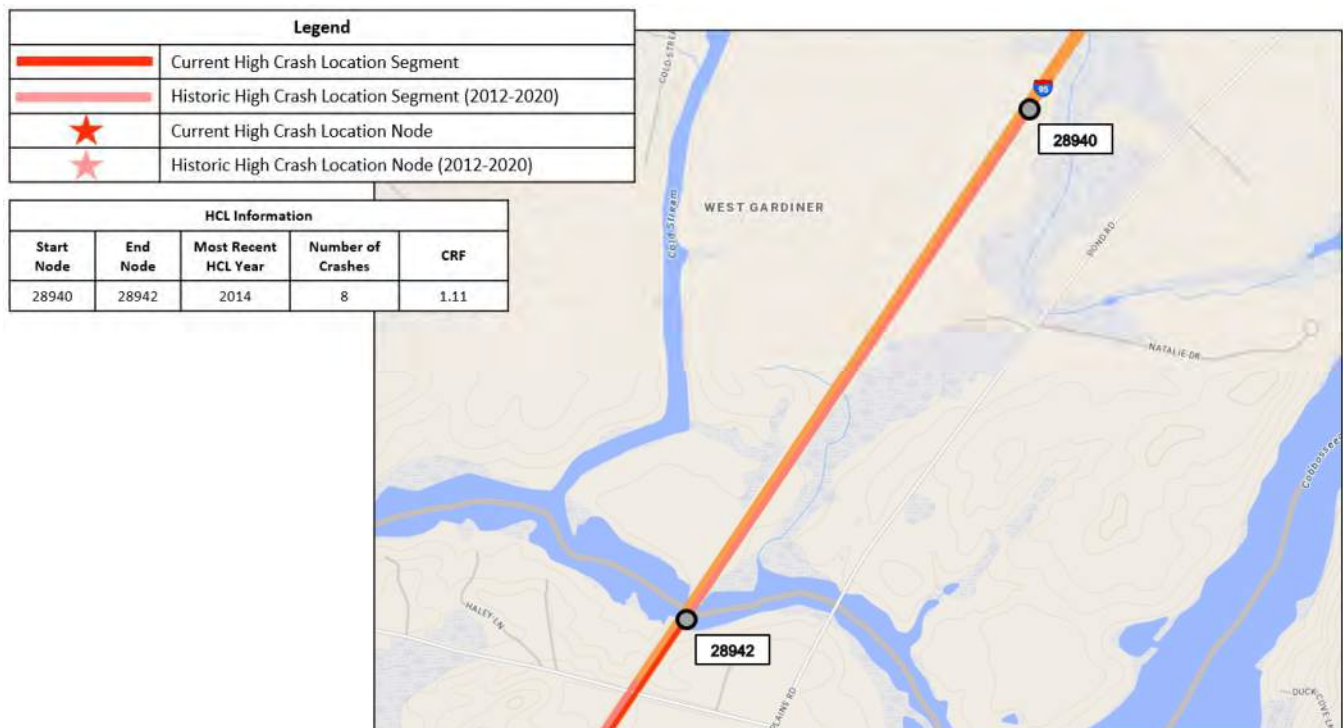
Introduction

There is 1 HCL for the mainline segment near the 102 barrier toll plaza during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- NB Segment Near Lunts Hill Road to Barrier Toll

This mainline segment is located along I-95 NB in the city of West Gardiner in Kennebec County. This section spans from the Cobbosseecontee Stream bridge, just north of the Lunts Hill Road bridge, to the West Gardiner Barrier Toll Plaza and is the last toll before I-295 NB merges with I-95 NB. The barrier plaza has an Open Road Tolling Lane and two collection lanes, one EZ Pass and one Cash, in each direction.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Around 2016, the West Gardiner Toll Plaza underwent changes to implement ORT lanes.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

The mainline of this segment is signed with a 70 MPH speed limit. At the toll plaza, the ORT lane is signed with the typical mainline speed limit, while there is a 35 MPH speed limit posted near the cash collection plaza and a 10 MPH posted speed limit through it. This segment has an AADT¹ of 5,730.

Corridor Characteristics

This segment carries vehicles along I-95 NB. The segment consists of two travel lanes with shoulders on both sides and ruble strips along both shoulders. Median guardrail exists along the entirety of this area to separate the NB and SB travel directions which transitions to concrete barrier near the toll plaza. There are also segments of guardrail at multiple locations along the outside of the roadway to protect against hazards.

