

Exit 75 Transportation Study

Phase I Report

Short Term Transportation Needs

Maine Turnpike Authority



Prepared by:

HNTB

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Introduction

Concerns regarding Auburn Interchange (Exit 75) have been raised by local residents and officials. These concerns include:

- The condition of the pavement
- The adequacy of the signing
- Difficult traffic maneuvers due to the limited distance for traffic weaving patterns combined with the high number of heavy trucks that use the interchange
- The overall condition/appearance of the interchange.
- Ability of interchange to accommodate future development growth for the area immediately adjacent to Exit 75

As a result of these concerns, the Maine Turnpike Authority (MTA), in cooperation with the City of Auburn, the Androscoggin Transportation Resource Center (ATRC), and the MaineDOT, is conducting a transportation study at and around the Exit 75 on the Maine Turnpike.

The Exit 75 Transportation Study is being conducted in two phases. Phase I will identify short term transportation needs, such as pavement condition and signing, and will recommend any short term improvements for a focused study area immediately adjacent to Exit 75 (see Figure 1). Phase II will identify future transportation needs by estimating and analyzing future traffic demand for the interchange and adjacent study area. This will be accomplished by developing strategies, focused on improving geometry and the configuration of Exit 75 to meet the transportation needs.

This report documents the findings and recommendations of the first phase.

Study Area

The study area for Phase I of the Exit 75 Transportation Study, as shown in Figure 1, includes the following locations:

- Exit 75 ramps: four interstate ramps (Northbound off and on, Southbound off and on) that include acceleration and deceleration lanes, the ramp proper, and the approach to the intersection with Route 202/4/100.
- Mainline: section of the Maine Turnpike two miles north and south of the Exit 75 Interchange
- Route 202/4/100: section of divided highway from the Danville Corner Road / Beech Hill Road intersection south to just north of the bridge over the Maine Central Rail Road line (1/2 mile either side of the signalized intersection for Exit 75).

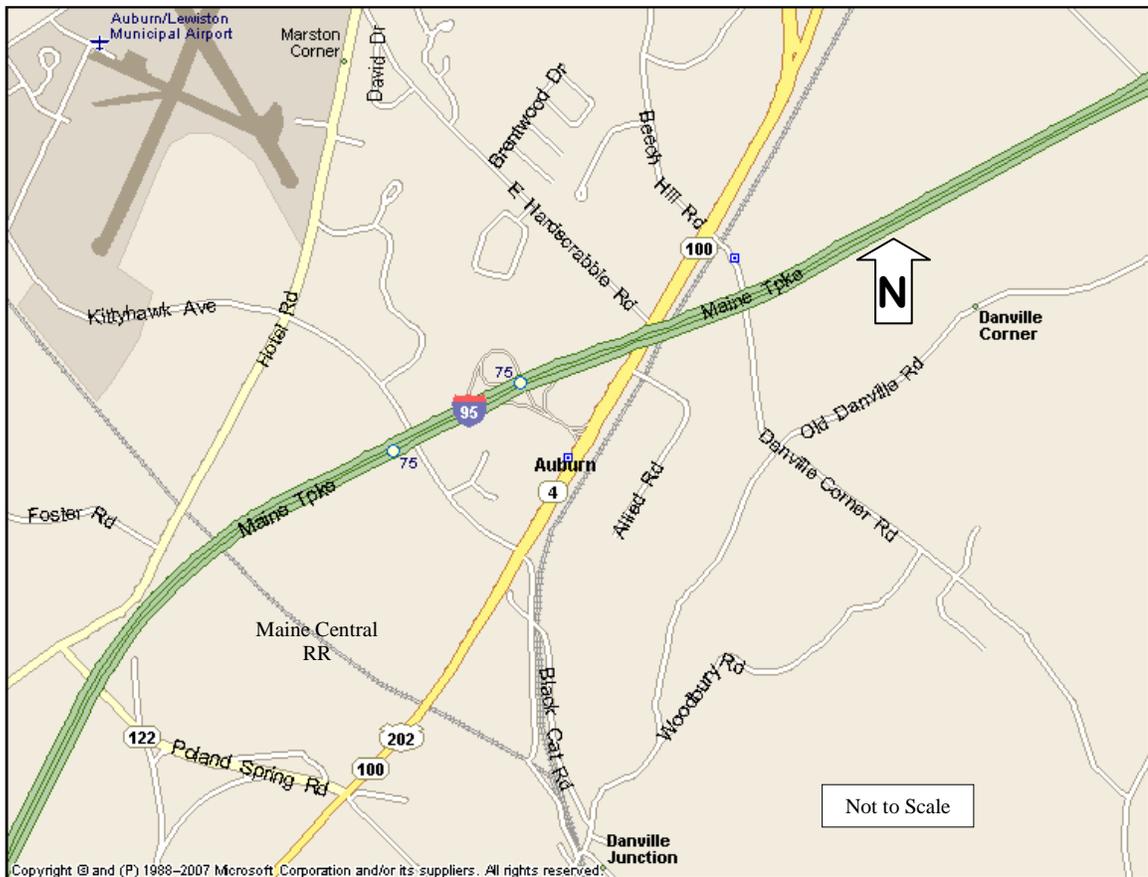


Figure 1 - Exit 75 Transportation Study Area

Assessment Methods

The transportation facilities within the study area were analyzed based on field observations performed by HNTB on October 20, 2009 and information collected by HNTB as part of the MTA's 2009 Annual Inspection. The facilities that were analyzed include:

- Pavement condition
- Lane and shoulder widths
- Signing
- Pavement markings
- Turnpike buildings

The scale used to rate the pavement and striping components of the roadway for this report is shown in Table 1. This rating system is also used for the MTA's Annual Inspection. The MTA's rating system ranks components from 1 to 13 however, the range 5 through 10 (or marginal to new) is the appropriate range for these studied roadway sections.

Several industry standards and guidelines were consulted in order to evaluate the adequacy of lane and shoulder widths, the application of signing, and pavement markings. They are the following:

- Maine Department of Transportation. Highway Design Guide. 2004. – referred to later in the report as MaineDOT's Highway Design Guide.
- U. S. Department of Transportation, Federal Highway Administration. *Manual on Uniform Traffic Control Devices for Streets and Highways*. 2003. – referred to later in the report as MUTCD
- American Association of State Highway and Transportation Officials. *A Policy on Geometric Design of Highways and Streets*. Washington, D.C., 2004. – referred to later in the report as AASHTO Policy

Table 1 - Rating System

Rating	Maintenance Activity	Rating for MTA Annual Inspection
New	No repairs needed	10
Good	No repairs needed	9
Generally Good	Potential exists for minor maintenance	8
Fair	Potential exists for major maintenance	7
Generally Fair	Potential exists for minor rehabilitation	6
Marginal	Potential exists for major rehabilitation	5

Exit 75 Ramps

The condition of the pavement, pavement markings, lane and shoulder widths, signing for the four interstate ramps (Northbound off and on and Southbound off and on) of the Maine Turnpike, and the Turnpike building at the Exit 75 interchange are assessed in this section.

Pavement

The ramps were repaved in 1993 and the acceleration lanes adjacent to the mainline were paved in 2006 during the Turnpike mainline paving. The assessment of the ramp pavement ranges from a “generally fair” condition to a “generally good” condition. Both NB and SB on ramps and acceleration lanes have a “fair” condition; both NB and SB off-ramps and their deceleration lanes have a “generally good” condition. Pavement between the mainline bridge and the Route 202/4/100 intersection is in a “generally fair” condition. This pavement has aged considerably with transverse, longitudinal and map cracking, and several patched pot holes. The MTA has an ongoing program to crack seal, patch, and overlay sections of the pavement as warranted. Figures 2-6 show images of this section of roadway.

Pavement rehabilitation of all ramps is needed. Partial depth pavement re-construction may be required from the merge area of the off-ramps to the Route 202/4/100 intersection, including the separated right turn lanes leading to and from the ramps, to improve pavement condition and extend life beyond that of an overlay.