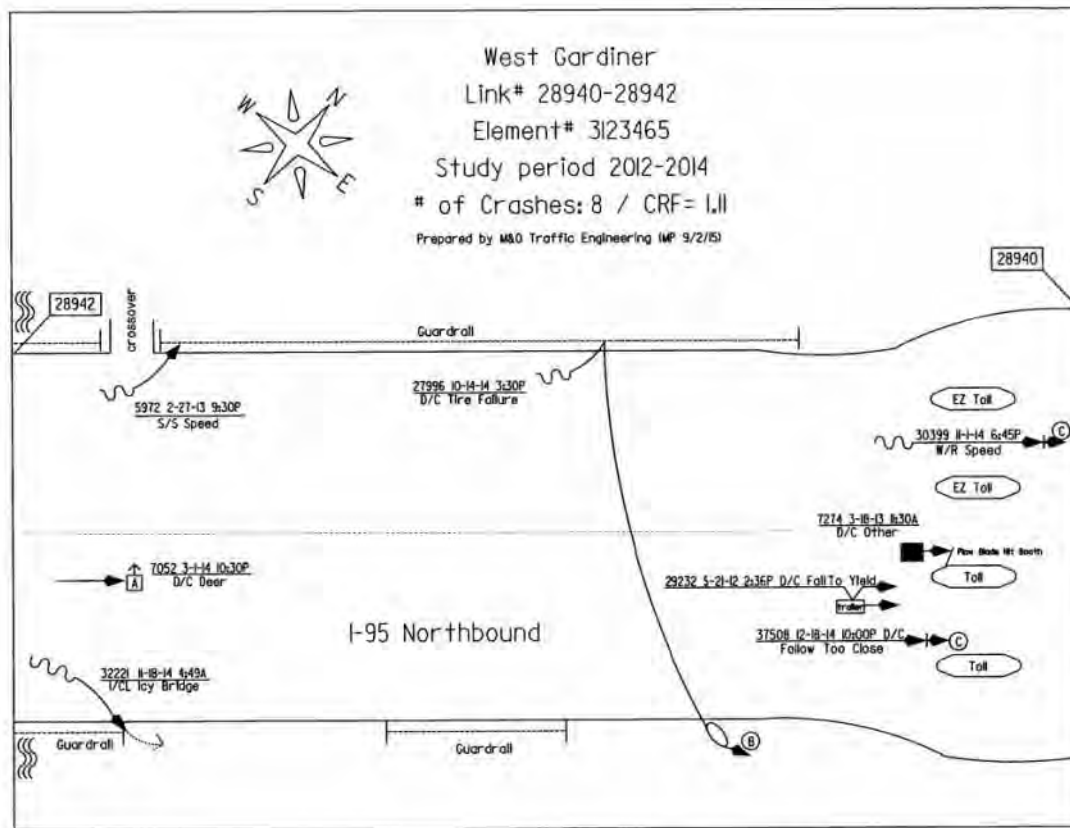
¹ 2022 AADT Summary Created by HNTB for MTA

Crash analysis

NB Segment Near Lunts Hill Road to Barrier Toll

Figure 2: 2012-2014 NB Toll Plaza Crash Diagram depicts the crash diagram for the most recent time period in which this location was identified as an HCL. This is the only time over the past 10 years that the location has been classified as an HCL.

Figure 2: 2012-2014 NB Toll Plaza Crash Diagram



As shown in **Figure 2**, there were 8 crashes resulting in a 37.5% injury rate during this analysis period.

- The leading cause of crash at this location was speeding which contributed to 2 crashes
- There was 1 animal collision at this location
- 1 crash was due to the bridge being icy
- There was 1 heavy vehicle involved in these crashes
- 4 of the crashes at this location resulted in vehicles departing from the travel way and colliding with guardrail
- 4 of these crashes occurred between October and February
- Most of these crashes occurred during the evening hours

Photo 1: NB Toll Plaza (2008) captured by Google Maps in October of 2008 depicts the condition of this location most nearly to the time that it was most recently noted as an HCL.

Photo 1: NB Toll Plaza (2008)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This segment of roadway is straight and flat, with the toll plaza posing the only sight distance concerns
Lighting	Lighting is present around the toll plaza.
General Sign Issues	Signing exists at the toll plaza for purposes including designating speed limits and noting collection type by lane.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders. Markings at the toll plazas aid in guiding vehicles through their lanes.
Barriers and Clear Zones	Median barrier exists along the entirety of the segment to separate the northbound and southbound travel directions. This consists of guardrail which transitions to concrete barrier near the toll plaza. There are also some lengths of guardrail along the outside of the roadway at some locations within the segment.
Bridges and Culverts	Bridge 0547 carries I-95 NB over Cobbosseecontee Stream and has components which have been given condition ratings ² of satisfactory and good.
Pavement	The pavement along this segment has most recently been given a pavement condition rating ³ of A.
Heavy Vehicles	The percentage of heavy vehicles in this area tends to average around 5% to 11%, depending on time of day.