**Figure 2 – Northbound off-ramp towards traffic
(Note crack sealing)**



**Figure 3 –NB & SB off-ramps approaching Route
202/4/100 intersection
(Note crack sealing for Turnpike exiting lanes and
overlay for entering lanes)**



Figure 4 – Looking at Route 202/4/100 intersection from Turnpike approach
(Note significant crack sealing, large cracks and patched pothole)



Figure 5 - Turnpike approach to the Route 202/4/100 intersection
(Note extent of cracking)



Figure 6 - Right slip lane onto on ramps from Route 202/4/100 southbound
(Note significant crack sealing and large cracks)

Lane and Shoulder Widths

MaineDOT's Highway Design Guide states that for Interstate ramps, travel lane widths should be 14' and the right and left shoulder widths should be 8' and 4' respectively. Travel lane and shoulder widths for the Exit 75 ramps meet these guidelines.

Signing

The signing at the Exit 75 ramps conveys different messages for motorists exiting and entering the Turnpike. As such, the signing at the Exit 75 ramps was broken down into off-ramp signing and on-ramp signing and is described in the following sections.

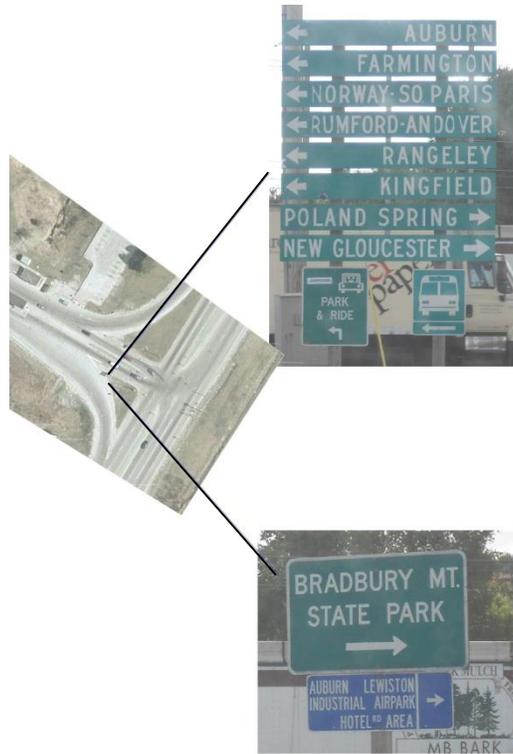


Figure 8 - Exit 75 off-ramp - Signing at center island

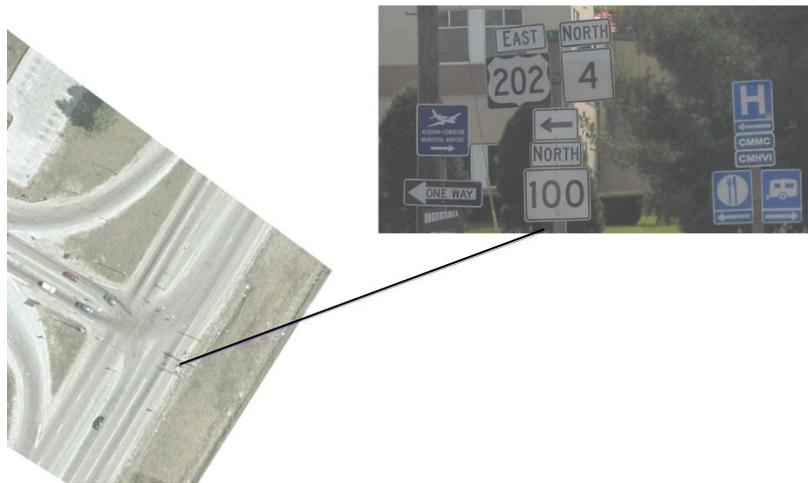


Figure 9 - Exit 75 off-ramp - Signing opposite Route 202/4/100

The large green/white directional assembly does not meet the current guidelines of the Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD strongly recommends that guide signs be limited to three lines of principal legend. The current assembly has eight. The reasoning for limiting the amount of legend is that the longer the legend on a guide sign, the

longer it will take motorists to comprehend it. This sign is also located at a less than ideal location. The information on this sign is needed by the motorist *in advance* of the decision point (being the triangular island that splits left and right turns). Due to this sign's location and amount of legend, this sign is easily overlooked by motorists. An example of a more effective sign is shown in Figure 10.



Figure 10 - Proposed Signing

The MUTCD recommends that a guide sign such as the proposed sign shown in Figure 10 be placed on the right side of the roadway at 200' before the decision point. This is a location where motorists would expect to find a guide sign. However, placing this sign on the off-ramps becomes challenging with the current configuration of the right turn lane from the Exit 75 off-ramps to Route 202/4/100. A possible solution would be to move the guardrail and pavement marking for the right turn (discussed further in the Pavement Marking section).

The Park & Ride sign on the traffic island is similar to, but not quite an MUTCD standard sign, it also has been vandalized (with a sticker). It should be replaced with a standard Park & Ride sign (see Figure 11) with an appropriate arrow designation.



Figure 11 – Standard Park & Ride Sign

The route sign assembly at the far side of the intersection on Routes 202/4/100 (also shown in Figure 9) needs arrow plaques below each route number. In addition, the MUTCD strongly recommends that an additional route sign assembly be placed at 400' from the decision point with every directional plaque and arrow plaque in order to pre-position vehicles in the correct lanes.

Several of the local attraction signs that are on the far side of the intersection shown in Figure 9 should be moved to the traffic island where they will better provide timely information. The signs for the hospital, food, and trailer camping should be visible to motorists before they make a decision on whether to go left or right. The sign for the airport is not a standard sign and should be replaced with a standard airport sign (see Figure 12) and moved to the traffic island. However moving these signs to the traffic island becomes difficult with the large green/white directional assembly in place. Because the directional assembly is not compliant with the MUTCD, is not in

an ideal location, and is easily overlooked due to information overload on the part of the motorist – it is recommended that it be removed.



Figure 12 – Standard Airport Sign

Other recommended signing changes to the exit 75 off-ramps are to (1) investigate the placement of the warning signs stating ‘rumble strip ahead’ from the northbound off-ramp. Rumble strips were not detected at the ramp during a field visit. (2) Remove the ‘NO TOLL AHEAD’ warning sign – this is no longer necessary as the adjustment time to removing the toll plaza is over and most exiting lanes that are not tolled on the Turnpike do not have similar signing.

Exit 75 On-Ramp Signing

A diagram of the Exit 75 on-ramp signing is shown in Figure 13, which includes the regulatory, warning, and guide signs. The regulatory and warning signs on the on-ramps are generally appropriate and convey a clear message. Unlike the off-ramp signing, the guide signs for the on-ramps do effectively convey directions to the motorist.



Figure 13 - Exit 75 on-ramps signing

Even though the sign at the beginning of the weave section (see Figure 14) displays a slightly different message than the guide sign at the split for northbound and southbound traffic (see

Figure 15), the message displayed is not confusing, and the placement of the signs is appropriate. During trips to the field, HNTB noted that these guide signs were highly visible and provided timely information. Therefore, upgrades to the guide signs at the weave section shown in Figure 14 and Figure 15 are not necessary, and mounting these signs at an overhead location is not warranted.



Figure 14 - Guide signs at beginning of weave section



Figure 15 - Guide signs at NB/SB traffic split section

Pavement markings

HNTB staff observed the pavement markings to be in a “generally fair” condition. Field observations show that the existing markings are beginning to fade. The Maine Turnpike restripes one to two times a year as part of the highway maintenance program.

During the next scheduled restriping or paving, it is recommended that the word “ONLY” be added to the arrow pavement markings within the two left turning approach lanes from Exit 75 to Route 202/4/100. The placement of the word “ONLY” should meet the guidelines of the MUTCD and the MaineDOT standard details.

Also, a change to the placement of the outside lane line on the off-ramp where the right turn splits off from the left turning traffic could improve the decision/weaving distance for traffic coming off the Turnpike headed for Route 202/4/100. Essentially, the change would involve a narrowing of the neck of the ramps at the triangular island as shown in Figure 16. Currently, northbound off-ramp traffic is not required to weave because they can access both the right turn and left turn onto Route 202/4/100 from the right lane. Southbound off-ramp traffic has to weave to get to the right turn lane onto Route 202/4/100. The weaving movement becomes difficult because of the large amount of pavement available for the right turn. Performing the weaving movement can effectively require two lane changes because of the width of the pavement. Reducing the width of pavement for the right turn would create more definition of lanes and more order.