Recommendations

The toll plaza has not been an HCL since 2014. There are no recommendations at this time.

² According to MaineDOT Public Map Viewer – Bridge Layer

³ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified Layer

Intersection High Crash Location: Exit 102

Node 28516: Exit 102 Intersection

Introduction

There is 1 HCL at the Exit 102 intersection during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Exit 102 Intersection

This HCL is located in the Town of West Gardiner in Kennebec County. The node included in the analysis area is associated with the adjacent intersection of the 102 interchange, Lewiston Road, and the West Gardiner Service Plaza. The 102 interchange provides NB off and SB On access to I-95 only, whereas Exit 103 provides NB On and SB Off access only via I-295 and Exit 51. The Service Plaza sees a significant number of travelers during the busying summer tourist season as well as semi-trucks stopping to rest. The intersection was converted into a single lane roundabout in 2015 to address crash concerns.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

Around 2016, the West Gardiner Toll Plaza underwent changes to implement ORT lanes.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This intersection consists of a four-legged roundabout. The AADT and Speed Limits of each leg can be found in the table below:

Approach	AADT ¹	Speed Limit
Exit 102 NB Off Ramp SB	1,233 ²	20 MPH Advisory Speed Through Roundabout
Lewiston Road EB	2,185	
Lewiston Road WB	4,213	
Service Plaza NB	1,988	

Corridor Characteristics

This intersection is a roundabout which provides access to the Exit 201 On/Off ramps, Lewiston Road and the West Gardiner Service Plaza. Each leg of this intersection has 1 approach lane and 1 receiving lane. Concrete and/or grass medians exist at each approach to separate the travel directions.

¹ From MaineDOT Public Map Viewer Unless Otherwise Specified

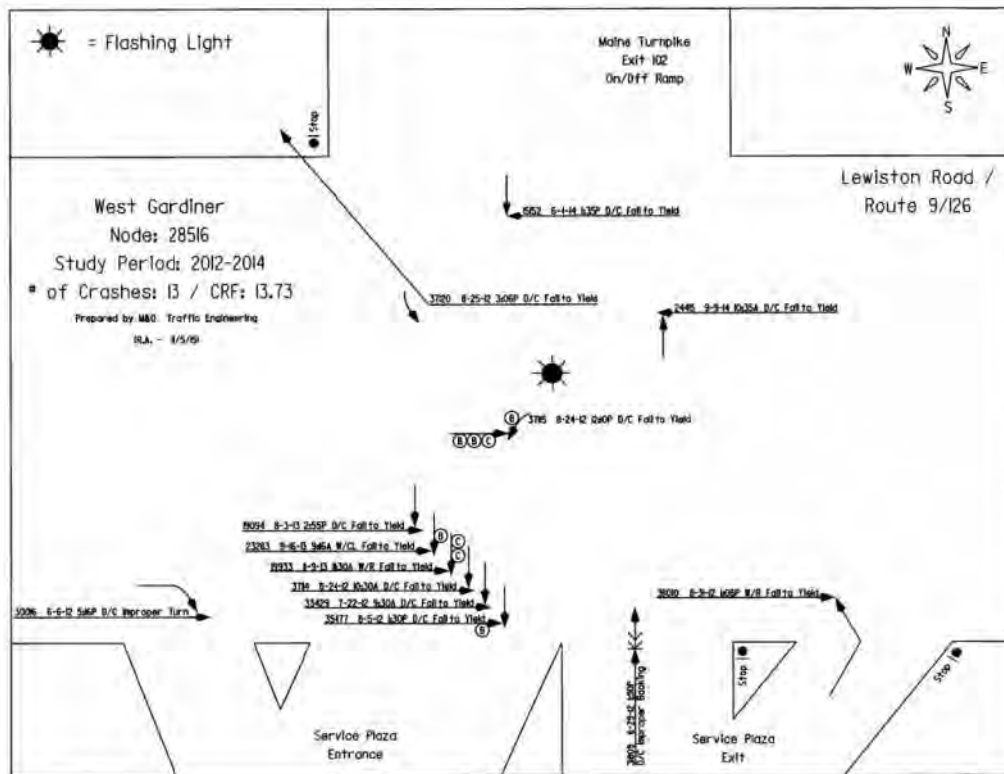
² 2022 AADT Summary Created by HNTB for MTA

Crash analysis

Exit 102 Intersection

Figure 2: 2012-2014 Exit 102 Intersection Crash Diagram depicts the crash diagram for this location during the most recent time in which it was classified as an HCL. This location qualified as an HCL during two time periods prior to this in the past 10 years.