Such a change would not have an adverse impact on traffic capacity of the intersection as long as it was placed at a point that the left-turning vehicle queues would not block the entrance to the right turn split. This change would be relatively easy to implement, could increase the weaving

and decision distance from 210 feet to 370 feet, and if combined with a corresponding move of the guardrail, would also provide a more visible place to put a new guide sign.



Note: photo taken before the toll booth was removed and a double left turn was implemented for the Exit 75 Ramps approach to Route 202/4/100.

Figure 16 - Proposed Pavement Marking Change

Turnpike Building

Exit 75 had a toll plaza until its removal in 1999. However, when the toll plaza was removed, not only did the extra pavement remain in place, but also a utility building on the northern side of the approach to Route 202/4/100. This building has a less than ideal appearance. Figure 17 shows the exterior of the building as seen by motorists.



Figure 17 – Old toll building at Exit 75

The building's primary purpose at this time is to house the electrical panels/disconnects for the plaza lighting. It is recommended that the building be removed and replaced with a utility cabinet unless the MTA decides to implement full ETC on the northern end. Removal of this building would also reduce maintenance costs.

Turnpike Mainline

The condition of the pavement, pavement markings, lane and shoulder widths, and signing for the northbound and southbound directions of the Maine Turnpike within two miles of Exit 75 are assessed in this section.

Pavement condition

The 2009 MTA Annual Inspection was referenced in order to rate the section of Maine Turnpike mainline two miles before and after the Exit 75. The NB mainline segment of the turnpike received a “generally good condition” rating and the SB mainline received a “good condition” rating. The field visit on October 20, 2009 confirmed this year’s inspection results. Only minor rutting (<1/4”) has occurred in this four mile segment. Transverse and longitudinal cracking were observed throughout this corridor, but not significant enough to warrant any repair/maintenance action. This section of the Maine Turnpike was repaved in 2006. No additional paving is recommended for this section of the Turnpike.



Figure 18 – Mainline of Maine Turnpike looking NB from the Kitty Hawk Ave. overpass

Lane and shoulder widths

MaineDOT’s Highway Design Guide states that for an interstate, travel lane widths should be 12’ and the right and left shoulder widths should be 10’ and 4’ respectively. The mainline travel lanes are 12 feet wide and the shoulders are 8 feet wide on the right and 4 feet on the left.

The shoulder width of the Turnpike mainline in this area met the standards and guidelines of the time when it was built. According to the AASHTO Policy, the fact that design guidelines have changed does not indicate that the Turnpike mainline is unsafe, nor does it mandate the initiation of an improvement project.

Safety on the mainline will be analyzed as part of the Phase II Study. At that time if it is found that there is a significant problem with safety in this area, safety improvements will be recommended.

Signing

A diagram of the Turnpike mainline guide signing is shown in Figure 19. The guide signs on the mainline, including those for Exit 75, effectively convey directions to the motorist. All signs and sign locations were found to be compliant with the MUTCD.

<i>NB SIGNING</i>	<i>LOCATION</i>	<i>SB SIGNING</i>	<i>LOCATION</i>
	~2.3 MILES SOUTH OF INTERCHANGE		
	2 MILES SOUTH OF INTERCHANGE		2 MILES NORTH OF INTERCHANGE
	1 MILE SOUTH OF INTERCHANGE		1 MILE NORTH OF INTERCHANGE
	~0.82 MILES SOUTH OF INTERCHANGE		~0.85 MILES NORTH OF INTERCHANGE
	1/2 MILE SOUTH OF INTERCHANGE		1/2 MILE NORTH OF INTERCHANGE
	~0.16 MILES SOUTH OF INTERCHANGE		~0.31 MILES NORTH OF INTERCHANGE
	AT INTERCHANGE		AT INTERCHANGE

Figure 19 - Exit 75 Mainline Signing

There are several guide or wayfinding signs on the mainline that are not continued at the off-ramps. In other words, signs are placed on the mainline leading motorists to Exit 75 as a means to get to a certain destination. Once the motorist exits at Exit 75 they are left with no further instructions on how to get to the destination that was referenced on the mainline. The MUTCD requires that services that are signed on the freeway be repeated at the intersection of the exit ramp if the services are not visible from the ramp terminus. Table 2 shows those destinations that are signed on the mainline but not on the off-ramps, as well as those destinations that are signed at the off-ramps but not signed on the mainline. As can be seen, there is a disconnection regarding wayfinding signing between the mainline and the Exit 75 off-ramps.

Table 2 - Signed Destinations at and near Exit 75

Destination	Guide signs located on Turnpike Mainline	Guide signs located on Exit 75 off-ramps or at intersection with Route 202/4/100	Should be considered for elimination
Route 202/4/100	Yes	Yes, but needs another route sign assembly	No
Auburn	Yes	Yes, but is not noticed on current signing	No
Nine other nearby towns	No	Yes	Yes, except New Gloucester
Shaker Village	Yes	No	Yes
Lost Valley and Sugarloaf Ski Areas	Yes	No	No
Central Maine Community College	Yes	Possibly, there is a small white on blue plaque that reads CMCC	No
University of Maine at Farmington	Yes	No	No
Hospital	Yes	Yes, but needs to be moved	No
Telephone	Yes	No	No
Trailer Camping	Yes	Yes, but needs to be moved	No
Gas	Yes	No	No
Food	Yes	Yes, but needs to be moved	No
Lodging	Yes	No	No
Park & Ride	No	Yes	No
Transit	No	Yes	Yes
Bradbury Mountain State Park	No	Yes	Yes
Auburn Lewiston Industrial Airpark Hotel Road Area	No	Yes	Yes
Auburn Lewiston Airpark	No	Yes, but needs to be moved	No

Those destinations that are signed at the Exit 75 off-ramps, do not necessarily need to be signed on the mainline. However, all destinations that are signed on the mainline should be signed at the Exit 75 off-ramps. There is a limited amount of space for signs and several destinations competing for space at Exit 75 off-ramps. It is suggested that officials from the City of Auburn, MaineDOT, MTA, and ATRC review this list and determine which destinations need guide signs and which could be eliminated.

Pavement markings

HNTB staff observed the pavement markings for both NB and SB lanes to be in a “generally good condition”. The Maine Turnpike restripes one to two times a year as part of the highway maintenance program. No improvements are recommended.

Route 202/4/100

The condition of the pavement, pavement markings, lane and shoulder widths, and signing for Routes 202/4/100 within ½ mile of Exit 75 are assessed in this section.

Pavement

HNTB staff observed the pavement on the section of Route 202/4/100 in the study area. Using the same rating methods as the MTA’s annual inspection, this section of Route 202/4/100 pavement was categorized as being in “fair condition”. There is consistent cracking, (longitudinal, transverse and map cracking) throughout the roadway corridor. The roadway is divided with a median that is either grassed or paved. The paved median has cracking with vegetation. See Figures 20 through 22 for images of the typical pavement condition within this corridor.



Figure 20 - Kitty Hawk Ave. intersection looking north toward Turnpike intersection



**Figure 21 – Turnpike intersection looking south toward Kitty Hawk Ave. intersection
(Note entrance to Irving gas station on right)**



Figure 22 – Danville Corner Road/Beech Hill Road intersection looking south toward Turnpike

Pavement at the intersection with the Exit 75 ramps was observed by HNTB staff to be in “marginal condition”. Rutting and shoving were observed and there is significant pavement

degradation in the median between the NB and SB Route 202/4/100 traffic. The double crown for both directions of Route 202/4/100 causes turning heavy vehicles to bounce even at moderate speeds (see Figure 23). Another issue at the intersection is the northbound left turn lane from Route 202/4/100 onto the Turnpike (see Figure 24). There is noticeable pavement shoving, rutting and cracking throughout this lane making the turning movement slow and difficult which is due in part to the “bouncing” vehicles as well as the constant stopping, queuing, and starting movements typically experienced at intersections.



Figure 23 - Exit 75 Intersection Left turn onto Route 202/4/100. (Note: Dip below truck bed)



Figure 24 – Looking south toward the intersection with Kitty Hawk Ave.

Improvements recommended for Route 202/4/100 are a pavement overlay and re-striping from the Maine Turnpike Overpass to Kittyhawk Ave. MaineDOT should consider extending the limits of an overlay through the entire section of focused study area on Route 202/4/100.