Figure 2: 2012-2014 Exit 102 Intersection Crash Diagram



As shown in **Figure 2**, there were 13 crashes resulting in a 30.8% injury rate during this analysis period.

- All but 2 of the recorded crashes at this location were caused by failure to yield
- The majority of crashes at this location involved vehicles traveling along Lewiston Road EB, many of which were collisions between them and vehicle traveling SB from the Exit 102 Ramps
- 1 of these crashes resulted in a vehicle departing the travel way
- 12 of these crashes occurred between the months of June and September
- There is not a strong correlation between time of day and crash frequency at this location

Photo 1: Exit 102 Intersection (2012) captured by Google Maps³ in June of 2012 depicts the condition of this location at the time that it was most recently noted as an HCL. This photo is from the viewpoint of a vehicle traveling along Lewiston Road WB.

Photo 1: Exit 102 Intersection (2012)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This intersection currently exists as a roundabout.
Lighting	There is lighting throughout the roundabout.
General Sign Issues	Signing at the approaches and at the roundabout include advisory speeds, yield, one way and route information signs.
Marking and Delineation	The roundabout is adequately marked with pavement markings to aid vehicles in navigating through the intersection.
Barriers and Clear Zones	Medians at each approach separate travel directions.
Bridges and Culverts	No bridges or culverts exist at this intersection.
Pavement	The pavement at the roundabout approaches have been most recently given the following pavement condition ratings: • Ramps SB Approach: C • Lewiston Road EB Approach: B • Lewiston Road WB Approach: B
Heavy Vehicles	The ramps at this intersection tend to have a percentage of heavy vehicles around 2% to 6%.

Conclusions

A new roundabout was constructed the year after the HCL was reported in 2014. No further HCL's or significant crash patterns have been reported to date with the construction of the new roundabout. No recommendations at this time.

³ Google Maps accessed March 23, 2023

Mainline High Crash Location: 103 - 109

Nodes 28831 to 28832: SB Segment North of High Street

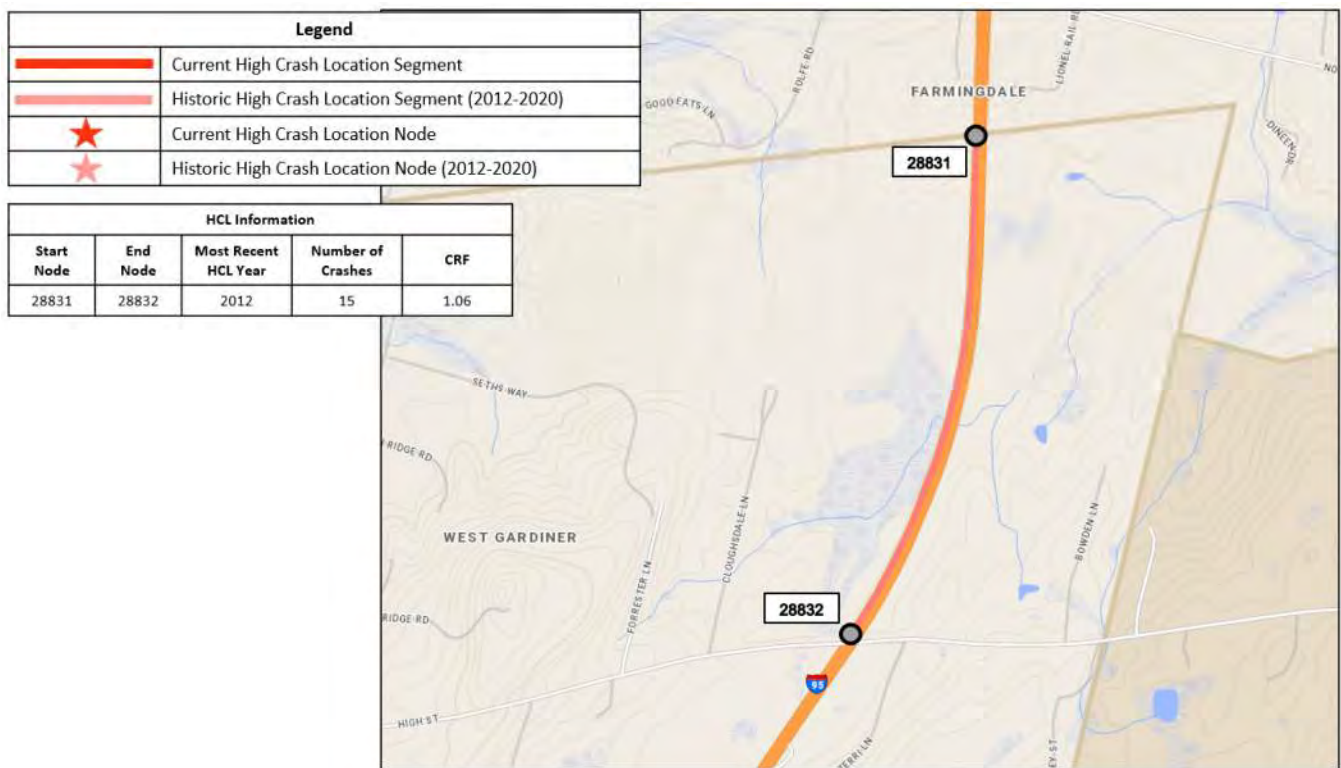
Introduction

There is 1 HCL at the southerly end of the mile marker 103 – 109 mainline segment during the most recent 10-year period as shown in **Figure 1: HCL Location Map**

- SB Segment North of High Street

This mainline segment is located along I-95 SB in the Town of West Gardiner in Kennebec County. The section extends from the town line of Farmingdale to the High Street Bridge right before the major I-95 diverge segment to I-295 SB.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

There were no recent construction activities near this location.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This mainline segment has a posted speed limit of 70 MPH and an AADT¹ of 16,534.

Corridor Characteristics

This segment carries vehicles along I-95 SB. It consists of 2 travel lanes with shoulders on both sides of the travel way. Rumble strips are along both shoulders and median barrier separates the northbound and southbound travel directions. Guardrail can also be found along the outside of the roadway at multiple locations along this segment.

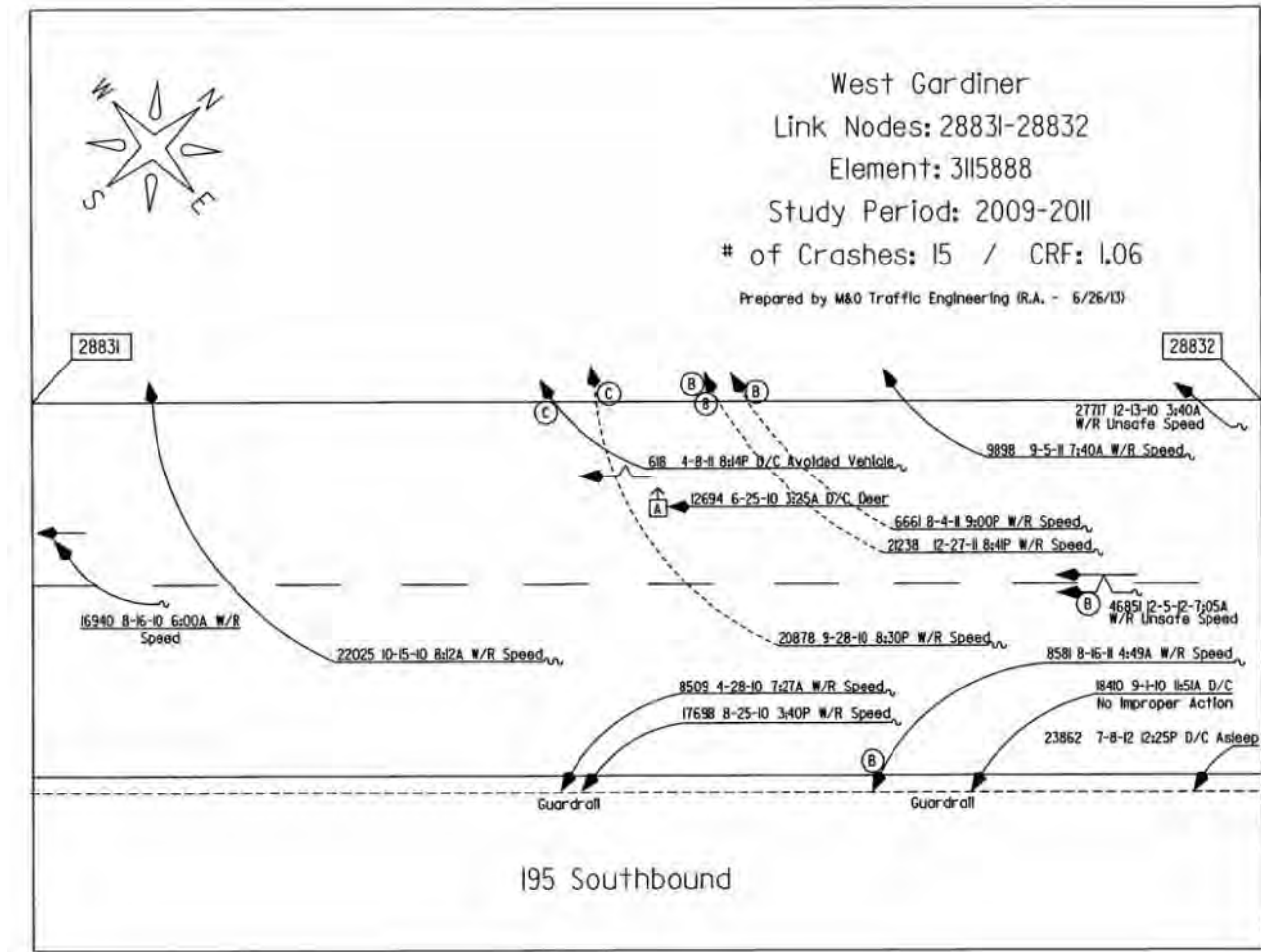
¹ 2022 AADT Summary Prepared by HNTB for MTA