Lane and shoulder widths

Route 202/4/100 is classified as a Major Arterial and is part of the National Highway System (NHS) for the section of roadway in the vicinity of the Exit 75 interchange. This section of roadway is a multilane divided highway. Table 3 documents the lane and shoulder widths (design standard vs. actual) for Route 202/4/100. The roadway was found to have appropriate travel lane and shoulder widths.

Table 3 - Route 202/4/100 Travel Lane and Shoulder Widths

Travel Lane and Shoulder Widths		
	Standard*	Actual**
Travel Lane	12'	12'
Auxiliary Lane	12' (11' min.)	11'
Right Shoulder (not curbed)	10'	10' – 12'
Left Shoulder (curbed)	4' (1' min.)	4'
Left Shoulder (not curbed)	4'	8'

* Design standard from MaineDOT’s “Highway Design Guide”

** Measurements taken from aerial photographs

Signing

A diagram of the Route 202/4/100 guide signing is shown in Figure 25. The guide signs and trailblazers on Route 202/4/100 for traffic heading southbound are compliant with the MUTCD. The southbound signing gives appropriate signing at appropriate locations to guide motorists to the Turnpike on ramps. The signing for northbound traffic, however, is not in compliance with the guidelines of the MUTCD. The MUTCD strongly recommends that an advance entrance direction sign (see Figure 26 for an example of this sign that is placed in the southbound direction) be placed on multi-lane conventional roads approaching an interchange. An advance entrance direction sign will better guide northbound traffic to the Turnpike.