Crash analysis

SB Segment North of High Street

Figure 2: 2009-2011 I-95 SB Crash Diagram depicts the most recent available crash diagram for this location. 2012 was the only time period in the past 10 years in which this location was identified as an HCL.

Figure 2: 2009-2011 I-95 SB Crash Diagram



As shown in **Figure 2**, there were 15 crashes resulting in a 40% injury rate during this analysis period.

- 11 of these 15 crashes were due to speeding
- There was 1 animal collision recorded at this location
- 12 of these crashes resulted in vehicles departing from the travel way
 - 5 of these 12 resulted in vehicles colliding with guardrail
- 8 of these crashes occurred between the months of August and October
- Many of these crashes occurred during early morning hours, with 7 crashes occurring between midnight and 9:00am

Photo 1: I-95 SB (2011) captured by Google Maps² in October of 2011 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 SB (2011)



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This section of I-95 SB is flat but is along a horizontal curve.
Lighting	There is no lighting along this segment.
General Sign Issues	There is signage along this segment for the upcoming Exit 102 Interchange.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders.
Barriers and Clear Zones	Median barrier exists along the entirety of the segment to separate the northbound and southbound travel directions. There are also some lengths of guardrail along the outside of the roadway at some locations within the segment.
Bridges and Culverts	Bridge 0550 carries High Street over I-95 at the southerly end of this segment and has components which have most recently been given condition ratings ³ of satisfactory and good.
Pavement	The pavement along this segment has most recently been given a pavement condition rating ⁴ of C.
Heavy Vehicles	This segment has a percentage of heavy vehicles that tends to average around 9% to 12%.

Conclusions

Speeding dominated the crash patterns for this area with a significant portion either leaving the travel lane or hitting the adjacent guardrail. The most recent recorded HCL was 10 years ago (in 2012) and there have been no reported HCL or significant crash patterns reported since. No recommendations at this time.

² Google Maps accessed March 23, 2023

³ According to MaineDOT Public Map Viewer – Bridge Layer

⁴ According to MaineDOT Public Map Viewer – CSL Condition Data Simplified

Mainline High Crash Location: 103 – 109

Nodes 71025 to 28840: Segment After Exit 109 SB On Ramp

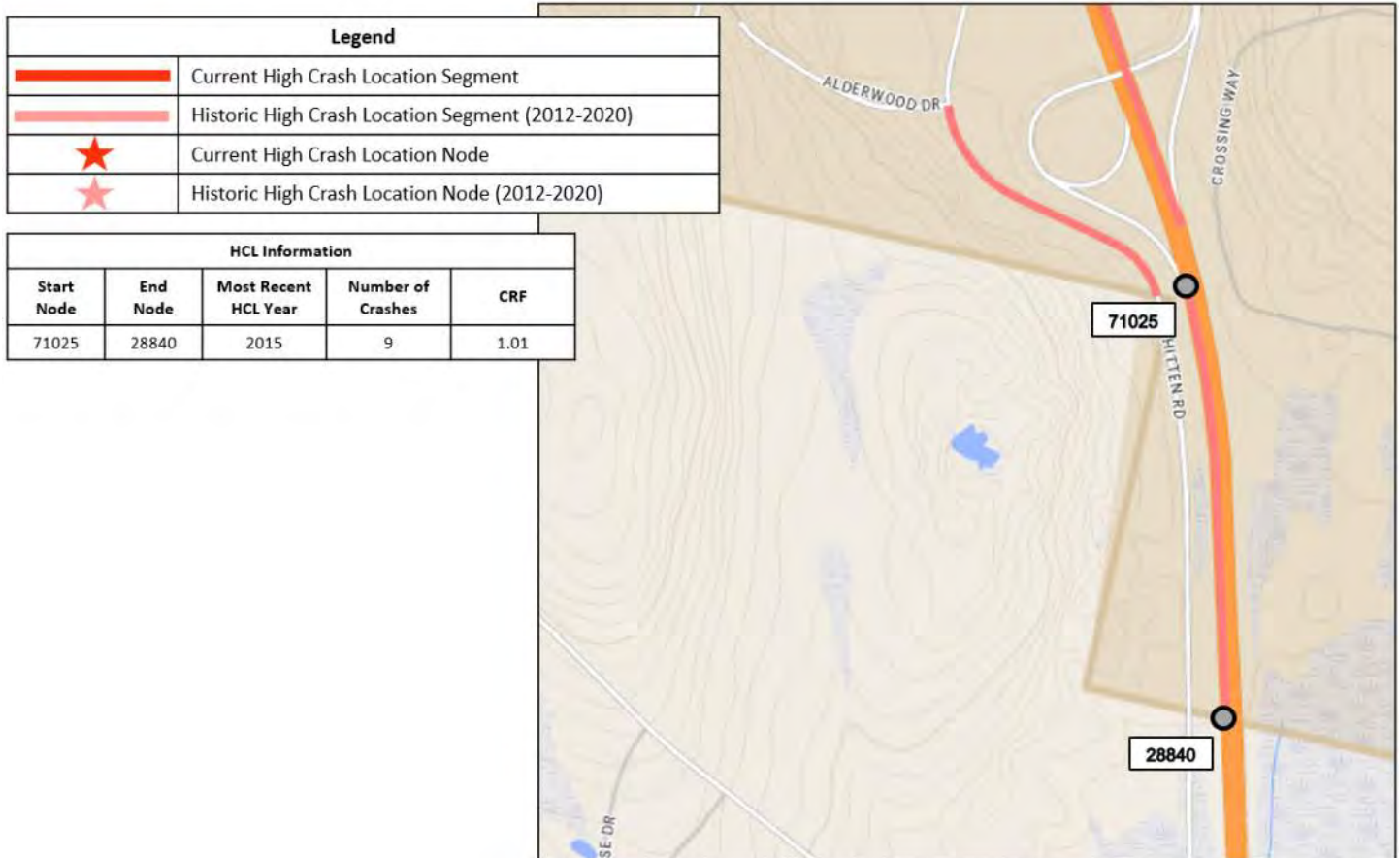
Introduction

There is 1 HCL at the northern section of mile marker 103-109 during the most recent 10-year period as shown in **Figure 1: HCL Location Map**.

- Segment after Exit 109 SB On Ramp

This mainline segment along I-95 SB is located in Augusta in Kennebec County. The section spans from the Exit 109 SB On Ramp to the town line of Augusta and Hallowell and includes a roughly 900' merge lane along a curve. Speed limits shift from 65 mph traveling south along I-95 through Augusta to 70 mph within this section.

Figure 1: HCL Location Map



Existing Conditions Assessment

Construction Activities

There were no recent construction activities near this location.

General Mobility Observations

This mainline segment is commuter-driven, with the weekday AM and PM Peak hours typically experiencing the highest volumes. The area does still tend to experience seasonal fluctuation in volumes, but this variation is less than what is typically experienced along the southern portions of the Turnpike.

Demographics

This mainline segment has a posted speed limit of 70 MPH and an AADT¹ of 16,534.

Corridor Characteristics

This segment carries vehicles along I-95 SB. It consists of 2 travel lanes with shoulders on both sides of the travel way. Rumble strips are along both shoulders and median barrier separates the northbound and southbound travel directions.