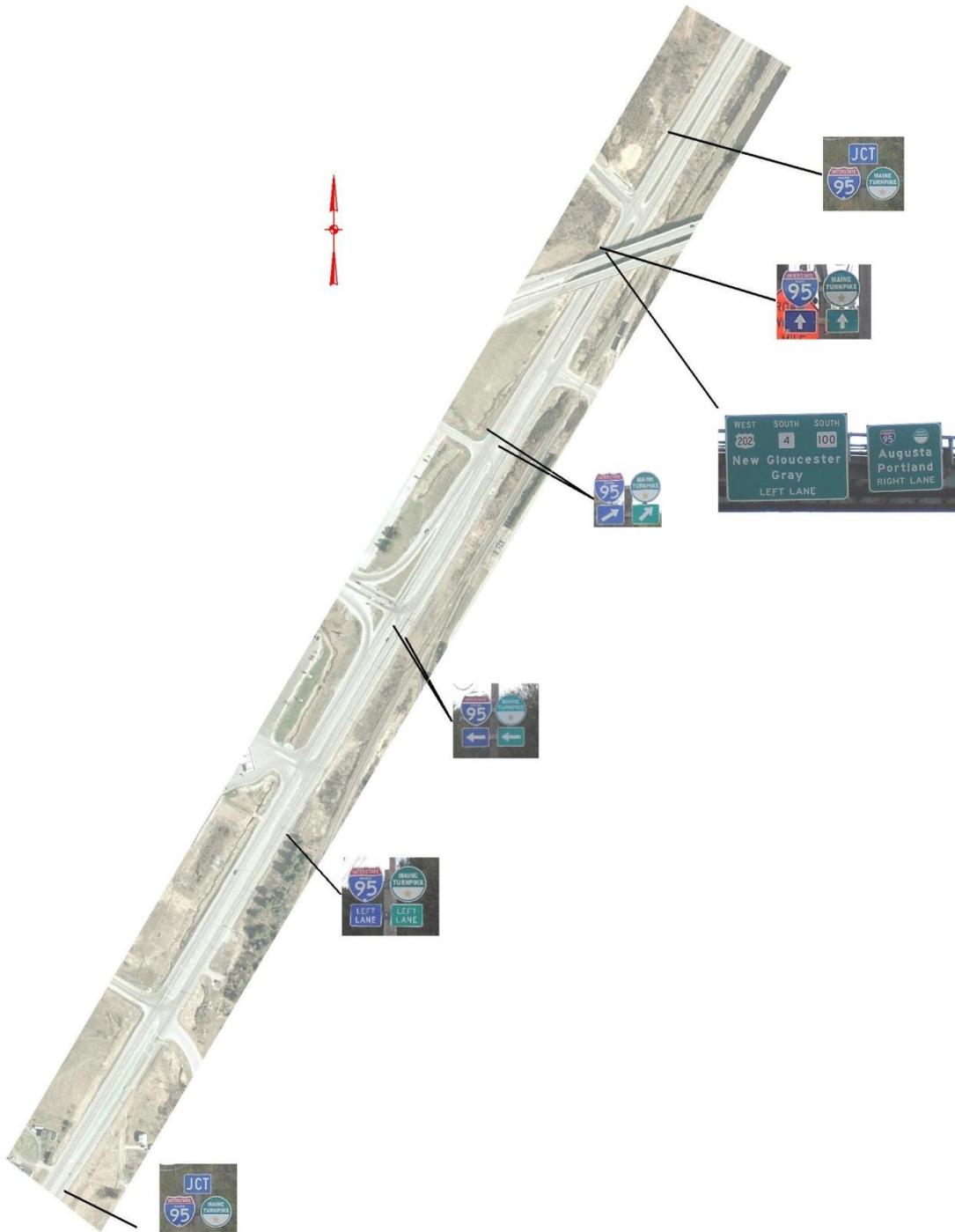


Figure 25 - Route 202/4/100 Signing



Figure 26 - Route 202/4/100 SB - Advance Entrance Direction Sign

Pavement markings

The pavement markings on Route 202/4/100 were observed by HNTB staff to be in a “generally fair” condition. The pavement marking were noted as faded or beginning to fade.

During the next scheduled restriping it is recommended that the arrow pavement markings within the approach lanes on Route 202/4/100 be completed using the current MUTCD guidelines and MaineDOT standard details. Changes should include the addition of left turning and through arrows as well as ‘ONLY’ markings for the left turn lane.

Recommendations

Based on the condition assessment and condition comparison described above, HNTB recommends the implementation of the following action items in the near future to ensure the safety and efficient mobility of the traveling public:

Exit 75 Ramps

- Pavement rehabilitation of all ramps is needed. Partial depth pavement re-construction may be required from the merge area of the off-ramps to the Route 202/4/100 intersection, including both slip lanes, to improve pavement condition and extend life beyond that of an overlay.
- A new MUTCD compliant destination guide sign and route sign assembly should be added to the off-ramps.
- Reduce the width of pavement for the right turn lane by moving guardrail and restriping. This will also provide a more visible place to put the new guide sign.
- The local attraction signs currently mounted across Route 202/4/100 should be moved to the traffic island.
- Make room for the local attraction signs by removing the large green/white directional sign. The eight panel sign is not compliant with the MUTCD, is not in an ideal location, and is easily overlooked.
- The current Park & Ride sign and airport sign should be replaced with standard signing.
- Rumble strips were not detected at the off-ramp during a field visit. It is therefore recommended that the warning signs for rumble strips be removed.
- Remove the 'NO TOLL AHEAD' sign, it is no longer necessary.
- Additional signing changes should be made after a decision has been made regarding the appropriate number of destinations and attractions to be signed at the interchange.
- During the next scheduled restriping or paving, it is recommended that the word "ONLY" be added to the arrow pavement markings within the two left turning approach lanes from Exit 75 to Route 202/4/100.
- Consider removing the utility building and replace with a utility cabinet or similar structure.

Turnpike Mainline

- No immediate action necessary within two miles of the interchange relative to pavement, pavement marking, and lane and shoulder width conditions.
- It is suggested that officials from the City of Auburn, ATRC, MaineDOT and MTA review the list of signs on page 13 and consider if any should be eliminated.

Route 202/4/100

- Pavement overlay and re-striping along Route 202/4/100 from the Maine Turnpike Overpass to Kittyhawk Ave. MaineDOT should consider extending the limits of an overlay through the entire section of focused study area on Route 202/4/100.
- An advance entrance direction sign would be beneficial for the northbound traffic. This sign would be similar to the sign for the Route202/4/100 southbound lanes
- During the next scheduled restriping, it is suggested that arrow pavement markings be placed within the approach lanes. Left turning and through arrows as well as ‘ONLY’ markings for the left turn lane would add clarity to the approaches to the intersection.