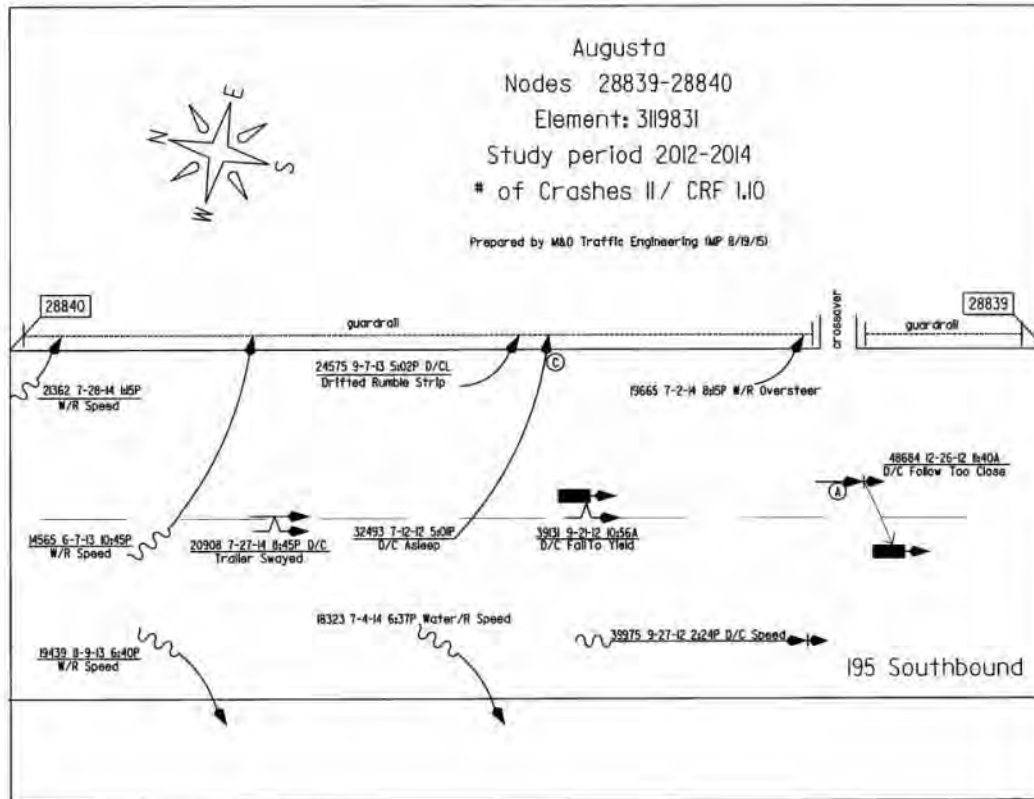
¹ 2022 AADT Summary Prepared by HNTB for MTA

Crash analysis

Segment after Exit 109 SB On Ramp

Figure 2: 2012-2014 I-95 SB Crash Diagram depicts the most recent available HCL diagram for this location. This location was also Identified as an HCL during the 2013-2015 time period over the past 10 years.

Figure 2: 2012-2014 I-95 SB Crash Diagram



As shown in **Figure 2**, there were 11 crashes resulting in a 18.2% injury rate during this analysis period.

- 5 of these crashes were caused as a result of speed
 - 1 of these 5 also involved water in the travel way
- 7 of these crashes resulted in vehicles departing from the travel way
 - 5 of these 7 resulted in vehicles colliding with guardrail
- 2 of these crashes involved heavy vehicles
- 7 of the 11 crashes at this location were single vehicle crashes
- All but 1 of these crashes occurred between the months of June and September
- 6 of these crashes occurred during the evening hours of 5:00pm to 9:00pm

Photo 1: I-95 SB Just South of Exit 109 Interchange captured by Google Maps in October of 2011 depicts the condition of this location at the time that it was most recently noted as an HCL.

Photo 1: I-95 SB Just South of Exit 109 Interchange



Findings and Observations

Existing Road Audit	
Road alignment and Cross Section	This segment has some slight horizontal curvature at the northern end, but is straight and flat beyond that.
Lighting	Lighting exists along this segment near the Exit 109 interchange.
General Sign Issues	There is speed limit signage along this segment.
Marking and Delineation	This location is adequately marked to separate lanes as well as shoulders.
Barriers and Clear Zones	Median barrier exists along the entirety of the segment to separate the northbound and southbound travel directions.
Bridges and Culverts	No bridges or culverts exist along this segment.
Pavement	The pavement along this segment has been most recently given a pavement condition rating ² of B.
Heavy Vehicles	This segment has a percentage of heavy vehicles that tends to average around 9% to 12%.

Conclusions

This has not been a high crash location since 2015. No Recommendations at this time.

² According to MaineDOT Public Map Viewer – CSL Condition Data Simplified